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Unravelling the Puzzle of Undergraduate Student Dropout

*An Umbrella Review Synthesising Systematic Reviews
on Explanatory Variables*

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Preface

Undergraduate student dropout in higher education is a dynamically complex event that prevents individuals, their families, and society from enjoying the benefits of education. This phenomenon has intensified its impact, considering the recent rapid digital and technological transformations of higher education and the diversification of the ways in which students learn.

This book synthesises the findings on the variables that explain undergraduate student dropout across the three main study modalities: face-to-face, virtual, and hybrid. An umbrella review was employed as the main research methodology, assembling a sample of 24 systematic reviews and synthesising the variables within the individual, socioeconomic, institutional, and academic determinants. The evidence gathered here shows how the field has evolved from a mental model of disjoint determinants towards one of intersections and nuances between them, and towards a representation of dropout as an algebraic combination of explanatory variables.

The book is intended for researchers, decision-makers, and practitioners in higher education who design retention policies, early-warning systems, and modality-aware support strategies in Higher Education Institutions, as well as for graduate students seeking a panoramic and critically appraised view of the evidence on student dropout.

*The authors
Bogotá, D.C., 2026*

CHAPTER 1

Introduction

Dropout in higher education has become one of the main problems of educational systems worldwide [1–5] due to the extent of this phenomenon in limiting the consolidation of the social and individual benefits brought by higher education among the population [6,7]. Thus, in the case of the social benefits limited by dropout, these include the reduction of economic inequality [7,8], improvement in the population's quality of life [9], stimulation of economic development [8,10], and the creation of a more informed and participatory society [8]. Dropout in higher education also hinders the formation of a highly skilled and committed workforce [11–13], affecting a country's global competitiveness. Regarding individual benefits, dropout negatively impacts individual development [14], limiting opportunities for personal growth, access to well-paid jobs, and the achievement of professional goals [8,12], as well as representing an immediate loss of economic investment and time dedication from access to education to withdrawal. Dropout can lead to decreased self-esteem and confidence in students [12,14], which can have long-term detrimental effects on their psychological and emotional well-being [15].

On the other hand, it is important to recognise that dropout in higher education has consequences for the actors in the educational system, among whom the student and their family, Higher Education Institutions (HEIs), and the State stand out [16]. For students and their families, dropping out can mean a significant loss of the time and money invested in higher education. Students and their families often face financial hardships to pay for tuition, books, and other education-related expenses [17,18]; hence, dropout represents a sunk cost for this first actor in the

educational system [19]. For HEIs, dropout can result in the loss of income, especially for private institutions, as tuition payments cease, which can lead to a financial crisis affecting the proper development of their substantive functions (teaching, research, and social projection). Likewise, a high dropout rate can damage the reputation of HEIs, affecting their ability to attract future students [20–22].

Regarding the consequences for the State, when students decide to drop out of higher education, there is a detriment to the financial resources that the State invests in educational subsidies and other programs aimed at supporting the academic training of the population [1]. These resources come from taxes paid by citizens and represent a significant investment in the educational and economic development of the country [1,18].

In this framework of the limitations of the benefits of higher education, as well as some of the consequences that dropout has for the actors of the educational system, the interest of the academic community, HEIs, and States in understanding the underlying causes of this phenomenon is recognised. Understanding these causes is fundamental for formulating effective strategies to prevent and mitigate dropout in higher education. That said, the academic community has tried to synthesise the evidence around the explanatory variables of dropout in higher education by developing scoping and systematised reviews (e.g., [23–25]). These reviews have been characterised by being delimited to specific contexts, whether by geographical area, educational level, or modality, among others.

Examples of efforts to synthesise the available evidence on this educational phenomenon are the reviews by Guzmán et al. [16], who consolidated the evidence around dropout in rural higher education; the one by Arias et al. [26], who documented the causes of dropout studied in Colombia; or the one by Orellana et al. [27], who identified the main variables that influence dropout in virtual education. In this sense, the specific contexts of the reviews conducted have made a valuable contribution to the understanding of dropout in higher education. However, despite

these isolated and contextual efforts, there is an imperative need for an umbrella review that addresses the problem of dropout in higher education globally and holistically, especially in undergraduate training programs. Thus, the question addressed by this umbrella review was:

What variables explain student dropout at the undergraduate training level from the study modality (face-to-face, virtual, and hybrid)?

Accordingly, this book synthesises the findings on the variables that explain student dropout at the undergraduate training level from the study modality (face-to-face, virtual, and hybrid). The methodology selected to achieve this objective was the umbrella review, which Grant and Booth [28] defined as a review compiling evidence from multiple reviews into one accessible and usable document; that is, an umbrella review is a systematic review of systematic reviews that synthesises evidence broadly [29].

The answer to the research question and the fulfilment of the corresponding objective based on the umbrella review contribute to the understanding of the underlying causes of student dropout at the undergraduate training level, which, in turn, allows the development of effective strategies to prevent and mitigate this phenomenon by HEIs and States. By specifically addressing the question of this umbrella review, a wide range of explanatory variables influencing students' decision to abandon their studies is considered, enriching the existing and partialised knowledge foundation of previous literature reviews. Furthermore, this umbrella review allows a panoramic view of the explanatory variables of student dropout, enabling their prevention and mitigation. Finally, for the academic community, the findings synthesised here on the explanatory variables studied by each modality will serve as a starting point for the development of future research.

This book is structured into six chapters. The first corresponds to this introduction; the second addresses the conceptualisation of dropout and

the determinants into which the explanatory variables of dropout in higher education are traditionally grouped; the third describes the methodology used for the development of the umbrella review; the fourth presents the results, starting with the study selection flow, the bibliometric characteristics, and the consolidation of the information on explanatory variables by determinant; the fifth develops the discussion of the results; and, finally, the sixth presents the conclusions of the review, including its limitations, practical implications, and future research opportunities.

CHAPTER 2

Dropout in Higher Education and Its Determinants

The definitions of student dropout are varied, reflecting the influence of the various academic, political, and social actors who have examined this educational phenomenon (e.g., [30–32]). These definitions are grouped into two main approaches. The first is operational and is used to quantify the number of students who drop out and to analyse some characteristics of these dropouts. An example of this approach is the definition used by the Colombian State, according to which a student is considered a dropout if they do not enrol in two consecutive academic periods and do not appear as graduated or excluded for disciplinary reasons [26,33].

The second approach focuses on understanding the causes and variables that explain why students end their academic training prematurely. An example of this perspective is provided by the ALFA GUÍA project [34], which defines dropout as a complex, multidimensional, and systemic event, which can be understood as cause or effect, failure or reorientation of a formative process, choice or forced response, or as an indicator of the quality of the educational system.

It is relevant to underline that no universally accepted definition of dropout exists, since this phenomenon can vary depending on the specific contexts and educational systems. Definitions can diverge in the criteria used to determine dropout, the statistical and mathematical models employed for its diagnosis and monitoring, the stages of the educational process considered, and the variables considered relevant to understanding and addressing the phenomenon [6]. For the purposes of this review,

and in order to answer the research question, the academic approach is adopted, specifically the definition given by the ALFA GUÍA project [34].

The explanatory variables most frequently analysed for this complex event are grouped into four determinants: individual, academic, institutional, and socioeconomic [26,30,31,35], as summarised in Figure 1. The individual determinant brings together the student's characteristics and personal environment, which directly influence the decision to abandon their training process. The socioeconomic determinant groups the variables related to the economic and social context to which the student and their family belong. The academic determinant refers to student performance, the achievement of learning outcomes, the development of competencies, and other factors that influence the learning process; this determinant considers both aspects related to the undergraduate training level and those of previous educational levels. Finally, the institutional determinant includes those variables that affect the student's training process and depend on HEIs.

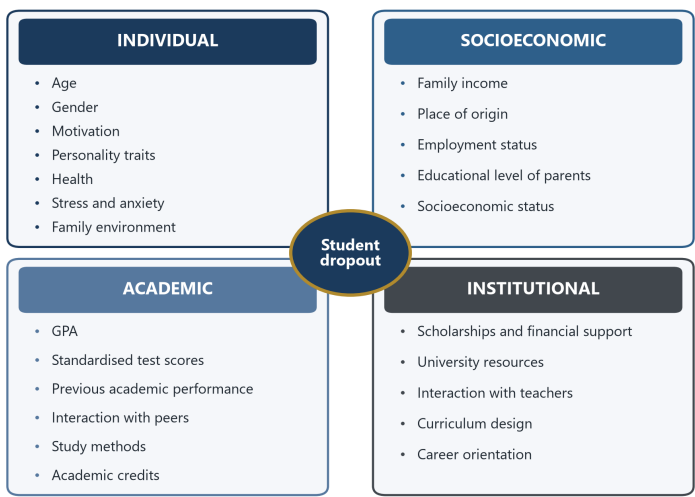


Figure 1. Examples of explanatory variables of dropout grouped by determinant.

Methodology

The umbrella review was used as the main methodology to synthesise the findings on the variables that explain student dropout at the undergraduate training level from the study modality (face-to-face, virtual, and hybrid). Although there is no established methodological path for umbrella reviews in the social sciences, there is a wealth of implementation experience in the medical and health sciences [29]. Therefore, this methodological path was adjusted in order to implement this umbrella review. That said, the following phases were carried out: review design and protocol registration; eligibility and exclusion criteria; information sources; search strategy; study selection and data extraction processes; comprehensive critical evaluation of the reviews; and methods for synthesising the information.

3.1 Design of the Review and Registration of the Protocol

Based on the parameters of the International Platform of Registered Systematic Review and Meta-analysis Protocols (Inplasy) [36], the protocol INPLASY202380066 was structured and registered, whose DOI is 10.37766/inplasy2023.8.0066, and in which the general lines of this umbrella review were established.

3.2 Eligibility and Exclusion Criteria

For the selection of studies in this umbrella review, specific eligibility and exclusion criteria were established. Regarding the eligibility criteria, only reviews that conformed to the methodology of systematised re-

views were included, characterised by following a structured and transparent protocol in the selection and analysis of the literature. In addition, studies had to focus specifically on dropout within undergraduate programs in HEIs, covering research from which information on the variables explaining dropout could be extracted.

Regarding the exclusion criteria, reviews that did not align with the methodology of systematised reviews, such as narrative, mapping, or scoping reviews, were discarded. Likewise, studies that dealt with dropout at educational levels or modalities different from undergraduate higher education were excluded. Research on dropout in continuing education, postgraduate programs, and courses offered in non-conventional modalities, such as Massive Open Online Courses (MOOCs), was excluded to ensure a specific and coherent focus in the analysis of dropout in undergraduate higher education. Systematic reviews not written in English or Spanish were also excluded, to ensure a clear and precise understanding of the studies in the most accessible and relevant languages for the researchers.

3.3 Information Sources

For this umbrella review, three interdisciplinary and two disciplinary databases were selected as information sources due to their broad coverage and relevance in educational and academic research. The interdisciplinary databases include SCOPUS, Web of Science (WoS), and ProQuest, chosen for their extensive academic publications covering various disciplines and allowing an exhaustive analysis of the literature on the explanatory variables of dropout at the undergraduate level. These databases are recognised for their methodological rigour and quality in the selection of publications, offering a wide spectrum of relevant and updated studies.

Regarding the disciplinary databases, ERIC and JSTOR were chosen; specialised in education and the social sciences, they are leading sources

in the educational literature, providing specific and detailed access to systematic reviews related to dropout in higher education.

3.4 Search Strategy

Based on the protocol, the theoretical search equation was structured using truncated characters and Boolean operators, and it was validated and certified by librarians from the Jorge Tadeo Lozano University of Bogotá.

```
("higher education" OR university OR college OR "tertiary education"
OR Bachelor OR degree OR undergraduate NOT (postgraduate OR "master
programs" OR "doctoral programs" OR PhD)) AND ("drop out" OR
"dropping out" OR desertion OR attrition OR withdrawal) AND
(student$) AND ("Systematic review")
```

It should be noted that the theoretical equation was adapted to the search engine of each database, given that not all of them operate in a standard way. With this consideration, the search was conducted between August 21 and 25, 2023. Table 1 presents the adaptation of this equation to each of the databases.

Table 1. Search equation for each database.

Database	Equation
SCOPUS	(dropout OR "drop out" OR drop-out OR "dropping out" OR desertion OR attrition OR withdrawal) AND (("higher education" OR university\$ OR college\$ OR "tertiary education" OR bachelor\$ OR degree\$ OR undergraduate\$) AND NOT (postgraduate\$ OR master\$ OR "master programs" OR "doctoral programs" OR "PhD")) AND (student\$) AND ("Systematic review")
JSTOR	Equation adapted from the theoretical search.
ERIC	Equation adapted from the theoretical search.
ProQuest	Equation adapted from the theoretical search.
WoS	ALL=((dropout OR "drop out" OR drop-out OR "dropping out" OR desertion OR attrition OR withdrawal) AND (("higher education" OR university\$ OR college\$ OR "tertiary education" OR bachelor\$ OR degree\$ OR undergraduate\$) AND NOT (postgraduate\$ OR master\$ OR "master programs" OR "doctoral programs" OR "PhD")) AND (student\$) AND ("Systematic review"))

3.5 Study Selection Process and Information Extraction

The documents located with the search formed a database called B_1 , which hosted the fields of title, abstract, and keywords for each result. B_1 was subjected to a first filter in which the researchers rated each record using two eligibility criteria: whether the document was a systematic review, and whether the object of the study revolved around the variables explaining student dropout at the undergraduate level. For this phase, the researchers were divided into two groups (GPCC-OLLG and AGR-SPBM), which independently assessed the inclusion and exclusion of all the documents. In the case of documents where there was a discrepancy between both groups, a fifth researcher (LGT) acted as a tie-breaker. The assessment was recorded in a spreadsheet that detected similarities and differences in the rating. Simultaneously, the assessment of the B_1 database was recorded in the PRISMA flow diagram [37,38].

From the positively rated documents, the B_2 database was configured, in which each text was read in full. This database recorded the following: title, authors, place, citation count, year of publication, main conclusions, study design, limitations, source of funding, study objectives, and variables explaining dropout, among others. The coding followed the same procedure developed for B_1 regarding the division of the researchers into groups of two and a tie-breaker, in order to categorise the information and thus answer the research question.

3.6 Comprehensive Critical Evaluation of the Reviews

To evaluate the comprehensiveness of the reviews and the possible impacts on the information extraction, the AMSTAR 2 protocol [38,39] was used, as it is an essential tool in evaluating the quality and methodological rigour of systematic reviews, especially in studies that involve evidence synthesis. The AMSTAR 2, with its 16 items, facilitates a comprehensive evaluation covering aspects such as the justification of the research question, the suitability of the study search method, the explanation of the study selection, the critical assessment of the quality of the in-

cluded studies, and the adequacy of the data synthesis methods. In this stage, the strengths, limitations, and possible biases of the systematic reviews were identified. Table 2 presents the items of the AMSTAR 2 protocol.

Table 2. *Description of the items of the AMSTAR 2 protocol.*

N°	Item
1	Did the research questions and inclusion criteria for the review include the components of PICO?
2	Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?
3	Did the review authors explain their selection of the study designs for inclusion in the review?
4	Did the review authors use a comprehensive literature search strategy?
5	Did the review authors perform study selection in duplicate?
6	Did the review authors perform data extraction in duplicate?
7	Did the review authors provide a list of excluded studies and justify the exclusions?
8	Did the review authors describe the included studies in adequate detail?
9	Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?
10	Did the review authors report on the sources of funding for the studies included in the review?
11	If meta-analysis was performed, did the review authors use appropriate methods for statistical combination of results?
12	If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?
13	Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?
14	Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?
15	If they performed quantitative synthesis, did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?
16	Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?

Source: Own elaboration based on [38,39].

Two groups of researchers operationalised the AMSTAR 2 protocol (GPCC-OLLG and AGR-SPBM), again counting on a tie-breaker (LGT). The evaluation of each of the 16 items for each systematised review was recorded in a spreadsheet that allowed similarities and differences in the rating to be detected, in which case they were resolved. This record also enabled the categorisation of the confidence levels in the quality of the systematic reviews. Table 3 presents the description of the categories and confidence levels developed by the researchers.

Table 3. Categories for the confidence level of systematic reviews.

Category	Fundamental characteristic	Non-fundamental characteristic
Critically low	More than two of the items 2, 4, 7, 9, 11, 13 and 15 have a response No or Partially Yes	More than two of the items 1, 3, 5, 6, 8, 10, 12, 14 and 16 have a response No or Partially Yes
Critically low	More than two of the items 2, 4, 7, 9, 11, 13 and 15 have a response No or Partially Yes	One of the items 1, 3, 5, 6, 8, 10, 12, 14 and 16 has a response No or Partially Yes
Low	Two of the items 2, 4, 7, 9, 11, 13 and 15 have a response No or Partially Yes	More than two of the items 1, 3, 5, 6, 8, 10, 12, 14 and 16 have a response No or Partially Yes
Low	One of the items 2, 4, 7, 9, 11, 13 and 15 has a response No or Partially Yes	One of the items 1, 3, 5, 6, 8, 10, 12, 14 and 16 has a response No or Partially Yes
Moderate	The items 2, 4, 7, 9, 11, 13 and 15 have a response Yes	More than two of the items 1, 3, 5, 6, 8, 10, 12, 14 and 16 have a response No or Partially Yes
High	The items 2, 4, 7, 9, 11, 13 and 15 have a response Yes	One of the items 1, 3, 5, 6, 8, 10, 12, 14 and 16 has a response No or Partially Yes

Source: Own elaboration based on [38,39].

3.7 Methods of Synthesising Information

The analysis of the results was developed in three parts. The first corresponds to the quantification of the search and study selection process through the PRISMA flow diagram, as well as the results of the compre-

hensive critical evaluation of the reviews. The second shows the bibliometric analysis of the documents selected for analysis. The third synthesises the findings on the variables that explain dropout within the individual, socioeconomic, academic, and institutional determinants.

The use of descriptive analysis and of inferences based on the inductive method in all parts of the analysis provided a solid basis for interpreting the data. This methodological approach allowed not only the description of the patterns observed in the data but also the inference of relationships and possible underlying causes, which was crucial for developing a deep understanding of the variables that explain dropout.

Results

4.1 Search, Study Selection and Critical Evaluation

With the implementation of the search equation in the databases, 61 documents were found in SCOPUS, 34 in WoS, 11 in ERIC, and 39 in ProQuest, for a total of 145; JSTOR did not produce any results. According to the PRISMA statement (Figure 2), a total of 30 documents were eliminated, as they were detected as duplicates in one or more of the consulted databases. The resulting database, B_1 , underwent the screening process for titles, abstracts, and keywords. Of the 115 screened documents, 24 received positive ratings from the reviewers for inclusion in the second filter, 84 received negative ratings, and seven received ratings that were discrepant between the two groups of researchers. These seven documents entered a new review to resolve the discrepancy, conducted by a fifth evaluator under the initial eligibility and exclusion criteria. Thus, finally, 91 documents were excluded, the causes being that the study population or problem did not correspond to dropout, its explanatory variables, or higher education at the undergraduate level (58); that the document was not a systematised review (15); both of these reasons simultaneously (8); conclusions of low quality (3); and exclusion by the researchers after the resolution of discrepancies (7). With the 24 remaining systematic reviews, the full-text reading and the comprehensive evaluation of the reviews proceeded.

The PRISMA flow diagram (Figure 2) provides a transparent visualisation of the entire screening and selection process, from the initial database search through duplicate removal, title and abstract screening, and

full-text assessment, to final inclusion. Each stage reports the number of records identified, screened, excluded with reasons, and ultimately retained for the umbrella review. This standardised reporting format enables reproducibility and supports the critical appraisal of the methodological rigour applied in this synthesis.

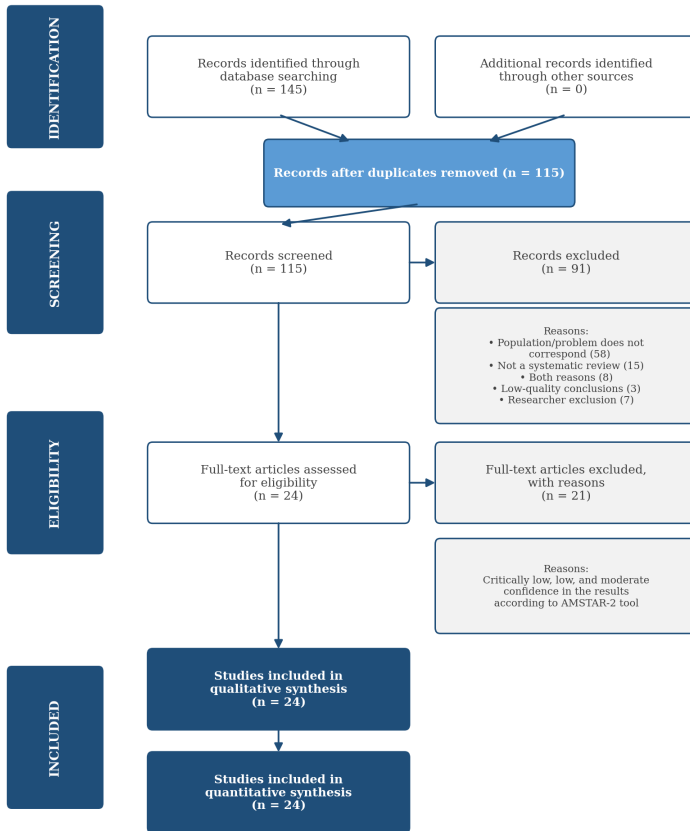


Figure 2. PRISMA flow diagram used for the search for systematic reviews.

The 24 systematic reviews, evaluated according to the AMSTAR 2 protocol whose items were described in Table 2, were classified into com-

pliance-level categories based on the criteria established in Table 3. The results showed that only three of the reviews developed a comprehensive process to ensure their replicability. Of the remaining reviews, 11 were classified as low compliance and ten as critically low compliance, as shown in Table 4. It is important to note that the score obtained does not necessarily correlate with the category classification, given that a document may have deficiencies in the fundamental domain items of AMSTAR 2.

Table 4. *AMSTAR 2 results and comprehensive critical evaluation.*

Document	Category	Score
Admission Criteria for Undergraduate Nursing Programs: A Systematic Review [39]	Low	34
Exploring support strategies for improving nursing student retention [40]	Critically low	35
A Systematic Review and Meta-analysis of Online Mindfulness-Based Interventions for University Students [41]	Low	46
A review on the prediction of students' academic performance using ensemble methods [42]	High	47
The WHO Health Promoting School framework [43]	High	46
Academic stress, desertion, and retention strategies for students in higher education [44]	Low	44
A Systematic Literature Review on Teaching and Learning Introductory Programming in Higher Education [45]	Critically low	41
Academic Analytics and Data Mining in Higher Education [46]	Critically low	37
Stress and Coping Strategies among Arab Medical Students [47]	Critically low	22
The effectiveness of peer mentoring in promoting a positive transition to higher education [48]	Critically low	17
A Systematic Literature Review of Student' Performance Prediction Using Machine Learning Techniques [49]	Low	42
Application of machine learning in higher education to assess student academic performance, at-risk, and attrition [50]	Critically low	27
Discrimination, bullying or harassment in undergraduate education [51]	Critically low	42
A systematic review on the deployment and effectiveness of data analytics in higher education [52]	Critically low	36

Table 4. *AMSTAR 2 results and comprehensive critical evaluation.*

Document	Category	Score
Artificial intelligence applications in Latin American higher education [25]	Low	32
Alcohol abuse prevention programs in college students [53]	Low	36
Effective interventions for preventing work related physical health complaints in nursing students [54]	Low	44
Active learning in the context of the teaching/learning of computer programming [55]	Low	42
Current stance on predictive analytics in higher education [56]	Low	45
Attrition and success rates of accelerated students in nursing courses [57]	Low	45
A systematic review of peer-assisted learning in fully online higher education [58]	Critically low	35
An integrative review of nursing students' clinical placement experiences [59]	Critically low	31
A Systematic Review Regarding the Prediction of Academic Performance [60]	Low	42
A comprehensive review of compassion fatigue in pre-licensure health students [61]	High	48

In order to provide a general overview of the existing literature before analysing in detail the determinants and variables that influence student dropout by study modality, Table 5 presents a synthesis of the main findings of each of the selected systematic reviews. This preliminary synthesis serves as a foundation for identifying common patterns and informing a deeper exploration of how these variables differ across the face-to-face, virtual, and hybrid modalities.

Table 5. *Summary of systematic reviews and main findings related to student dropout.*

Document	Summary	Main findings	Ref.
Application of machine learning to assess student academic performance, at-risk, and attrition	Systematic review and meta-analysis of ML applications in HE for student performance, at-risk, and attrition.	88% used supervised learning. Random Forest, Naïve Bayes, SVM and Decision Tree were dominant. Accuracy was the most used metric.	[50]
Current stance on predictive analytics in higher education	Systematic review of predictive analytics in HE (2008–2018) covering ML techniques, challenges and future directions.	Synthesises methods used to predict performance via EDM/ML. Identifies challenges in data quality and model portability.	[56]
Alcohol abuse prevention programs in college students	Evaluates the efficacy of alcohol-abuse prevention programs in college populations.	Interventions reduced consumption (34 studies) and related problems (8 studies). ~70% reported success. Gender-specific, tailored programs were most effective.	[53]
Online Mindfulness-Based Interventions for University Students	Reviews and meta-analyses of online MBIs, attrition rates, and mental-health outcomes.	Online MBIs improve mental health vs. non-active controls (small-medium effect). Higher attrition than non-active and active controls.	[41]
Deployment and effectiveness of data analytics in HE	Systematic review of the impact of data analytics on student outcomes.	Three-quarters of the studies report positive impact. Methodological inconsistency limits comparability and causal explanation.	[52]
Nursing students' clinical placement experiences	Integrative review of longitudinal clinical placement experiences in nursing.	Timely, inclusive support reduces attrition. A Collaborative Clinical Placement Program model improves belonging and learning.	[59]
Teaching and Learning Introductory Programming in HE	Updates the literature on contemporary introductory programming challenges in HE.	Key skills: problem-solving and mathematical ability. Main barriers: methods, tools and personalisation.	[45]
Peer-assisted learning in fully online HE	Reviews OPAL (Online Peer-Assisted Learning) in fully online distance programs.	Inconclusive due to small N and methodological heterogeneity. Suggests OPAL reduces isolation and supports learning.	[58]

Table 5. *Summary of systematic reviews and main findings related to student dropout.*

Document	Summary	Main findings	Ref.
Admission Criteria for Undergraduate Nursing Programs	Reviews admission criteria for undergraduate nursing programs.	GPA is the most used but inconsistent predictor of NCLEX. A combination of academic and non-academic criteria is more effective.	[39]
Interventions for preventing physical health complaints in nursing students	Reviews the effectiveness of interventions to prevent physical health complaints and dropout.	Evidence is scarce and conflicting. Effects are small with high risk of bias and clinical heterogeneity.	[54]
Academic Analytics and Data Mining in HE	Discusses academic analytics and educational data mining for instructional decisions.	The University System of Georgia algorithm predicts completion/withdrawal with up to 74% accuracy. CMS audits aligned beliefs with interactive teaching.	[46]
Discrimination, bullying or harassment in undergraduate manual therapy	Critical interpretive synthesis on discrimination and bullying in osteopathy, chiropractic and physiotherapy education.	Bullying is prevalent. Attainment gaps and attrition for ethnic minorities and students with disabilities.	[51]
Student Performance Prediction Using Machine Learning Techniques	Reviews ML techniques (2009–2021) for student performance prediction.	Decision Tree, Naïve Bayes and SVM are dominant. Gaps in class balancing, temporal features and feature engineering.	[49]
Support strategies for improving nursing student retention	Explores support strategies to reduce attrition in nursing programs.	Sense of belonging, self-efficacy and motivation drive retention. Automated text messaging, APPL support and pastoral care help retention.	[40]
Compassion fatigue in pre-licensure health students	Concept analysis of compassion fatigue in undergraduate health students.	Antecedents: coping ability, self-efficacy, clinical/occupational hazards. Consequences: decreased well-being and program withdrawal.	[61]
Peer mentoring in the transition to HE — Protocol	Mixed-methods systematic review protocol on peer mentoring for first-year students.	First-year students face isolation, financial hardship and academic stress. Peer mentoring boosts belonging, engagement and retention.	[48]

Table 5. *Summary of systematic reviews and main findings related to student dropout.*

Document	Summary	Main findings	Ref.
AI applications in Latin American higher education	Reviews AI applications in HE in Latin America.	Predictive modelling, intelligent analytics, assistive tech and content/image analytics. AI helps detect dropout risk.	[25]
Attrition and success rates of accelerated nursing students	Compares accelerated vs. traditional nursing-program outcomes.	Graduate accelerated students fare well. Limited and inconclusive data on international students; non-graduate accelerated students struggle.	[57]
Prediction of academic performance using ensemble methods	Reviews ensemble-method research for predicting academic performance.	Random Forest is dominant. Academic, sociodemographic and psychosocial factors are the most influential.	[42]
WHO Health Promoting School framework	Reviews the HPS framework's effect on student health, well-being and achievement.	Some interventions improve health outcomes (e.g., physical activity reducing BMI). Effects on academic achievement need more evidence.	[43]
Academic stress, desertion, and retention strategies	Examines academic stress and retention strategies in HE.	Stress causes physical and mental impacts. Dropout is linked to socioeconomic, individual, institutional and academic factors.	[44]
Active learning in computer programming	Characterises active learning in computer-programming education.	Active learning improves satisfaction, motivation and performance. Main difficulty: increased teacher effort.	[55]
Stress and Coping among Arab Medical Students	Reviews stress, anxiety and coping in Arab medical students.	High perceived stress, depression and anxiety. Limited data on coping strategies and their effects on attrition.	[47]
Prediction of Academic Performance — Systematic Review	Analyses recent research on academic-performance prediction.	The academic factor is the primary predictor. Supervised ML (SVM, RF, NN) is dominant. Objectives: performance (53%), risk (14%), knowledge (12%).	[60]

4.2 Bibliometric Analysis

The 24 analysed systematic reviews were published between 2010 and 2022, and 62.5% of them were published from 2020 onwards, as summarised in Figure 3. Regarding authorship, a total of 127 authors were involved in these reviews, and it is observed that 50% of the reviews have three or fewer authors. As of January 2024, these reviews had accumulated a total of 694 citations, which represents an approximate average of 29 citations per review. The distribution of the number of citations according to the year of publication is shown in Figure 4, highlighting that the reviews published in 2010 and 2019 are the most cited.

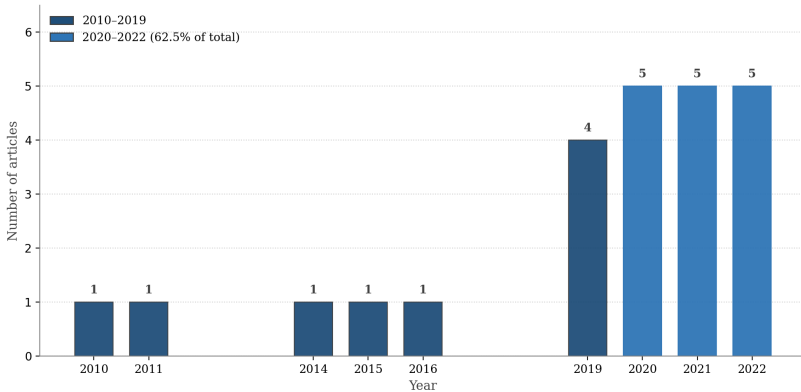


Figure 3. Number of included systematic reviews by year.

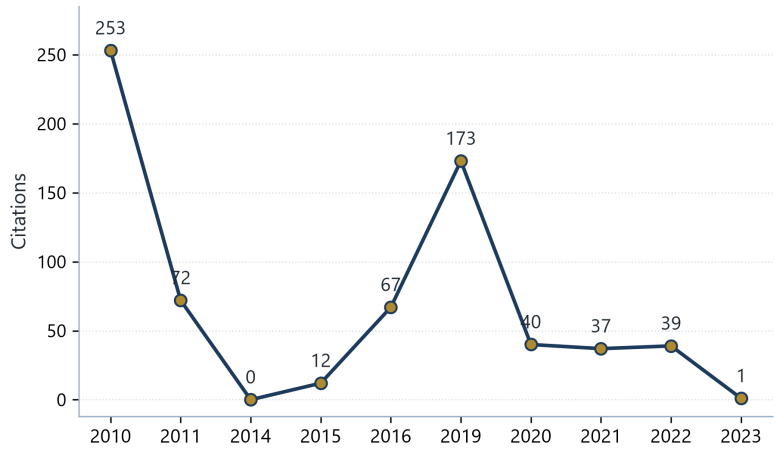


Figure 4. Citations by year.

4.3 Context of the Studies

The frequency of countries identified in the studies reveals a marked geographical concentration in the academic production on student dropout in higher education (see Figure 5). Among the 24 systematic reviews included in this review, the United Kingdom, the United States, and Australia emerged as the countries most frequently mentioned in the findings, accounting for 56% of the total contributions. This overrepresentation of English-speaking countries reflects an epistemic bias towards Global North contexts, which may limit the generalisability of the findings to regions with different educational dynamics.

In contrast, Latin American countries such as Colombia ($n=3$) and Mexico ($n=3$), and others like Brazil, Peru, Bolivia, Ecuador, and Chile, are scarcely mentioned—appearing only once or twice across the systematic reviews—despite the high dropout rates that characterise these contexts. Similarly, there is a low representation of African and Asian countries, including Nigeria, Iran, Pakistan, and Tanzania ($n=1$ each), under-

scoring the need to promote the production and systematisation of locally grounded evidence.

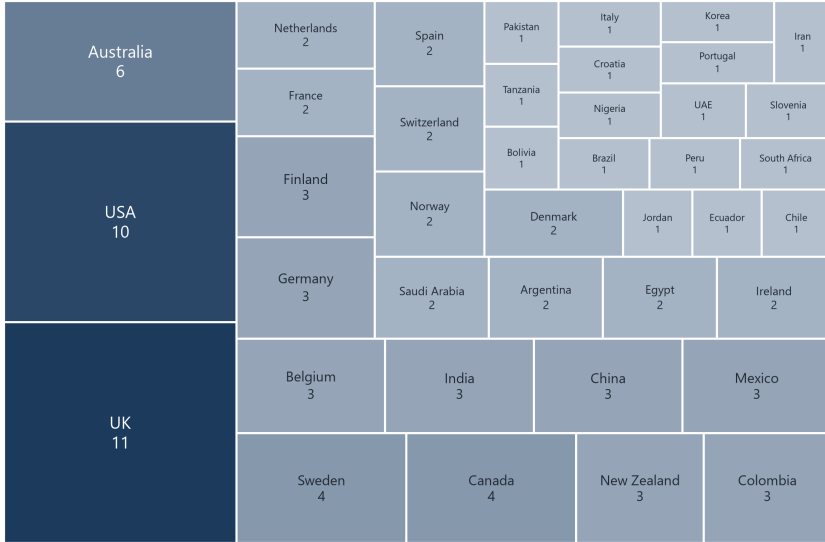


Figure 5. Treemap of the frequency of countries included in the findings of the systematic reviews.

The Sankey diagram (Figure 6) illustrates the relationship between the country of origin of the systematic reviews included in the umbrella review and the educational modality addressed (face-to-face, virtual, hybrid, or not specified). This visualisation reveals a strong concentration of research from countries such as the United States, the United Kingdom, Mexico, Colombia, Germany, and Finland focused on virtual education. In contrast, countries such as India, Canada, China, and Egypt show a greater emphasis on studies centred on face-to-face learning modalities.

It is particularly noteworthy that a significant proportion of countries—including Australia, Chile, Peru, Saudi Arabia, and the Netherlands—produce systematic reviews that do not specify the educational modality. This lack of specification represents a substantial methodological limitation for comparative analysis and interpretation.

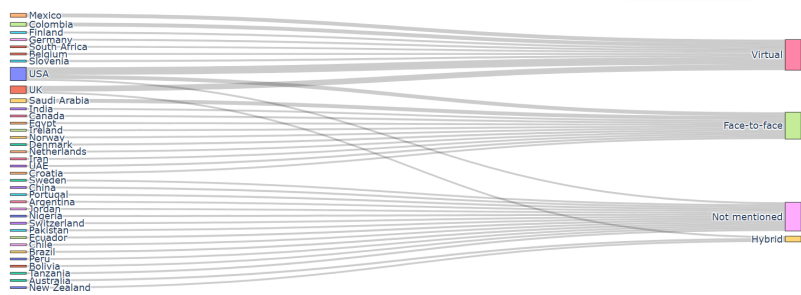


Figure 6. Sankey diagram showing the relationship between the country of the systematic review and the educational modality addressed.

4.4 Synthesis of Findings on Explanatory Variables

In general, the variables that can explain undergraduate student dropout, particularly in the context of the different study modalities (face-to-face, virtual, and hybrid), include a combination of variables belonging to the individual, academic, institutional, and socioeconomic determinants (see Figure 1). It should be noted that certain variables are located at the intersection of at least two of these determinants due to the complexity of their characteristics; examples of these are technological accessibility, digital literacy, and bullying (individual and institutional), standardised test results (academic and institutional), or place of origin (individual and socioeconomic). In addition, these variables are influenced by the specific challenges and advantages that each study modality offers. Table 6 presents the synthesis of the variables found in the documents, distinguishing the results by determinant and their relationship with the educational modalities.

The synthesis presented in Table 6 is organised into the four major determinants—individual, socioeconomic, academic, and institutional—which serve as the foundational framework for analysing undergraduate student dropout. Each determinant aggregates a set of explanatory variables identified in the systematic reviews, along with the specific studies that documented them. This organisation enables a com-

parative reading: variables that recur across multiple studies signal robust evidence, whereas those reported only once or twice indicate emerging or context-specific findings that warrant further investigation.

It is worth noting that several variables transcend a single determinant and operate at the intersection of two or more categories, reflecting the inherently multidimensional nature of the dropout phenomenon. Variables such as technological accessibility, digital literacy, social integration, and bullying illustrate how individual characteristics interact with institutional conditions, while socioeconomic status and place of origin connect the individual sphere with structural inequalities. Reading the table through this lens helps to identify intervention points where institutional action can address multiple drivers of dropout simultaneously.

Table 6. *Explanatory variables identified in the documents.*

Individual determinant	Studies
Age	[41, 42, 43, 44, 45, 48, 50, 51, 53, 56, 60, 61]
Gender	[41, 42, 43, 44, 45, 48, 50, 51, 53, 56, 60, 61]
Marital status	[41, 42, 43, 44, 45, 48, 50, 51, 53, 56, 60, 61]
Family environment	[41, 43, 44, 45, 48, 50, 51, 53, 56, 60]
Ethnicity	[43, 53, 56]
Health problems and calamities	[41, 42, 43, 44, 45, 48, 50, 51, 53, 60]
Social integration	[40, 41, 43, 44, 45, 48, 50, 51, 53, 60]
Scheduling conflicts with extracurricular activities	[42, 43, 44, 45, 48, 50, 51, 60]
Academic performance	[39, 44, 46, 48, 50, 60]
Results in entrance exams	[39]
Stress, anxiety, and depression	[44, 47, 61]

Table 6. *Explanatory variables identified in the documents.*

Individual determinant	Studies
Attitudes	[53, 61]
Motivation	[39, 40, 44, 45, 48, 53, 60, 61]
Personality traits	[39, 42, 44, 45, 61]
Previous healthcare experience	[39]
Position among siblings	[41, 43, 44, 48, 51, 53, 60]
Service / volunteering	[39]
Socioeconomic determinant	Studies
Family income	[44, 47, 49, 56]
Distance from home to the study centre	[51]
Person economically responsible for the student	[44]
Household income	[25, 43]
Place of origin	[44]
Socioeconomic status	[25, 43, 44, 47, 48, 49, 50, 51, 56, 61]
Employment status	[44]
Employment and income of parents	[44]
Economic dependence	[44, 47]
Educational level of parents	[25, 43, 47, 49, 60]
Academic determinant	Studies
Average grades (GPA) in prerequisite courses	[39, 46, 50, 52, 56, 57, 60]
Performance in individual science courses (biology, physiology, anatomy/physiology, chemistry, pathophysiology)	[39, 46, 50, 52, 56, 57, 58, 60]
Scores on standardised admission tests	[39, 46, 50, 52, 56, 57, 60]
Previous academic performance	[39, 46, 50, 52, 56, 57, 60]
Interaction with peers	[39, 40, 48, 50, 52, 56, 57, 58, 60]
Interaction with academic staff	[39, 40, 48, 50, 56, 57, 60]
Link with the institution	[39, 40, 48, 50, 57]

Academic determinant	Studies
Academic credits of the course	[39, 50]
Academic resources used	[44, 58]
Study methods	[45]
Programming-related skills	[45]
English language proficiency	[45]
Participation in OPAL (Online Peer-Assisted Learning)	[48, 58]
Institutional determinant	Studies
Availability of scholarships and financial support	[44, 46, 48, 49, 51, 59, 60]
University resources	[40, 44, 45, 46, 47, 48, 49, 51, 59, 60]
Public order and political environment	[44, 46, 48, 51, 53, 56, 59, 60]
Level of personal interaction with teachers	[40, 44, 45, 46, 47, 48, 49, 51, 59, 60]
Ethos, habitus, and environment of the institution	[40, 43, 45, 46, 47, 48, 49, 51, 53, 59, 60]
Participation with families or communities	[43, 48, 51, 60]
School attendance and non-academic outcomes	[48, 60]
Curriculum and school environment outcomes	[43, 45, 47, 49]
Process outcomes	[43]
Student engagement and relationship system	[40]
Career orientation	[44, 48, 50]

4.5 Individual Variables

Regarding the variables related to the individual determinant, it was found that the level of participation and interaction of students with their peers [58] and teachers or academic staff [41] can lead students to drop out. This is because low interaction and participation in academic and extracurricular activities can generate a feeling of isolation and disconnection from the educational environment. In this sense, the studies indicated that more direct interaction is usually offered in face-to-face classes,

while in virtual classes more proactive participation strategies are required [41,58]. Hybrid models attempt to balance both, but their effectiveness may vary, so the results on this variable as a predictor of dropout for this modality are still inconclusive [56].

On the other hand, time management [46,60] and self-discipline [46,60], as explanatory variables of dropout, have been addressed in the virtual and hybrid modalities. In these modalities, it has been found that higher levels of self-discipline and time-management skills are required due to the flexibility [58] and autonomy [46] they demand. The nature of online and hybrid education can lead students to face unique challenges in organising their time and maintaining a constant study pace [46,56,58]. Without physical presence in a classroom and direct interaction with teachers and peers, students may feel less compelled to follow a regular study schedule, leading to procrastination and the accumulation of pending work. This can trigger work overload and stress, increasing the chances of academic dropout.

Social integration into the university community is, in fact, an essential variable in student retention, as evidenced by the early studies on dropout developed by figures such as William Spady and Vincent Tinto. Social integration not only improves the educational experience of students but also plays a crucial role in their decision to continue their training [62]. In the face-to-face modality, social integration is usually more accessible due to the physical and constant interaction with the university environment [41,45,49,58]. Studies that point out this variable in the virtual modality highlight that the lack of face-to-face interaction and the often isolated nature of online learning require additional efforts by both educational institutions and students to build a community and meaningful connections among students, teachers, and administrative staff [41,49,53,58].

In a broad category, students' personal circumstances stand out, where variables such as financial stability [45,50,56,57], family responsibilities [52,57], health problems (physical and mental)

[41,42,45,48,54,55,61], and work commitments [50,51] are triggers for dropout in all educational modalities. In this sense, financial stability is related to the need to seek economic resources, representing a decrease in study time due to the dedication of some hours to work. Similarly, family responsibilities limit the time available for academic training. Health problems, on the other hand, not only reduce the physical and mental availability for learning but also increase stress and anxiety. These factors in turn affect academic performance and motivation, leading to student dropout. In the case of virtual programs, isolation can also affect mental health.

4.6 Socioeconomic Variables

Origin [45,50] and family context [41,45] influence dropout, with origin being more evident in the face-to-face modality and family context in all modalities [41,58]. The country of origin or citizenship of the student can influence their educational experience, especially in international contexts, affecting aspects such as cultural adaptation and social support [50]. In addition, the educational level of the parents is a significant factor [45]; parents with higher education are usually better equipped to academically support their children and to promote the importance of higher education, which can reduce the dropout rate.

In line with the above, the socioeconomic level of a family [45,50,56], including income [45] and occupation [50,56], directly impacts the student's ability to finance their higher education and, therefore, their continuity in it. The employment situation [45] and income of the parents are crucial, as financial problems can force students to work or to drop out of their studies [31,41]. The student's own employment status is also relevant; working while studying can be challenging and affect academic performance.

In the case of face-to-face education, the geographical distance between the student's home and the HEI can be a decisive factor in dropout [50]. Long distances imply higher costs and more time in transport-

ation, which can become an obstacle for students, especially for those with financial limitations or family responsibilities. Finally, the country's macroeconomic environment is an external factor that can profoundly impact higher education [56]. An unstable or recessionary economy can limit job opportunities for graduates, reduce investment in education, and increase financial insecurity, all factors that can negatively influence students' decision to continue their studies.

4.7 Academic Variables

For the academic variables, academic performance [40,45,46], evidenced by average grades (GPA) in prerequisite courses and scientific subjects such as mathematics, biology, and chemistry [40], has been considered a critical variable that can influence dropout in higher education in the three educational modalities analysed. Scores on standardised admission tests and previous academic performance also determine the student's decision to continue their training [40,45].

On the other hand, social interaction and student participation are essential to prevent dropout. In face-to-face and hybrid education, healthy relationships with peers and academic staff can provide crucial emotional and academic support [41,48,53]. The connection with the institution, often strengthened by participation in activities such as Online Peer-Assisted Learning (OPAL), plays a crucial role in integrating the student into the educational community, thus reducing the likelihood of dropout in the virtual modality [41]. In turn, a high academic load, represented by a high number of course credits or semesters completed, can be overwhelming and lead to dropout [47,56]. Similarly, participation in extra-curricular activities [43,45] and additional subjects [43], although enriching, can increase the load, affecting student well-being and academic performance, and eventually their permanence in the educational program; this situation occurs in the face-to-face modality.

Curricular design and the overall quality of the academic program are critical variables in student retention [50]. A poorly structured cur-

riculum or a program that does not meet student expectations can demotivate students and increase dropout rates. On the other hand, well-designed and high-quality programs can improve student satisfaction and reduce the likelihood of dropout. This situation is observed in all modalities. In the case of hybrid and virtual education, the availability and efficient use of academic resources, such as multimedia content and forums, are essential for academic success. Thus, the behaviour of the student on the platform, especially regarding multimedia, can significantly influence dropout.

In fields such as nursing, clinical placement experiences are vital for the student's practical training [59]. A negative or insufficient experience in these placements can discourage students and lead them to question their career choice, increasing the dropout risk. On the contrary, positive and enriching clinical experiences can strengthen the student's commitment to their educational program and future profession.

4.8 Institutional Variables

In the case of the three modalities, it was evidenced that the way in which an HEI organises and manages its educational programs throughout the different academic stages is fundamental to preventing dropout [56]. Efficient academic management ensures that students receive a coherent and structured education tailored to their needs and learning stages [56]. A poorly organised educational structure, on the other hand, can generate confusion and demotivation, increasing the risk of dropout. In addition to management, the physical and technological infrastructure, including libraries, laboratories, study spaces, and available technology, is essential for effective learning [44]. The lack of these resources can hinder students' academic progress and contribute to their dropout.

In virtual HEIs, it is common practice to provide scholarships or discounts to cover tuition costs, this being less usual in face-to-face or hybrid models [45]. Thus, the availability and accessibility of financial support and scholarships play a crucial role in students' retention in higher

education. Financial stress is one of the main variables explaining dropout, and the offer of scholarships and financial support can significantly alleviate this burden, allowing students to focus more on their studies and less on financial concerns.

The participation of families and local communities in the educational process is fundamental for student success [44]. This interaction can provide additional support and a sense of belonging, which is especially important in the face of academic or personal difficulties that could lead to dropout. Developing strategies and systems to encourage student interaction and commitment to the institution is crucial [45]. These systems can include orientation activities, mentorships, and student clubs. A high level of student commitment to the institution can increase their sense of belonging and decrease the likelihood of dropout. This last aspect is still a challenge for virtual HEIs, where contact with students is limited and a high degree of innovation is required to achieve student participation in dropout prevention and mitigation systems.

Discussion

Student dropout is a dynamically complex phenomenon that requires analysis at multiple levels (individual, institutional, governmental, or regional) [27,31,33], approaching the individual comprehensively, using various techniques (quantitative, qualitative, or mixed) [6,19,23], and covering different time frames (cross-sectional or longitudinal) [15,23,63]. In this sense, the monitoring of variables through this umbrella review is highly relevant. Based on the traditional grouping of the explanatory variables of undergraduate student dropout into the four determinants shown in Figure 1 (individual, academic, institutional, and socioeconomic) [30–32], this review revealed intricate variables such as compassion fatigue, substance abuse, bullying, technological accessibility, interaction with peers and academic staff, platform participation, student engagement, and digital literacy, which share traits across multiple determinants. This suggests that the complexity of the phenomenon continues to evolve and demands that the theory supporting it evolve at a similar pace. The mental model in which dropout determinants were conceived as disjoint sets of explanatory variables has shifted towards a model in which these determinants intersect, thereby requiring analytical approaches such as system dynamics, which allow the modelling of causal relationships among variables (e.g., the need to address teenage pregnancy) [6,20].

In addition, this review showed that dropout explanations cannot be separated from the geographic, social, and economic contexts in which the studies are conducted. The concentration of scientific production in Global North countries—such as the United States, the United Kingdom,

and Australia—introduces epistemic biases that may limit the applicability of the findings in Global South contexts, such as Latin America or Africa. Therefore, it is urgent to promote systematic research focused on underrepresented regions, especially given their high dropout rates and specific structural challenges.

When analysing the variables by modality (face-to-face, virtual, and hybrid), differentiated patterns emerge that affect both the causes of dropout and the institutional strategies for its mitigation. In face-to-face education, the sense of belonging, direct interaction with peers and teachers, and regular class attendance play a central role in student retention. Variables associated with academic performance, vocational orientation, course load, and access to physical infrastructure (e.g., libraries or laboratories) are also predominant. Socio-emotional factors such as academic stress and anxiety are present but are often managed through in-person support mechanisms such as tutoring or counselling.

In virtual education, the risk of isolation intensifies, making factors such as self-regulation, discipline, time management, and digital literacy critical. Relevant institutional variables include platform design, the quality of digital content, remote tutorial support, and the availability of technological tools. Additionally, difficulties in building meaningful relationships in virtual settings, along with connectivity issues and home environments that are not conducive to study, are identified as highly influential factors in dropout decisions. In hybrid education, a combination of the factors present in both other modalities is observed, along with unique challenges related to adaptation to mixed environments, the management of asynchronous workloads, and the coordination between online and in-person sessions. Logistical difficulties, such as commuting for in-person sessions combined with online demands, create particular tensions. This modality requires a high level of institutional flexibility and a clear organisation of academic time, with students needing the ability to alternate effectively between both environments.

The modality also determines how institutions track students: while in-person settings rely on direct observation, virtual and hybrid settings depend on data-analytics systems to monitor participation (e.g., LMS access frequency, resource usage, connection times), which transforms both risk indicators and early-warning systems. In summary, the modalities not only influence the intensity of certain variables but also reshape their interaction and visibility. Therefore, dropout prevention and mitigation strategies must be differentiated by modality, recognising the pedagogical, technological, and contextual specificities of each. It is also important to acknowledge that curriculum design, institutional support structures, and material conditions—such as connectivity, safety, or economic stability—play a differentiated role depending on the national or regional context. Thus, effective retention policies must include strategies tailored to each modality and grounded in contextual analysis, avoiding the use of uniform approaches for diverse realities.

Conclusions, Limitations and Implications

6.1 Conclusions

Through the methodology of the umbrella review, the objective of synthesising the findings on the variables that explain undergraduate student dropout from the study modality (face-to-face, virtual, and hybrid) was achieved on a sample of 24 systematic reviews. Although these 24 systematic reviews met all the eligibility criteria, this was not the case when their comprehensive critical evaluation was performed and categories were assigned for the confidence level of the systematic reviews according to AMSTAR 2. It is possible that, as these review methodologies originate in the health sciences, they are not yet fully observed in the social sciences. Therefore, in conclusion, there is also a need for a methodological path specific to the social sciences for systematic reviews and umbrella reviews, in light of what has been constructed in the health sciences.

It was also possible to conclude the intersection of the determinants as sets of explanatory variables, since many of them have traits or are anchored in different determinants. Additionally, it was possible to establish that the propensity of each student to drop out of higher education studies at the undergraduate level in the face-to-face, hybrid, and virtual study modalities is a not-necessarily-linear combination of two types of variables: the first type being associated with the dynamics of the study modality, and the other being those that could affect any per-

son linked to an HEI as a student, also considering the interactions between them.

6.2 Limitations

One of the main limitations of this umbrella review is access to the entire universe of existing databases, initially because these databases are not free access, and HEIs acquire the most prestigious or notable ones in the market. The availability and quality of the data are not homogeneous, as not all studies included detailed information on specific variables, and the data quality was not uniform among the different types of study modalities. Additionally, instability was observed in the definition of variables, because the studies used different definitions for some key variables related to undergraduate student dropout, also considering that the variables that influence dropout may vary according to the institutional, regional, or national context, which may limit the generalisation of the results. It is also necessary to clarify that, since the study modalities are constantly evolving, it is possible that the older systematic reviews in the sample may not reflect the current realities of undergraduate student dropout in the hybrid, face-to-face, and virtual modalities.

Another limitation, methodological in nature, is the adaptation of protocols, criteria, and experiences from other areas, such as medicine, so that they can be implemented in the social sciences. This means that, although it is possible to advance in designing the methodology by taking references from other areas or disciplines of knowledge, it is also possible that methodological aspects arise that must be addressed as they emerge. Publication biases may be added, in that the systematic reviews included in the B₂ database might have presented more significant or interesting results, biasing the synthesis of information.

The scope of this umbrella review is to synthesise the available evidence in an academic publication, and although it provides inputs for decision-makers or public-policy formulators, it may not be found in the sources they usually consult. Thus, this limitation should be overcome

through the participation of the researchers in governmental forums, beyond scientific events, to communicate the findings on the explanatory variables of undergraduate student dropout according to the study modality.

6.3 Practical Implications

The complexity of the phenomenon of undergraduate student dropout, the number of variables that directly or indirectly influence it, and their intricate interaction imply that any descriptive, explanatory, predictive, or simulation model must be of high resolution; that is, it involves detailed aspects such as those described in this book.

In addition, the units responsible for diagnosing, monitoring, and mitigating undergraduate student dropout in Higher Education Institutions must have the appropriate models to carry out their work, as well as early-warning systems that allow them to accurately accompany each of the needs and requirements according to the characteristics of each person, whose risk level has been defined through the explanatory variables according to the model of intersected determinants. Moreover, another practical implication is the need to produce guiding documentation for the academic and administrative staff who advise students in each study modality, so that they are trained to attend to the particularities of each mode of study (face-to-face, hybrid, and virtual), in general scenarios such as adaptation to academic or institutional life, and in particular scenarios such as the loneliness of virtuality.

The relevance and timeliness of the results of this research can be used as inputs for the creation of plans or projects applicable to the government agenda; public-private partnerships could become a possibility for expedited action to apply dropout-risk mitigation plans in any modality.

6.4 Future Research

Future research could include the design of key performance indicators and the formulation of public and private policies to monitor permanence in the virtual and hybrid modalities, making use of tools from areas or disciplines such as artificial intelligence, data analytics, digital marketing, and neuroscience. The possibility of conducting detailed comparative research between the different study modalities is also contemplated, in order to better understand the differences in dropout rates and the factors that influence them. Likewise, using what has been learned about the explanatory variables, predictive models could be developed in the future to identify students at risk of dropping out and to provide early interventions.

On the other hand, the identification of the most influential variables in dropout in each modality enables the design of specific interventions aimed at addressing those variables and improving student retention, also allowing institutions to personalise their support programs to meet the unique needs of the students in each modality. In that order, the virtual and hybrid modalities can benefit from the implementation of innovative educational technologies that improve the learning experience and reduce institutional dropout rates. The identification of specific barriers in each modality could lead to institutional or governmental initiatives to improve the accessibility and inclusion of students from diverse backgrounds and abilities. In other words, opportunities for future work were observed in terms of analysing the incidence on undergraduate student dropout of institutional capacities in infrastructure, endowment, and training, to meet the general requirements of the student population and the singularities according to the study modality. Finally, the possibility of collaborative inter-institutional work can be considered, sharing data and best practices among institutions offering different study modalities, making the diagnosis, treatment, and monitoring of undergraduate student dropout more effective.

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About this book

Undergraduate student dropout in higher education is a dynamically complex event that prevents individuals, their families, and society from enjoying the benefits of education. This phenomenon has intensified its impact, considering recent rapid digital and technological transformations.

Based on an umbrella review of 24 systematic reviews, this book synthesises the variables that explain undergraduate dropout across face-to-face, virtual, and hybrid study modalities, and reframes the traditional four-determinant model (individual, socioeconomic, academic, institutional) as an intersected and dynamic structure rather than a set of disjoint categories.

The book is intended for researchers, decision-makers and practitioners in higher education who design retention policies, early-warning systems, and modality-aware support strategies in Higher Education Institutions.



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