

Mathematical performance of students with intellectual disabilities in primary education: a systematic review

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KEYWORDS

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ABSTRACT

Students with intellectual disabilities face significant challenges in participating in and learning mathematics, many of which stem from segregating views regarding their potential for achievement in this school subject. This systematic review examined the available research on the mathematical performance of these students in primary education. The study followed the PRISMA 2020 guidelines for the collection and synthesis of empirical evidence. The electronic search was conducted in May 2025 in the Web of Science, Scopus and SciELO databases. Following the identification, selection, and screening processes, 71 articles published between 1999 and 2025 were analysed. The results indicate a predominance of studies focusing on pupils with mild intellectual disabilities and a priority given to the analysis of pedagogical factors through interventions with quantitative approaches. Progress is observed in the area of numbers and basic operations, which is predominantly procedural in nature. Furthermore, there is a growing interest in examining individual variables, with a particular focus on general and domain-specific cognitive skills, which are not consistently reflected in interventions designed to develop them. The findings suggest a need to direct research towards fostering conceptual understanding and problem-solving, drawing on the available evidence to promote equitable and high-quality opportunities in mathematics.

Rendimiento matemático de estudiantes con discapacidad intelectual en educación primaria: una revisión sistemática

PALABRAS CLAVE

Logro
Habilidades
Aritmética
Cognición matemática

RESUMEN

Los estudiantes con discapacidad intelectual enfrentan importantes desafíos para participar y aprender matemáticas, muchos de los cuales derivan de visiones segregadoras sobre sus posibilidades de logro en esta disciplina escolar. Esta revisión sistemática examinó la investigación disponible acerca del rendimiento matemático de este alumnado en educación primaria. El estudio siguió las orientaciones PRISMA 2020 para la recopilación y síntesis de evidencias empíricas. La búsqueda electrónica se realizó en mayo de 2025 en las bases de datos Web of Science, Scopus y SciELO. Tras los procesos de identificación, selección y cribado, se analizaron 71 artículos publicados entre 1999 y 2025. Los resultados indican un predominio de estudios centrados en estudiantes con discapacidad intelectual leve y una prioridad por el análisis de factores pedagógicos mediante intervenciones con enfoques cuantitativos. Se observan avances en el ámbito de los números y las operaciones básicas, de carácter mayoritariamente procedimental. Además, se identifica un creciente interés por examinar variables individuales, con especial énfasis en las habilidades cognitivas de dominio general y específico, que no se traducen de forma sistemática en intervenciones orientadas a su desarrollo. Desde una perspectiva práctica, los hallazgos sugieren la necesidad de orientar la investigación hacia el fomento del conocimiento conceptual y la resolución de problemas, integrando la evidencia disponible para favorecer oportunidades equitativas y de calidad en las matemáticas.

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Mathematics is essential for individual well-being, social cohesion, and equity, as it enables decision-making through the creative and critical application of mathematical concepts and procedures (OECD, 2024). At the macro level, the learning of mathematics drives socioeconomic growth and innovation by providing tools to address global challenges such as climate change and sustainable development (Chacón & Curbera, 2020; Dhersin et al., 2022). Therefore, all students must have access to equitable, high-quality mathematics education (National Council of Teachers of Mathematics [NCTM], 2000).

Even so, many students do not attain significant achievement in mathematics, which negatively affects their quality of life and increases the risk of early school dropout and socioeconomic disadvantages in the future (Bitsakos, 2025; Murillo & Graña, 2020). Thus, individuals with disabilities face a higher risk of educational segregation, are less likely to develop proficiency in mathematics and are at greater risk of dropping out of secondary school (Cote & Banks, 2025). It is a situation that is particularly pronounced among students with intellectual disabilities (ID), as they are generally provided with less rigorous curricula and are excluded from much of the mathematics curriculum (San Martín et al., 2025). Consequently, the international literature agrees that individuals with intellectual disabilities experience difficulties learning mathematics and making progress in the subject (Daniel, 2024; Tan et al., 2019). Low expectations and the belief that intelligence quotient (IQ) is a fixed and determining factor in academic achievement further contribute to these difficulties (Tassé & Balboni, 2021; Xin et al., 2024).

Mathematics achievement is a multifactorial phenomenon shaped by the interaction of cognitive, contextual, and socio-emotional variables (Díaz-Simón & Ansari, 2025). From this perspective, individual factors linked to cognitive variables are recognized as important markers and precursors of performance in early childhood, and as predictors and indicators of future learning (Träff et al., 2023). These include domain general skills such as working memory and processing speed, and domain specific skills such as number sense and understanding of numbers (Passolunghi & Lanfranchi, 2012). However, there is a paucity of such studies on students with intellectual disabilities (Soltani & Mirhosseini, 2020), who present significant limitations in both intellectual functioning and adaptive behavior, as reflected in their conceptual, social, and practical skills (AAIDD, 2021). Among the contextual variables associated with mathematical achievement, such as socioeconomic status and family support, the role played by teaching practices is particularly notable (Murillo & Graña, 2020; Xu, 2023). The evidence suggests that with appropriate instruction, students with intellectual disabilities can develop mathematical skills and continue to advance in their learning (Faragher, 2023; Spooner et al., 2019).

Based on this evidence, systematic reviews have been conducted that evaluate the effects of mathematics interventions on students with intellectual disabilities, and that summarize their primary methodological strategies as well as their content, objectives, and resources. For example, Schnepel & Aunio

(2022) report greater effects from interventions based on explicit and systematic instruction, implemented in one-on-one or small group settings with primary-school students. Park et al. (2020) focus on the maintenance phase, identifying methodological variations, although there are similarities in the content covered. Alhwaiti (2022) analyzes teaching strategies, highlighting the effectiveness of the minimal prompting system, which includes feedback and error correction.

However, to make progress toward equity in mathematics, it is not only necessary to identify effective teaching practices, but also to recognize what students with learning disabilities are capable of doing and how their learning develops (NCTM, 2000). This is key to transforming beliefs and expectations associated with disability, as they influence the quality of access to learning in the mathematics classroom (NCTM, 2026). Furthermore, although international policies have made progress in the promotion of educational inclusion, their impact on learning outcomes remains unclear (Cote & Banks, 2025). In this context, systematic reviews are essential for the rigorous assessment and synthesis of the available evidence, supporting educational practice and informed decision-making (Booth et al., 2021). However, no systematic reviews were found that specifically focused on the mathematics achievement and learning of students with intellectual disabilities.

Study objectives

This systematic review seeks to analyze and synthesize the scientific evidence on the mathematics performance of primary school students with intellectual disabilities, focusing on academic learning (NCTM, 2000) and the cognitive skills that serve as precursors of mathematical competence (Passolunghi & Lanfranchi, 2012). Unlike other reviews, it adopts a broader perspective by including observational and intervention studies with quantitative, qualitative, and mixed-methods designs. The analysis focuses on primary education, as this stage lays the foundation for mathematical learning and is linked to subsequent achievement throughout the students' educational trajectories (OECD, 2024; Robinson & Buchko, 2023). The study will provide evidence that can inform the teaching practices of both pre-service and in-service teachers and contribute to future research. Within this framework, the following four questions are raised: (1) What are the main research foci? (2) What mathematical learning outcomes and cognitive skills are assessed? (3) What are the methodological characteristics of the studies? (4) What are the main findings regarding learning, and what limitations are reported in the research?

Method

This systematic review was conducted in accordance with the PRISMA 2020 guidelines (Page et al., 2021). The protocol was registered retrospectively in the Open Science Framework (OSF) in April 2026, following completion of the selection and analysis process (<https://doi.org/10.17605/OSF.IO/QJK2V>). The research questions and search terms were defined using the

SPIDER framework (Cooke et al., 2012), which is well-suited to integrating quantitative, qualitative, and mixed-methods studies. The process was structured in three consecutive phases of identification, screening, and inclusion (see Figure 1).

The inclusion criteria, as defined within the SPIDER framework (Cooke et al., 2012), were as follows: S (sample): primary school students with intellectual disabilities; PI (phenomenon of interest): academic learning and/or cognitive skills in mathematics; D (design): observational and intervention studies; E (evaluation): assessed skills, learning outcomes, or performance outcomes; R (research type): quantitative, qualitative, and mixed-methods studies. The exclusion criteria were as follows: S (sample): studies that did not include primary school students with intellectual disabilities; PI (phenomenon of interest): reporting only on outcomes related to teaching practice, school management, or family support; D (design): studies in other subject areas; E (evaluation): studies evaluating only factors associated with teaching practice, the family context, or emotional factors; R (research type): theoretical, methodological, and instrumental research; book chapters and essays.

The electronic search was conducted in the Web of Science, Scopus and SciELO databases between May 13 and 17, 2025; search terms were required to appear in the titles or abstracts; no restrictions were placed on language or year of publication. The search strategy was applied identically in Web of Science and Scopus, while in SciELO the language was adjusted using equivalent terms in Spanish: *“mathematics” OR “mathematics education” OR “mathematics achievement” OR “mathematical learning difficulties” OR “mathematical learning” OR “mathematical cognition” OR “mathematical precursors” OR “mathematical predictors” OR “cognitive skills” OR “mathematical skills” OR “skills numeracy” OR “cognitive development” OR “arithmetic*” OR “number sense” OR “numerical cognition” OR “mathematics problem solving” AND “intellectual disab*” OR “mental retardation” OR “intellectual and developmental disabilities” OR “cognitive disability*” OR “Down syndrome”*.

Identification phase

The search initially identified 1,216 records, which were managed using the Rayyan application during both the identification and screening phases. A total of 375 duplicates were detected, yielding a sample of 841 articles (see Figure 1). No additional literature search was conducted.

Screening phase

Three reviewers simultaneously applied the inclusion and exclusion criteria (see Figure 1). First, the titles and abstracts of 841 articles were screened in a blinded manner using Rayyan, resulting in the selection of 267 documents. Of these, 54 articles were unavailable for download, which left a sample of 213 studies for full-text review. The reasons for exclusion were recorded in Rayyan and any discrepancies were resolved through consensus meetings.

Inclusion phase

The risk of individual bias was assessed using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., version 2018), which is designed for systematic reviews that include qualitative, quantitative, and mixed-methods studies. Two reviewers independently applied the MMAT protocol to the 71 included articles, assigning a numerical score to each criterion (0 = *Not met or cannot be determined*; 1 = *Met*). Based on this coding, the risk of bias was assessed according to the proportion of criteria met and classified as follows: high risk (between 20% and 40%), moderate risk (60%), and low risk (between 80% and 100%).

Data were extracted from the 71 included studies using a standardized 12-item form, with items defined based on the research questions (see Table S1 in Supplementary material). The first five included articles were extracted by one reviewer and verified jointly; the remaining data were extracted independently by two reviewers, who resolved discrepancies during consensus meetings. The data were then compiled into an Excel spreadsheet to facilitate the synthesis.

The studies were classified into four categories based on two criteria from the SPIDER framework: study design and phenomenon of interest. These categories were: (1) mathematics interventions: studies that evaluate the effectiveness of an intervention; (2) cognitive predictors: observational studies on general or domain-specific cognitive abilities; (3) mathematics performance: observational studies on academic achievement; and (4) developmental trajectories: observational studies on differences among age cohorts.

The synthesis method did not include a meta-analysis because of the studies' heterogeneity; instead, a descriptive analysis of categorical variables was conducted (Campbell et al., 2020), calculating frequencies and percentages and providing narrative descriptions. To this end, the data were coded into numerical categories to calculate frequencies and percentages (see Table S1 in Supplementary material), as well as narrative descriptions to present relevant information from the analysis.

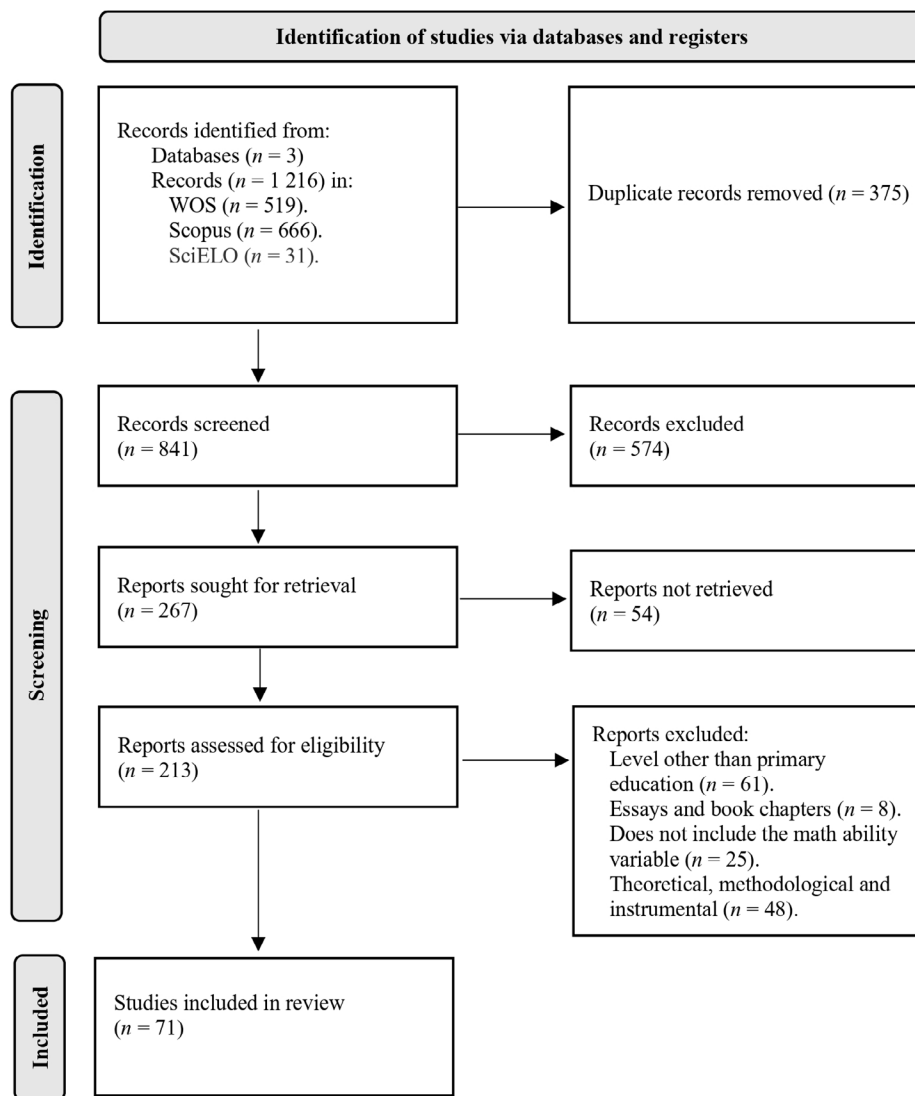
Results

General information

The review included 71 articles published between 1999 and 2025. When individual risk of bias was assessed, 80% ($n = 57$) were classified as low risk, while 20% ($n = 14$) were classified as moderate risk (see Supplementary material). The studies were conducted in 27 countries, with the United States, the United Kingdom, and Turkey each accounting for 11% ($n = 8$) (see the complete data matrix in Supplementary material).

The total sample consisted of 2,326 participants with intellectual disabilities between the ages of 5 and 17 years. The number of participants per study ranged from one to 265. Of this total, the largest percentage of the studies involved students with mild intellectual disabilities (44%), followed by participants with Down syndrome (25%).

Figure 1
PRISMA Flow Diagram



Areas and skills covered

The results showed that the primary research foci were distributed across four categories: mathematics interventions, cognitive precursors, mathematics performance, and developmental trajectories (see Table S2 in Supplementary material). Intervention studies designed to evaluate the effectiveness of mathematics interventions predominated (59%, $n = 42$). A total of 20% ($n = 14$) focused on cognitive precursors through observational studies that examined domain general and domain specific cognitive skills. Similarly, 14% ($n = 10$) addressed mathematics achievement, emphasizing school learning through the use of observational designs. Finally, 7% ($n = 5$) examined development trajectories, focusing on differences in the development of mathematics skills among different age cohorts.

Regarding mathematical learning and cognitive skills examined in the research (see Table S2 in Supplementary material), 92% ($n = 66$) of the studies assessed school learning with

a focus on performance in solving addition problems. On the other hand, 32% ($n = 23$) examined cognitive abilities. Among domain general skills, working memory was the most frequently studied variable, while in domain specific skills, non-symbolic comparison was the most frequently examined.

Methodological approaches and data collection techniques

Of the articles reviewed, 87% ($n = 62$) were quantitative studies. Within this group, 27% ($n = 17$) used single-case experimental designs, and another 27% ($n = 17$) used comparative non-experimental designs. On the other hand, qualitative and mixed-methods studies accounted for 10% ($n = 7$) and 3% ($n = 2$), respectively (see Table S3 in Supplementary material).

With regard to data collection, 34% ($n = 21$) of the quantitative studies combined standardized tests with informal assessments as measures of mathematical achievement. By contrast, qualitative studies collected data through observation, supple-

mented by interviews, informal tests, and document reviews. Finally, the mixed-methods studies used informal tests together with interviews, focus groups, and surveys as data collection strategies.

Key learning findings

A general summary follows of the main findings (see Supplementary material for a full review). The findings are grouped as follows: (1) intervention studies, (2) cognitive precursors, (3) mathematical achievement, and (4) developmental trajectories. Additionally, the findings within each of these areas are described in terms of mathematical skills (school-based learning and/or cognitive skills).

Mathematical interventions

In this area, studies ($n = 42$) that focused primarily on evaluating the effectiveness of mathematics interventions were analyzed. From the data, two subgroups were identified: those focusing on teaching approaches or methods ($n = 29$) and those focusing on the use of digital technologies ($n = 13$).

Interventions focusing on teaching approaches or methods

In this subgroup, the studies employed approaches such as schema-based instruction, guided instruction, and systematic instruction, among others. The main academic skills assessed were numbers and operations, including counting and recognizing quantities, arithmetic computation, word problems, and, to a lesser extent, other areas such as geometry and measurement.

1) *Counting and recognizing quantities:* A Mathematics Recovery model (Study Code [SC] 17) showed significant improvements in oral counting and number identification among participants with severe intellectual disabilities and autism, with a substantial effect size. As for students with mild or moderate intellectual disabilities (SC 20), improved performance was observed in classifying and sequencing objects. Similarly, students with DS showed an increased use of subitizing skills to recognize quantities when they are presented in standard configurations (e.g., the faces of a die), as well as counting strategies when the arrangement of items is random (SC 37).

2) *Arithmetic:* Instructional sequences focusing on the procedural aspects of addition and subtraction predominated. These results indicated that, following the intervention, participants showed improved accuracy in solving addition problems (SC 23, SC 49, SC 53 and SC 64), solving two-digit subtraction problems using the algorithm (SC 56), and solving multiplication problems through the automatic recall of multiplication tables (SC 3). On the other hand, the intervention sequences for students with DS resulted in improvements in written calculation involving simple addition and subtraction (SC 28).

3) *Word problems:* Six interventions focused on solving addition and subtraction problems were identified. Schema-based instruction was effective in helping students with intellectual disabilities and autism to distinguish between and solve

different types of problems (SC 33). Likewise, students with mild intellectual disabilities progressed toward more sophisticated problem-solving strategies, moving from representing sets to identifying the mathematical operation (SC 51). One study directed the intervention toward solving multiplication problems (SC 60) and toward computational thinking, reporting a moderate effect.

4) *Multiple content areas:* Eight studies implemented interventions in more than one content area (numbers and operations, geometry, and measurement). Of particular note was a qualitative intervention with students with DS, that involved parents and the home environment, promoting early numeracy skills and the recognition of geometric shapes (SC 69). Similarly, an intervention planned collaboratively by teachers (SC 46) improved relational skills related to comparing and classifying quantities in two groups of students with mild intellectual disabilities. A study on topic-based lessons (SC 24) also enabled students with significant intellectual disabilities to have greater access to mathematics content aligned with their grade level.

Interventions emphasizing the use of digital technologies

This subgroup was characterized by interventions mediated by digital technologies ($n = 13$), such as tablets or software, aimed at learning in the areas of numbers and operations (e.g., counting, recognizing quantities, and performing calculations).

As for counting and recognizing quantities, the interventions primarily used software featuring games and activities on multimedia devices. Among the findings, there was evidence of progress in the acquisition of counting principles (SC 6); greater understanding of fractions represented numerically and graphically (SC 9); and progress in the ability to create sets and patterns (SC 38).

In arithmetic, instruction primarily involved the use of digital tablets, multimedia games, videos, and calculators. Some findings show improvements in performance and a reduction in the time spent performing subtraction in word problems (SC 16); progress in addition and subtraction when using tablets (SC 21 and SC 68); improvements in number comparison and mental calculation among students with DS (SC 47); and greater accuracy in solving multiplication and division problems (SC 50).

Cognitive precursors

This section classified observational studies ($n = 14$) that focused on the role of domain general and/or domain specific cognitive skills identified as precursors of achievement in mathematics. The results of eight studies reported findings concerning students with mild intellectual disabilities. In this respect, one study showed that domain general cognitive skills (working memory, processing speed, and long-term memory) and domain specific skills (symbolic and non-symbolic comparison) together contributed 48% to performance in simple addition and subtraction tasks (SC 41); and among these skills, symbolic comparison was the most important precursor.

A second study investigated the contribution of different aspects of working memory, with results indicating that central executive function was the aspect of working memory that contributed most to arithmetic performance (SC 2). On the other hand, one study observed a moderate association between attentional ability and performance on addition and subtraction calculations involving quantities up to one million (SC 11).

Assessment of Mathematics achievement

In this area, observational studies ($n = 10$) were classified that sought to report on and characterize achievement in school mathematics. A study compared progress in numerical skills across four performance profiles among students with mild and moderate intellectual disabilities over the course of a school year (SC 45). It was observed that the group that initially showed the poorest performance in symbolic comparison and in understanding the principle of cardinality did not exhibit significant changes by the end of the academic year. The study also found that the remaining three profiles, which initially showed greater development in their symbolic numerical skills, extended their performance to higher numerical ranges.

A second longitudinal study compared academic progress in inclusive classrooms (SC 44), showing that at the beginning of the school year, IQ was the only significant predictor of progress in mathematics for students with ID. Subsequently, school experience related to numerical skills became a significant predictor of mathematics learning, whereas IQ was no longer a significant predictor.

Finally, a study compared levels of mathematical literacy among students with mild ID (SC 19). The results showed performance levels that were 50% lower than those of their peers without disabilities across all curricular areas. However, it was found that they were able to solve relatively complex tasks when they were familiar with the content. The authors note that participants with ID had access to a considerably reduced curriculum.

Trajectories of Mathematical development

This section includes observational studies ($n = 5$) that examined differences in the development of mathematical skills among individuals from different age cohorts. A noteworthy study that compared achievement across multiple content areas found no significant relationship between performance and increasing chronological age in either the WS or the DS group (SC 40). Likewise, in numerical and calculation tasks, participants with DS outperformed the group with WS; both groups showed greater mastery of addition and subtraction than of multiplication; and the greater linguistic ability of the group with WS did not confer an advantage in numerical tasks (SC 5).

Limitations reported in the research

Regarding the limitations noted in the 71 studies analyzed, 20 documents (28%) did not report any limitations. Among the

studies that did ($n = 51$), the reported limitations were related to study design (31%), sample size (25%), and the measures assessed (12%).

Discussion

The purpose of this systematic review was to analyze and synthesize the available scientific evidence on the mathematics achievement of primary school students with ID. To this end, the learning outcomes described in the curricular standards (NCTM, 2000) and the cognitive skills underlying mathematical competence (Passolunghi & Lanfranchi, 2012) were considered. Taken as a whole, the studies provide a comprehensive overview of the current state of knowledge in the field.

In general, the studies consistently report school learning related to numbers and operations places, with a marked emphasis on procedural aspects, while conceptual understanding appears to be a less-developed component. Similarly, recent studies in Chile of students on the autism spectrum and students with hearing impairments report that mathematics instruction is primarily oriented toward the memorization and reproduction of procedures (Lazarraga-Ojeda & Piñeiro, 2026; Piñeiro et al., 2026). This evidence contrasts with the principles of high-quality mathematics education, in which conceptual understanding and problem-solving are key elements (Dhersin et al., 2022; NCTM, 2026). In this regard, the findings of the present review reinforce the need to promote a different approach to mathematics learning for students with ID, who typically receive teaching approaches characterized by instrumental biases, which have limited the students' learning development (Broitman et al., 2023; Lambert & Tan, 2017; Tan et al., 2019).

Secondly, there is growing interest in examining the cognitive skills underlying mathematical competence, such as working memory, executive functions and domain specific cognitive skills, including number sense. This trend is consistent with research conducted in populations without disabilities, which indicate that the study of these factors has implications for the design of educational interventions aimed at strengthening these skills and preventing future difficulties (Passolunghi & Lanfranchi, 2012; Träff et al., 2023).

As for the methodological characteristics of the included studies, the majority are quantitative, with a small number employing qualitative and mixed-methods approaches.

This distribution highlights the need for greater methodological diversification in research.

In this respect, qualitative studies allow for contextualized analyses of teaching and learning processes, while the mixed-methods approaches offer more robust findings on the phenomenon under study (Creswell & Creswell, 2018).

Implications of the results

The results of this systematic review bear important implications for educational practice, public policy, and future research on teaching and learning of mathematics among primary school students with ID. The evidence highlights these students' poten-

tial for developing mathematical competencies, countering the low expectations and limiting beliefs that have historically perpetuated educational inequities (Daniel, 2024; Faragher, 2023). Furthermore, the findings offer guidance for the design of mathematics learning experiences focused on understanding. They also help identify priority areas for developing and strengthening the teaching strategies of both practicing and pre-service teachers, based on the areas least addressed in the studies analyzed and informed by the aspects most frequently addressed in the reviewed research.

In addition to the above, these findings provide information of relevance to policymakers by synthesizing findings from international research on mathematics learning among students with ID. Within this framework, the study contributes evidence on the educational outcomes of students with disabilities, thereby enabling an analysis of the impact of inclusive education approaches in terms of access, participation, and learning (Cote & Banks, 2025).

With respect to the implications for future research, the findings of this review suggest the need to carry out studies that include samples of participants with moderate, severe, and profound ID; that is, subgroups of individuals who require more intensive levels of support. Likewise, the use of research designs that integrate quantitative and qualitative methodologies is recommended, along with the incorporation of individual and contextual variables, to better understand the learning and achievement in mathematics of these students.

Review limitations

Several limitations should be considered when interpreting the results of the review. First, additional search strategies were not included, such as reviewing gray literature or screening reference lists. This may have increased the risk of publication bias toward studies reporting positive results or led to the exclusion of relevant studies. Secondly, a significant number of articles were unavailable for partial or full download, a limitation that may have resulted in the exclusion of promising research. Thirdly, in the screening phase, while discrepancies in article exclusions were resolved through consensus meetings, no formal measures were used to assess the level of agreement, thus increasing the risk of decisions influenced by subjective criteria.

A fourth limitation concerns the type of synthesis: the heterogeneity of the included articles may have prevented the identification of nuances reflected in the diversity of the research.

Finally, although the protocol was published on OSF, the absence of prospective registration affects the transparency and reproducibility of the process.

Conclusions

An initial conclusion is that over the past 25 years, empirical research on mathematical achievement among schoolchildren with intellectual disabilities has focused predominantly on quantitatively oriented intervention studies. A second conclu-

sion is that the learning outcomes assessed in mathematics have focused on procedural skills in the area of numbers and basic operations.

This conclusion highlights the need to expand research toward conceptual knowledge and problem-solving, thereby informing school practices with the potential to reduce inequalities and segregating perspectives in mathematics teaching to students with ID. Finally, research on domain general and domain specific cognitive skills has not yet translated into early interventions that align with the importance of these variables, as precursors of early mathematical competence and future mathematical learning.

Authors contribution

Conceptualization: O.L., G.C.E.

Methodology: O.L.

Data curation: O.L., G.C.E., C.R.R.

Formal analysis: O.L.

Validation: G.C.E., C.R.R.

Writing – Original draft: O.L.

Writing – Review & editing: G.C.E., C.R.R.

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Conflict of interests

The authors declare that there is no conflict of interests.

Data availability statement

The data supporting the results and conclusions of this study are available on OSF at <https://doi.org/10.17605/OSF.IO/6SQ9K> (data matrix) and at <https://doi.org/10.17605/OSF.IO/Z75JE> (individual bias risk assessment).

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Material complementario

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