

Running head: THE EFFECTS OF LACK OF SUPPORT FOR DYSCALCULIA

The Effects of Under-identification and Lack of Support on Students with Dyscalculia

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I hereby affirm that I have neither given nor received help on this assignment -Edith Onaolapo

Abstract

This literature review synthesizes current research examining how under-identification and insufficient support influence the academic and psychosocial outcomes of students with dyscalculia. Dyscalculia is a specific learning disability that affects an individual's ability to process numerical information, perform mathematical calculations, and apply quantitative reasoning. The literature under review includes a qualitative case study approach. Despite its documented impact on academic performance and daily functioning, many educational systems still under-identify dyscalculia throughout this research as encapsulated under the three themes that will be explicitly explained, compared and discussed in the analysis of themes. Across the literature, researchers consistently show that institutional identification processes often fail to detect mathematical learning disabilities early, which delays access to effective interventions. Although evidence-based instructional strategies demonstrate positive outcomes when teachers implement them, many students receive support only after prolonged academic difficulty. Researchers also document significant emotional and developmental consequences associated with persistent mathematical failure, including reduced self-confidence, increased mathematics anxiety, and limitations in future educational and career opportunities. These findings suggest that educators and policymakers must strengthen early identification systems, improve teacher preparation, and expand access to targeted instructional supports. The review concludes by identifying gaps in the literature and proposing directions for future research and educational advocacy.

Keywords: Specific learning disability, support, intervention, teaching methods, dyscalculia, mathematics learning disabilities, identification, educational equity.

The Effects of Under-Identification and Lack of Support on Students with Dyscalculia

Mathematical competence plays a critical role in students' academic development, everyday decision-making, and long-term educational opportunities. However, students with dyscalculia, a specific learning disability that affects numerical processing and mathematical reasoning; often encounter persistent challenges when learning mathematics. Dyscalculia involves difficulty understanding numerical magnitude, performing calculations, and applying mathematical concepts to problem-solving situations. Despite the importance of early numeracy skills, educational systems frequently overlook dyscalculia or identify it only after students experience prolonged academic difficulty.

Historically, Researchers have focused more attention on reading disabilities such as dyslexia than on dyscalculia. As a result, intervention research, teacher preparation programs, and educational policies, have often prioritized literacy over numeracy. Consequently, many students with dyscalculia struggled for years before educators identified their learning needs. Recent research suggests that systemic factors within school identification frameworks contribute to this delay. For example, scholars examining Response to Intervention (RTI) systems report that schools often retain students with persistent mathematics difficulties in intervention tiers rather than refer them for specialized evaluation (Gilmour et al., 2024; Perry-Higgs, 2019). These practices can delay formal identification and access to specialized services.

At the same time, instructional research demonstrates that targeted teaching strategies can significantly improve mathematical understanding for students with learning disabilities. Studies show that structured instructional approaches such as schema-based instruction, metacognitive strategy training, and technology-assisted learning environments can strengthen students'

mathematical reasoning and problem-solving abilities (Hott et al., 2021; Lucangeli et al., 2019; Mutlu & Akgün, 2017). These findings indicate that educators can mitigate many mathematical learning challenges when they implement appropriate instructional supports.

However, delayed identification and insufficient support can produce consequences that extend beyond academic performance. Students who repeatedly experience failure in mathematics often develop negative perceptions of their abilities, increased anxiety toward numerical tasks, and reduced motivation to engage in learning (Lucangeli et al., 2019; Mutlu, 2024). Over time, these experiences can influence educational trajectories and career opportunities, particularly in fields that require strong quantitative skills.

This literature review examines existing research on the effects of under-identification and lack of support for students with dyscalculia. Specifically, the review addresses the following research questions: How do school identification frameworks influence the recognition of dyscalculia? What academic consequences emerge when schools delay or fail to implement intervention? How does unsupported dyscalculia influence students' psychosocial development and long-term outcomes? To answer these questions, this review synthesizes ten peer-reviewed studies using a thematic analysis approach.

Major Themes

Several themes emerged during the literature review, but these three major areas of this field have received the most attention which may point to further research and actions. The literature reveals three major themes: systemic under-identification of dyscalculia within school identification frameworks, delayed or absent intervention and its academic consequences, and psychosocial and long-term life impacts of unsupported dyscalculia.

Terminology

In the organization of this literature review, certain differences in terminology required resolution. Throughout the discussions and presentations, the researchers used specific learning disability (SLD) or disabilities or mathematical learning disability interchangeably with dyscalculia though SLD could also refer to other specific learning disabilities but in this presentation, I am referring only to dyscalculia. Additionally, response to intervention (RTI) was also used interchangeably with intervention and support in this review.

Methodology

I conducted this literature review from January to March of 2026, searching mainly the ERIC online databases for primary-sources, peer-reviewed journal articles on the effects of under-identification and lack of support on students with dyscalculia within the last 10 years which returned as null with the keywords; *dyscalculia*, *under-identification*, and *support*. So, I decided to use related words to broaden my scope; *support or teaching methods*, *specific learning disabilities or dyscalculia*; these new advance search gave me 31 peer reviewed articles. Thereafter, I decided to select 10 studies that addressed my research questions and provided a balanced presentation of issues with multiple perspectives. Finally, I documented the views of these articles so as to gain an overview of the state of the research and identify any existing gaps in the literature on this interesting topic.

Analysis of Themes

Systemic Under-Identification of Dyscalculia Within School Identification Frameworks

Researchers consistently report that educational systems under-identify dyscalculia. Although schools have adopted identification frameworks designed to support students with

learning difficulties, these systems often fail to detect mathematical learning disabilities early. Studies examining identification frameworks reveal that many schools rely heavily on observable academic performance rather than systematic screening for underlying numerical processing difficulties. As a result, teachers may interpret mathematical struggles as general academic weakness rather than as indicators of dyscalculia.

Research on RTI frameworks illustrates this issue clearly. Gilmour et al. (2024) found that schools often retain students with persistent mathematics difficulties in intervention tiers rather than refer them for specialized evaluation. Instead of accelerating identification, prolonged placement in intervention tiers can delay the diagnostic process. However, Institutional decision-making also shapes identification practices. Perry-Higgs (2019) demonstrated that administrative priorities, policy constraints, and resource allocation influence how schools respond to students' academic needs. In some cases, procedural requirements lead educators to prioritize documentation of interventions before initiating formal evaluations, which can postpone identification.

Classroom-based research further reveals that teachers frequently recognize students' mathematical struggles informally. Case studies examining instructional interventions show that educators often observe persistent difficulties with numerical concepts but may lack the specialized knowledge necessary to identify dyscalculia explicitly (Chin & Fu, 2021; Koç & Korkmaz, 2020). Together, these findings indicate that systemic factors within educational identification frameworks contribute to the under-recognition of dyscalculia. Because schools fail to identify many students early, those students often miss opportunities to receive targeted instructional support during critical developmental stages.

Delayed or Absent Intervention and Its Academic Consequences

The literature strongly demonstrates that targeted instructional interventions can improve mathematical learning for students with dyscalculia. However, many students receive these supports only after educators have documented prolonged academic difficulty. Though, Researchers have identified several instructional approaches that support mathematical learning among students with learning disabilities; for example, schema-based instruction helps students organize mathematical information and apply systematic strategies when solving problems (Hott et al., 2021). This approach strengthens students' ability to analyze mathematical relationships and develop structured problem-solving methods.

Other studies emphasize the importance of metacognitive strategy training. Lucangeli et al. (2019) showed that teaching students to monitor and regulate their own thinking processes can improve accuracy and persistence in mathematical tasks. By strengthening students' awareness of their cognitive strategies, teachers can help them approach problem solving more effectively.

Researchers have also explored technology-assisted learning tools. Mutlu and Akgün (2017) demonstrated that computer-assisted instruction can strengthen students' approximate number skills by allowing them to interact with visual representations of numerical relationships. While Instructional case studies reinforce these findings. Chin and Fu (2021) and Koç and Korkmaz (2020) showed that explicit instruction targeting foundational number concepts can significantly improve students' mathematical performance.

Despite the effectiveness of these approaches, many students do not receive these supports early in their educational development. Instead, schools often implement interventions only after students experience repeated academic failure (Gilmour et al., 2024; Ennis et al., 2018). This delay increases learning gaps and reduces the potential impact of instructional strategies. These findings suggest that the main challenge does not lie in the absence of effective interventions. Instead, schools often fail to implement these strategies early enough to prevent cumulative academic difficulties.

Psychosocial, Emotional, and Long-Term Life Impacts of Unsupported Dyscalculia

Researchers increasingly recognize that dyscalculia affects more than academic performance. Persistent mathematical difficulties can also shape students' emotional development and long-term life opportunities. Students who struggle with mathematics may begin to perceive themselves as incapable learners, which decreases their motivation to engage in academic activities. Studies show that repeated experiences of mathematical failure often reduce students' academic self-confidence and increase anxiety related to numerical tasks (Lucangeli et al., 2019).

Research also shows that these emotional responses influence students' academic identities. Mutlu (2024) documented how individuals with dyscalculia often report feelings of frustration, embarrassment, and social comparison with peers during their educational experiences. The consequences of unsupported dyscalculia also extend into everyday life. Difficulties with numerical reasoning can affect practical skills such as financial management, time estimation, and decision-making involving quantitative information (Mutlu, 2024).

Furthermore, mathematical difficulties can influence long-term educational pathways. Students who struggle with foundational numeracy often avoid academic disciplines that require strong quantitative skills. Sari et al. (2024) suggest that interdisciplinary learning environments, such as STEAM (Science, Technology, Engineering, Art, and Mathematics) based instruction, may help increase engagement and confidence among students with learning disabilities. Together, these findings demonstrate that dyscalculia can affect students' emotional well-being, academic engagement, and future opportunities when educators fail to provide appropriate support.

Discussions

This literature review synthesized research examining how under-identification and lack of support affect students with dyscalculia. The literature consistently highlights three interconnected issues: schools frequently under-identify dyscalculia, delayed intervention contributes to persistent academic difficulty, and unsupported mathematical learning disabilities can produce significant psychosocial consequences. Although researchers have identified effective instructional strategies for supporting students with dyscalculia, many schools do not implement these strategies on time. As a result, students often experienced repeated academic failure before receiving appropriate support.

Strengths and Limitations

The main strength of this study is that it is a qualitative case study research that investigates how under-identification within school frameworks shapes academic outcomes and emotional development for students with dyscalculia. Though several gaps remain within the literature, many studies focus on instructional interventions but provide limited insight into how

systemic identification processes shape students' experiences. Additionally, relatively few studies explore how students themselves interpret and navigate educational environments that do not fully recognize their learning needs on time.

Future Research and Implications for Schools

Future research should examine how identification systems, instructional practices, and institutional policies shape the educational experiences of students with dyscalculia. Although existing research documents structural barriers that delay identification, scholars still know relatively little about how students experience these barriers within classroom environments and intervention systems. Qualitative research could provide important insight into how students navigate mathematics instruction, school-based intervention models, and special education processes. Understanding students' lived experiences would help researchers and educators identify ways to strengthen early support systems and improve long-term academic outcomes.

Researchers should also investigate the effectiveness of early screening systems for identifying mathematical learning differences. Many schools rely heavily on intervention frameworks before initiating formal evaluations, which can delay diagnosis and access to specialized services. Evidence suggests that prolonged intervention timelines sometimes postpone formal identification of specific learning disabilities in mathematics (Gilmour et al., 2024). Future studies should therefore evaluate universal mathematics screening practices implemented during the early elementary grades. Screening tools that assess number sense, magnitude comparison, and early computational fluency may detect cognitive processing differences before persistent academic failure develops even from early childhood education in preschool. By examining long-term outcomes for students identified through early screening

models, researchers can determine whether proactive identification improves mathematical achievement and student confidence.

Teacher preparation also represents an important area for continued research. Many teacher education programs address specific learning disabilities broadly but provide limited instruction on dyscalculia or mathematics-specific learning differences. Researchers should examine how targeted professional preparation influences teachers' ability to recognize early indicators of mathematical learning disabilities and implement effective instructional strategies. Educators who understand the characteristics of dyscalculia are more likely to initiate appropriate referrals and provide responsive instruction. Research evaluating professional development models, including instructional coaching and collaborative problem-solving frameworks, may help identify strategies that strengthen teacher capacity to address diverse mathematical learning needs.

Schools must also translate research findings into structural reforms that improve identification and instructional support. Firstly, schools should implement universal mathematics screening across the early elementary grades. Early screening reduces reliance on subjective referral practices and helps ensure that all students receive equitable opportunities for early support. Students from historically marginalized communities often experience delayed identification when schools depend primarily on teacher observations or informal academic concerns. Universal screening provides a more systematic and equitable approach to identifying students who may require additional evaluation or intervention.

Secondly, schools should strengthen professional development related to mathematical learning disabilities. Teachers require explicit training to interpret screening data, recognize

conceptual misunderstandings, and implement targeted instructional supports. Evidence suggests that structured interventions and metacognitive strategy instruction can improve students' mathematical performance when educators implement them consistently (Lucangeli et al., 2019). However, teachers often need sustained coaching and collaborative planning time to integrate these approaches into everyday instruction. Schools that invest in ongoing professional learning are more likely to build instructional systems that respond effectively to students' mathematical learning differences.

Finally, school systems must strengthen accountability within intervention frameworks. Response to Intervention models were designed to provide early support; however, extended placement in intervention tiers without formal evaluation can delay access to specialized services. Gilmour et al. (2024) found that prolonged RTI timelines sometimes function as structural barriers that postpone formal identification of mathematical learning disabilities. District policies should therefore establish clear timelines for reviewing intervention data and initiating comprehensive evaluations when students fail to respond to evidence-based instruction. Strengthening data-monitoring systems can help schools ensure that intervention frameworks support timely identification rather than unintentionally delaying services.

Conclusions

The literature consistently indicates that dyscalculia remains under identified within many educational systems, creating a significant equity issue with long-term academic and psychosocial consequences. Identification frameworks such as Response to Intervention were intended to provide early assistance to struggling learners; however, research suggests that these systems can sometimes delay formal diagnosis and access to specialized support. Gilmour et al.

(2024) reported that extended intervention timelines frequently postpone comprehensive evaluations, delaying students appropriate services. As a result, many learners experience repeated academic difficulty and growing math frustration.

Delayed identification also affects students' social and emotional development. Mutlu (2024) found that students who do not receive early support for dyscalculia often experience reduced self-confidence, strained peer relationships, and uncertainty about future academic and career opportunities. Students who encounter persistent difficulty without understanding the underlying cause may begin to internalize negative beliefs about their abilities. Subsequently, these experiences can narrow educational pathways and deter participation in Mathematical competence fields.

Despite these challenges, the literature demonstrates that effective instructional interventions can improve mathematical learning outcomes when educators implement them consistently and on time. For example, Sari et al. (2024) found that integrating arts-based approaches into STEM instruction increased engagement and strengthened conceptual understanding among students with specific learning disabilities. Interdisciplinary learning experiences allow students to explore mathematical ideas through multiple forms of representation, which can reduce barriers to comprehension. Similarly, Mutlu and Akgün (2017) showed that computer-assisted instruction targeting approximate number skills produced measurable gains in numerical reasoning for students with dyscalculia. Technology-supported interventions provide opportunities for targeted practice and immediate feedback that help students develop foundational numerical understanding.

However, instructional improvements alone cannot resolve systemic barriers. Institutional leadership and policy decisions also influence whether students receive consistent and effective support. Perry-Higgs (2019) demonstrated that governance conflicts within school systems can disrupt individualized education plans and limit access to appropriate services. When organizational priorities overshadow student needs, learners with disabilities struggle.

The literature highlights the importance of strengthening students' metacognitive processes alongside direct skill instruction. Lucangeli et al. (2019) found that self-regulatory training helped students with learning disabilities monitor their thinking, recognize errors, and improve mathematical accuracy. Instruction that encourages students to reflect on their reasoning strengthens both problem-solving ability and confidence. Similarly, Chin and Fu (2021) demonstrated that structured and explicitly scaffolded instruction improved mathematical understanding when teachers tailored interventions to individual learning needs. These findings suggest that many mathematical difficulties involve challenges in strategy use and self-monitoring rather than simple deficits in computational skill.

Overall, the research indicates that improving outcomes for students with dyscalculia requires systemic reform, earlier identification, and sustained instructional support. Schools must implement proactive screening systems, strengthen teacher preparation related to mathematical learning disabilities, and ensure that intervention frameworks support timely evaluation and services. Many students with dyscalculia will continue to remain academically invisible despite the availability of effective instructional interventions. Though, continued research and policy reform can help ensure that educational systems recognize mathematical learning differences earlier and provide equitable opportunities for all students to succeed in mathematics.

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