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Original Article

A Systematic Review Protocol of Screening Instruments for Children and Adolescents with Specific Learning Disorder

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ABSTRACT

Background: Specific learning disorder is an increasingly prevalent problem worldwide. It is directly associated with decreased self-confidence and higher dropout rates among affected children. Therefore, the purpose of this study is to develop a protocol for a systematic review of screening instruments for specific learning disorders in children and adolescents.

Methods: To conduct a task accurately, a precise protocol is required. This systematic review protocol will be developed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) guidelines. It intends to review articles that have validated different screening instruments for specific learning disorders in children and adolescents. PubMed, Web of Science, Scopus, Cochrane Library, and PsycINFO will be searched for peer-reviewed publications. Gray literature will also be reviewed. Eligible studies will be assessed using the Modified Consensus-Based Standards for the Selection of Health Measurement Instruments (COSMIN) Risk of Bias checklist to evaluate their methodological quality.

Results: Many researchers and clinicians use instruments to screen for specific learning disorders. However, there is no comprehensive study that identifies the most appropriate instruments or that collectively reports their benefits, gaps, and psychometric properties.

Conclusion: This study will review these instruments to evaluate their benefits and limitations and to provide information on their psychometric indices and methodological quality, using the Modified Consensus-Based Standards for the Selection of Health Measurement Instruments (COSMIN) checklist. This protocol, which is essential for conducting a robust review, provides a clear framework for the systematic evaluation of screening tools for specific learning disorders.

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Introduction

The phenomenon of learning disorder (LD) is widespread and increasingly recognized worldwide. It has been the focus of many researchers over the years (1). In 2013, the DSM-5 defined specific learning disorder (SLD) as a condition in which children experience difficulties in learning and using academic skills that persist for at least 6 months despite the provision of targeted interventions. These difficulties manifest in one or more domains, including reading, writing, or mathematics (2). SLD is one of the most common neurodevelopmental disorders (NDDs), affecting approximately 3–10% of children (3).

Impaired academic skills are significantly below what is expected for the child's chronological age and substantially interfere with academic performance, occupational functioning, and activities of daily living. As these children grow older, their difficulties often persist and extend to broader areas of daily functioning and adaptation. Initial academic problems may lead to secondary consequences, including low self-esteem, depression, school dropout, impairments in social relationships, and other long-term adverse effects on quality of life. However, many of these cases remain unidentified in the early stages, particularly within school settings, due to average or above-average intelligence and the lack of standardized screening tools (4–7).

To develop effective rehabilitation programs and evaluate their impact on children with SLD, reliable and valid screening measures are essential (8). In fact, without timely screening, treatment may be delayed. In contrast, early screening followed by appropriate intervention can prevent the long-term complications of these disorders and contribute to the development of a productive society.

However, due to the multidimensional nature of learning disabilities and particularly the presence of normal intelligence in many affected children (2, 9, 10), screening and early identification of these problems remain challenging.

Over the years, various screening tools have been developed to identify children and adolescents with SLD or its subtypes. Different researchers have employed a range of instruments to screen these children in their studies (11–14). Some of these tools are application-based (15), whereas others are questionnaire-based (16). Screening instruments include both single-item (17) and multi-item (18) tools that assess various dimensions of learning disorders. Additionally, there are tools designed for preschool children (15) and for school-aged populations (19). However, no study has comprehensively reviewed these instruments or provided a structured framework for their evaluation and categorization to facilitate informed selection by users as needed.

This study aims to contribute to the existing body of knowledge and provide a structured pathway for the systematic review of these tools. This protocol introduces a comprehensive and valuable review of SLD screening instruments used with children and adolescents worldwide.

To conduct an accurate, methodologically sound review, a detailed, well-structured protocol must first be developed, with all procedural steps clearly specified. Therefore, this study aims to develop a protocol for a systematic review (SR) of SLD screening instruments for children and adolescents. This review seeks to address the following questions:

1. What screening instruments are available worldwide for identifying SLD in children and adolescents?
2. What are the characteristics of SLD screening instruments used in children and adolescents?

Methods

This study presents a preliminary protocol and does not represent an update of a previous systematic review (SR). The protocol has been developed and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P) checklist. The PRISMA-P (2015) checklist comprises 17 numbered items, divided into 26 sub-items, that should be addressed in systematic review and meta-analysis protocols. The checklist is organized into three main sections: administrative information, introduction, and methods (20). The completed checklist is provided in Additional File 1.

Eligibility Criteria

Study Characteristics: This review will include all published studies that focus on the development or psychometric evaluation of screening instruments for learning disorders (LD) in children and adolescents. Specifically, eligible articles must assess the psychometric properties of the instruments—such as reliability, validity, and/or responsiveness—using appropriate statistical methods. In other words, any study that introduces a screening tool for specific learning disorders (SLD) or evaluates an existing tool in terms of statistical indicators and reports the results will be included. The specific psychometric properties to be extracted are detailed in the data extraction form, provided in Additional File 4.

Articles must be published in English or Farsi. Given the preliminary search and the potential for a large number of studies, at a minimum, the article abstracts must be available in English or Farsi to be considered. There will be no geographic restrictions, and all relevant studies published up to August 2023 (date of search) will be included.

Exclusion Criteria: Studies will be excluded if they focus on screening strategies or diagnostic instruments, as the aim of this review is rapid and timely screening rather than formal diagnosis. Additionally, studies that use screening instruments solely as outcome measures (e.g., in randomized controlled trials or validation studies) will be excluded. Non-original articles, such as reviews, commentaries, and editorials, will also be excluded. Only full-text articles will be considered, as abstracts often provide insufficient information regarding study design and methodology.

Population: This review will include studies involving children and adolescents aged 0 to 18 years with learning disorders (LD). Given the potential scarcity of studies addressing specific learning disorders (SLD), all LD studies will be included in the initial review phase. The focus on SLD will be emphasized in the discussion and conclusion sections.

Sampling Procedures: All participant sampling procedures will be considered eligible for inclusion.

Setting and time frame: No restrictions will be applied regarding the study setting. The literature search will include publications up to August 2023.

Report Characteristics

Only articles with English or Persian abstracts will be included. Additionally, only studies published within the defined search period will be considered.

Information Sources and Search Strategy: At a minimum, the Medline and Embase databases will be searched. Additional sources will include other relevant databases, contact with study authors, and gray literature. Database searches will be structured around the population and outcomes of interest. Specifically, PubMed, PsycINFO, Web of Science, Cochrane Library, and Scopus will be searched from their inception through August 2023 for peer-reviewed publications. Authors will be contacted when necessary to obtain additional information, and gray literature will be reviewed to minimize publication bias.

The search strategy will utilize a combination of Medical Subject Headings (MeSH) and free-text terms, employing Boolean operators (AND/OR) to combine search concepts. Proposed keywords include: “mass screening,” “reproducibility of results,” “learning disabilities,” “specific learning disorder,” “dyslexia,” “dyscalculia,” and “agraphia.” If the initial search yields few results, the strategy may be refined to optimize retrieval. The preliminary search strategy is provided in Additional File 2.

Study Records

Selection Process: Two independent reviewers will conduct the study selection at each phase, including screening, eligibility assessment, and final inclusion. All retrieved studies will be imported into EndNote software, and duplicates will be removed. The reviewers, who are members of the research team and experts in learning disorders, will independently assess the articles against the predefined inclusion and exclusion criteria. The initial screening will be based on titles and abstracts, followed by a full-text review of studies that meet the preliminary eligibility criteria. In cases of disagreement between the two reviewers, a third reviewer will be consulted to reach a consensus. Reasons for exclusion at the full-text stage will be documented and reported.

Data Extraction: Data extraction forms will be independently developed and completed by two reviewers, with information drawn from each study in accordance with the study objectives. The extraction form will first be adapted to the included studies by the two reviewers independently, and any disagreements regarding data points will be resolved through discussion and consensus. The information collected will include: author name, publication year, study participants, sample size, sample age (Mean ± SD), instrument properties (including name, type, target participants, administration time, assessed skills, required equipment, language, country of development, response scale, dimensions, and number of items), benefits of the instrument, limitations (if reported), and psychometric properties of the tools (see Additional File 4).

Risk of Bias Assessment

The methodological quality of the selected studies will be evaluated using the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN) checklist [21]. This checklist comprises 10 domains: measurement development, content validity, structural validity, internal consistency, cross-cultural validity/measurement invariance, reliability, measurement error, criterion validity, responsiveness, and hypothesis testing (construct validity). It was specifically developed to assess the methodological rigor of studies reporting on measurement properties.

If certain measurement properties are not reported in the included studies, the modified COSMIN checklist will be used. In this modified version, columns corresponding to unreported indicators will be removed. The procedure for evaluating article quality and performing related calculations will follow the methodology described by Kasemitabar (2020) (see Attachment 3).

Results

Data Synthesis

The extracted data will be systematically reported and summarized in tables and further discussed in expert panels. Given the multidimensional nature of learning disorders, it is anticipated that the included instruments, populations, study designs, and other variables will yield heterogeneous data. Therefore, a quantitative meta-analysis is neither appropriate nor feasible.

Instead, a qualitative synthesis will be conducted, considering factors such as study methodological quality, strengths and limitations of the tools, participant age, cultural context, type of instrument, and any feasible classification or subgroup analyses. The strength of the evidence will be assessed based on the percentage scores derived from the modified COSMIN checklist and the completeness of the information reported for each instrument within the studies.

Discussion

Screening children’s and adolescents’ health and implementing early intervention services can reduce the severity of disorders, lower societal costs, and provide every child with the opportunity to reach their full potential and improve their quality of life (22, 23). This issue is particularly important for children with learning disabilities, who are often not identified until school age or even adolescence due to the absence of

general intelligence deficits. As a result, these children frequently face multiple challenges in life without appropriate treatment or understanding of the underlying causes (4–7).

This systematic review aims to comprehensively evaluate all screening instruments for learning disorders, identifying both the benefits and limitations of the most frequently used tools for specific learning disorders (SLD). The findings will assist researchers and clinicians in selecting the most appropriate instruments for early and accurate screening of children and adolescents. Additionally, the results can inform cross-cultural adaptation of these instruments across different populations.

The heterogeneity and multidimensionality of learning disorders may limit the feasibility of meta-analysis. Nevertheless, a side-by-side comparison of all tools, including their strengths, weaknesses, and psychometric properties, remains highly valuable. In fact, the insights gained from this type of combined qualitative analysis are comparable in importance to those derived from meta-analytic methods. The synthesis will be conducted through expert panel discussions, and the results will be presented visually using figures, tables, and graphs to enhance clarity and usability.

Writing a detailed protocol before conducting the systematic review (SR) will enhance the study's accuracy and ensure the reliability of its results. Developing such a protocol represents a crucial stage in the SR process, as discussed in this article. This protocol will be valuable to researchers undertaking future large-scale SRs of SLD screening tools. Moreover, it can serve as a guide for researchers designing reviews of screening tools for other disorders, providing a structured framework to improve the quality and rigor of their work. One limitation of this protocol is that it focuses exclusively on screening tools; future studies could expand this framework to include systematic evaluation of screening strategies.

Conclusions

Reviewing screening tools and examining their strengths and limitations will provide important guidance to researchers and clinicians in selecting appropriate instruments. Because this protocol is based on the PRISMA-P guidelines, it offers a structured and reliable approach to facilitate this process and improve the quality of future systematic reviews.

Authors' Contributions

All authors were involved in all stages of the study, including conceptualization, protocol development, and manuscript preparation.

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Conflict of Interest: The authors declare no competing interests.

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