

Summary

Enhancing Early Detection: Psychometric Evaluation of the Early Learning Disability Symptoms Assessment Tool

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Learning disabilities are defined as a neurodevelopmental disorder in which an individual, despite having average or above-average intelligence, experiences significant difficulties in academic areas such as reading, writing, and mathematics (American Psychological Association [APA], 2013). Early assessment and intervention are crucial to prevent these difficulties from spreading to other domains over time and negatively affecting overall functioning (Zhang et al., 2020).

Children at risk for learning disabilities often require support in multiple domains during the preschool period, including language, motor, social-emotional development, early literacy and mathematics, left-right discrimination, attention, motivation, self-regulation, and academic attitudes (İzoğlu-Tok & Doğan, 2022; Price et al., 2022). Failure to identify children at risk for learning disabilities at an early stage leads to increased difficulties over time, as confirmed by longitudinal research (Firat & Erdem, 2020; Partanen & Siegel, 2014; van Viersen et al., 2017).

Since early indicators are spread across multiple developmental domains, the development of multidimensional assessment tools is essential. Although many assessment tools exist internationally to evaluate learning skills—such as the Child Development Inventory (CDI), Colorado Learning Difficulties Questionnaire (CLDQ), Learning Disabilities Scale (LDS), and Number Sets Test—these tools typically rely on a single source of information, such as parents or teachers alone, which limits the depth of assessment (Geary et al., 2009; Iretton & Glascoe, 1995; Willcutt et al., 2011; Zahra et al., 2014).

Children at risk often experience difficulties across

multiple domains, and these challenges may resemble those of typically developing children, which complicates the assessment process. Therefore, there is a need for multidimensional and comprehensive assessment tools (Gutiérrez et al., 2020; Steele, 2004). These assessments should draw on both the perspectives of those who know the child closely—such as teachers and parents—and expert evaluations (Cairney et al., 2021). Gathering information from multiple sources provides a more holistic understanding and supports more accurate decision-making (Cairney et al., 2021). Furthermore, as children may exhibit different behaviors across contexts, multi-source assessments provide a more comprehensive evaluation of development (Fletcher et al., 2014; Fletcher & Miciak, 2024; Individuals with Disabilities Education Act [IDEA], 2006). However, most existing tools either focus on only one domain or rely on a single source of information, which limits holistic diagnosis. Thus, this study is grounded in the need for an assessment tool that integrates teacher, parent, and expert perspectives.

Before developing the tool, we conducted a qualitative study—along with a review of the literature and existing tools—to confirm its cultural appropriateness. In the study by İzoğlu-Tok and Doğan (2024), interviews were carried out with parents and teachers to identify early indicators of learning disabilities. Based on this information, we created the Early Learning Disability Symptoms Assessment Tool (ELDSAT) for use with kindergarten and first-grade children. This study primarily aimed to develop the ELDSAT and evaluate its validity and reliability. Accordingly, the central research question is whether the ELDSAT is a valid and reliable instrument.

Method

This research is a scale development study conducted using the descriptive survey model, a quantitative research method. Before beginning data collection, we obtained the approval documents from the Hacettepe University Ethics Committee (KA-19141) and the Ministry of National Education.

Sample

Due to challenges in defining the population framework or accessing the risk group, we used cluster sampling, a multi-stage sampling approach (Serper et al., 2016). The study population consisted of children attending public preschools and first grades in the central districts of Ankara, Turkey. A total of 663 participants—including kindergarten and first-grade children, their parents, and teachers—were included in the study, with 73 contributing to the pilot studies and 590 participating in the exploratory and confirmatory factor analyses.

Data Collection Tools

In this study, we used four instruments for data collection: a demographic information form, the Learning Disability Early Symptoms Screening Scale (LDESSS), Marmara Primary Education Readiness Scale (MPERS), and ELDSAT. Since the early indicators of learning disabilities span various domains such as mathematics, reading, writing, language, cognition, socio-emotional, and motor skills, the LDESSS and MPERS scales were employed to establish criterion-related validity for the study (APA, 2013; İzoglu-Tok & Doğan, 2022; Zhang et al., 2020).

Creating an Item Pool

Based on the findings of the preliminary qualitative study (İzoglu-Tok & Doğan, 2024), together with insights from the literature and existing assessment tools, three separate item pools were developed for children, parents, and teachers.

Child Scale (ELDSAT-CS): The item pool for the ELDSAT-CS consisted of 100 items covering reading, writing, mathematics, perception, left-right discrimination, sequencing, and expert opinion.

Parent Scale (ELDSAT-PS): The item pool for the ELDSAT-PS included 72 items addressing motor development, language and communication skills, social and emotional development, attention, motivation, self-regulation, and study attitudes.

Teacher Scale (ELDSAT-TS): The ELDSAT-TS consisted of 10 items covering motivation, self-regulation, and academic performance and attitudes.

Procedure

First, we obtained approval from the institutions where the research was conducted. Subsequently, consent was obtained from the teachers, parents, and children who comprised the participant group. The data collection process included individual interviews with children, conducted under standardized instructions followed by the practitioner. During this stage, parents and teachers filled out the Likert-type ELDSAT-PS and ELDSAT-TS. Completing the forms took approximately 10 minutes for the ELDSAT-TS, 20 minutes for the ELDSAT-PS, and 30 minutes for the ELDSAT-CS. Data collection was carried out between September 25, 2021, and July 10, 2023.

Expert Opinion and Pilot Study Process

In this study, we used the Lawshe technique to establish content validity (Lawshe, 1975). Two pilot studies were conducted. Prior to the pilot studies, we received feedback from nine experts specializing in child development, educational measurement and evaluation, and Turkish language. Based on the Content Validity Index (CVI) formula, the content validity was found to be statistically significant (Lawshe, 1975). As a result of the analyses, no items were removed before the pilot studies. For all items across the three forms, Cronbach's alpha coefficients ranged between .81 and .92 in the first pilot study, and between .89 and .97 in the second pilot study, indicating satisfactory internal consistency. Item removal was only carried out after the second pilot study. Since the item-total correlation coefficient was below .30, 42 items were removed from ÖGEBDA-ÇÖ (resulting in 96 items), five from ÖGEBDA-EÖ (resulting in 85 items), and two from ÖGEBDA-ÖÖ (resulting in 17 items).

Data Analysis

In this study, we used Factor (version 12.03.02), Mplus (version 8), Jamovi (version 2.3.21), SPSS statistical software (version 23) and R software in the reliability and validity analyses of the three scales (ELDSAT-CS, ELDSAT-PS and ELDSAT-TS).

Results

Child Scale

For the ELDSAT-CS, the KMO value was .870 and the Bartlett test was significant, indicating that the data were suitable for factor analysis ($ELDSAT-CS = .000, p < .05$) (Bartlett, 1954; Kaiser, 1974). As a result of the exploratory factor analysis (EFA), items with poor or low loadings were removed, and a five-factor structure

was obtained. These factors were identified as Writing and Mathematics, Word-Syllable Knowledge, Letter Knowledge, Left-Right Discrimination, and Expert Opinion. The scale explained 59.67% of the total variance. A strong positive correlation was found with the MPERS ($r = .836, p < .001, p < .05$), and confirmatory factor analysis (CFA) results showed excellent model fit. Reliability coefficients ranged between $\alpha = .836-.947$ and $\omega = .837-.948$.

Parent Scale

For the ELDSAT-PS, the KMO value was .937 and the Bartlett test was significant (ELDSAT-PS = .000, $p < .05$) (Bartlett, 1954; Kaiser, 1974). EFA and parallel analysis revealed a two-factor structure. These factors, named Language and Communication Skills and Prerequisite Learning Skills and Attitudes, consisted of 44 items and explained 54.96% of the total variance. Factor loadings ranged from .45 to .94. Item means ranged between 3.51 and 4.56, while item-total correlations were between .47 and .77. A moderate correlation with the LDESSS was found ($r = .403, p = .027, p < .05$). CFA supported the two-factor structure, and reliability coefficients were calculated between $\alpha = .944-.971$ and $\omega = .945-.971$.

Teacher Scale

For the ELDSAT-TS, the KMO value was .936 and the Bartlett test was significant analysis (ELDSAT-TS = .000, $p < .05$) (Bartlett, 1954; Kaiser, 1974). The analyses revealed a single-factor structure, and the 17-item scale explained 61.29% of the total variance. This factor was named Prerequisite Learning Skills and Attitudes. Factor loadings ranged from .42 to .78, while item-total correlations varied between .62 and .87. A test-retest conducted two months apart showed a high correlation ($r = .783, p < .01$). CFA supported the single-factor structure, and reliability coefficients were calculated as $\alpha = .960$ and $\omega = .960$.

Overview of the Assessment Tool

When examining the correlations between the total and sub-dimension scores of the three scales, strong relationships were found between the child scale and the sub-dimension of writing, mathematics, word-syllable knowledge, and expert opinion ($r = .718-.851$). In the parent scale, high correlations were observed between the language and communication sub-dimension and the prerequisite skills sub-dimension ($r = .775-.903$). The teacher scale showed moderate correlations with both the child and parent scales ($r = .262-.329$), while some sub-dimension revealed lower but still significant correlations.

Based on cutoff points, high-, medium-, and low-risk groups were identified. For the ELDSAT-CS total scores, children scoring between 0–30 were classified as high risk, those scoring 31–42 as medium risk, and those scoring 43 and above as low risk. For the ELDSAT-PS, scores of 0–159 indicated high risk, 160–205 indicated medium risk, and 206 and above indicated low risk. Finally, for the ELDSAT-TS, scores between 0–59 were classified as high risk, 60–81 as medium risk, and 82 and above as low risk.

Discussion

Child Scale

General Structure and Dimensions: The ELDSAT-CS was developed to identify children at risk for learning disabilities. It consists of 46 items and five dimensions: Writing and Mathematics, Word-Syllable Knowledge, Letter Knowledge, Left-Right Discrimination, and Expert Opinion. The scale explains 59.67% of the total variance. Combining Writing and Mathematics into a single factor suggests that skills often assessed separately in the literature may serve as a holistic indicator for this age group. Similarly, Letter Knowledge and Word-Syllable Knowledge align under phonological awareness. Left-Right Discrimination was simplified for younger children, while the Expert Opinion factor incorporates contextual elements such as attention and motivation into the assessment.

Validity and Reliability: All factor loadings exceeded .30, and CFA results confirmed construct validity (Field, 2013). The scale showed a strong correlation with the MPERS. Fit indices ($GFI, CFI, TLI, AGFI > .95$; $RMSEA < .05$) indicated excellent model fit (Hu & Bentler, 1999). Cronbach's Alpha and McDonald's Omega coefficients were also high, demonstrating strong reliability (Şencan, 2005).

Parent Scale

General Structure and Dimensions: The ELDSAT-PS is based on parental evaluations and includes 44 items across two dimensions: Language and Communication Skills, and Prerequisite Learning Skills and Attitudes. The structure explains 54.96% of the total variance. Difficulties related to attention, motivation, self-regulation, and socio-emotional development clustered into a single factor. Findings show that the parent scale provides useful insights into children's risk of learning disabilities (Bonti et al., 2021; Snowling et al., 2019; Price et al., 2022).

Validity and Reliability: Factor loadings ranged from .45 to .94, while item-total correlations were between .47 and .77. Criterion-related validity was supported

by a moderate positive correlation with the LDESSS. CFA indicated excellent model fit (Hu & Bentler, 1999) and Cronbach's Alpha and Omega coefficients (.944–.971) demonstrated high reliability (Şencan, 2005).

Teacher Scale

General Structure and Dimensions: The ELD-SAT-TS is a single-factor scale with 17 items, labeled as Prerequisite Learning Skills and Attitudes. It explains 61.29% of the total variance. This factor encompasses motivation, self-regulation, and academic performance, highlighting the importance of teacher observations in identifying children at risk for learning disabilities.

Validity and Reliability: Item loadings ranged from .42 to .78, with item-total correlations between .62 and .87. Test-retest analysis over a two-month interval showed high stability ($r = .783, p < .01$). CFA results confirmed acceptable to excellent model fit (Hu & Bentler, 1999). Cronbach's Alpha and Omega values were both .960, indicating strong internal consistency (Şencan, 2005).

Overview of the Assessment Tool

The correlation findings indicate overall consistency both within and across the three scales. Strong correlations were observed among Writing-Mathematics, Word-Syllable Knowledge, and Expert Opinion in the child scale, and between Language and Communication Skills and Prerequisite Skills in the parent scale. The teacher scale showed moderate to low correlations with the other scales, reflecting that children's behaviors vary across contexts. This pattern is also explained by Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1979).

Each scale's scores were grouped into low, medium, and high levels of risk. Rather than serving a diagnostic function, this classification aims to facilitate early risk detection and guide intervention planning. The results underscore the importance of assessing early signs in predicting later academic outcomes and enabling timely interventions.

This study has certain limitations, such as being confined to central districts of Ankara, relying on self-report data, and being conducted in the post-COVID-19 period, which may have affected developmental outcomes. Nevertheless, ELDSAT represents a unique, multi-source tool in Turkey that makes an important contribution to early risk identification processes. The instrument provides a holistic evaluation across domains such as writing, mathematics, language, communication, and prerequisite skills. Furthermore, it has the potential to be applied in future longitudinal studies.