



HOW TO IMPROVE ASSESSMENT AND TREATMENT OF MULTILINGUAL CHILDREN WITH LANGUAGE AND READING DISORDERS



MULTI MIND! is a research and training network that seeks fundamental breakthroughs in multilingualism research by adopting a multi-disciplinary perspective with the following main scientific themes: Language learning, cognition, and creativity, language processing and the multilingual brain, multilingual cognition and society, language impairment in multilingual children, and multilingualism in migration and refugee settings

INTRODUCTION

This policy report addresses assessment and intervention for Developmental Language Disorder (DLD) and Developmental Dyslexia (DD) in multilingual children. Given the importance of distribution of resources, targeted research projects and interdisciplinary collaboration with all relevant stakeholders (International Expert Panel on Multilingual Children's Speech, 2012), the report has taken into consideration the perspectives of clinicians and health care providers alongside academics from the project "The Multilingual Mind - MultiMind".

KEY FINDINGS

Detection of DLD and DD in multilingual children can be improved through:

- the use of language tasks that are independent of prior lexical knowledge such as nonword repetition tasks and dynamic assessment
- the additional use of nonlinguistic tasks (such as processing speed, auditory discrimination, visual attention, working memory and executive functions)
- the contextualization of children's language performance according to their language background and history
- the use of computerized, multilingual screenings

SLT training, education, and research needs should include:

- continued provision of recent and comprehensive information, as well as of adequate resources and materials
- constant re-evaluation of current (best) practices according to recent research findings in collaborative projects between academics and clinicians

This Policy Report was approved by the dbl (Deutscher Bundesverband für Logopädie e.V.), the dbs (Deutscher Bundesverband für akademische Sprachtherapie und Logopädie), the ESLA (European Speech and Language Therapy Association), the FLI (Federazione Italiana Logopedisti), the GISKID (Gesellschaft für interdisziplinäre Spracherwerbsforschung und kindliche Sprachstörungen im deutschsprachigen Raum e.V.), logopädieaustria (Berufsverband der österreichischen Logopädinnen und Logopäden), the Multilingual-Multicultural Affairs Committee of the International Association of Communication Sciences and Disorders (IALP), and the SINPIA (Società Italiana Neuropsichiatria dell'Infanzia e dell'Adolescenza).

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METHODOLOGY

This report starts with a summary of the directions contained in **previous**, similar **policy reports**. These are updated based on more recent scientific evidence (data published in international, peer-reviewed scientific journals), including research from the project “MultiMind”. Relevant references are provided at the end of the report.

The evaluation of evidence-based findings rested on the following principles:

- (a) for *diagnostic protocols*: availability of data on **diagnostic accuracy** and **psychometric characteristics** of the assessment tools, and
- (b) for *intervention programs*: pre-post treatment **effectiveness data** in children with DLD/DD with respect to an appropriate **control** group.

Moreover, selection of the studies was based on the inclusion of children from an **appropriate age range** (3 to 5-6 years for DLD and 6 to 9-10 years for DD), so as to provide information that can be used to direct and support intervention in the moment when it is most needed and most effective. When relevant studies conducted with children from different age ranges were included, the children’s age has been specified.

BACKGROUND & CHALLENGES

Accurate diagnosis

Only if a child shows difficulties in *all languages spoken*, can this condition be considered of *clinical relevance* (Garraffa et al., 2019). Mixing languages or supposedly randomly switching from one to another (code-mixing, code-switching; IALP, 2011) are not signs of language impairment (Bishop et al., 2017).

It is important to distinguish between the information needed (a) to make an adequate *nosographic diagnosis* (impaired vs. not impaired) and (b) to evaluate and describe the child’s performance on a wide range of linguistic abilities (*functional diagnosis*) in order to identify specific clinical goals (e.g. articulation, grammar, vocabulary). Single clinical markers may be sufficient to reach the first goal (a), but a whole set of tests are necessary to describe the child’s complete linguistic *functional profile* (b). In this perspective, also *monolingual norms* may constitute a useful (*non-diagnostic*) *benchmark* to compare the child’s competence with general functional requirements/expectations, especially in school settings.

Influence of exposure on bilingual language acquisition

Multilingual language acquisition is highly variable depending on the children’s language exposure and experience. Since differences in both of these variables make bilingual children not comparable to monolingual children in their family language (also referred to as first language, L1) as well as in the societal language (also second language, L2), *monolingual norms should not be applied* to multilingual children for diagnostic purposes (IALP, 2011, 2020). Furthermore, all languages spoken by the child and their heritage culture should be taken into consideration in Speech and Language Therapy (SLT) intervention to a) *reduce the risk of misdiagnoses* (i.e. false negative and false positive diagnoses; Lehti et al., 2018; Grimm &

LIMITATIONS OF PREVIOUS RESEARCH

There is **scarcity** of data concerning *diagnostic accuracy* (in terms of **sensitivity and specificity**, i.e. the capacity of a test to correctly identify children who have a disorder without erroneously including TD children) and *psychometric characteristics* of tests (in terms of **validity**, i.e. the ability of the test to measure what it declares to be measuring, and **reliability**, i.e. the degree of precision and stability of the measurement) for multilingual children.

Similarly, limited evidence exists concerning the *effectiveness* of **intervention** programs for multilingual children with DLD and DD emerging from **rigorous** experimental protocols and controlled designs.

Finally, experimental studies often do not *distinguish* among **different language groups**, making interpretation and generalization of results more difficult.

Schulz, 2014) and b) *preserve* children’s *cultural identity* and *linguistic ability, especially in their L1* (Carrol, 2017). Multilingual children are often subjected to insufficient or late access to intervention, which can have detrimental effects because treatment outcomes are better with early- than with late-onset intervention (Law et al., 2003). *Language background history* (i.e. cumulative length of exposure; Garraffa et al., 2019) needs to be assessed thoroughly and taken into account when evaluating multilingual children’s language competence. Therefore, involving parents in diagnostic and interventional procedures is crucial to providing the best possible service for multilingual children (IALP, 2011).

Language-based assessment & intervention methods

In addition to the assessment of the children’s language background (also through parental questionnaires such as the ALDeQ, that proved to be clinically useful in DLD identification with 100% specificity and 82.9% sensitivity, extending to 91.4% when combined with direct language measures, Bonifacci et al., 2020), the evaluation of their language competence is recommended *to take place in both languages* (IALP, 2011, 2020). However, this entails that the examiner would ideally need to speak or at least have some background knowledge of all languages of a child, also in order to estimate potential effects of cross-linguistic interaction and interference.

POSSIBLE SOLUTIONS



Language-specific tasks

Among others, in the BiSLI COST Action ISO804 project (<https://www.bi-sli.org/>; Armon-Lotem et al., 2015) several tasks for “Language Impairment Testing in Multilingual Settings (LITMUS)” - including nonword and sentence repetition tasks - were constructed following well-defined principles and are (being) validated in various different languages and multilingual settings. The repetition of language-specific or quasi-specific (Chiat, 2015) nonwords was found to discriminate between bilingual children with/without DLD at high levels of sensitivity and specificity (Boerma et al., 2017), although not all studies confirmed this finding (Gutiérrez-Clellen & Simon-Cerejido, 2010; Thordardottir & Brandeker, 2013). The same is observed for sentence repetition tasks, showing generally good sensitivity and specificity in multilingual DLD risk identification but also variability across languages and age groups (Marinis & Armon-Lotem, 2015; Armon-Lotem & Meir, 2016; <https://www.litmus-srep.info/>; Fleckstein et al., 2018; Pratt et al., 2021). The use of *computerized* versions of the tasks in which L1 and L2 tasks are automatically presented and evaluated can enable examiners who do not speak the child’s L1 to conduct complete assessment in both languages (Eikerling et al., 2022). Further advantages concern a positive effect on children’s motivation (Hautala et al., 2020) and the possibility of remote testing (Hodge et al., 2019).

Nonlinguistic abilities

The assessment of nonlinguistic abilities (i.e., working memory, processing speed, attentional control) has the potential to integrate language assessment protocols and to facilitate the diagnostic process for multilingual children because they are independent of both the child’s language experience and the examiner’s mastery of the language(s).

Several correlations have been found between *rhythm* and phonological processing as well as rhythm and syntactic processing in typically developing (TD) children. Furthermore, DD and DLD children have been found to underperform TD peers in rhythm discrimination, anticipating the beat of a metronome and the syllable envelope perception (Lense et al., 2021). Therefore, it may be worth pursuing rhythmic abilities as potential non-linguistic markers/risk factors for the early identification of DLD (Ladányi et al., 2020). A few studies have reported positive effects of rhythm-based training on DLD (Schön & Tillmann, 2015) and DD (Flaugnacco et al., 2015; Cancer et al., 2020) but *no data are available on multilingual children with DLD/DD*.

Besides the rhythmic deficits, children with DLD or DD exhibit deficits in *memory, attention* and in *executive functions*, such as planning, monitoring and revising during problem solving, and these deficits are independent of the linguistic background. A recent study (Ebert & Pham, 2019) has assessed the diagnostic potential of three nonlinguistic tasks including processing speed, auditory working memory, and attentional control (inhibition) in various bilingual and monolingual groups of children with DLD aged 6 to 10. For all three tasks, *adequate sensitivity or specificity* (but not both in most cases) was achieved in nearly all age groups. Interestingly though, diagnostic accuracy at a certain age was *not always comparable* in the *different language groups*. A study by Park et al. (2021) also examined the diagnostic accuracy of nonlinguistic tasks (procedural learning, executive attention, and processing speed) in TD and DLD children with various linguistic backgrounds aged 8 to 12. In bilinguals, the *combination of linguistic and nonlinguistic tasks provided very good sensitivity and specificity* figures - over 90% for procedural learning measures combined with a measure derived from the Clinical Evaluation of Language Fundamentals (CELF, Semel et al., 2003).

Dynamic Assessment

Dynamic assessment evaluates the child’s ability to learn new language skills, *reducing the disadvantage of insufficient language exposure*: the assessment of language ability is based on changes made from pretest to posttest or on specific measures of modifiability, such as the amount of cues needed, number of repetitions, and learning curves. In an interventionist approach (more objective and easier to include in a diagnostic protocol), the fixed scripts follow a graduated prompting approach, in a predefined order. In an interactionist approach, mediated learning principles are applied, whereby the clinician focuses on the child’s learning needs (Poehner, 2008). A recent meta-analysis (Orellana et al., 2019) showed that the *sensitivity* values for the seven included studies involving bilingual children ranged from 77% to 89%, while *specificity* ranged from 80% to 96%. Similarly, kindergarten dynamic assessment of coding ability (learning a new orthographic code) in Latino bilingual children predicted *reading* ability at grade 1 with sensitivity and specificity values above 80% (Petersen & Gillam, 2015).

KEY FINDINGS (EXTENDED)

Language-specific L1 & L2 assessment:

- The repetition of nonwords has shown generally good sensitivity, specificity and validity in identifying multilingual children with DLD (Guasti et al. 2021) and DD (Vender et al., 2019).
- Repetition of highly controlled language-specific nonwords can be more informative with respect to children’s clinical status compared to language-nonspecific ones (Bloder et al., 2021a). If the examiner does not speak a child’s L1, this poses a presentation and a rating problem that could be solved through the use of computerized systems.
- Computerized screenings allow reliable identification of the risk of language and reading disorders through assessment in children’s home and societal language (Eikerling et al., 2022)

Non-linguistic abilities in language and reading assessment

- Tasks assessing timing anticipation abilities, rhythm production, and executive functioning are sensitive to the presence of DD in monolingual children speaking various languages (Ladányi et al., 2020; Pagliarini et al., 2020, Pagliarini et al., 2020, 2021; Persici et al., 2019) and may increase the accuracy of identification of DD in multilingual children, although their diagnostic accuracy and psychometric properties still have to be investigated.
- A combination of verbal working memory and linguistic measures (vocabulary) in Spanish-English bilingual children aged 3-5 allowed for sensitivity values of 73% and specificity of 77% in DLD identification (Guiberson & Rodriguez, 2020), while processing speed, visual attention (especially inhibition) and verbal working memory tasks (Ebert & Pham, 2019; Park et al., 2020, 2021) combined with linguistic scores reach accuracy scores close to or above 90% in multilingual DD and DLD identification.

SLT training

- Despite their good theoretical knowledge concerning the specific requirements in diagnosis and therapy provision for multilingual children, SLTs cannot always apply this knowledge in common practice (Bloder et al., 2021b) and they often do not feel confident in their capacity to assess multilingual children (Stankova et al., 2021).
- Concrete experience in working with multilingual children is the most influential factor for the development of mindful and multilingually oriented attitudes and approaches in SLT (Bloder et al., 2021b)

POLICY IMPLICATIONS

- To ensure adequate diagnostic procedures for bilingual children, funding should be directed to multidisciplinary consortia towards **developing multilingual exposure-independent tasks such as nonword and sentence repetition tasks and computerized screening protocols** for all languages spoken by children.
- Sufficient resources need to be provided to ensure complete and accurate diagnostic processes in clinics that ideally incorporate both **linguistic and non-linguistic tasks** since both contribute to risk identification of DD and DLD in multilingual children.
- Multidisciplinary teams of researchers and clinicians should be given the possibility and the resources to:
 - Investigate the potential contribution of **dynamic assessment tools**
 - Assess **diagnostic accuracy** for all the linguistic and nonlinguistic tasks and their combinations whilst taking into account the **age** and the specific **language(s)** spoken by the children, since these parameters may vary with age and language group
 - Define cut-offs for clinical application for all new linguistic and nonlinguistic measures
 - Provide data on their **psychometric properties**
 - **Adapt** the protocols employed with school-age children with DLD **extending** them to preschool children
 - Assess the effectiveness of **intervention** programs based on **nonlinguistic** functions, such as sensitivity to rhythm with bilingual preschool children with DLD, using appropriate **control groups**.
- The above-mentioned topics should be part of **SLT training**, while **multidisciplinary teamwork** including SLTs and psychologists/neuropsychologists should allow optimal integration of linguistic and nonlinguistic assessment.
- Continued **professional training** on multilingualism should be granted to the professionals in charge of assessment and treatment, together with adequate opportunities for **practical experience** in working with multilingual children during training, and the availability of **appropriate materials and resources**.

Further reading

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The complete reference list can be accessed here: www.multilingualmind.eu/policy-reports

