

Screening for the Identification of Preschool Oral Language Difficulties:

A Validation Study in Brazil.

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Conflict of Interest

There are no relevant conflicts of interest.

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Abstract

Purpose: This study aimed to develop and validate a screening questionnaire for the early identification of language difficulties in Brazilian Portuguese-speaking preschool children.

Method: The paper is divided into two studies. In the first, we reported the theoretical principles that guided the development of the screening instrument (SIOLD) and tested the validity of its structure. The psychometric properties of the SIOLD were tested using a sample of 748 children attending Year 1 of preschool. Thirty two teachers coming from eight different schools completed individual questionnaires for all their students. [Confirmatory Factor Analysis](#) was used to assess the validity of the SIOLD. In the second study, we investigated the accuracy of the questionnaire for identifying children with oral language difficulties using a different sample of 100 preschool children. Using ROC curve, we assessed the sensitivity and specificity of the SIOLD to identify children who showed impaired language performance in a short battery of tests.

Results: The SIOLD has been shown to be a reliable and valid questionnaire for assessing [the form and content](#) of oral language in preschool children. It showed good accuracy, with sensitivity of .857 and specificity of .946 for the identification of language impairment.

Conclusions: The questionnaire provides a useful tool for enabling [Brazilian](#) teachers to refer language-impaired children to the speech-language services. The theoretical and clinical implications are discussed.

Keywords: language impairment, early identification, oral language screening, teacher report questionnaire.

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Language disorders are one of the most common types of childhood disability (Conti-Ramsden & Botting, 1999; Dockrell, Bakopoulou, Law, Spencer & Lindsay, 2015; Law, Parkinson & Tamhne, 2000), affecting approximately 7% of school-aged children (for USA; Tomblin et al., 1997, for UK; Norbury et al., 2016). This prevalence is higher than all other developmental disorders that are considered as public health problems, like obesity (Karnik & Kanekar, 2012).

The consequences of language disorders on children's lives can be long-lasting (Beitchman, Brownlie & Bao, 2014; Conti-Ramsden, St Clair, Pickes, & Durkin, 2012). Although up to 40% of children who struggle to develop language at the age of 3-4 may resolve their difficulties (e.g. Bishop & Edmundson, 1987), many still experience language problems at the age of school entry (Snowling, Duff, Nash & Hulme, 2016). After the ages of 5-6, language trajectories are stable, suggesting that children who have not overcome their difficulties at this stage are likely to present persistent language problems (Norbury et al, 2017). For many, language disorders are associated with a downward spiral of poor language and learning difficulties, which can have an impact on children's friendships, academic self concept and ultimately on their psychosocial well being (Conti-Ramsden & Botting, 2004; Lindsay & Dockrell, 2012).

Despite the high prevalence of language disorders and its persistent consequences, there is research evidence showing that early intervention can substantially reduce the burden of the condition (Law, Garrett & Nye, 2004; Snowling & Hulme, 2011). The problem, however, is that early diagnosis is still far from being the common practice in most countries: language disorders are often not recognised until children fail to achieve academic skills, which delays treatment and reduces the chances of success later in life (Bryan, Garvani,

Gregory & Kilner, 2015). This is even more problematic in countries where valid and reliable screening tools are lacking and where public policies for early identification of developmental disorders are not yet implemented.

In Brazil, the early identification of children at risk of language disorders in preschools depends upon teacher knowledge and experience [with](#) language difficulties. To our knowledge, there is only one published questionnaire developed for Brazilian teachers to identify language disorders in preschool children (Silva, Labanca, Eglea & Costa-Guarisco, 2014). [Although the initiative is valuable, the instrument has not yet been validated](#) and its sensitivity (0.3-0.4) and specificity (0.6-0.9) values are [not high](#). Unfortunately, this means that teachers, being the professionals who spend most time with children, [lack the appropriate tools](#) to identify language difficulties in the early years (Dockrell & Howell, 2015).

In this paper, we aim to address this shortcoming by developing and validating a screening questionnaire for use by Brazilian preschool teachers to identify children with language difficulties. We provide in the next sections a comprehensive discussion on the diagnosis and early identification of language disorders, and present the rationale that underlies the [development of the](#) screening tool.

Definition, Terminology and Controversy Surrounding Language Disorders

Language disorders may present in different forms and levels of severity, but always involve difficulties in acquiring aspects of language, including phonology, semantics, grammar and/or pragmatics (Bishop, Snowling, Thompson & Greenhalgh, 2017; Law et al., 2000). Language Disorders may be associated with a biomedical condition (i.e. autism spectrum disorder, hearing impairment, intellectual disability or neurological impairment) or in isolation, as a primary language learning difficulty. In the first case ([language disorders associated with a biomedical condition](#)), the difficulties are usually easily visible to parents, paediatricians and teachers. In the second case ([primary language learning difficulty](#)), it can

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be less clear that the child has a language problem because it may be hidden in normal discourse and only evident when language learning is required. It follows that these difficulties are under diagnosed or can often be attributed to other problems, such as antisocial behaviour (Bishop, 2014).

At least two main reasons have been raised to explain why language disorders are under diagnosed. First, early identification is influenced by contextual factors including social and health support, professional knowledge and skills, and local policies (Lindsay, 2011; Mroz & Hall, 2003). Professionals that deal with children's development, but are not language experts, are not often aware of the existence of a clinical condition in which children fail to develop language [for no clear reason](#). They usually tend to associate language and speech problems either with more severe conditions that may explain children's difficulties, or with more transient cases of language delay that may resolve spontaneously. The second reason is the lack of consensus about language disorders even among experts. Different terminology has been used to define children with primary language learning difficulties, "Specific Language Impairment" (SLI) being the most used by researchers over the last three decades (Bishop, 2014; Conti-Ramsden, 2014; Rice, 2014). When there is not a single term used to describe a combination of symptoms, there is disagreement on how to diagnose, when and who to treat, and ultimately how to bring awareness of the condition to the general public. Another consequence is that non-experts are not empowered to refer children who they suspect to have difficulties to speech and language services.

[In order to overcome the issue of under diagnosis](#), researchers from a multinational and multidisciplinary team conducted a comprehensive survey (the CATALISE panel) in order to reach consensus on how to diagnose and label children who struggle to develop language without other associated medical conditions. The consensus was to use the term "Developmental Language Disorder" (DLD) with the addition of specifiers to better describe

the main areas of language difficulties: semantics, phonology, syntax, morphology, pragmatics and/or discourse (Bishop, Snowling, Thompson & Greenhalgh, 2016, Bishop et al., 2017). Henceforth, following the recommendations of the consensus, we will consistently use the term DLD to refer to this group of children.

Identification of Developmental Language Disorders

The diagnosis of DLD involves inclusion and exclusion criteria: children should have performance below expectation on standardised language tests and should not have a medical condition associated with the language difficulties. However, there is not a clear cut-off that distinguishes between language disorder and normal variation in language ability, and the prevalence naturally depends on locally agreed criteria (Bishop et al, 2016). Cut-offs of 2SD below the mean, as recommended by the ICD-10 (WHO, 1992), are stringent and only identify children with severe language problems (low sensitivity, but high specificity). On the other hand, adopting the more common criterion of two or more language composite scores below 1.25 SD of the mean, as used by Tomblin et al. (1997), usually includes children that have not been suspected by caregivers or professionals to have language difficulties (high sensitivity, but low specificity).

Early identification should focus on the areas of language that are most commonly affected in DLD. Children with this condition usually struggle to learn the core aspects of language, failing to develop phonological, semantic and/or grammatical abilities (Bishop et al., 2016). Phonological/speech problems are common among preschool children and easier identified particularly when a child's speech is not easily intelligible (Bishop & Hayiou-Thomas, 2008). Semantic problems (particularly poor vocabulary) are the most common symptoms of language disorders; they are the most sensitive to environmental differences such as, for example, socioeconomic ones (Fernald, Marchman & Weisleder, 2013; Hart & Risley, 1995). Children with DLD tend to use generic words to refer to specific referents, fail

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to define words and classify them into semantic categories and struggle to understand abstract concepts and dual meaning.

Impairments in other aspects of language learning, such as grammatical knowledge, have been considered to be one of the core 'markers' of language impairment (Conti-Ramsden, Botting & Faragher, 2001). At least for a subgroup of children with DLD, learning the grammatical rules of a language constitutes a fundamental problem. Although these difficulties may occur for any language being acquired, the specific difficulties they experience may vary according to the characteristics and nature of the language (Leonard, 2014). For example, children with DLD have well-documented deficits using tense and agreement inflections in English. Children tend to omit verbal inflectional morphemes that are usually non-stressed suffixes, which leads to an overuse of nonfinite verbs, specially the infinitive form (Leonard, 2000). In Romance languages, like Brazilian Portuguese, children also struggle to understand and use verb inflections, but the high frequency and regularity of verb morphology may facilitate the perception that these features are crucial to the language (Bedore & Leonard, 2001). Brazilian DLD children, therefore, make verb inflection errors (Araújo, 2007), but rarely choose the infinitive form instead of the inflected form. In contrast to morphological difficulties, other grammatical problems are universal across languages (e.g., poor comprehension of sentences with complex syntactic structure, especially those involving long-distance relationships).

Together, phonological, semantic and/or grammatical problems can be considered markers of DLD for children whose main difficulties are related to the form and content of language (cf. its functional use; Bishop et al., 2016). However, these core difficulties can frequently lead to problems in other areas of language. Children who struggle to understand semantic complex relations and fail to produce grammatical and intelligible utterances will inevitably have poor narrative skills (Norbury & Bishop, 2003); they may also perceive

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themselves as poor communicators, have fewer communicative interactions, adopt a more responsive and internalizing behaviour, and avoid social environments where communication is needed (Conti-Ramsden & Botting, 2004; Puglisi, Cáceres-Assenço, Nogueira & Befi-Lopes, 2016).

The present study

The present study aims to develop and validate a screening questionnaire for use by Brazilian preschool teachers to identify children with language difficulties. The main purpose of this screening is to help teachers detect children at risk for DLD and refer them to speech and language therapists for a full evaluation using well-standardized clinical assessment tools. However, because the questionnaire focuses on language symptoms and is not meant to be used for diagnosis (as any screening tools), it is likely that it will also detect children with language disorders associated with other conditions. Here we describe two studies: the first examines the conceptual structure and psychometric properties of the screening questionnaire; the second combines the results from the questionnaire and from children's assessment to explore the sensitivity and specificity of the SIOLD in identifying preschool children with oral language difficulties.

Study 1 – Development and Validation of the Screening Questionnaire

In this study, we aimed to develop and validate a screening tool for the identification of oral language difficulties by preschool teachers. The scale uses teacher observations of child language to decide which children are 'at risk' of language disorder and hence would benefit from referral to speech and language services. Because children with DLD primarily struggle with the structural components of language (phonology, semantics and/or grammar), we assessed each of these domains separately, rather than with general questions. We also

intended the screening to cover aspects of language functioning *that are usually also affected in children with DLD*, such as pragmatic and narrative skills.

Method

Design of the screening questionnaire. We first reviewed the international literature on language screening questionnaires suitable for preschool children. The development of the SIOLD (Screening for Identification of Oral Language Difficulties by Preschool Teachers) was inspired by existing questionnaires and checklists that are available in English, including the Children's Communication Checklist – 2 (CCC-2; Norbury, Nash, Baird, & Bishop, 2004) and the oral language components of both the Classroom Communication and Learning Checklist (CCLC; Wiig & Secord, 2000) and the Communication and Language scales of the Early Years Foundation Stage Profile (EYFSP; Department for Education, 2014).

The second step was to create the structure of the SIOLD and elaborate its questions. The questions from the above mentioned instruments that tapped the language domains of interest (phonology, vocabulary, grammar, narrative and pragmatics) were initially selected. Subsequently, other questions that were judged to be clinically relevant and easy to be answered by non-language experts were elaborated and organised into the corresponding domains. As a screening tool, the purpose of the instrument was not to identify specific language problems because this would require expert knowledge, but rather to detect manifestations that are common among children with DLD. All questions were phrased in nontechnical language and followed by examples when necessary to increase response accuracy. Two experienced teachers working in the Secretary of Education of the city of Rio Claro – SP (Brazil) judged how accessible the questions were and provided written feedback for each question they struggled to understand or score. Changes, when required, included replacing words that were considered to be too technical (e.g. “phonemes” for “speech

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sounds”) and adding examples to expressions that could be misinterpreted (e.g. for the item “struggles to talk about past events”, we added the example “what s/he has done in school”). The content of the SIOLD was therefore considered to be suitable for the Brazilian context and educational system.

The first version of the SIOLD consisted of 18 questions assessing five different language domains: three questions tapping phonology (e.g. speaks clearly, pronouncing all sounds correctly), four questions for vocabulary (e.g. easily learns new words), four questions assessing grammar (e.g. combines words to make sentences), four questions for narrative (e.g. talks about future events) and three questions measuring pragmatics (e.g. gives the right amount of information in your answers without being too precise or too vague). The questions were selected with the aim of generating a five-factor model with each language domain represented by one latent variable (at least three items per domain). Eight of the questions were formulated negatively (instead of positively) to force teachers to evaluate every statement in its own right (Ratray & Jones, 2007). For each question, teachers were required to rate the frequency with which that behaviour was shown by the child (never/ almost never = 0; sometimes = 1; always/ almost always = 2). Table 1 presents a comparison between the characteristics of the SIOLD and other instruments that inspired its development.

Table 1 about here

Ethical considerations. Ethical clearance for this study was provided by the Ethics Committee of the Federal University of São Paulo (CAEE: 43868715.5.0000.5505).

Participants. In order to assess the validity of the questionnaire, data were collected from children participating in a broader study (the LIFEY Project). All teachers working in the preschools that took part in that project were eligible to fill in the SIOLD. The preschools were under the control of the Secretary of Education of the City of Rio Claro, in the state of São Paulo - Brazil. Overall, 33 teachers (all female) coming from eight different schools

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completed individual questionnaires for all their students ($N = 754$, 51.7% of which were boys). According to municipal official records, 53.6% of teachers have only the bachelor degree, 38.7% have a specialization degree, 1.9% has masters and 0.2% has a doctoral degree. The remaining 5.5% of teachers have only finished high school and have a degree equivalent to a technician in education.

Participants ranged in age from 4;03 to 5;05 years ($M=4;09$). All subjects were attending Year 1 of preschool and spoke Portuguese as their native language. After collecting data, we excluded children who had received a formal diagnosis of specific conditions by a medical doctor (e.g. autism spectrum disorders, Down syndrome, intellectual disability, hearing impairment and microcephaly) ($N=5$). One additional child was excluded because Portuguese was not the main language spoken at home. Our final sample included 748 children.

Procedures. Teachers were instructed to fill in individual questionnaires for each student using LimeSurvey, a free open source online survey. The software required all questions to be answered in order to move on to the next page to avoid missing items. Teachers did not receive any training to complete the questionnaire because we aimed to have an instrument that was easy to be administered. Each teacher received a unique login code to access the survey and used anonymous ID codes to preserve the identity of children and ensure data confidentiality. Answers were recorded online and data were automatically exported to excel and SPSS files once requested.

Results

The questionnaire adopted a theoretical model having *a priori* five domains or factors: phonology, vocabulary, grammar, narrative and pragmatics. Teachers' responses were scored as ordinal items (i.e., three-point Likert scale). The dimensional structure of the SIOLD and its internal consistency was tested with [Confirmatory Factor Analysis \(CFA\)](#). We

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investigated model fit using the mean-and variance-adjusted weighted least squares (WLSMV) estimator in Mplus 7.4. Due to the complex sampling structure (i.e., 33 teachers assessing 754 children), standard errors were computed by a sandwich estimator and chi-square test of the model fit took into account the non-independence of observations (multilevel analysis was used with children clustered among teachers). The following cut-off criteria were used to determine a good model fit: WRMR near or below .9, RMSEA near or below .06, CFI and TLI near or above .95 (Hu & Bentler, 1999).

First, we assessed the original five-factor structure of the SIOLD. The solution was inadmissible because estimated standardized correlations between two pairs of latent variables were greater than one (Grammar and Narrative: $r = 1.03$; Grammar and Pragmatics: $r = -1.06$). We therefore decided to remove the Pragmatic and Narrative domains from the questionnaire and re-run the remaining three-factor model. This decision was taken because we found inappropriate to remove the construct “Grammar” from the model, considering it constitutes the core structural aspects of language, together with phonology and semantics. The new three-factor model was admissible and provided a good fit to the data: $\chi^2_{(41)} = 107.270$, $p\text{-value} < .001$; RMSEA = .046 (90% CI = .036 to .057); CFI = .974; TLI = .965. Factor variances were fixed at one and all factor loadings were freely estimated and statistically significant at $p < .001$.

For each factor, scale reliability (represented by ρ) was estimated based on standardized CFA results. All reliability indices were satisfactory: $\rho_{(\text{phonology})} = .897$, $\rho_{(\text{vocabulary})} = .834$, $\rho_{(\text{grammar})} = .876$. Correlations between factors ranged from moderate to strong, but some exceeded the usual cut-off for problematic discriminant validity (.85). We therefore re-specified the model to a unidimensional factor, rearranging all remaining 11 items to load into one single domain named “Language”. The model fit indices for this model were satisfactory ($\chi^2_{(44)} = 143.929$, $p\text{-value} < .001$; RMSEA = .055, (90% CI = .045 to .065);

CFI = .961; TLI = .951) and the reliability index was: $\rho_{(\text{language})} = .939$. Figure 1 shows the final unidimensional model.

Figure 1 about here

The final structure of the SIOLD consisted of 11 items loading on a broader single Language factor. This version of the questionnaire and its English translation are shown in Appendices 1 and 2, respectively.

Discussion

The SIOLD was created to provide Brazilian teachers with a measure for detecting language difficulty in Portuguese. We first created the instrument with questions tapping phonology, vocabulary, grammar, narrative, and pragmatics. After testing the construct validity of the SIOLD with CFA, we reduced the length of the instrument down to eleven questions tapping phonology, vocabulary and grammar (but not pragmatics and narrative). All questions loaded on a broader single language factor (unidimensional model), which seems to reflect children's abilities to use the form and content of language.

Study 2 – Sensitivity and Specificity of the SIOLD for Detecting Language Difficulties

An independent sample of children was assessed using the validated version of the SIOLD in order to assess the accuracy with which it could identify preschool children with oral language difficulties. This study was conducted in a different city from the validation study (above).

Method

Ethical considerations. Ethical clearance was provided by the Ethics Committee of the Federal University of Santa Catarina – Brazil (CAAE: 52861516.4.0000.0121).

Participants. Three hundred children attending a state preschool in the city of Florianópolis (Santa Catarina – Brazil) were recruited for this study. Inclusion criteria were defined as: speaking Portuguese as first language and having no previous history of hearing,

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visual, cognitive, neurological or psychiatric problems and/or genetic syndromes. Overall, ten teachers rated their pupils' language (30 children per teacher/ classroom) using the SIOLD. Four of them (40%) had a bachelor degree whereas six (60%) had a specialization degree. Table 2 shows detailed information about teachers.

Table 2 about here

A sub-sample of 100 children (ten students per teacher/ classroom) was randomly selected from the full sample to be directly assessed by speech-language therapists. Children in this final sample ranged in age from 5;00 to 6;08 ($M = 6;00$).

Procedures. In order to assess the sensitivity and specificity of the SIOLD, children were directly assessed by speech-language therapists using a short battery of language tests. The examiners were trained to administer the language assessment, were unfamiliar with children and blind to their scores on the SIOLD. Performance in these tests was taken as the gold standard and was used to classify children into typically developing (TD) or language impaired (LI). Teachers' ratings on the SIOLD were then compared across the language groups.

Vocabulary. A short version of the Expressive Vocabulary Test (ABFW; Befi-Lopes, 2004) was used to assess vocabulary level ($\alpha = .91$). The child is presented with pictures and asked to name objects, professions, places, colours and shapes. A fixed set of 60 items randomly chosen from the original test was administered, and raw scores were recorded (0-60).

Comprehension. A short version of the Test for Reception of Grammar – 2 (TROG-2; Bishop, 2003) in Brazilian Portuguese was used to assess grammatical understanding. Licenses were obtained for use of the translated version of this test for research purposes. The child hears a sentence and selects the corresponding picture out of four choices. The original

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test comprises 80 items, but in this study we used 20 randomly selected items following Engel de Abreu, Cruz-Santos and Puglisi (2014) ($\alpha = .74$). Raw scores were used (0-20).

Phonological memory. The Brazilian Children's Test of Pseudoword Repetition (BCPR; Santos & Bueno, 2003) was used to assess phonological skills ($\alpha = .94$). The child is encouraged to repeat 40 pseudowords varying from two to five syllables in length. Raw scores were used (0-40).

Results

To score the SIOLD, we first needed to re-code the items measuring language difficulties to make them comparable to the items measuring language abilities, so that the higher the score in the questionnaire, the better the language skill. For example, for items measuring language abilities, the answer "always" is scored 2 and "never" is scored 0. For items measuring language difficulties we mirrored this scoring system so that "always" was scored 0 and "never" was scored 2. By doing this, all items tapped children's language performance in the same direction, and we were able simply to add up the scores on each of the 11 items of the SIOLD. The final outcome of the questionnaire had possible scores ranging from 0 to 22. Appendix 3 shows the original valence of each item of the questionnaire (positive or negative items) and illustrates how each item is scored for clinical purposes.

For the accuracy analysis, we first aimed to identify children with language disorder based on a single language score. This score was generated using principal component analysis to extract the common variance between children's performance on the three measures of language battery (vocabulary, comprehension and phonological memory). The results showed that each of the three language tests had similar factor loadings: vocabulary (.458), comprehension (.465) and phonological memory (.412). Using the single factor score, we split the data into two groups using the cut-off that is usually adopted by clinicians to

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diagnose language disorder; i.e., more than 1.5 SD below the mean. [Table 3](#) shows descriptive statistics ([percentage of correct answers](#)) on vocabulary, comprehension and phonological memory for children deemed to be DLD (7% of the sample) versus TD.

[Table 3](#) about here

In order to test the sensitivity and specificity of the SIOLD, we used ROC curve analysis with the questionnaire as the dependent variable and the groups (DLD and TD) as the state variable. The results revealed excellent accuracy of the questionnaire for identifying children with language disorder, with area under the ROC curve of .935 (SE = .039, CI: .859 – 1.000, $p < .001$) (see Figure 2).

[Figure 2](#) about here

The classification accuracy of the questionnaire using the cut-off of 13.5, which yielded the best combination of sensitivity and specificity (derived from ROC curve analysis), is shown in [Table 4](#). At this cut-off, the sensitivity of the SIOLD was .857 (meaning it correctly identifies more than 85% of children with DLD) and its specificity was .946 (indicating that it correctly classifies as negative cases more than 94% of children without DLD). Put another way, the screener missed 14.3% of children with DLD (false negatives) and there were 5.4 % false positives (children who did not have DLD but were identified as positive cases). For clinical purposes, we also calculated the positive and negative predictive values. Amongst the cases positively identified by the SIOLD as having DLD, 54.5% were true cases of DLD (positive predictive value). For the cases that passed on the SIOLD (negative cases), 98.9% did not have DLD (negative predictive value).

[Table 4](#) about here

Discussion

In summary, the SIOLD showed good sensitivity (.857) and excellent specificity (.946) when setting the cut-off at 13.5; and demonstrated positive and negative predictive

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values of respectively 54.5% and 98.9%. The combination of these findings shows that the SIOLD over-predicts positive cases, but identifies most children with true DLD and passes most children without DLD, as required of a good screening test.

General Discussion

The purpose of the present study was to develop, validate and measure the accuracy of a screening questionnaire for identifying oral language difficulties in preschool children. The SIOLD was designed to be an easy tool for preschool teachers to assess children's oral language skills at an early stage.

We tested the dimensional structure of the SIOLD and its internal consistency using CFA. The best statistical solution was a unidimensional one, in which the items tapping phonology, vocabulary and grammar loaded into a broader single language factor. This model combines two aspects that are desirable for a screening tool: it contains the items assessing the core domains of interest and it is practical, due to its simplicity.

The development of SIOLD was devised to take account of the areas of language that are usually impaired in children with DLD, namely phonology, semantics, grammar, discourse and/or pragmatics (Bishop et al., 2017; Law et al., 2000). Data showed that the initial theoretical model structured in five language factors was not satisfactory, but the one keeping only the items originally designed to load into the structural components of language (phonology, vocabulary and grammar) had good fit indices. Phonology, vocabulary and grammar are related to the structure and content of language, and problems in these areas refer to behaviours that are more apparent and easy to be observed, such as speech problems, use of imprecise words and inability to combine words into sentences (Prelock, Hutchins & Glascoe, 2008). This dimension of language seemed to be more coherently scored by teachers than the functional one (narrative and pragmatics). This may have implications on the profile of children teachers are more likely to identify. Bishop et al. (2006) found that the scales of

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the CCC-2 assessing structural aspects of language (speech, syntax and coherence) were the ones that showed substantial effect sizes when comparing children at risk of DLD with those at low risk.

In contrast, the items that tapped narrative (e.g. “talking about future events”) and pragmatic skills (e.g. “struggling to understand social rules”) were not found to fit the model and were eventually removed from the scale. These items refer to communicative behaviours that encompass higher-order cognitive and/or social abilities, such as self-regulation and social competence (Conti-Ramsden & Botting, 2004).

Narrative skills are usually impaired in children who struggle to integrate complex semantic relations and fail to produce grammatical and intelligible utterances (Norbury & Bishop, 2003). However, these skills are also commonly affected in children who have difficulties organizing the sequence of events in time and understanding intentions, beliefs and desires of others, such as individuals with Attention Deficit Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (ASD) (Kuijpe, Hartman, Bogaerds-Hazenberg & Hendriks, 2017). Even among children with DLD, the ones with lower nonverbal IQ (<85) showed worse narrative skills than the ones with higher nonverbal IQ (Wetherell, Botting & Conti-Ramsden, 2007), suggesting that cognitive abilities also influence performance on these tasks even when language is the primary disorder.

Pragmatic difficulties are usually a consequence rather than a comorbid symptom of DLD (Bishop, 2000), but can manifest also as a primary deficit in other conditions such as ASD or Social Communication Disorders (Brukner-Wertman, Laor & Golan, 2016). It could be that, because both narrative and pragmatic skills depend on other higher-order functions and are impaired in a wide range of clinical conditions, teachers find it more difficult to consistently observe these behaviours.

Another aspect that should be noted is that although the instrument was designed to tap multiple domains, the fact that the unidimensional model was preferred over the multidimensional one suggests that teachers did not make clear distinctions between children's language symptoms. This is not problematic, for screening purposes. The main objective of a screening tool is to accurately identify at-risk individuals and refer them to the appropriate health services (Norbury et al., 2004). The final model suggests that instead of being used to identify the language areas of main difficulty, the SIOLD should be implemented to identify children who struggle to learn any aspect of the language structure and content.

In the second study, we used the final version of the SIOLD to explore how accurately it identified preschool children with language difficulties. We found that the questionnaire worked well with good sensitivity and specificity when fixing the cut-off at 13.5. Sensitivity, also called the true positive rate, indicates the proportion of positive cases that are correctly identified as such (in this case, the percentage of children with language impairment correctly identified by having language difficulties). Specificity measures the proportion of negative cases that are correctly identified as such (in this case, the percentage of typically developing children who are correctly identified as not having language difficulties). The fact that the SIOLD correctly identified almost 90% of the DLD cases is good for a screening tool, meaning that almost all children with language difficulties can be correctly detected. Previous studies exploring the accuracy of other language screeners reported sensitivity of or beyond 80% (e.g. Archibald & Joanisse, 2009; Wallace et al., 2015; Stone, Engels, Vermulst & Janssen, 2010). Moreover, the specificity of the questionnaire was excellent, meaning 95% of typically developing children were correctly identified as not having language difficulties (scores under 13.5). The combination of these findings shows

that if used clinically to screen a population, the SIOLD is a reliable [tool](#) to identify children with DLD, although it over-predicts positive cases.

This study has some limitations. We have not tracked developmental patterns using this screening tool, and our findings speak only to the performance of 5- to 6-year-old children. In addition, the accuracy study used a small sample from a single city of the south region of Brazil, which is not therefore representative of the whole country. It is important that future studies extend these findings and analyse the accuracy of the SIOLD at different ages and socio-demographic contexts.

The high prevalence of undetected language impairment in children (Bishop et al. 2016) and the strong predictive relationship between language difficulties and academic failure implies a need to empower teachers to identify children with language difficulties early in their school careers. To our knowledge, there are no valid and reliable questionnaires in Portuguese that can be used by preschool teachers to refer children with speech and language difficulties at an early age. We provide here one such questionnaire, which we have found to be both reliable and valid for the assessment of structural aspects of oral language such as speech, vocabulary and grammar. Our findings suggest that preschool children who score under 13.5 on the SIOLD should be referred to speech and language services.

Conclusion

This study showed that children's oral language difficulties can be accurately accessed by preschool teachers using the SIOLD. The questionnaire showed good psychometric properties and the unidimensional structure was preferred over the three- and five-factor models. Using this single dimension of the questionnaire, the cut-off of 13.5 demonstrated good sensitivity and specificity for the identification of children with oral language difficulties. Empowering teachers to refer language difficulties children to speech-

language services may provide them with interventions at an early age to help prevent future academic failure.

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References

- Araújo, K. (2007). Desempenho gramatical com crianças em desenvolvimento normal e com distúrbio específico de linguagem. PhD dissertation in Semiotics and General Linguistics – Faculdade de Filosofia, Letras e Ciências Humanas da Universidade de São Paulo, São Paulo.
- Archibald, L. M. D., & Joanisse, M. F. (2009). On the sensitivity and specificity of nonword repetition and sentence recall to language and memory impairments in children. *Journal of Speech, Language, and Hearing Research*. 52(4), 899-914. [https://doi.org/10.1044/1092-4388\(2009/08-0099](https://doi.org/10.1044/1092-4388(2009/08-0099)
- Bedore, L. M., Leonard, L. B. (2001). Grammatical morphology deficits in Spanish-speaking children with specific language impairment. *Journal of Speech, Language, and Hearing Research*, 2001;44:905–924.
- Befi-Lopes D. M., Fernandes F. D. M., Wertzner H. F. (2004). ABFW: teste de linguagem infantil nas áreas de fonologia, vocabulário, fluência e pragmática. Carapicuíba: *Pró-Fono*.

- Beitchman, J. H., Brownlie, E. B., and Bao, L. (2014). Age 31 mental health outcomes of childhood language and speech disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 53, 1102–1110. <https://doi.org/10.1016/j.aac.2014.07.006>
- Bishop DVM. (2000). Pragmatic language impairment: a correlate of SLI, a distinct subgroup, or part of the autistic continuum? In: Bishop DVM, and Leonard LB, eds. *Speech and Language Impairments in Children: Causes, Characteristics, Intervention and Outcome*. Hove, UK: Psychology Press, 99-113.
- Bishop, D. V. M. (2003). *The Test for Reception of Grammar Version 2, TROG-2*. London, En: Harcourt Assessment.
- Bishop, D. V. M. (2014). Ten questions about terminology for children with unexpected language problems. *International Journal of Language and Communication Disorders* 49, 381-415. . <https://doi.org/10.1111/1460-6984.12101>
- Bishop, D. V., Adams, C. V., & Norbury, C. F. (2006). Distinct genetic influences on grammar and phonological short-term memory deficits: Evidence from 6-year-old twins. *Genes, Brain and Behavior*, 5(2), 158-169. <https://doi.org/10.1111/j.1601-183x.2005.00148.x>
- Bishop, D. V. M., Edmundson, A. (1987). Language-Impaired 4-Year-Olds: Distinguishing Transient from Persistent Impairment. *Journal of Speech and Hearing Disorders*, v52 n2 p156-73.
- Bishop, D. V., & Hayiou-Thomas, M. E. (2008). Heritability of specific language impairment depends on diagnostic criteria. *Genes, brain, and behavior*, 7(3), 365-72 <https://doi.org/10.1111/j.1601-183X.2007.00360.x>
- Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T., CATALISE consortium. (2016). CATALISE: A multinational and multidisciplinary Delphi

- consensus study. Identifying language impairments in children. *Plos One*, 11(7), <https://doi.org/10.1371/journal.pone.0158753>.
- Bishop, D. V. M., Snowling M. J, Thompson P. A., Greenhalgh T., CATALISE-2 consortium. (2017). Phase 2 of CATALISE: a multinational and multidisciplinary Delphi consensus study of problems with language development: Terminology. *Journal of Child Psychology & Psychiatry*, 58(10): 1068-1080. <https://doi.org/10.1111/jcpp.12721>
- Brokner-Wertman, Y., Laor, N., Golan, O. (2016). Social (Pragmatic) Communication Disorder and Its Relation to the Autism Spectrum: Dilemmas Arising From the DSM-5 Classification. *J Autism Dev Disord*. 46(8):2821-9. DOI: 10.1007/s10803-016-2814-5.
- Bryan, K., Garvani, G., Gregory, J., Kilner, K. (2015). Language difficulties and criminal justice: the need for early identification. *International Journal of Language and Communication Disorders*. 50, 763–775. <https://doi.org/10.1111/1460-6984.12183>
- Conti-Ramsden, G. (2014). What should we call children who struggle to talk? Taking a developmental, global perspective on diagnostic labels – reflections on Bishop. Commentary on Bishop, D.V.M. Ten questions about terminology for children with unexplained language problems. *International Journal of Language & Communication Disorders*, 49, 405-407. <https://doi.org/10.1111/1460-6984.12101>.
- Conti-Ramsden, G., Botting, N. (1999). Classification of children with specific language impairment: longitudinal considerations. *Journal of Speech, Language and Hearing research*, 42, 1195-1204.
- Conti-Ramsden G., Botting N, (2004). Social difficulties and victimization in children with SLI at 11 years of age. *Journal of Speech, Language and Hearing research*, 47(1):145–61. [https://doi.org/10.1044/1092-4388\(2004/013\)](https://doi.org/10.1044/1092-4388(2004/013)).

- Conti-Ramsden, G., Botting, N. & Faragher, B. (2001) Psycholinguistic markers for specific language impairment (SLI). *Journal of Child, Psychology and Psychiatry*, 42, 741–748.
- Conti-Ramsden, G., St Clair, M. C., Pickles, A., Durkin, K. (2012). Developmental trajectories of verbal and nonverbal skills in individuals with a history of specific language impairment: From childhood to adolescence. *Journal of Speech, Language, and Hearing Research*, 55:1716–1735. [https://doi.org/10.1044/1092-4388\(2012/10-0182\)](https://doi.org/10.1044/1092-4388(2012/10-0182))
- Department for Education (2014). EYFSP, National Statistic. Attainment by pupil characteristics: 2013 to 2014. Part of Statistics early years foundation stage profile. Applies to England. Retrieved 2016, September 24 from <https://www.gov.uk/government/statistics/eyfsp-attainment-by-pupil-characteristics-2013-to-2014>.
- Dockrell, J. E., Bakopoulou, I., Law, J., Spencer, S., & Lindsay, G. (2015). Capturing communication supporting classrooms: The development of a tool and feasibility study. *Child Language Teaching and Therapy*, 31(3), 271-286. <https://doi.org/10.1177/0265659015572165>
- Dockrell, J. E., Howell, P. (2015). Identifying the challenges and opportunities to meet the needs of children with speech, language and communication difficulties. *British Journal of Special Education*. Vol.42, Number 4. <https://doi.org/10.1111/1467-8578.12115>.
- Engel de Abreu, P. M., Cruz-Santos, A., Puglisi, M. L. (2014). Specific language impairment in language-minority children from low-income families. *International Journal of Language and Communication Disorders*; 49(6):736-47. <https://doi.org/10.1111/1460-6984.12107>.

- Fernald, A., Marchman, V. A., & Weisleder, A. (2013). SES differences in language processing skill and vocabulary are evident at 18 months. *Developmental Science*, 16(2), 234–248. <http://doi.org/10.1111/desc.12019>
- Hart, B., Risley. T. (1995) *Meaningful Differences in the Everyday Experience of Young American Children*. Brookes Publishing, Baltimore, 308 pp.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55.
- Karnik, S., & Kanekar, A. (2012). Childhood Obesity: A Global Public Health Crisis. *International Journal of Preventive Medicine*, 3(1), 1–7.
- Kuijper, S. J., Hartman, C. A., Bogaerds-Hazenberg, S. T., Hendriks, P. J. (2017). Narrative production in children with autism spectrum disorder (ASD) and children with attention-deficit/hyperactivity disorder (ADHD): Similarities and differences. *Abnorm Psychol*.126(1):63-75. DOI: 10.1037/abn0000231.
- Law, J., Garrett, Z., Nye, C. (2004). The efficacy of treatment for children with developmental speech and language delay/disorder: a meta-analysis. *Journal of Speech, Language and Hearing Research*, 47(4):924-43.
- Law, J., Parkinson, A., Tamhne, R. (EDS) (2000). *Communication Difficulties in Childhood: a practical guide*. Abingdon: Radcliffe Medical Press.
- Leonard, L. B. (2000). Specific Language Impairment across languages (cap 7). In: Bishop DVM, Leonard LB. *Speech and language impairments in children: causes, characteristics, intervention and outcome*. New York: Psychology press, p.115-130.
- Leonard, L. B. (2014). Specific Language Impairment Across Languages. *Child Development Perspectives*, 8(1), 1–5. <http://doi.org/10.1111/cdep.12053>

- Lindsay, G. (2011). The collection and analysis of data on children with speech, language and communication needs: the challenge to education and health services. *Child Language Teaching and Therapy*, 27, 135–150. <http://doi.org/10.1177/0265659010396608>
- Lindsay, G., Dockrell, J. E. (2012). Longitudinal patterns of behavioral, emotional, and social difficulties and self-concepts in adolescents with a history of specific language impairment. *Language Speech and Hearing Services in Schools*, 43:445–60. [https://doi.org/10.1044/0161-1461\(2012/11-0069\)](https://doi.org/10.1044/0161-1461(2012/11-0069))
- Mroz, M., Hall, E. (2003). Not yet identified: the knowledge, skills, and training needs of early years professionals in relation to children's speech and language development. *Early Years*, 23:2, 117-130, <https://doi.org/10.1080/09575140303109>
- Norbury, C. F. & Bishop, D. V. M. (2003) Narrative skills of children with communication impairments. *International Journal of Language & Communication Disorders*, 38:3, 287-313, DOI: [10.1080/136820310000108133](https://doi.org/10.1080/136820310000108133)
- Norbury, C.F., Gooch, D., Wray, C., Baird, G., Charmand, T., Simonoff, E., ... & Andrew, P. (2016). The impact of NVIQ on prevalence and clinical presentation of language disorder: Evidence from a population study. *Journal of Child Psychology and Psychiatry*, 11, 1247–1257. <https://doi.org/10.1111/jcpp.12573>
- Norbury, C. F., Nash, M., Baird, G., & Bishop, D. V. (2004). Using a parental checklist to identify diagnostic groups in children with communication impairment: a validation of the Children's Communication Checklist—2. *International Journal of Language & Communication Disorders*, 39(3), 345-364. <https://doi.org/10.1080/13682820410001654883>
- Norbury, C. F., Vamvakas, G., Gooch, D., Baird, G., Charman, T., Simonoff, E. and Pickles, A. (2017), Language growth in children with heterogeneous language disorders: a

- population study. *Journal of Child Psychology and Psychiatry*, 58: 1092–1105.
<https://doi.org/10.1111/jcpp.12793>
- Prelock, P. A., Hutchins, T., & Glascoe, F. P. (2008). Speech-Language Impairment: How to Identify the Most Common and Least Diagnosed Disability of Childhood. *The Medscape Journal of Medicine*, 10(6), 136.
- Puglisi, M. L., Cáceres-Assenço, A. M., Nogueira, T. & Befi-Lopes, D. M. (2016). Behavior problems and social competence in Brazilian children with specific language impairment. *Psicologia: Reflexão e Crítica*, 29, 29. Epub June 20, 2016. <https://dx.doi.org/10.1186/s41155-016-0027-7>
- Rattray, J., & Jones, M. C. (2007). Essential elements of questionnaire design and development. *Journal of Clinical Nursing*, 16, 234–243. <https://doi.org/10.1111/j.1365-2702.2006.01573.x>
- Rice, M. (2014). Advocating for SLI. Commentary on Bishop, D.V.M., 2014. Ten questions about terminology for children with unexplained language problems. *International Journal of Language & Communication Disorders*, 49, 402-403. <https://doi.org/10.1111/1460-6984.12101>.
- Santos, F. H., & Bueno, O. F. A. (2003). Validation of the Brazilian children's test of pseudoword repetition in Portuguese speakers aged 4 to 10 years. *Brazilian Journal of Medical and Biological Research*, 36 (11), 1533–1547.
- Silva, L. K., Labanca, L. M., Eglea M. C., & Costa-Guarisco, L. P. (2014). Identificação dos distúrbios da linguagem na escola. *Revista CEFAC*, 16(6), 1972-1979. <https://doi.org/10.1590/1982-0216201415813>
- Snowling, M. J., Duff, F. J., Nash, H. M., Hulme, C. (2016). Language profiles and literacy outcomes of children with resolving, emerging, or persisting language impairments. *Journal of Child Psychology and Psychiatry*, 57(12): 1360-1369.

- <https://doi.org/10.1111/jcpp.12497>. Epub 2015 Dec 17.
- Snowling. M. J., Hulme, C. (2011). Evidence-based interventions for reading and language difficulties: creating a virtuous circle. *British Journal of Educational Psychology*, 81(Pt 1):1-23. <https://doi.org/10.1111/j.2044-8279.2010.02014.x>.
- Stone, L. L., Engels, R. C. M. E., Vermulst, A. A., Janssen, J. M. A. M. (2010). Psychometrics properties of the parents and teacher's versions of strengths and difficulties questionnaires for 4-12- years-olds. A review. *Clinical Child and Family Psychology Review*, 13, 254-274. <https://doi.org/10.1007/s10567-010-0071-2>
- Tomblin, J.B., Records, N.L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research*, 40, 1245–1260.
- Wallace, I. F., Berkman N., Watson L. R., Coyne-Beasley, T., Wood C. T., Cullen, K. K. N. (2015). Screening for Speech and Language Delay in Children 5 Years Old and Younger: A Systematic Review. *Paediatrics*, 136; e448. <https://doi.org/10.1542/peds.2014-3889>
- Wetherell, D., Botting, N., Conti-Ramsden, G. (2007). Narrative skills in adolescents with a history of SLI in relation to non-verbal IQ scores. *Child Language Teaching & Therapy*, 23, 95-113. <https://doi.org/10.1177/0265659007072322>
- Wiig, & Secord (2000). Classroom Communication and Learning check list. Retrieved 2016, September 20 from https://slp4teachers.wikispaces.com/file/view/440961_classroom.pdf
- World Health Organization. (1992). The ICD-10 classification of mental and behavioural disorders : clinical descriptions and diagnostic guidelines. Geneva: World Health Organization. <http://www.who.int/iris/handle/10665/37958>