Reading & Writing - Journal of the Reading Association of South Africa
ISSN: (Online) 2308-1422, (Print) 2079-8245

Adapting a screening tool for dyslexia in isiXhosa

Authors:
Annelize Clark[1]
Kalavani Naidoo[1]
Adaiah Lilenstein[2]

Affiliations:
[1]Training Department, Bellavista SHARE, Johannesburg, South Africa

[2]Department of Economics, University of Cape Town, Cape Town, South Africa

Corresponding author:
Annelize Clark,
annelize.clark@bellavistaschool.co.za

Dates:
Received: 25 Mar. 2019
Accepted: 25 Sept. 2019
Published: 27 Nov. 2019

How to cite this article:
Clark, A., Naidoo, K. & Lilenstein, A., 2019, 'Adapting a screening tool for dyslexia in isiXhosa', *Reading & Writing* 10(1), a235. https://doi.org/10.4102/rw.v10i1.235

Background: While much research is dedicated to the understanding of dyslexia in the English-speaking population, there is limited knowledge about how this condition presents in African languages. The need for a literacy screening tool in a learner's home language to aid in early identification, and therefore early intervention, is crucial for reading success in South Africa.

Objectives: The aim of this study was to adapt and develop a screening tool for dyslexia for home language isiXhosa learners.

Method: The three-part tool consisting of a learner screening tool, a teacher checklist and a parent questionnaire to target the identification of the majority of the indicators for dyslexia. The tool was piloted on a small group of 15 learners across Grades 1–4, identified by their teachers as having literacy difficulties. In addition, seven learners were identified by their teachers as average performers and were used as a control group. A team of three professional field workers analysed the data collected and identified five learners as clearly at risk and five learners as possibly at risk. Ten indicators for dyslexia were considered. Of these, there were high correlations between Phonological Awareness and Spelling, Decoding and Alphabetic Principle, as well as Spelling and Oral/Written Discrepancy. After piloting the screening tool, the researchers made further revisions to the content and length of all three parts of the tool, with the aim to simplify the tool for both the assessor and the teachers or parents completing the checklists.

Results: Findings indicate that the adapted screening tool, together with the adapted teacher checklist and parent interview, give professionals an indication of whether an isiXhosa-speaking child is at risk for dyslexia.

Conclusion: A larger study using the same tool with the aim of refining the tool further would be beneficial. The study also opens doors for the adaptation of the tool into other African languages.

Keywords: dyslexia; isiXhosa; indicators; phonology; reading; writing; learning difficulties; literacy difficulties; teacher identification.

Introduction

Dyslexia is a specific learning difficulty characterised by effortful reading and spelling. This can be as a result of various combinations of difficulties in phonological awareness, rapid naming and orthographic mapping (sound-symbol relationships) that present differently at different stages of development (Hulme & Snowling 2015; Lyon 1995; Rose 2009). It is estimated that dyslexia affects between 5% and 15% of schoolgoing learners (Rose 2009). A range of prevalence is presented, as it is widely accepted that dyslexia exists on a continuum from mild to severe. It compromises a learner's whole learning experience: the ability to read for meaning, as well as the ability to put knowledge into a written format. This learning difference manifests across languages and is not more prevalent in a particular culture, language or race (American Psychiatric Association 2013; Siegel 2006).

Languages with an alphabetic writing system occur on a continuum of transparent-opaque orthography. Opaque orthographies, such as English, are more difficult for learners with dyslexia. African languages have transparent orthographies, where the grapheme-phoneme correspondence is simple. Languages are also classified according to typographies. English is analytic and stress-timed, whereas African languages are more agglutinating and syllabic. Although isiXhosa is a transparent language, it has a conjunctive orthography. A conjunctive orthography refers to the convention of writing different elements of the same words as one word, which results in large, multi-syllabic words, but with a comprehensive meaning (Van der Merwe & Roux 2014).

A dyslexic isiXhosa learner may therefore find dense text difficult to read. Learners at risk of dyslexia in a transparent language are likely to have considerable difficulty acquiring the complex orthography of English (Mortimore et al. 2012). Sixteen per cent (16%) of the South African population speak isiXhosa as their home language, making it the second most widely spoken language in South Africa after isiZulu at 22.7% (Statistics South Africa 2012, cited in Rossouw & Pascoe 2018). In South Africa, children often have to master oral and written literacy at school in a language that is different from their home language, particularly after the Foundation Phase (usually English). A second language learner will not easily self-correct reading errors in English as the second language (referred to as first additional language, FAL) if the level of mastery of the home language (in this case isiXhosa) is affected (Lundberg 2002). The need for a screening tool in a learner's home language is therefore optimal. The current literacy situation in South Africa remains a problem. More than 50% of Grade 4 learners in South Africa are not yet reading for meaning (Spaull 2016, cited in Spaull, Pretorius & Mohohlwane 2018).

Dyslexia screeners in South Africa are available in English, but not in other recognised African languages, and therefore also not in isiXhosa. South Africa has 11 official languages and, although about 70% of learners have access to instruction in their home language (LoLT) in the first 3 years of schooling, there is a lack of assessment or screening materials that can be used to identify literacy difficulties within these languages. It is therefore safe to conclude that we have a substantial number of South African learners who are dyslexic, and the majority of these learners remain unidentified due to a lack of resources and screening tools.

The aim of this study was to adapt and develop a comprehensive screening tool for dyslexia for home language isiXhosa learners. It was piloted on a small sample of learners and the results are reported in this article. Developing a reliable and valid screening tool in an African language will facilitate the development of assessment procedures and resources so that more young children who struggle with literacy difficulties or dyslexia in the South African classroom can be identified in the early grades. A dyslexia screening tool will particularly benefit early identification and intervention, as the brain is more malleable and adaptable during earlier years. Early intervention also reduces associated intractable vulnerabilities such as poor self-esteem, lack of confidence, school failure and long-term lowered income (Gaab 2017; Lyytinen et al. 2015; Ring & Black 2018).

Our research question was therefore formulated as: Are we able to adapt and develop a comprehensive screening tool with enough evidence to determine risk for dyslexia for the home language isiXhosa-speaking Foundation Phase learner? With the help of an isiXhosa-speaking speech and language therapist (SPLT), the Bellavista Dyslexia Screening Tool was adapted for isiXhosa-speaking learners who might face difficulty with the acquisition of literacy skills. After the pilot, further adaptations were made to the tool and the modified version is attached.

Literature review

Reading and dyslexia

The Simple View of Reading (Rose 2009, after Gough & Tunmer 1986) model is a primary guide for assessing and teaching reading. The model describes reading comprehension as the product of two areas of expertise: word recognition (decoding) and oral language proficiency. It explains how learners may make progress in one area of reading, but not another, and that, if a learner makes adequate progress in both word recognition and language comprehension, reading will develop adequately. The child who develops good oral language comprehension skills but does not make gains in the word recognition process is at risk for dyslexia.

Researchers Hulme and Snowling (2015) agree that there are three main predictors for decoding (reading) skills:

- Phonemic Awareness – the awareness of the smallest units of sounds and the ability to identify and manipulate these individual sounds within words.
- Letter-Sound Knowledge – knowledge of the group of letters (graphemes) that represent the letter sounds (phonemes).
- Rapid Automised Naming (RAN) – the ability to name familiar visual stimuli rapidly. Naming speed difficulties suggest access to one's language lexicon is slow, which impacts on reading speed (Hulme & Snowling 2015).

Early isiXhosa reading instruction exposes learners to a syllabic approach early on in order to combine syllables into common words of two and three syllables (Pascoe & Smouse 2013). African languages, such as isiXhosa, are strongly syllabic, and these learners tend to do better on syllable awareness than phonemic awareness items (Diemer, Van der Merwe & De Vos 2015). However, phonemic awareness still seems to be a stronger predictor of decoding than syllable awareness (Wilsenach 2016).

Multilingualism and dyslexia

Irrespective of whether they are monolingual, bilingual or multilingual, learners with dyslexia present with a similar profile despite differences in alphabetic orthography (Chung, Ho & Chan 2011). Joshi, Prakash and Surendranath (2010) reviewed literature on reading and literacy difficulties in bilingual learners and found that almost all participants had difficulty in both languages they were tested in and there would be phonological processing difficulties in both languages if they were dyslexic (Chung et al. 2011; Klein & Doctor 2003). It must be noted, however, that although dyslexia might manifest differently across different writing systems, phonological processing will remain a difficulty (Kovelman, Bisconti & Hoeft 2016). One can therefore make

the assumption that a learner who presents with dyslexia traits in isiXhosa as a first language will present with similar difficulties when learning reading and writing in English, especially with phonological processing, in the classroom in later grades. Similarly, reading speed and fluency difficulties might go unnoticed in isiXhosa learners early on, but might emerge in later years. This may be attributed to the fact that dyslexic isiXhosa readers may read accurately but slowly in isiXhosa due to the more transparent orthography of isiXhosa. However, when they read in English (which has an opaque orthography) in later years, they will have both fluency and accuracy difficulties. Since the majority of English reading is only done from Grade 4, it makes it more difficult for teachers to identify reading difficulties early on.

Features of a dyslexia screening test

While much research is dedicated to understanding dyslexia in the English-speaking population, there is limited knowledge of the effects of the condition in African languages. Teachers and professionals in South Africa have a difficult time identifying learners at risk for dyslexia and other literacy difficulties reliably, due to insufficient screening tools and a limited knowledge around the development of African languages. A survey with SPLTs in the Western Cape confirmed this, and suggested that assessment materials in dominant local languages will improve confidence in developing intervention strategies (Maphalala, Pascoe & Smouse 2010).

Given that learners in South Africa usually learn in their mother tongue until Grade 4 (with English as an additional language from Grade 1), access to a screening tool for dyslexia in the home language would allow for earlier detection. Schools generally wait for a learner to 'fail' at literacy before the child is identified for assessment (Gaab 2017). Gaab (2017) justifies that intensive interventions are most effective in the reception year and first grade. When early learners who are at risk for dyslexia receive explicit, structured and intensive instruction, they have the potential to perform at average reading levels (Torgesen 2004). Gaab recommends several key characteristics to be included in screening batteries: they should be short, quick and easy to administer, be comprehensive (including all the key indicators of dyslexia), be done during or before the reception year, and include a short family history, and be developmentally appropriate (Gaab 2017).

In summary, a dyslexia screener will therefore focus on the main indicators presented by a learner who is at risk for dyslexia. These include phonological awareness, decoding, knowledge of the alphabetic principle (that sound can be represented by a letter or string of letters and letter-sound knowledge), spelling and written output (sentence and paragraph structure). Auditory discrimination and oral fluency (the ability to speak fluently and with ease) are generally intact, but will vary from child to child. Some learners might present with visual or auditory difficulties, or have a double deficit – both fluency and phoneme awareness difficulties, and others only a single deficit (Bowers & Wolf 1993). Listening comprehension should present as adequate, because a child at risk for dyslexia usually presents with a stronger oral language and comprehension, and there will be a clear discrepancy between oral and written language (Kelly & Phillips 2016). The indicators of dyslexia are not normative, but highly individual because of the compensatory skills employed.

Method

Participants and research setting

As isiXhosa is not widely spoken in the Gauteng area in South Africa, choices for schools were limited. The research team consisted of an educational psychologist, a SPLT proficient in isiXhosa, and an occupational therapist who is also a Foundation Phase remedial teacher. The University of Stellenbosch identified seven schools in Gauteng, two independent schools and five government schools, where the LoLT is isiXhosa. These schools were identified as functional schools with records of good Annual National Assessment (ANA) scores. The schools also had a quintile 4 ranking. A quintile ranking is an indication of the socio-economic status of the school, where a ranking of 1 is a no-fee school that serves a poor school community and quintile 5 schools are fee-paying and represent the least poor school communities (Van Wyk 2015).

The researchers then identified the seven schools using the Gauteng Basic Education Department's Education Management Information System (EMIS) and contact was made telephonically with the schools. The two independent schools confirmed that their LoLT is English so they were excluded from the selection. The three top ANA performing schools were chosen in an attempt to reduce environmental factors such as poverty as far as possible. The schools were all located in urban informal settlements and had electricity and running water. Classroom sizes varied from 30 to 60 learners per classroom; however, for the larger groups basic resources such as pencils were limited.

Poverty is a reality for most of the learners. The schools provide all learners with a meal. Most of the learners live with a single parent or grandparent in informal settlements or hostels, and 'home' remains the Eastern Cape as parents had to move or split up for job opportunities. The social, psychological and emotional stability of these learners may therefore be compromised, which in turn compromises the learners' true academic potential. One cannot view a child in isolation of the family or their environment (Kelly & Phillips 2016; Mowder 2005; Shonkoff & Meisels 2010). From the parent interviews, it also emerged that two learners experienced trauma after the loss of one or both parents. In the latter case, the interviewee was the learner's grandmother.

Upon the first visit to the schools, researchers met with the principal, briefed teachers individually on the focus of the

research and discussed learner profiles of learners who struggle in literacy. Teachers discussed learners they thought might meet this profile, and thereafter completed the teacher checklist, which took roughly 15 min to complete. Learners with known significant trauma and head injuries were excluded in the selection process. The researchers reviewed the selected learners' isiXhosa, English and Mathematics books and finalised a shortlist of learners that they deemed may be at risk for dyslexia. Based on their clinical experience, researchers identified 13 learners as potentially at risk for dyslexia across the three schools within the Foundation Phase and Grade 4. The final group of learners was discussed with the principal, who sent out consent letters to the parents.

A control group of seven learners across the three schools were also selected by the teachers, who were asked to identify average performers. A total of 20 learners whose parents consented to the screening was enrolled for the study. From the 20 learners, 3 learners were in Grade 1, 6 learners were in Grade 2, 6 learners were in Grade 3 and 4 learners were in Grade 4. One learner was absent. Of the 19 participants, 13 male and 6 female, 5 were repeating their grade.

During the second visit to the schools, 19 parent interviews were conducted by the clinical psychologist. Running parallel was the learner screening which was done by the isiXhosa-speaking SPLT. A translator was used for three of the interviews. One identified child was absent. Teacher checklists were not administered for the control group. One parent did not arrive for the parent interview.

The development of the dyslexia screening tool

The Bellavista Dyslexia Screening Tool (BVDST) for English home language learners was adapted and reworked according to the structure of the language, for the young isiXhosa learner in Grades 1–3. The English tool is used for screening learners' literacy skills and makes use of the administrator's skills to analyse, find patterns in literacy difficulties and interpret findings. It is not normed. After adapting the tool into isiXhosa, the screening tool was reviewed by a biliteracy specialist working on bilingual and multilingual children's literacy development. It is not a diagnostic tool, but a screener to guide early identification and intervention for learners at risk of literacy difficulties. It allows for the administrator to make use of examples in order to determine whether the learners understand what is required of them for each item of the tool.

The tool includes screening of the following components:

- Auditory Discrimination task (also called a same/different task) – the ability to tell whether two words are the same or different. For example, 'imali' – 'ibali', or 'lala – lala'. In each instance the learner will say whether the word is the same or different.
- Phonological Awareness (all phonological awareness tasks are done orally):
  - Phoneme blending – the ability to listen to sounds, hold them in memory and blend them together to make a word.
  - Phonological segmentation – the ability to listen to a word and segment it into its constituent phonemes.
  - Phoneme deletion – require multi-syllable, syllable and phoneme deletion, for example: 'say *tatamisa*, now say it without *tata*' = *misa*.
  - Phonological substitution – the ability to substitute sound or syllable for another.
- Knowledge of common sequences, which includes the ability to recite days of the week or months of the year.
- Knowledge of grammar and punctuation by pointing out related elements in a short passage and explaining why these are found in a sentence – Grade 2 onwards, administrator will include questions according to concepts covered in the curriculum.
- Sound-Symbol correspondence – the ability to recognise consonant clusters as taught in the appropriate age group.
- Oral semantic fluency task – naming as many animals as one can in a minute.
- Listening Comprehension – listening to and understanding a short story.
- Auditory or passage recall task – answering questions about a short story.
- Single word recognition – reading simple, decodable words that are taught frequently in the classroom, as well as simple, high frequency words.
- Spelling tasks – writing simple, dictated words with the correct spelling.
- Free writing task – a qualitative analysis of vocabulary use, writing formation spelling, sequencing, expression of ideas, structure, grammar and so on. Administrator will take into consideration grade level of the learner and simplify or leave out entirely depending on the learner's age, grade and school term.

It is important to note that the tool is designed for an educated or trained assessor who understands the developmental progression of learning and who can make judgements around which items to administer and which items to leave out. Rapid Automised Naming was left out of the assessment, as it forms part of a standardised assessment.

The development of parent interview and teacher checklist

A background history of learning difficulties in the family, as well as a developmental history may contribute to holistic understanding of the learner and the level of risk for dyslexia. A teacher checklist was adapted from Kelly and Phillips (2016), specialists in the assessment and intervention of dyslexic-type difficulties. A parent interview was also developed. The aim of the interview and checklist was to identify difficulties in the area of literacy that consistently presented in the home and classroom, and to triangulate the information with the learners' performance on the screening tool. The parent interview included questions related to family and medical

history, as well as identifying difficulties with reading and spelling. The teacher checklist refers to questions related to reading and spelling, but also to mathematics, as a discrepancy in skills may strengthen the possibility of risk for dyslexia.

Scoring procedures

Data were captured across the three screening sources (teacher checklist, parent interview and learner screener) and compiled into 10 variables as per Table 1. Capturing across three different sources ensured triangulation of results and therefore increased the reliability of the study. Phoneme awareness and auditory discrimination were excluded from the teacher checklist and these concepts together with sequencing, alphabetic principle and written output were excluded from the parent interview due to complexity of the indicators. The other variables are tracked across the three screening methods.

Each component of the assessment administered was scored. The raw score was then converted into assessment scores: a child who scored in the lower third on the raw scores (33.3%) was ranked as 0 (problem); scores in the second third were ranked as 1 (some difficulty/risk) and scores in the higher third were ranked as 2 (intact). Statistics were run on both the assessment and the raw scores; due to the lower variability of the assessment scores, most statistics were run on the raw scores. After analysing the results, it was found that some of the learners selected as controls (the average performers selected by the teachers) presented with results consistent with a dyslexic or learning difficulty profile. The control learners who presented with dyslexic-type profiles were analysed as part of the risk group. Of the seven control learners, there were only two learners that represented true controls; the other four learners were identified as false negatives. For this reason (such a small control sample), we present all the data grouped together from this point on and have categorised the learners into *clearly at risk*, *at risk*, *other disorder*, and *not at risk* groups.

TABLE 1: Subcomponents for data analysis.

Screening tool	Teacher checklist	Parent interview
Phonological awareness	No data	No data
Auditory discrimination	No data	No data
Sequencing	Sequencing	No data
Decoding/reading	Decoding/reading	Decoding/reading
Alphabetic principle	Alphabetic principle	No data
Oral/semantic fluency	Oral/semantic fluency	Oral/semantic fluency
Spelling	Spelling	Spelling
Listening comprehension	Listening comprehension	Listening comprehension
Written output	Written output	No data
Discrepancy between oral and written language	Discrepancy between oral and written language	Discrepancy between oral and written language

Ethical consideration

Ethical clearance was obtained from the Department of Basic Education. Each parent or guardian of the selected learners, as well as the teachers and their school principal signed and gave informed consent.

Results

Categorisation of learners

Table 2 represents the number of learners for each indicator within these categories.

How useful was the screening test for identifying isiXhosa learners at risk for dyslexia?

Based on the triangulation of screening data from the sample of 19 learners (one was absent on the day of assessment), 5 learners were identified as being *clearly at risk* for dyslexia. Eight learners were identified as being *possibly at risk* for dyslexia. There were also 5 learners who were identified as being *at risk*, but their difficulties are better explained by a different condition or learning difficulty, for example when the child's difficulties were global. Two learners from the control group presented with literacy skills that were intact.

The adapted isiXhosa screener identified learners at risk for dyslexia and was measured against the researchers' clinical experience. The findings for each child were captured in a personalised report and feedback was given to the parents and Head of Foundation Phase. After completion of the fieldwork and feedback with stakeholders, a 2-h workshop on reading and spelling intervention strategies for at-risk learners was facilitated for all the Foundation Phase teachers and the parents of the selected learners at the three schools.

TABLE 2: Identifying learners' risk for dyslexia from the screening tool.

Indicator	Clearly at risk (*n*)	Possibly at risk (*n*)	At risk but better explained by a different learning issue (*n*)	Not at risk (*n*)
Phonological awareness	11	3	1	4
Auditory discrimination	0	0	2	17
Sequencing	2	6	4	7
Decoding/reading	10	0	4	5
Alphabetic principle	9	3	2	5
Oral/semantic fluency	0	3	2	14
Spelling	13	2	0	4
Listening comprehension	0	2	4	13
Written output	10	7	2	0
Discrepancy between oral and written	9	4	2	4

Overview: Scores for 'at risk' and 'not at risk' children

What did the screening tool show about the *not at risk* (indicated as control for the purpose of this study) and the *at risk* learners' profile, based on the teachers' categorisation of their learners?

This section looks at average scores for the different domains of functioning across *at risk* and *not at risk* children. Figure 1 presents average raw scores for control and *at risk* children. Given that phonological awareness is the largest category (with a maximum score of 59 on the original tool), it is not surprising that the greatest differential can be seen on this domain. *Not at risk* children scored 19 on average while *at risk* children scored 15. *Not at risk* children also scored more highly on the two domains that should not be affected by dyslexia: Oral/Semantic Fluency and Listening Comprehension.

Figure 2 displays the same information, but using assessment scores (i.e. the three rankings of 0, 1 and 2) rather than raw scores. Additional derived domains now included are Oral/Written Discrepancy (i.e. the discrepancy between Oral and Written language scores), Sequencing, and Written Output. *At risk* children display lower average scores on most, but not all domains. *At risk* children have the same average score as *not at risk* children on Oral/Written Discrepancy and Alphabetic Principle (although the latter was lower when using the more varied raw scores). The greatest discrepancies between the two groups of

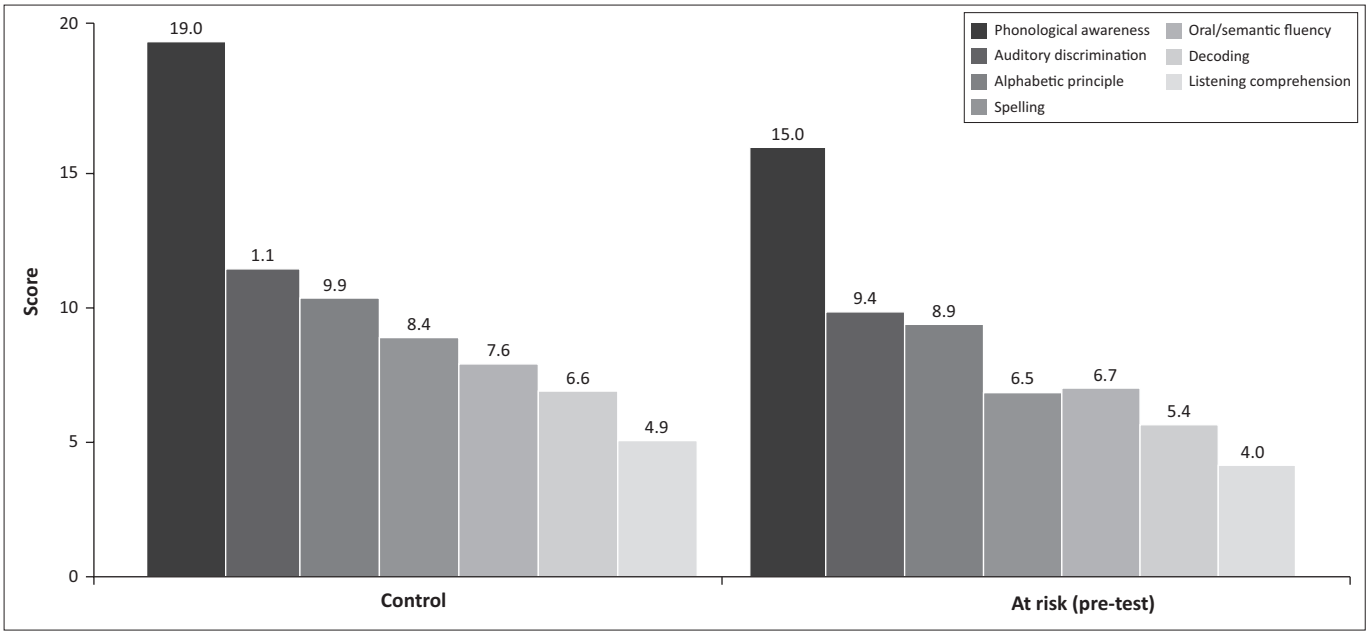

FIGURE 1: Raw scores – *At risk* and *not at risk* children.

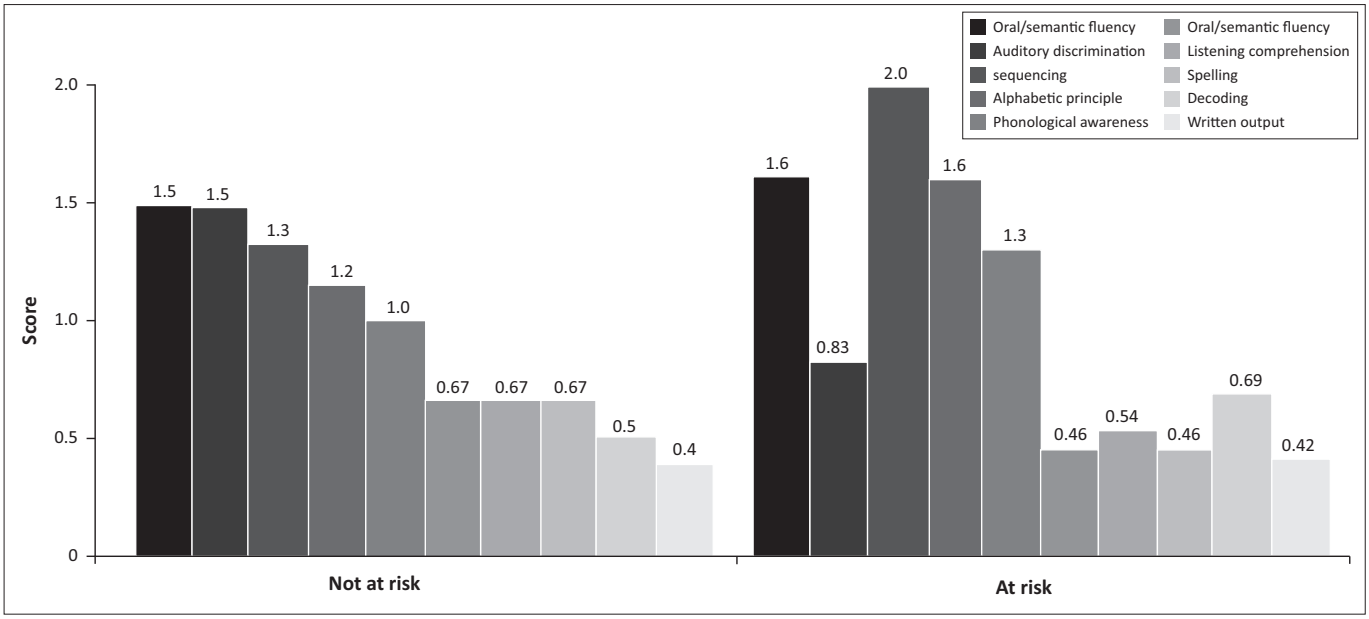

FIGURE 2: Average assessment scores of *at risk* and *not at risk* children.

children are in Phonological Awareness (0.58 lower), Written Output (0.4 lower), Auditory Discrimination (0.3 lower) and Spelling (0.29 lower).

Figure 3 contrasts *at risk* children with *clearly at risk* children. Those identified as clearly at risk have similar Oral/Semantic Fluency and higher Listening Comprehension, the two domains unlikely to be affected by dyslexia, and score lower on the other items. On average, then, those identified as clearly at risk are well defined according to the profile of impairment that is known to be associated with dyslexia.

Figure 4 contrasts *at risk* children (including *clearly at risk* children) and those identified as *not at risk*. Those identified as at risk have higher Oral/Semantic Fluency and Listening Comprehension.They also have higher Auditory Discrimination, Sequencing, and Phonological Awareness. As may be expected, when including those who are at risk and not just clearly at risk for dyslexia, the average profile of

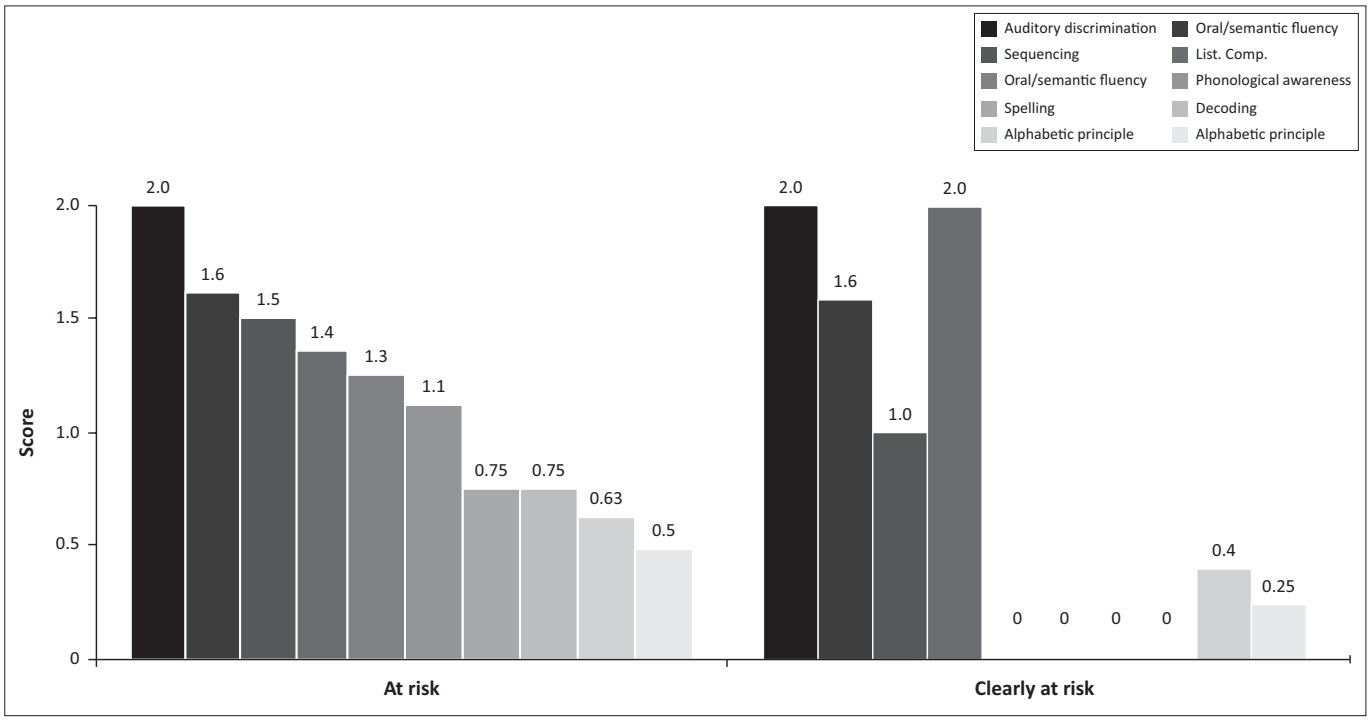

FIGURE 3: Assessment scores for *at risk* and *clearly at risk* children.

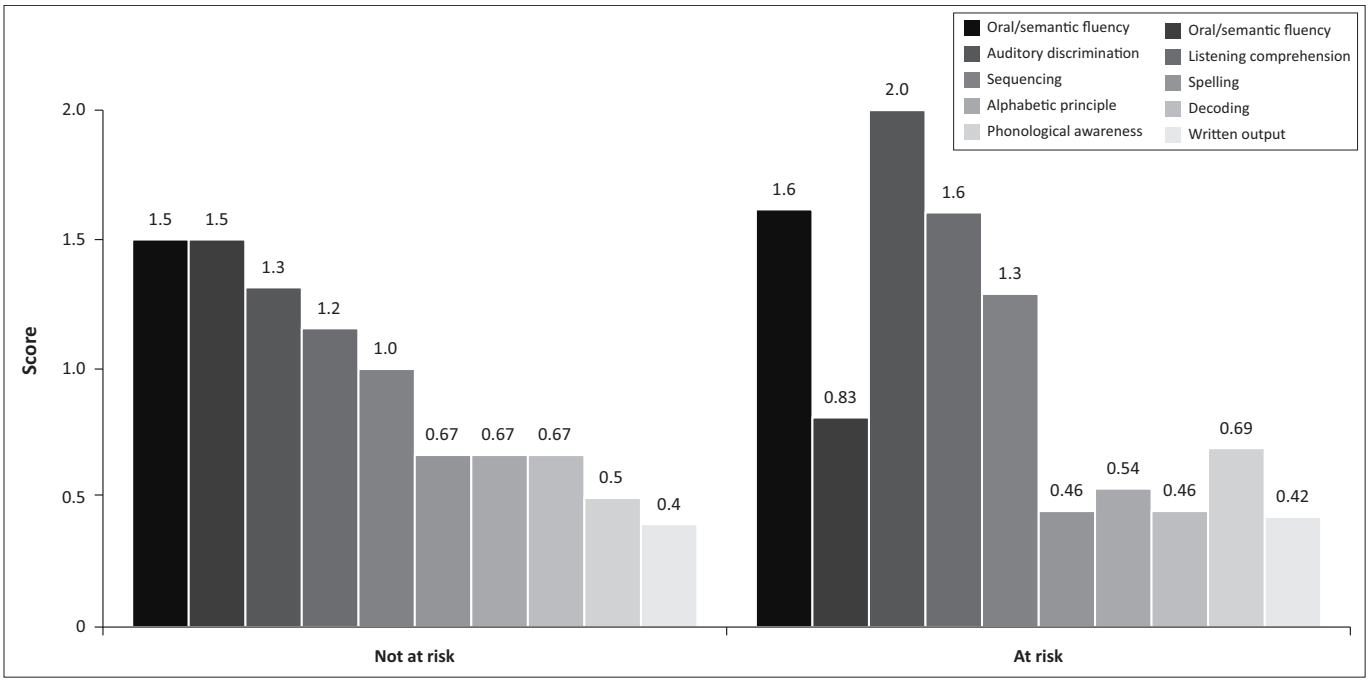

FIGURE 4: Average assessment scores of *clearly at risk* and *not at risk* children.

impairment is not as clearly delineated according to the typical dyslexia presentation.

Impaired domains: Is the profile of impairment consistent?

This section explores how well related the different 'risk factors' (Phonological Awareness, Auditory Discrimination, Sequencing, Decoding, Alphabetic Principle, Spelling, Written Output, and Oral/Written Discrepancy) are for children identified as at risk.

Table 3 displays correlations (Spearman's rho) between the different domains of functioning which should be impaired in dyslexia for children identified as at risk after testing took place. This includes both *clearly at risk* and *at risk* children. Unfortunately, due to the very small number of children identified as clearly at risk, the same table cannot be replicated for this group alone. Additionally, since there was no variation in the scores for Auditory Discrimination, these correlations cannot be ascertained. If these children really were all at risk for dyslexia, we should see high correlations between the different domains since they should present with a similar, and typical, profile of impairment. High correlations are defined here as between 1.0 and 0.7, moderate correlations are between 0.4 and 0.6, and low correlations are 0.1 to 0.3.

In Table 3, we see that most correlations are again in the low range. However, we do see very high and statistically significant correlations for Phonological Awareness with Spelling, and Decoding with Knowledge of the Alphabetic Principle, Spelling, and Oral/Written Discrepancy. Sequencing displays low correlations with all domains except spelling. It appears that Decoding and Alphabetic Principle are the most consistent indicators of being at risk of dyslexia in this sample.

Discussion

The results in this study suggest that learners who were identified as clearly at risk displayed dyslexia-type difficulties, resulting in reading and spelling difficulties. There were high correlations between Phonological Awareness with Spelling, as well as Decoding with Alphabetic Principles, Spelling, and Oral/Written Discrepancy. The greatest differences between the *at risk* group and the *not at risk* group were in Phonological Awareness, Written Output, Auditory Discrimination and Spelling. Those identified as clearly at risk had higher Oral/Semantic Fluency and Listening Comprehension, the two domains unlikely to be affected by dyslexia, and scored far lower on most other items. A lower score in Oral/Semantic Fluency may be due to the teaching environment and level of poverty, as per Frith's environmental component of the causation model of dyslexia (Kelly & Phillips 2016). On average, those identified as clearly at risk are well defined according to the profile of impairment that is known to be associated with dyslexia. For teachers, the main indicators are difficulties with decoding and knowledge of the alphabetic principle.

Throughout the statistics, there seem to be low correlations with Auditory Discrimination, which correlates with a study done by Paul et al. (2006), who found that dyslexic children and control children did not differ statistically in Mismatch Field amplitude or latency when tested for Auditory Discrimination, but only differed in Phonological skills. Further research is required in this area. Oral semantic fluency did not show a discrepancy between the *at risk* group and the *not at risk* group.

Changes to screeners and forms

After piloting the screening tool, the researchers made further revisions to the content and length of some of the components. It was reviewed by an educational psychologist whose home language is isiXhosa, after which a final version was produced.

Similarly, the teacher checklist was simplified from two pages to one page. Many teachers had difficulty completing the questionnaire accurately. Statements were adapted into simpler questions, and a yes/no option was provided for the teacher to circle, rather than to write a response.

The parent interview was shortened. The order of questions was changed in such a way that the conversation starts with the child's current functioning and moves back towards birth history, which enabled the parents to report on pressing issues first and therefore build rapport with the interviewer.

Limitations

There were several limitations to the study. First language isiXhosa speakers in Gauteng are limited in number, and

TABLE 3: Correlations between risk factors for *at risk* children.

Riskfactor	Phon. Aware.	Aud Disc.	Sequen.	Decod.	Alph. Prin.	Spelling	Writ. Out.	O/W Disc.
Phon. Aware.	1.00	-	-	-	-	-	-	-
Aud. Disc.	-	-	-	-	-	-	-	-
Sequen.	0.24	-	1.00	-	-	-	-	-
Decod.	0.64	-	0.29	1.00	-	-	-	-
Alph. Prin.	0.36	-	0.18	0.77***	1.00	-	-	-
Spelling	0.84***	-	0.41	0.87***	0.62**	1.00	-	-
Writ. Out.	0.32	-	-0.03	0.29	0.56*	0.12	1.00	-
O/WDisc.	0.48	-	0.31	0.68**	0.44	0.53*	0.31	1.00

Phon. Aware, Phonological Awareness; Aud.. Disc, Auditory Discrimination; Sequen., Sequencing; Decod., Decoding; Alph. Prin., Alphabetic Principle; Writ. Out.,Written Output; O/W Disc., Discrepancy between oral and written language.

*, $p < 0.1$; **, $p < 0.05$; ***, $p < 0.01$.

schools with a LoLT in isiXhosa are therefore similarly limited. The schools were not as functional as we had hoped, which made it difficult to rule out environmental factors like poverty and lack of quality instruction. Often, adequate quality instruction in early reading is compromised. The quintile ranking of the schools was not an accurate representation of the school community, thus low socio-economic factors may have had an impact on the results. Classroom sizes ranged from 50 to 60 learners per class. Unfortunately, with such large group sizes it is unlikely that a teacher will have an in-depth knowledge of a child's learning profile. This was evident in the selection of average performers for the research control group, as many of these learners also presented with literacy difficulties. In retrospect, it may have been more beneficial for the research team to have requested top performers to use as a control group instead of average performers. There were only two learners of the seven control learners that represented true controls.

The selected sample was small, compromising the outcomes. A larger sample within a larger selection of schools would have been beneficial. The tool may benefit from another cycle of piloting, ideally in areas where isiXhosa is the predominant language.

The screening tool requires further refinements in terms of presenting phonological awareness skills more accurately. It is also important to take into consideration that African language readers in general perform lower on phonological awareness tasks (Wilsenach 2019).

The screening tool can only be used by teachers who have a sound understanding of literacy development and literacy difficulties or learning support educators and SPLTs. Critical analysis and age-grade comparison is necessary to make an informed conclusion based on the learner's performance.

Conclusion

The study provides a first step into designing a valid isiXhosa dyslexia screening tool. The screening tool was able to identify specific breakdowns in the various areas of performance, specifically Phonological Awareness, Auditory Discrimination (less so), Sequencing (less so), Decoding/Reading, Knowledge of the Alphabetic Principle, Spelling, Listening Comprehension, Written Output, and Discrepancy between oral and written language in another language, supporting current research (Chung & Ho 2010; Klein & Doctor 2003).

Furthermore, the validity of the screener was supported by the parent and teacher questionnaires through triangulation, where the teacher checklist, parent questionnaire and screener could be used to substantiate indicators showing risk for dyslexia. In addition to triangulation, the researchers' clinical judgement and experience in the field of dyslexia and literacy difficulties supported the results. The adapted isiXhosa screening tool, together with the adapted teacher checklist and parent interview, will therefore give a professional an indication of whether a child is at risk for dyslexia in isiXhosa.

The isiXhosa screening tool can be further refined by additional studies using larger sample populations. Adaptation of the tool into other African languages is to be encouraged, as it would enable the identification, and therefore the early intervention, of learners at risk for dyslexia regardless of their home language.

The screener can be obtained through request via email: share@bellavistaschool.co.za.

Acknowledgements

We would like to acknowledge Nonyameko Njongwe, speech and language therapist with a Master's Degree in Early Childhood Intervention, who is proficient in isiXhosa. She was responsible for the development, implementation and revision of the screening tool. We also acknowledge Dr Nicholas Spaull, senior researcher in the Economics Department at Stellenbosch University and Director of Funda Wande, for his guidance, support and input. Thank you to the Funda Wande Project and Bellavista School for funding the project. Special thanks to Elizabeth (Lilli) Pretorius, Professor of Linguistics at University of South Africa (UNISA), who reviewed the article.

Competing interests

We declare that we have no financial or personal relationships that may have inappropriately influenced us in writing this article.

Author's contributions

A.C. coordinated the project and writing of the report and was one of the field workers and trainers of parents and teachers. K.N. helped with coordination and review of the report and was one of the field workers and trainers of parents and teachers. A.L. was the statistician and provided the explanation of the graphs in the report.

Funding information

- Funda Wande Project under Nic Spaull for partial funding of the project.
- Bellavista School for funding the remainder of the project.
- Bellavista School for funding of resources – photocopies, stationery and concrete objects for use during screening..

Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Disclaimer

The views expressed in this article are of the researchers and not an official position of the institution or funders.

References

American Psychiatric Association, 2013, *Diagnostic and statistical manual of mental disorders*, 5th edn., CBS Publishers, Arlington, TX.

Bowers, P.G. & Wolf, M., 1993, 'Theoretical links among naming speed, precise timing mechanisms and orthographic skill in dyslexia', *Reading and Writing: An Interdisciplinary Journal* 5, 69–85. https://doi.org/10.1007/BF01026919

Chung, K., Ho, C. & Chan, D., 2011, 'Cognitive skills and literacy performance of Chinese adolescents with and without dyslexia', *Reading and Writing* 24(7), 835–859. https://doi.org/10.1007/s11145-010-9227-1

Chung, K.K.H. & Ho, C.S.H., 2010, 'Second language learning difficulties in Chinese children with dyslexia: What are the reading-related cognitive skills that contribute to English and Chinese word reading?', *Journal of Learning Disabilities* 43(3), 195–211. https://doi.org/10.1177/0022219409345018

Diemer, M., Van der Merwe, K. & De Vos, M., 2015, 'The development of phonological awareness literacy measures for isiXhosa', *Southern African Linguistics and Applied Language Studies* 33(3), 325–341. https://doi.org/10.2989/16073614.2015.1108769

Gaab, N., 2017, 'It's a myth that young children cannot be screened for dyslexia!', *International Dyslexia Association eXaminer*, viewed 28 March 2018, from https://dyslexiaida.org/its-a-myth-that-young-children-cannot-be-screened-for-dyslexia/.

Gough, P.B. & Tunmer, W.E., 1986, 'Decoding, Reading, and Reading Disability. *Remedial and Special Education*', 7(1), 6–10.

Hulme, C. & Snowling, M.J., 2015, 'Learning to read: What we know and what we need to understand better', *Child Development Perspectives* 7(1), 1–5. https://doi.org/10.1111/cdep.12005

Joshi, R., Prakash, P. & Surendranth, S., 2010, 'Dyslexia and hyperlexia in bilinguals', *Dyslexia* 16(2), 99–118. https://doi.org/10.1002/dys.402

Kelly, K. & Phillips, S., 2016, *Teaching literacy to learners with dyslexia – A multisensory approach*, 2nd edn., Sage, London.

Klein, D. & Doctor, E.A.L., 2003, *Patterns of developmental dyslexia in bilinguals. Dyslexia in different languages: Cross-linguistic comparisons*, pp. 112–136, Whurr Publishers, Philadelphia, PA, ix, 308.

Kovelman, L., Bisconti, S. & Hoeft, F., 2016, 'Literacy & dyslexia revealed through bilingual brain development', *International Dyslexia Association eXaminer* April(1), 1.

Lundberg, I., 2002, 'Second language learning and reading with the additional load of dyslexia', *Annals of Dyslexia* 52(1), 165–187. https://doi.org/10.1007/s11881-002-0011-z

Lyon, G.R., 1995, 'Toward a definition of dyslexia', *Annals of Dyslexia* 45, 3–27. https://doi.org/10.1007/BF02648210

Lyytinen, H., Erskine, J., Hamalainen, J., Torppa, M. & Ronimus, M., 2015, 'Dyslexia – Early identification and prevention: Highlights from the Jyväskylä longitudinal study of dyslexia', *Current Developmental Disorders Report* 2(4), 330–338. https://doi.org/10.1007/s40474-015-0067-1

Maphalala, Z., Pascoe, M. & Smouse, M., 2014, 'Phonological development of first language isiXhosa-speaking children aged 3;0–6;0 years: A descriptive cross-sectional study', *Clinical Linguistics and Phonetics* 28(3), 176–194. https://doi.org/10.3109/02699206.2013.840860

Mortimore, T., Hansen, L., Hutchings, M., Northcote, A., Fernando, J., Horobin, L. et al., 2012, *Dyslexia and multilingualism: Identifying and supporting bilingual learners who might be at risk of developing SpLD/dyslexia*, research report, British Dyslexia Association, Bracknell.

Mowder, B., 2005, 'Parent development theory: Understanding parents, parenting perceptions and parenting behaviours', *Journal of Early Childhood and Infant Psychology* 2005(Annual), 45.

Pascoe, M. & Smouse, M., 2012, 'Masithethe: Speech and language development and difficulties in isiXhosa', *South African Medical Journal* 102(6), 469–471. https://doi.org/10.7196/SAMJ.5554

Paul, I., Bott, C., Heim, S., Wienbruch, C. & Elbert, T.R., 2006, 'Phonological but not auditory discrimination is impaired in dyslexia', *Journal of Neuroscience* 10(1), 2945–2953. https://doi.org/10.1111/j.1460-9568.2006.05153.x

Ring, J. & Black, J., 2018, 'The multiple deficit model of dyslexia', *Annals of Dyslexia* 68(2), 104–125. https://doi.org/10.1007/s11881-018-0157-y

Rose, J., 2009, *Identifying and teaching children and young people with dyslexia and literacy difficulties*, DCSF-Dyslexia, viewed from http://www.thedyslexia-spldtrust.org.uk/media/downloads/inline/the-rose-report.1294933674.pdf.

Rossouw, K. & Pascoe, M., 2018, 'Intervention for bilingual speech sound disorders: A case study of an isiXhosa–English-speaking child', *South African Journal of Communication Disorders* 65(1), 566. https://doi.org/10.4102/sajcd.v65i1.566

Shonkoff, J. & Meisels, S., 2010, *Handbook of early childhood intervention*, 2nd edn., Cambridge University Press, Cambridge.

Siegel, L., 2006, 'Perspectives on dyslexia', *Paediatric Child Health* 11(9), 581–587. https://doi.org/10.1093/pch/11.9.581

Spaull, N., Pretorius, E. & Mohohlwane, N., 2018, *Investigating the comprehension iceberg: Developing empiricle benchmarks for early grade reading in agglutinating African languages*, Research on Social Economic Policy (RESEP), Stellenbosch.

Torgesen, J.K., 2004, 'Avoiding the devastating downward spiral: The evidence that early intervention prevents reading failure', *American Educator* 28, 6–19. Reprinted in the 56th Annual Commemorative Booklet of the International Dyslexia Association, November, 2005.

Van der Merwe, A. & Le Roux, M., 2014, 'Idiosyncratic sound systems of the South African Bantu languages: Research and clinical implications for speech-language pathologists and audiologists', *South African Journal of Communication Disorders* 61(1), e1–e8. https://doi.org/10.4102/sajcd.v61i1.86

Van Wyk, C., 2005, *An overview of education data in South Africa: An inventory approach. A working paper of the department of economics and the bureau for economic research at the University of Stellenbosch*, viewed 17 May 2018, from https://www.ekon.sun.ac.za/wpapers/2015/wp192015/wp-19-2015.pdf.

Wilsenach, C., 2016, 'Identifying phonological processing deficits in Northern Sotho-speaking children: The use of non-word repetition as a language assessment tool in the South African context', *South African Journal of Communication Disorders* 63(2), e1–e11. https://doi.org/10.4102/sajcd.v63i2.145

Wilsenach, C., 2019, 'Phonological awareness and reading in Northern Sotho – Understanding the contribution of phonemes and syllables in Grade 3 reading attainment', *South African Journal of Childhood Education* 9(1), a647. https://doi.org/10.4102/sajce.v9i1.647