






Grade 4 learners with reading and writing difficulties in Mauritius: Oral reading and spelling characteristics



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Dates:

Received: 06 Mar. 2022
Accepted: 31 Aug. 2022
Published: 03 Mar. 2023

How to cite this article:

Veerabudren, S., Kritzinger, A., Graham, M.A., Geertsema, S. & le Roux, M., 2023, 'Grade 4 learners with reading and writing difficulties in Mauritius: Oral reading and spelling characteristics', *South African Journal of Childhood Education* 13(1), a1200. <https://doi.org/10.4102/sajce.v13i1.1200>

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Background: Learners with reading and writing difficulties (RWD) are accommodated in Mauritian government schools without formal curriculum adjustment and teacher support. Little is known about their RWD. The aim was to describe the characteristics of Grade 4 learners with RWD.

Aim: To describe the characteristics of Grade 4 learners with RWD.

Setting: Government primary schools in Mauritius, in urban and rural areas.

Methods: Grade 4 learners with RWD from 20 randomly selected schools were identified with the Screening Tool for Learning Disorders (STLD). A comparative design was used. Parents of 67 learners with RWD (research group [RG]) gave consent. Forty-nine learners without RWD were selected as a control group (CG) based on academic performance and consent. Hearing loss and visual impairment were excluded. The Clinical Evaluation of Language Function Observation Rating Scale (CELF-5 ORS), the Schonell Spelling Test and the Gray Oral Reading Test were used.

Results: The CELF-5 ORS showed a wide range of difficulties of the RG with speaking, listening, oral reading and writing. There were significant differences between the RG and CG with reading and spelling. Despite being in Grade 4 (mean age 9.0 years), the mean spelling age for the RG was 5.5 years, corresponding to a Grade 1 level. Positive correlations were found between the STLD and listening, speaking and reading on the CELF-5 ORS for the RG. The more likely it was that participants had specific learning disorders on the STLD, the worse the spelling. Those with a history of speech and language delay performed more poorly with reading and spelling.

Conclusion: Difficulties were confirmed by all the measures. Diagnostic assessments for specific learning disorders are required to exclude intellectual disability and other comorbidities. There is a dire need for intervention programs for learners with RWD in mainstream government schools in Mauritius. Programs should include speech-language therapists and aim at prevention, identification, diagnosis and intervention.

Contribution: The study is important for speech–language therapists working in the education system and primary school teachers. There is a dire need to implement intervention programs for learners with RWD in mainstream government schools in Mauritius.

Keywords: Grade 4 learners; reading and writing difficulties; mainstream government schools; Mauritius; specific learning disorder.

Introduction

Reading and writing difficulties (RWD) refer to an undiagnosed collection of learning difficulties underlying reading and writing. The learner may experience difficulties with accurate and/or fluent word recognition and decoding and encoding abilities, which typically result from a deficit in knowledge about the phonological component of language (Prestes & Feitosa 2017). Delays in the development and production of phonological codes include deficiencies in auditory perception and discrimination of phonemes (Ozernov-Palchik & Gaab 2016), phoneme-grapheme correspondence (Boros et al. 2016; Law et al. 2018), phonological awareness (Cavalli et al. 2017) and phonological memory (Kastamoniti et al. 2018). Secondary consequences of RWD may include problems in reading comprehension and reduced reading experience that can impede the growth of a child's vocabulary and background knowledge (Alt et al. 2017). These difficulties

significantly impact a child's ability to access the school curriculum and achieve academic success. Reading and writing difficulties and specific learning disorders, when diagnosed, account for higher rates of school dropout, psychological distress, unemployment and lower income in later life (American Psychiatric Association [APA] 2013). Failure to address RWD can lead to low self-esteem, anger, behavioural problems and depression in the child (Novita 2016; Zarkowska & Clements 2018). Little is known about learners with RWD in Mauritius, a low- to middle-income country (LMIC) with an understudied context.

There are certain differences in RWD between LMICs and high-income countries (HICs). While it is estimated that 5% – 15% of all school-age children across cultures experience RWD, the condition is also influenced by socio-economic backgrounds (Peterson & Pennington 2015; Rapin 2016; Shifrer, Muller & Callahan 2010). Epidemiological studies, mostly from HICs, report that the prevalence of reading deficits is approximately 4% – 9% and 3% – 7% for deficits in mathematics among learners (APA 2013). The prevalence of learners with RWD appears to be higher in LMICs. A study in Edirne, Turkey, for example, found 13.6% of learners with reading impairment, 6.9% with writing impairment and 6.5% with mathematical impairment (Görker et al. 2017). In general, LMICs face more challenges relating to the identification and intervention of learners with RWD. The education systems in LMICs often do not have sufficient resources to support schools with teaching aids, train teachers to use alternative teaching methods, collect data and monitor the performance of learners with RWD in an inclusive education environment (Kim, Lee & Zuilkowski 2020). Another factor in some LMICs is high learner–teacher ratios at primary level education. In Chad, Malawi and Rwanda, the learner–teacher ratios were reported to be 62:1, 70:1 and 58:1, respectively (UNESCO 2017). In Madagascar, there is one trained primary level teacher on average for every 273 pupils (UNESCO 2017). A study on teacher perspectives of learners with RWD in mainstream government schools in Mauritius revealed that the number of learners in classes ranged between 15 and more than 35, which indicates variation across countries (Veerabudren et al. 2021a, 2021b). Many teachers were not adequately trained to support learners with RWD in an inclusive education setting (Veerabudren et al. 2021a, 2021b). A low remuneration scale may also decrease teachers' job satisfaction (Gamero Burón & Lassibille 2016).

Furthermore, a low adult literacy rate in LMICs has implications for children's learning in the home and negatively impacts modelling of literacy behaviours (UNESCO 2017). These factors, typically not found in HICs, present serious challenges for formal identification practices of learners with RWD, implementing reading and writing interventions and improving children's learning.

Identification practices for learners with RWD are highly refined in HICs, with many countries developing a set of

standards that can be followed to ensure appropriate assessment of learners with RWD (Agrawal et al. 2019; Gündoğmuş 2018). Initiatives are aimed at teacher training to facilitate the identification of learners with RWD and intervention, using current evidence-based strategies (Mather, White & Youman 2020). Countries are adapting and modifying the national curriculum to promote individualised instruction by developing individual education plans through a multidisciplinary process involving parents, teachers, administrators, the learner, other relevant support staff and service providers, such as speech–language therapists to establish better learning goals (Alkahtani & Kheirallah 2016).

In contrast, in LMICs such as Mauritius and South Africa, educational practices have not yet been fully developed to include all learners with special needs (Adewumi & Mosito 2019). Recommendations from HICs cannot be directly applied because of differences in the educational systems and the characteristics of learners and families who access services. In Mauritius, the characteristics of RWD in school-age children are not fully known. To date, no research study could be found investigating RWD among young learners in Mauritius. There appears to be a lack of awareness about RWD and intervention options for learners with RWD among educators and parents. The study on perspectives of teachers on learners with RWD in Mauritius further showed that teachers were able to identify learners with such problems in their classes but were unaware of symptoms and causes of RWD (Veerabudren et al. 2021a, 2021b). Teachers do not receive any training in inclusive education or how to assist learners with RWD in a regular classroom (Veerabudren et al. 2021a, 2021b). A study about the perspectives of parents with children with RWD in the same setting also showed that parents have limited information about the symptoms and causes of their child's RWD, therefore describing children with RWD mostly as lazy or ascribing RWD to poor teaching methods. Parents were also unfamiliar with appropriate interventions to support their child with RWD (Veerabudren et al. 2021a, 2021b).

Another factor to consider when studying RWD in Mauritius is the multilingual nature of the majority of households. Based on the first author's personal knowledge of the Mauritian context, most learners acquire Mauritian Creole as their first language and French as a second language before the age of 3. Mauritian Creole or Morisien is a French-based language, with a similar phonology as French and English words in the standardised version of the language (Adone 1994). Children typically start their education from age 5 through the medium of English (Ministry of Education and Human Resources 2006). Apart from the majority multilingual context, there is also a disconnect between the use of oral and written languages. While Mauritian Creole dominates as the most frequently spoken first language of the population, it is not the language of learning and teaching in Mauritius. English and French are the main oral and print languages for commerce and education (Owodally 2013;

Sonck 2005). Emergent literacy skills may be delayed as limited children's literature exist in Mauritian Creole (Owodally 2010). When children enter the first grade, they are Mauritian Creole–French bilinguals who are required to respond to the academic demands in English and French as medium of instruction. Because of the proximity to French and English, Mauritian Creole learners in general and learners with RWD in particular may benefit from cross-lingual transfer. According to Cummins (2019), the languages of multilingual learners interact in complex ways that enhance overall language and literacy development. It is therefore important to investigate to which extent learners with RWD are influenced by their multilingualism.

Successive bilingual learners, like children in Mauritius who were exposed to the language of learning and teaching when they entered school for the first time, may appear to have RWD. With sufficient exposure to the language of learning and teaching and with effective time spent on tasks, difficulty reading and writing may be temporary (Cummins 2019; Owens 2014). Long-term RWD, which may lead to the diagnosis of a specific learning disorder, shows a different profile of difficulties. Reading and writing difficulties are frequently preceded by language delay in the preschool years, where difficulties manifest in both languages when the child enters school (APA 2013). In such a complex linguistic situation, it is important to describe the characteristics of learners with RWD in Mauritius.

Grade 4 learners aged between 8 and 9 years may be the most appropriate population to investigate in such a study, as a learner typically becomes a sophisticated reader by 9 years of age (Abbott, Berninger & Fayol 2010). Grade 4 learners are typically able to read and write independently at sentence level to meet academic demands (Horowitz-Kraus et al. 2017). A better understanding of the characteristics of learners with RWD in Mauritius may create awareness of the need for intervention and open a pathway to diagnosis and inclusive education practices to be implemented in classrooms. The aim of the study was to describe the oral reading and spelling characteristics of Grade 4 learners with RWD in mainstream government schools in Mauritius.

Method

Research design and research ethics

A descriptive comparative research design was used to investigate the characteristics of learners with RWD. Since no normative data exist in Mauritius to compare the participants' performance on measures developed in other settings, a control group (CG) of learners without RWD was utilised as comparison to interpret the results of standardised measures that were used in the study.

Clearance from the Ethics Committee (reference number HUM018/0520) of the University of Pretoria, South Africa,

and the Ministry of Education of Mauritius was obtained. Permissions from 20 randomly selected mainstream government schools in Educational Zone 2 in Mauritius were obtained to identify learners with and without RWD in Grade 4 classes. The zone has a near equal distribution of urban and rural schools. Once identified by teachers with the Screening Tool for Learning Disorder (STLD) (Vidyadharan, Tharayil & George 2017) and based on academic performance, all prospective participants' parents were approached to give informed consent that their children could participate in the study. Children gave assent by verbally agreeing to participate and wrote their names on a consent page. All learners with RWD (research group [RG]) were referred for follow-up after completion of the study.

Selection of participants

For the purpose of the study, RWD refer to persistent academic learning difficulties regarding reading accuracy, reading comprehension and spelling across the different languages of instruction, English and French, which are both used as mediums of instruction in Mauritius. Inclusion criteria were that learners should have been in Grade 4, aged between 8 and 9 years old and attending a government primary school at the time of data collection. The RG was identified using the STLD developed by Vidyadharan et al. (2017) in India. The screening tool was therefore developed in a similar LMIC to the island of Mauritius. The STLD contains 26 items from the domains of reading, writing, spelling and mathematics, but the different domains are not scored separately. According to the tool, a total score of 11–20 indicates a need for an assessment to confirm a learning disorder, and a score of > 20 signals a learning disorder. Inclusion criterion for RG ($n = 67$) was based on a score of 11 or higher on the screening tool to be identified with RWD (see Table 1). The CG ($n = 49$) comprised typically achieving learners without any RWD, randomly selected by their teachers based on their latest exam performance in class. As shown in Table 1, participants from both groups were bilingual, as they all speak Mauritian Creole or French at home, yet the language of learning and teaching is mainly English.

The presence of a hearing difficulty in both groups was ruled out by a hearing screening test, validated by Mahomed-Asmail et al. (2016) for schoolchildren. All participants had audiological thresholds within normal limits (below 15 dB) across three frequencies, 500 Hz, 1000 Hz and 2000 Hz. Hence, they all passed the hearing screening except for one prospective participant, who was then referred for diagnostic testing and eliminated from the study sample. There were no visual difficulties observed, but five participants in the CG wore spectacles at the time of data collection. Table 1 summarises the gender and age for the RG and CG and STLD score of the RG, where SD and IQR stand for standard deviation and interquartile range, respectively.

As further shown in Table 1, there was a significant difference in age between the two groups, with the RG on average 3

TABLE 1: Participant description ($n = 116$).

| Variable | Statistic | | | | | | Research group ($n = 67$) | | | | | | Control group ($n = 49$) | | | | Test statistic | p | | |
|----------------------|-----------|------|------|--------|----|-----|-----------------------------|------|------|--------|-----|-----|----------------------------|------|------|--------|----------------|-----|--------------|-------|
| | n | % | Mean | Median | SD | IQR | n | % | Mean | Median | SD | IQR | n | % | Mean | Median | | | SD | IQR |
| Gender | | | | | | | | | | | | | | | | | | | $z = 0.487$ | 0.626 |
| Male | 68 | 58.6 | - | - | - | - | 38 | 32.8 | - | - | - | - | 30 | 25.8 | - | - | - | - | - | - |
| Female | 48 | 41.1 | - | - | - | - | 29 | 25.0 | - | - | - | - | 19 | 16.4 | - | - | - | - | - | - |
| Age in years | | | | | | | | | 9.0 | 9.1 | 0.5 | 0.4 | | | 9.3 | 9.3 | 0.3 | 0.3 | MW = 118.500 | 0.003 |
| Home language | | | | | | | | | | | | | | | | | | | $z = 0.226$ | 0.821 |
| Mauritian Creole | 105 | 90.5 | - | - | - | - | 61 | 91.0 | - | - | - | - | 44 | 89.8 | - | - | - | - | - | - |
| French | 11 | 9.5 | - | - | - | - | 6 | 9.0 | - | - | - | - | 5 | 10.2 | - | - | - | - | - | - |
| English | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | - | - |
| STLD score | | | | | | | | | 20.1 | 21 | 3.6 | 5 | | | | | | | | |

STLD, Screening Tool for Learning Disorder; MW, Mann-Whitney test; SD, standard deviation; IQR, interquartile range.

months younger than the CG. The two groups, however, had an equal number of years of education, as they were all in Grade 4. There was no difference in gender distribution between the two groups. There were also no significant differences in home language between the RG and CG.

Among the RG ($n = 68$), several learners had a history of delayed speech and language development ($n = 26$, 38.8%) as reported by their parents in a questionnaire. Their educational history showed that most RG participants had the opportunity to attain school readiness in the form of preprimary education ($n = 61$, 91.0%). Only three participants had a preterm birth and a hospital stay after birth, but they did not have any neonatal illness.

Material

Once the participants of both groups were identified by the teachers with the assistance of the researcher using the STLD, the Clinical Evaluation of Language Function, fifth edition, Observation Rating Scale (CELF-5 ORS) (Wiig, Semel & Secord 2013) was independently completed by the RG participants' class teachers to cross-verify the findings of the STLD. The CELF-5 ORS was used to obtain a systematic observation of listening, speaking, reading and writing skills of the RG in the classroom. These observations helped in obtaining a better profile of the RG in the domains generally affected in learners with RWD. Data were collected towards the end of the school year in 2020 so that teachers would have known the learners in their classes well. The researchers regarded the teachers' observations of the RG's difficulties as valuable and anticipated that the use of the CELF-5 ORS by teachers could have created awareness of the importance of formal identification of learners with RWD in their classes. The parents of the RG also completed a questionnaire, which consisted of questions related to their medical and developmental history. The parents' responses were used to investigate relationships between medical and developmental history and characteristics of learners with RWD.

Two assessment tools, the Gray Oral Reading Test, fourth edition (GORT-4), and the Schonell Spelling Test, were used

to investigate the reading and spelling characteristics of Grade 4 learners in both the RG and CG. The GORT-4 (Wiederholt & Bryant 2001) is widely known as an objective measure of oral reading progress and diagnosis of oral reading difficulties. Four different scores provide comprehensive information about a learner's oral reading skills: rate (the amount of time taken by a learner to read a story); accuracy (the learner's ability to read each word in the story correctly); fluency (the learner's rate and accuracy scores combined); and comprehension (the appropriateness of the learner's responses to questions about the content of each story read). The GORT-4 includes two forms, A and B, containing 14 developmentally sequenced reading passages each and 5 comprehension questions related to each passage. Standard scores, percentile ranks, grade equivalents and age equivalents are provided for each score. Form A was used in this study as it is the pre-intervention test stimulus. Since studies show an absence of bias for gender and ethnicity in the GORT-4 stories and questions, it appeared to be an appropriate test to use in Mauritius (Craig et al. 2004; Speltz et al. 2017).

The Schonell Spelling Test (Schonell 1952) consists of a list of 100 graded words, which are read aloud while the participants writes the words. The test is widely used by psychologists and special educators to provide reliable results about spelling errors and spelling age of learners across grade levels (Chmilar 2016). The words used in the Schonell Spelling Test appeared to be appropriate for the Mauritian population. No words with unfamiliar cultural references were identified. To verify the relevance of the tests before data collection, the researcher administered both the GORT-4 and the Schonell Spelling Test to five Grade 4 learners without RWD in Mauritius. The learners were familiar with all words in the spelling test and could read the passage on Grade 4 level without any difficulty. The CG data were used as local reference for the Schonell Spelling Test and GORT-4 RG scores.

Data collection procedure

Parents of the RG completed the parent questionnaire. The researcher familiarised the teachers with the CELF-5 ORS and

requested them to complete the scale for the RG. Since data collection was conducted at the end of the academic year, the teachers were familiar with their learners and reported no difficulty completing the scale. After participants gave assent to participate, the two tests (GORT-4 ORS and the Schonell Spelling Test) were administered individually in a quiet room according to test instructions. The administration time for the GORT-4 typically ranged from 15 min to 30 min. The researcher determined the first reading passage level for each participant by using the entry point according to the grade level in the table provided in the examiner's booklet (Wiederholt & Bryant 2001). Participants were provided with the passage and requested to read it orally as 'carefully and quickly as you can' (Wiederholt & Bryant 2001). Participants' reading was timed with a cell phone stopwatch and deviations from the print were noted as the participant read the passage. Following the reading evaluation, the researcher removed the passage, read the comprehension questions to participants and noted their answers. Testing continued until a ceiling had been reached, determined by the fluency score. The ceiling is reached when a participant exceeds the maximum number of misread words permitted in the stories. In this study, the RG could only read to Story 4 while the CG read to Story 12.

Following the reading test, the Schonell Spelling Test was carried out. Participants were provided a piece of lined paper, coded at the top. The researcher dictated each word, saying the word individually, then in a sentence and finally repeating the single word again (e.g. time – Can you tell me the time? – time). The dictation was slow and clear, participants were not rushed and words were repeated as often as needed. The test was discontinued when 10 consecutive errors were made. The approximate duration of the entire data collection session for the RG was 20 min – 30 min, whereas the CG required longer time, approximately 45 min, as they could read more stories in the GORT-4.

Data analysis

The raw data obtained from the CELF-5 ORS, the GORT-4 and the Schonell Spelling Test were tabulated using alphanumerical codes to ensure the confidentiality of the participants' data. Scores of the CELF-5 ORS are obtained by calculating the number of statements that obtained a mark; that is, the teacher indicated a 'yes' for the statement. The maximum score indicating difficulties (number of 'yes' statements) for listening skills is 14, for speaking skills 24, for reading skills 6 and for writing skills 6. Four different scores, namely reading rate, accuracy, fluency and comprehension, were obtained from the GORT-4. Standard scores, percentile ranks, grade equivalents and age equivalents are provided for each score. The spelling scores of the participants were obtained from the Schonell Spelling Test by dividing the total number of words correctly spelled by 10. The number is then added to five. A conversion table to convert tenths of a year into months is used to obtain the spelling age of participants.

The coded data were analysed using descriptive statistics, such as frequencies and percentages, using the Statistical

Package for the Social Sciences (SPSS) version 26 (IBM Corporation, Armonk, New York, United States). For continuous variables, the researchers tested for normality using the Shapiro–Wilk test. Since none of the p -values was greater than 0.05, normality was not present. Accordingly, nonparametric tests were used for statistical analysis of the continuous variables, such as to determine significant differences between the two study groups (Mann–Whitney [MW] test) and correlations (Spearman) between data. Spearman correlations were reported as 'rs' as the custom for nonparametric data. For categorical variables, the two-proportions z -test was used to test for differences in proportions between the RG and CG. If the p -value was < 0.05 , the difference (MW and z -test) or the correlation (Spearman) is statistically significant. Possible correlations were investigated between the outcomes of the STLD used to identify Grade 4 learners with RWD, the CELF-5 ORS, the GORT-4 measures and the Schonell Spelling Test. Correlations between the RG's developmental history obtained through the parent questionnaire and their performance on the GORT-4 and Schonell Spelling Test are described.

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of Pretoria Research Ethics Committee (no. HUM018/0520).

Results

The characteristics of Grade 4 learners with RWD are described according to scores on the CELF-5 ORS regarding listening, speaking, oral reading and writing skills as completed by their classroom teacher. Oral reading and spelling abilities are shown by performance on the GORT-4 and the Schonell Spelling Test and compared with those of the CG.

Clinical Evaluation of Language Function, Fifth Edition, Observation Rating Scale findings

Table 2 summarises the descriptive statistics of the CELF-5 ORS for the RG, which shows that most of the language function difficulties were observed in reading and writing skills. The results showed the wide range of difficulties the RG experiences with speaking, listening, reading and writing. The RG obtained a mean score of 8.6 out of 14 for difficulties in listening skills, indicating that most participants experienced more than 50% of the difficulties reported in the CELF-5 ORS items for listening skills. The SDs for listening and especially for speaking skills indicate a large variation, with scores

TABLE 2: Descriptive statistics of the Clinical Evaluation of Language Function, fifth edition, Observation Rating Scale for the research group ($n = 67$).

| Domains | Maximum error score | Mean | Median | SD | IQR |
|------------------|---------------------|------|--------|-----|-----|
| Listening skills | 14 | 8.6 | 9 | 3.6 | 5 |
| Speaking skills | 24 | 14.4 | 14 | 6.4 | 8 |
| Reading skills | 6 | 5.6 | 6 | 0.8 | 0 |
| Writing skills | 6 | 5.8 | 6 | 0.5 | 0 |

SD, standard deviation; IQR, interquartile range.

widely dispersed from the mean scores, also indicated by the IQR.

The RG's difficulties with reading and writing skills were also reflected in the scores obtained on the STLD (mean = 20.1, SD = 3.6). However, the RG also failed many items pertaining to their listening and speaking skills on the CELF-5 ORS, which indicate significant difficulties with receptive and expressive language skills.

Correlations between the Screening Tool for Learning Disorder and Clinical Evaluation of Language Function, fifth edition, Observation Rating Scale domains for the research group

Positive correlations were found between the STLD and the listening, speaking and reading domains of the CELF-5 ORS for the RG. The higher they scored on the screening tool (which indicates a higher risk for specific learning disorder), the more difficulties were observed in their listening ($r_s = 0.49, p < 0.001$), speaking ($r_s = 0.48, p < 0.001$) and reading ($r_s = 0.24, p = 0.046$) skills. The positive correlation shows the validity of the STLD, a screening tool which is not as widely used as the CELF-5 ORS, to identify learners with RWD.

Oral reading ability

Table 3 shows the comparison between the RG and CG for the GORT-4 results, with a significant difference in all measures of the test. The mean standard score on the GORT-4 (mean = 5.3,

TABLE 3: Comparison between the research group and control group for the Gray Oral Reading Test, fourth edition.

| GORT-4 measures | Research group (<i>n</i> = 67) | Control group (<i>n</i> = 49) | MW | <i>p</i> |
|------------------------------|------------------------------------|-----------------------------------|------|----------|
| Standard score | | | 0.00 | < 0.001* |
| Mean | 5.3 | 28.0 | | |
| Median | 4.0 | 27.0 | | |
| SD | 3.1 | 3.9 | | |
| IQR | 3.0 | 7.0 | | |
| Reading comprehension | | | 77.0 | < 0.001* |
| Mean | 6.2 | 40.7 | | |
| Median | 4.0 | 41.0 | | |
| SD | 7.0 | 12.0 | | |
| IQR | 9.0 | 18.0 | | |
| Reading rate | | | 0.00 | < 0.001* |
| Mean | 4.0 | 31.9 | | |
| Median | 1.0 | 34 | | |
| SD | 4.9 | 4.3 | | |
| IQR | 8.0 | 7.0 | | |
| Reading accuracy | | | 2.0 | < 0.001* |
| Mean | 4.3 | 37.2 | | |
| Median | 2.0 | 39.0 | | |
| SD | 5.7 | 5.9 | | |
| IQR | 9.0 | 9.0 | | |
| Reading fluency | | | 0.00 | < 0.001* |
| Mean | 8.3 | 67.7 | | |
| Median | 4.0 | 66.0 | | |
| SD | 10.4 | 9.0 | | |
| IQR | 17.0 | 9.0 | | |

GORT-4, Gray Oral Reading Test, fourth edition; MW, Mann-Whitney test, SD, standard deviation; IQR, interquartile range.

*, Significant at 5% level of significance.

SD = 3.1) for the RG was significantly below that of the CG (mean = 28.0, SD = 3.9, $p < 0.001$). When the standard scores of the RG were converted to calculate the oral reading quotient, most RG participants scored below 79, which indicates 'poor' to 'very poor' performance for oral reading skills compared to the CG, which was within the range of above average and superior. The RG also had significant difficulties with reading comprehension (mean = 6.2, SD = 7.0) compared to the CG (mean = 40.7, SD = 12.0, $p < 0.001$). Although the CG are bilingual learners similar to the RG, they did not perform more poorly on oral reading ability and reading comprehension. It therefore seems that bilingual learning did not negatively affect their oral reading ability.

Spelling ability

Table 4 shows the comparison of the RG and CG for the Schonell Spelling Test, with significant differences between the two groups on all measures. The majority of learners with RWD in the RG had great difficulties with spelling. Despite being in Grade 4 and having a mean chronological age of 9.0 years, their mean spelling age was 5.5 years, which corresponds to a Grade 1 level. In comparison, the mean spelling age of the CG was 9.3 years, which is equal to their mean chronological age (mean = 9.3 years, see Table 1). It seems that bilingual learning also did not affect the spelling ability of the CG.

Correlations between the Screening Tool for Learning Disorder and Schonell Spelling Test for the research group

A negative correlation was observed between the STLD and the number of words correctly spelled on the Schonell Spelling Test. The higher their score on the STLD, indicating a high risk for specific learning disorder, the poorer the spelling scores ($r_s = -0.24, p = 0.04$). Participants who scored lower on the spelling test also had a poor standard score on the GORT-4 ($r_s = 0.28, p = 0.01$). The correlations between the

TABLE 4: Comparison between research group and control group on the Schonell Spelling Test.

| Variable | Research group (<i>n</i> = 67) | Control group (<i>n</i> = 49) | MW | <i>p</i> |
|--|------------------------------------|-----------------------------------|------|----------|
| Number of words correctly spelt | | | 0.00 | < 0.001* |
| Mean | 6.0 | 43.2 | | |
| Median | 3.0 | 45.0 | | |
| SD | 7.4 | 8.4 | | |
| IQR | 10.0 | 13.0 | | |
| Total score | | | 49.0 | < 0.001* |
| Mean | 5.7 | 9.3 | | |
| Median | 5.3 | 9.5 | | |
| SD | 1.4 | 0.8 | | |
| IQR | 0.9 | 1.4 | | |
| Spelling age | | | 0.00 | < 0.001* |
| Mean | 5.5 | 9.3 | | |
| Median | 5.4 | 9.4 | | |
| SD | 0.7 | 0.8 | | |
| IQR | 0.8 | 1.3 | | |

*, Significant at 5% level of significance.

MW, Mann-Whitney test, SD, standard deviation; IQR, interquartile range.

different instruments indicate the validity and reliability of the results.

Correlations between the research group's speech and language developmental history, the Schonell Spelling Test and Gray Oral Reading Test, fourth edition

Research group participants whose parents reported that their child had a history of delayed speech and language as a toddler performed significantly more poorly in the Schonell Spelling Test ($r_s = -0.27, p = 0.02$) and the GORT-4 ($r_s = -0.35, p < 0.001$). Therefore, negative correlations were found between reported speech and language delay in the past and current spelling and oral reading skills. No further correlations were found between the oral reading and spelling characteristics of the RG and their home language or developmental history.

Discussion

The characteristics of learners with RWD showed that they have significant difficulties in learning and using the academic skills of reading and writing, both on teacher-reported measures and their actual performance on the GORT-4 and the Schonell Spelling Test, in comparison with peers without RWD. Several correlations between the different measures show the validity and reliability of the results. It is unlikely that the significant difference in age between the RG (mean age 9.3 years) and CG (mean age 9.0 years) can account for the severity of RWD in the RG as the two groups had similar educational opportunities.

The home language of both the groups was mostly Mauritian Creole, with a few speaking French at home. None had English as their home language despite it being the main language for learning and teaching. It appears that the differences between the RG and the CG in oral reading and spelling cannot be associated with bi- or multilingual learning, as the groups had similar home languages and equal exposure to English as language of learning and teaching. It may, however, be beneficial to promote reading and spelling skills by exposing preschool Mauritian children to English at an earlier stage.

The results of the study provided a rich description of RWD in the RG. Apart from scoring close to the maximum error scores for reading and writing on the CELF-5 ORS, most participants in the RG scored more than 50% of difficulties in the domains of listening and speaking, which relate to receptive and expressive language difficulties. Those with a parent-reported history of speech and language delay in the RG performed more poorly on the Schonell Spelling Test and GORT-4. The results reinforce the association between language difficulties and RWD (Adlof & Hogan 2018). Many research studies have underscored the hypothesis that the presence of a developmental language disorder increases a learner's risk of experiencing RWD and poor academic

achievement when compared to learners with typical language skills (Del Tufo, Earle & Cutting 2019; Price et al. 2021). Listening and speaking difficulties could significantly limit a learner's classroom participation and learning of basic reading and writing skills. There was a large variation in SDs for listening and speaking skills in the RG, indicating widely dispersed scores from the means. A possible explanation may be that as a group, learners with RWD differ greatly in listening and speaking difficulties (Tran & Duong 2020). The widely dispersed scores may not only indicate differences in severity but also variations in the nature of the RG learners' ongoing language difficulties.

No such variations in SDs were observed for reading and writing skills on the CELF-5 ORS. Almost all learners in the RG showed the maximum difficulties in reading and writing abilities (5.6 out of 6 and 5.8 out of 6, respectively). The more likely the participant had specific learning disorder on the STLD, the fewer words were spelled correctly. These findings correlated well with the STLD results, showing the feasibility of using the screening tool for early detection of RWD and the risk for specific learning disorder.

The oral reading skills of the RG were significantly poorer than that of the CG on the GORT-4. The RG showed consistently inaccurate and effortful oral reading because of difficulties in sounding out words. Their reading comprehension scores also showed that they had significant difficulties in understanding the meaning of what is read compared to the CG. The findings indicate that the GORT-4 might also be a useful instrument for identifying the oral reading proficiency of learners in Mauritius. Similarly, the RG's spelling accuracy was significantly below their chronological age, corresponding to Grade 1 learners, while the CG scores matched their chronological age and grade level on the Schonell Spelling Test.

With the battery of measures used, it is evident that several academic domains are affected in the RG. According to the diagnostic criteria for specific learning disorder, the severity of the RG's difficulties may then be described as moderate to severe (APA 2013). Hence, the RG shows distinctive features of specific learning disorder rather than temporary RWD. However, diagnostic assessments must still be carried out as recommended by APA (2013) to distinguish the RG participants' RWD from intellectual disability, neurological disorders, psychosocial adversity, lack of proficiency in the language of learning and teaching or inadequate educational instruction. The presence of sensory disorders such as hearing impairment and visual impairment was already ruled out in the study. Learners with conditions such as attention deficit hyperactivity disorder, neurological disorder or autism spectrum disorder may show RWD as well, but these conditions were neither reported by the parents nor observed by the researcher during administration of the tests.

The presence of ongoing speech and language difficulties in some of the participants in the RG supports the existence of

developmental language disorder in the group. The role of language skills in the development of reading and writing has been continuously supported by scientific evidence in psycholinguistics, cognitive psychology and neuroscience (Navas, Ciboto & Borges 2017). Although there may be cost implications, it is therefore evident that speech–language therapists are an essential part of prevention, assessment and intervention of RWD (American Speech–Language–Hearing Association 2001).

The study has several implications for Mauritius. A set of carefully selected assessment material should be available for use by educational psychologists and speech–language therapists working in the Ministry of Education in Mauritius. This collaboration may promote early identification of learners with specific learning disorder and conditions which may underlie inattentive behaviour, disorders of speech and language or impaired cognitive processing in the early grades. Speech–language therapists should be given the opportunity to collaborate with teachers to implement specific teaching strategies, make adjustments to the curriculum and provide intervention programs for learners with RWD in an inclusive education setting, with the expectation of meeting the demands of the national curriculum (Hogan 2018).

Limitations of the study are that the participants' proficiency in the language of learning and teaching and their home literacy environments were not investigated. There were also no developmental histories of the CG available to make comparisons between the groups. The limitations indicate future research priorities.

Conclusion

Most participants in the RG had moderate to severe difficulties in both reading and writing skills, indicating a high risk for specific learning disorder when comorbidities can be excluded. Significant differences between the performance of the RG and CG indicated the validity of measures used and that there was no evidence of discrimination against a distinctive cultural and linguistic sample of Mauritian learners. The battery of measures used in the study may assist to identify RWD in learners. The study is important for speech–language therapists working in the education system. There is a dire need to implement intervention programs for learners with RWD in mainstream government schools in Mauritius. These programs should not only involve identification and assessment but also provide for adjustments to the national curriculum, teacher training and classroom accommodations. Speech–language therapists play an important role in programs for the prevention of specific learning disorder, addressing speech and language delays in early intervention and promoting emergent literacy.

Acknowledgements

The authors would like to thank the teachers who participated in this study.

Competing interests

The author(s) declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

Authors' contributions

Both S.V. and A.K. planned the study; S.V. collected the data and wrote the article. A.K., S.G. and M.L.R. reviewed the manuscript. M.A.G. carried out the statistical analysis and reviewed the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Data availability

The data that support the findings of this study are available from the corresponding author, S.V., upon request.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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