





South African professionals and developmental dyslexia: Knowledge, needs and perspectives



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Background: Despite extensive research on the specific learning disorder (developmental dyslexia) – SLD (DD), many fallacies still cause confusion amongst professionals worldwide. These myths involve the characteristics, diagnoses and treatment of SLD (DD) and should be eradicated.

Aim: The authors aimed to determine the knowledge, needs and perspectives of South African professionals working with children with SLD (DD).

Setting: A mixed-methods research design was implemented.

Methods: A survey study was carried out and a sample of 108 respondents was obtained. The respondents include speech-language therapists (SLTs), occupational therapists (OTs) and psychologists.

Results: Speech-language therapists and psychologists displayed better knowledge about the facts of SLD (DD), compared to OTs. Their knowledge levels were, however, not significantly affected by existing misconceptions surrounding the condition. The fallacy that SLD (DD) is caused by a visual impairment is still believed. An investigation into the professionals' perspectives regarding the identification of SLD (DD) suggested that South African psychologists were the most confident of their ability to identify characteristics. Nonetheless, all professionals reported not being convinced of their ability to provide a differential diagnosis of the disorder. Statements regarding management highlighted the uncertainties about the importance of addressing phonological awareness skills in treatment. Additional training needs were also identified as SLTs, OTs and psychologists generally feel unprepared to assess and treat SLD (DD).

Conclusion: The differences identified amongst professional groups were related to the knowledge of the facts and characteristics of SLD (DD) and the ability to identify and manage the condition. Additional training needs should be addressed.

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Keywords: Developmental dyslexia; assessment; treatment; training; specific learning disorder.

Introduction

Literacy skills are paramount in ensuring continuous learning opportunities and full participation within society (Kotze & Schaefer 2018). A global trend of low literacy rates amongst children and an increase in the prevalence of paediatric neurodevelopmental disorders has provided an impetus for research in the field of specific learning disorders (SLDs) (Cainelli & Bisiacchi 2019).

Specific learning disorders are marked by learning difficulties in three major academic domains: reading, writing and mathematics (Marshall & Snow 2019). In the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V), SLD (developmental dyslexia [DD]) is now being classified under the category of SLD (American Psychiatric Association 2013; Cainelli & Bisiacchi 2019; Colenbrander, Ricketts & Breadmore 2018). Specific learning disorder (DD) is a disorder of high prevalence as it affects 5% – 10% of individuals worldwide (Knight 2018).

In South Africa, the condition affects 3% – 7% of the population (Disability Info South Africa 2016). These figures are concerning, as individuals with SLDs such as SLD (DD) present with learning difficulties (Colenbrander et al. 2018). The learning difficulties often result in limited educational success, as poor academic performance increases the probability of lower grades,

school dropout, fewer occupational prospects, difficulties in finding employment and engaging in illegal activities (Hulme & Snowling 2016; Marshall & Snow 2019).

Specific learning disorder (DD) may also be detrimental to the mental and emotional well-being of an individual, as it is frequently associated with depression, anxiety, frustration, social isolation and low self-esteem (McArthur & Castles 2017; Sanfilippo et al. 2020). It is well advised, therefore, to investigate the incidence of SLD (DD) within South Africa.

Identifying SLD (DD) in South Africa is an intricate task, as the country faces many challenges arising from poverty, ethnic differences and lack of access to educational programmes (Fourie, Sedibe & Muller 2018). Further complications include the low literacy and numeracy abilities of school-aged children (Pretorius & Spaul 2016). These poor performances can be partially attributed to delays in language development, as 77% of learners have access to first-language (African languages) education during the foundation phase (Grades 1–3) of their schooling career only (Kotze & Shaefer 2018).

A vast majority (90%) of Grade 4–12 learners in South Africa receive education in English, which is their second or third language (Pretorius & Spaul 2016). The acquisition of literacy skills is consequently negatively affected, as English additional language learners typically display reduced speech and language skills as well as inadequate reading and spelling abilities (Geertsema & Le Roux 2014). It can be argued that their proficiency in English has not developed sufficiently to ensure optimal academic performance (Mphahlele & Nel 2018). Professionals working in the field of SLD (DD) should have adequate knowledge about the nature of the condition and its management, as they play an important role in assisting the affected children.

Specific learning disorder (DD) is a lifelong learning disability of neurobiological origin (Navas, Ciboto & Borges 2017). It is characterised by difficulties with accurate word recognition, poor spelling abilities, reduced reading comprehension skills and limited vocabulary knowledge (Marshall & Snow 2019). Specific learning disorder (developmental dyslexia) is highly hereditary and is more prevalent in boys than girls (Hulme & Snowling 2016). Individuals with SLD (DD) display unconventionalities in brain function and structure.

Atypical activity in the left temporo-parietal and left occipito-temporal cortex, as well as the left frontal cortex, can be detected via neuroimaging (Ozernov-Palchik & Gabrieli 2018; Ryder & Norwich 2018). A reduction in grey matter is also indicative of structural alterations, which impede the optimal functioning of all the brain regions (Ozernov-Palchik & Gabrieli 2018). A single cause for the disorder cannot be determined, but the popular notion exists that it is the result of impaired phonological processing abilities (Couvignou, Peretz & Ramus 2019). Phonological processing refers to the ability to decode and encode auditory (linguistic) information,

to store and retrieve this information and to plan its reproduction during verbal and written communication tasks (Wilsenach 2016). It involves three independent but interrelated skills, namely phonological awareness, phonological memory and rapid naming (Verhoeven & Keuning 2018). Deficits in these skills may result in severely reduced reading and spelling capabilities.

Specific learning disorder (DD) is represented on a continuum of severity depending on the nature and complexity of the orthographic system, as well as the environmental factors to which an individual is exposed (Rello & Baeza-Yates 2017; Tilanus 2019). The symptoms of SLD (DD) generally become visible during the foundation phase of schooling. Precursors can, however, already be identified in early childhood (age 3–6 years) (Sanfilippo et al. 2020).

These precursors may include delayed fine motor abilities, speech sound impairments, language disorders and difficulties in developing adequate phonological awareness skills (Adlof 2020; Navas et al. 2017). Reduced visual–motor integration abilities, impaired memory skills, sensory deficits and wavering concentration are also often associated with SLD (DD) (Coetzee & Gerber 2018; Marshall & Snow 2019; Yilmaz 2021). Language disorders persisting past the age of 6 years further increases the possibility of a positive diagnosis of SLD (DD) (Adlof & Hogan 2018). A multidisciplinary approach should therefore be implemented to ensure the timely diagnosis and appropriate management of the condition (Yilmaz 2021).

The multidisciplinary team involved in diagnosing and treating individuals with SLD (DD) usually includes speech–language therapists (SLTs), occupational therapists (OTs), clinical and educational psychologists and paediatricians (Sanfilippo et al. 2020). Each professional provides unique contributions to the process of identification, assessment and treatment of SLD (DD). Early identification followed by a formal diagnosis of SLD (DD) requires elaborate neuropsychological, behavioural, environmental and social assessments and can be supported by prior screening results (Phillips & Odegard 2017; Sanfilippo et al. 2020). The results of these assessments provide guidance on identifying appropriate intervention programmes for SLD (DD).

The process of identification and the provision of appropriate treatment plans for SLD (DD) are hindered by existing misconceptions amongst professionals working with these children. These uncertainties relate to the origin and true characteristics of SLD (DD) as well as the responsibilities of those involved in identifying and managing the condition (Soriano-Ferrer, Echeagaray-Bengoia & Joshi 2016).

Many consider SLD (DD) to be a visual impairment or the misinterpretation of letters (Washburn et al. 2013). Letter reversal is also widely but erroneously regarded as the main indicator of the disorder. The beliefs that SLD (DD) can be cured, or that affected children are lazy and ill-disciplined, are persistent myths in society (Hoskins 2015). Local and

international studies were therefore reviewed to gain insight into the global perspective of SLD (DD) amongst professionals including SLTs, OTs and psychologists.

International research has revealed discrepancies in the knowledge levels of SLTs regarding the origin, characteristics, identification and treatment of disorders in reading and writing, including SLD (DD) (Davis & Murza 2019). Wilson, McNeill and Gillon (2015) stated that SLT students in New Zealand displayed a better understanding of spoken language concepts than literacy concepts. Similar findings were reported by Domagala and Mirecka (2017), as the knowledge of Polish SLT students regarding SLDs was described as inadequate.

In Turkey, SLTs were perceived to be reasonably knowledgeable about the characteristics of these conditions, but evaluation and intervention plans were often structured according to incorrect information, which negatively affects therapy outcomes (Yilmaz 2021). A study conducted in Australia also identified superior linguistic knowledge levels amongst dually qualified SLT teachers, but restricted awareness of aspects relating to literacy was highlighted (McLean, Snow & Serry 2021). In 2010, the American Speech–Language–Hearing Association (ASHA) reported that 91% of SLTs were unfamiliar with disciplinary literacy (Davis & Murza 2019). In 2016, ASHA also noted that only 33% of SLTs regularly provide literacy intervention to school-aged children (ASHA 2016). Gaps in the knowledge levels of SLTs regarding SLDs and literacy have therefore been confirmed.

The perspectives of other professionals, including psychologists and OTs, were also considered. Despite the abundant research efforts in the field of special education, few studies have systematically examined how school psychologists perceive their own proficiency in special education decisions (Maki, Burns & Sullivan 2018). A study conducted in the United States of America (USA) found no significant difference in the knowledge levels of general and special educators and educational psychologists regarding the characteristics of SLD (DD) (White, Mather & Kirkpatrick 2019).

Furthermore, many of the respondents felt unprepared to work with children with SLD (DD). Psychologists in the USA also assumed little responsibility for the identification and treatment of this condition, as they see themselves as only involved in the assessment process (White et al. 2019). These findings were matched in the United Kingdom (UK) where 30% – 50% of educational psychologists who participated in a study voiced uncertainties regarding the assessment and diagnosis of SLD (DD) (Ryder & Norwich 2018).

The knowledge and confidence levels of Australian psychologists working with this condition are also uncertain, as only 2.38% of postgraduate course content relates to SLD (Sadusky et al. 2018). Little research has been conducted on

the perspectives of OTs regarding SLDs. This state of affairs is concerning, as OTs play an integral role in assisting children with SLD (Nelson et al. 2009).

In African countries, research involving professionals practising in SLDs such as SLD (DD) is limited, and a shortage of qualified healthcare professionals, including SLTs, OTs and psychologists, was also identified (Agho & John 2017). Wylie et al. (2016) further reported that many SLTs working across Africa have only part-time employment within the private or nonprofit sector, as few job opportunities are provided by the state (Wylie et al. 2018). A lack of training programmes and professional support in Africa (excluding South Africa) thus inhibits the sustainability of service delivery (Wylie et al. 2016).

In sub-Saharan Africa, South Africa provides the greatest number of training programmes for allied health professionals (Agho & John 2017; Wylie et al. 2018). Reviewing available literature within the South African framework should therefore provide insight into the knowledge and perspectives of SLTs, OTs and psychologists with regard to SLD and specifically SLD (DD).

In a study conducted by Erasmus et al. (2013), many South African SLTs acknowledged their role in providing assessment and intervention services to individuals affected by language and literacy difficulties. These professionals appeared reluctant, however, in fulfilling their roles relating to written language difficulties, because of low confidence in their abilities and a lack of training. Similar findings were reported by Geertsema and Le Roux 2020, as the majority of SLT participants indicated little involvement in the assessment and management of SLD (DD). Moolla and Lazarus (2014) also revealed existing uncertainties amongst South African psychologists regarding their roles and responsibilities in the identification and treatment of SLDs such as SLD (DD) as they aim to facilitate school development and provide educational support.

Uncertainties about the cause, characteristics and assessment of SLD (DD), as well as a lack of training of the professionals involved, clearly have a negative impact on its accurate identification and treatment. The result is that children are under- or misdiagnosed (Mbatha 2018). These children continue to experience learning difficulties throughout their schooling and also later in life.

Young people with SLD (DD) generally remain uneducated and struggle to contribute meaningfully to a country's economic growth. The following research question is therefore relevant: what are the knowledge levels, needs and perspectives of South African professionals working with children with SLD (DD)?

Method

The aim of the research is to determine the pertinent knowledge, needs and perspectives of professionals working

with SLD (DD) in South Africa. The study was therefore conducted according to four objectives which are as follows:

- To determine the knowledge levels of South African professionals about the facts and misconceptions pertaining to SLD (DD).
- To investigate the perspectives of South African professionals relating to the assessment of SLD (DD).
- To determine the perspectives of South African professionals regarding the management of SLD (DD).
- To identify additional training needs of South African professionals working in the field.

Research design

A mixed-methods survey design was employed for this study. Mixed-methods research allows the collection of both qualitative and quantitative data (Creswell & Hirose 2019). Qualitative data provide subjective information regarding the feelings and experiences of participants, and quantitative data aim to achieve objectivity and precise measurements. It explains existing relationships between variables by identifying associations and correlations. The integration of the two approaches allows for the research findings to be described, explained and evaluated (Leavy 2017).

Study population and sampling strategy

Participant selection procedures

Participants were selected using a purposive sampling technique as a form of nonprobability sampling (Bryman & Bell 2014). A purposive sample reflects the characteristics that best represent the population of interest to the study. A total sample size of 148 responses was gathered in the study, but 39 respondents did not indicate their profession. The remaining 109 respondents included 51 SLTs, 23 OTs, 35 psychologists and one paediatrician. The paediatrician was, however, excluded from the sample, as we could not fairly compare the larger groups to a single respondent. The final sample thus consisted of 108 respondents.

Inclusion criteria

All respondents were qualified professionals and registered with their respective professional bodies. The SLT and psychologist respondents all specified a minimum working experience of 1 year, and one OT respondent indicated working experience of less than 1 year. Responses further included professionals working with children with a diagnosis of SLD (DD), as well as other developmental conditions within the mainstream and remedial school settings and also the private sector.

Setting

A web-based questionnaire was distributed for respondents to complete (Maymone et al. 2018). Facebook as a social media platform was used to invite prospective respondents to participate in the study. The prospective respondents were recruited from Facebook groups established for allied professionals. These groups included ST's, PT's, OT's, DT's,

and Audio's; Community Service 2016 Allied professionals and MBChB interns; Afrikaanse Spraakterapeute; Comm Path students take action and South African Audiologists and Speech-Language Therapists.

Data collection and analysis procedures

Data collection

Data collection was carried out over a period of 2 months as respondents completed the questionnaire independently. The researcher provided contact information where prospective respondents could raise uncertainties or questions regarding the questionnaire. Unfortunately, the initial response rate was poor and the link to the questionnaire had to be reposted to the respective Facebook groups on a weekly basis.

More professionals displayed an interest in participating in the study after being contacted personally, and the researcher was subsequently able to obtain a more suitable survey sample size. The web survey required approximately 21 min to complete. An estimated time of completion was determined by calculating the weighted average. A weighted average is calculated by multiplying each number in the data set by a certain amount depending on its frequency or relative importance before making the final calculation (Merriam-Webster n.d.).

Data collection material and apparatus

Qualtrics (Qualtrics International, Inc., Provo, Utah, United States) was utilised to create an online questionnaire. The collected data were captured on a Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, Washington, United States), and code numbers were assigned to each respondent to ensure confidentiality.

Data analysis

All responses were captured, transferred to data files and analysed using parametric and nonparametric tests as part of the Statistical Package for the Social Sciences (SPSS; IBM Corporation, Armonk, New York, United States). The process of data collection and analysis was completed with the assistance of a statistician, and descriptive statistics consisting of means, frequencies, percentages and statistical significance were produced to organise and explain the research findings (Akoglu 2018).

The statistical significance of variables was measured according to a probability factor (p -value). The p -value may range from zero for no compatibility to one for perfect compatibility. Research results are viewed as statistically significant if the p -values are equal to or below 0.05. All other values are regarded as 'non-significant' (Greenland et al. 2016). During the analysis of continuous variables, normality should always be tested to determine whether data have been extracted from a normally distributed population (Field 2018). If a p -value is greater than 0.05, the data are normally distributed and parametric tests should ideally be used.

Conversely, if a p -value is less than 0.05, the data differ from normality and nonparametric tests should be used. Examples of nonparametric tests include the Kruskal–Wallis test and the chi-square test.

The Kruskal–Wallis test was therefore implemented to determine whether statistically significant differences existed between independent category groups for continuous variables. This test was chosen instead of the parametric analysis of variance (ANOVA) as the continuous variables are not normally distributed. The Kruskal–Wallis test statistic confirms a statistically significant difference between categories ($p < 0.05$). Pairwise comparisons (using the Mann–Whitney test) were conducted to see where these significant differences occur.

The chi-square test was conducted to determine the level of agreement between the statements or questions within the survey and the answers provided by the respondents, according to their professions. Fisher's exact test analysed small samples where only a few respondents agreed with a statement. The p -values were calculated and if the p -value was less than 0.05, a dependence was accepted between the level of agreement of the statement and the professions. Cramer's V value was interpreted to determine the level of association between the statements and professions. A p -value of more than 0.05 indicated no significant difference between professions and level of agreement with statements.

Ethical considerations

Ethical approval was granted by the Research Ethics Committee of the Faculty of Humanities at the University of Pretoria. The administrators of the respective Facebook groups were contacted via Facebook Messenger and written consent was obtained for the questionnaire link to be posted on the groups, prior to the commencement of the study. The researcher gained informed consent from all respondents by requesting them to select the built-in consent button if they chose to participate in the study. Respondents who decided not to complete the questionnaire could select the exit button. The respondents were, however, unable to withdraw from participation once the questionnaire had been submitted. The confidentiality of all respondents was ensured by the absence of requests for personal information which would have identified respondents and the use of numeric codes.

Results and discussion

The information obtained from the questionnaire was divided into seven categories as set out in Table 1. The first category of questions involved the demographic profile of the respondents, including age and the highest level of education attained. Questions concerning working location, the language in which services are provided as well as years of experience in working with children with SLD (DD) were also included. Research results regarding the

knowledge, needs and perspectives of South African professionals working in the field of SLD (DD) are reported and discussed according to the aforementioned four objectives of the study.

A Fisher's exact test p -value of 0.000 revealed significant differences amongst professionals regarding the highest level of education attained. Psychologists presented with the highest qualifications, as 5.9% of these respondents had obtained PhDs, followed by 38.2% with master's degrees and 55.9% with bachelor-level university degrees. In contrast, 17.4% of OTs had attained master's degrees, whilst 82.6% had finished their basic professional university degrees. In the case of STs, 3.9% had attained master's degrees and 96.1% had acquired basic professional university degrees.

Data pertaining to years of experience in working with children with SLD (DD) rendered noteworthy statistics. The inferential statistic ($p = 0.241$) implied no significant differences between the categories relating to years of experience and profession, as mean values suggested 10 years for SLTs, 9 years for OTs and 12 years for psychologists. Nevertheless, significant differences were found between some categories regarding the number of children with SLD (DD) seen throughout the course of a career. Mean values

TABLE 1: Demographic information.

Demographic information	Profession		
	SLT	OT	Psychologist
Age			
Minimum	25	25	28
Mean	36.20	36.90	43.93
Maximum	65	49	66
Highest qualification attained			
University degree	96.1%	82.6%	55.9%
Postgraduate, master's degree	3.9%	17.4%	38.2%
Postgraduate, PhD	0.0%	0.0%	5.9%
Years of experience in working with children with SLD (DD)			
Minimum	1.0	0.0	1.0
Mean	10.85	9.05	12.83
Maximum	45	20	40
Number of children with SLD (DD) seen throughout the course of a career			
Minimum	2	1	2
Mean	259.67	50.55	431.33
Maximum	2000	450	5000
Children with SLD (DD) on current caseload			
Yes	95.1%	60.0%	75.9%
No	4.9%	40.0%	24.1%
Number of children with SLD (DD) seen every week			
Minimum	0	0	0
Mean	13.44	2.55	4.00
Maximum	85	10	25
Language in which therapy services are provided			
Afrikaans (%)	21.6	26.1	8.6
English (%)	76.5	73.9	88.6
Zulu (%)	0.0	0.0	2.9
German (%)	2.0	0.0	0.0

SLT, speech–language therapists; OT, occupational therapists; SLD (DD), specific learning disorder (developmental dyslexia).

included 260 seen by SLTs, 51 by OTs and 431 by psychologists. It was revealed that 95.1% of SLTs are currently working with children affected by SLD (DD), followed by 60.0% of OTs and 75.9% of psychologists.

The Kruskal–Wallis test further determined that SLTs see a mean of 13 children with SLD (DD) every week, whilst OTs see 3 per week and psychologists see a mean of 4 per week. Thus, significantly more SLTs and psychologists are working with children affected by the disorder, as opposed to OTs. These statistics are important as they provide insight into the perspectives of professionals regarding the facts and misconceptions related to SLD (DD) as well as the identification and management of the condition.

Objective 1: To determine the knowledge levels of South African professionals about the facts and misconceptions regarding specific learning disorder (developmental dyslexia)

Significant differences between SLTs and OTs ($p = 0.007$) as well as between OTs and psychologists (p -value = 0.004) were identified as represented by the pairwise comparisons (using the Mann–Whitney test) (Table 2).

Factual knowledge about specific learning disorder (developmental dyslexia)

The results indicated significant differences in knowledge levels amongst two of the three professional groups that were paired (Table 2). An average score of 80% was achieved by SLTs, 73% by OTs and 80% by psychologists. A p -value of 0.0835 suggested no significant difference within each profession in the level of agreement with the statement 'I believe SLD (DD) is a language-based learning disability caused by a deficit in phonological processing'. The results showed that 52.4% of SLTs agreed with this statement, followed by 19% of OTs and 37.9% of psychologists. Many professionals, including 42.9% of OTs and 20.7% of psychologists indicated that they were unsure about the statement.

No significant difference was found within each profession in the level of agreement with the statement 'I am aware that individuals with SLD (DD) have the ability to follow written instructions' (p -value of 0.117). The research suggested that 39.4% of SLTs generally agreed ('agree' and 'strongly agree') with this statement, followed by 27.3% of OTs and 31.8% of psychologists. Interestingly, 54.6% of psychologists generally disagreed ('disagree' and 'strongly disagree') with this statement, whilst the corresponding figure was 21.1% for SLTs and 36.4% for OTs.

TABLE 2: Pairwise comparison of the facts of specific learning disorder (developmental dyslexia).

Sample	Mann–Whitney test statistic	p	Significant difference
OT and SLT	19.630	0.007	Yes
OT and psychologist	-22.905	0.004	Yes
SLT and psychologist	-3.274	0.623	No

SLT, speech–language therapists; OT, occupational therapists.

The current research findings regarding factual knowledge about SLD (DD) are supported by a previous study conducted in South Africa, pertaining to the knowledge levels of SLTs regarding written language difficulties. According to Erasmus et al. (2013), the majority of South African SLTs in private practice acknowledged their role in addressing written language difficulties and felt that they possess the knowledge necessary to do so. Clark, Naidoo and Linenstein (2019), however, reported that South African professionals have limited knowledge about African languages as well as the indicators of SLD (DD) within African languages, as the appearance of these indicators may vary across orthographies.

The results of this study also concur with international studies pertaining to the knowledge levels of SLTs, OTs and psychologists regarding SLD (DD). These studies included projects in the USA, Poland and Australia. In the USA, national survey research found that school-based SLTs displayed superior knowledge regarding literacy concepts (Wilson et al. 2015).

Another study by Blood et al. (2010) reported that SLTs professed to have adequate general knowledge of written language disorders, including SLD (DD). Their knowledge relates particularly to aspects such as emergent literacy skills and collaborative efforts within a multidisciplinary team. Wadlington and Wadlington (2005) also reported that almost all the SLT and psychology participants in their study agreed that SLD (DD) often occurs in conjunction with conditions such as attention-deficit disorder (ADD), attention-deficit–hyperactivity disorder (ADHD), language disorders and dysgraphia.

Australian authors Sadosky et al. (2021) also concurred with the findings of the current study and indicate that their psychologists similarly have adequate knowledge about SLD (DD). All respondents in their study were able to provide an accurate definition of SLD (DD) and could distinguish the condition from other learning disabilities. Furthermore, all the participants emphasised the importance of a comprehensive assessment followed by a differential diagnosis.

This is unexpected in the light of the earlier report by Sadosky et al. (2018) that only 2.38% of postgraduate psychology course content in Australia relates to SLDs. Interestingly, SLTs in Virginia, USA, indicated limited knowledge of structured literacy, as 91% of the SLT respondents reported being unfamiliar with the concept (Davis & Murza 2019). A study conducted in Poland also revealed inadequate knowledge levels amongst postgraduate SLT students regarding SLD (DD). In this regard, the limited knowledge levels of the SLT students could be ascribed to minimal or no training in the field of SLD (DD), as many of these students initially graduated in other professions before embarking on studies in speech–language therapy (Domagala & Mirecka 2017).

Misconceptions regarding specific learning disorder (developmental dyslexia)

Various misconceptions are associated with SLD (DD) (White et al. 2019), including the notions that individuals with SLD (DD) present with below-average intelligence and that letter reversals are the main indicator of the disorder. The belief that SLD (DD) results from a visual impairment is also widely accepted. Nonetheless, results of the current study indicated that 89.0% of all participants agree that individuals with SLD (DD) do not present with below-average intelligence. The researchers also found that 54.1% of respondents agreed that letter reversals are not the primary precursor of SLD (DD), whilst only 22.9% disagreed with this statement.

A further 14.7% of the respondents indicated their uncertainty regarding letter reversals and SLD (DD), and 8.3% did not provide an answer to the question. No significant differences were, however, detected regarding the view that SLD (DD) does not result from visual impairments, as 34.2% of SLTs agreed with this statement, followed by 41.7% of OTs and 27.3% of psychologists. Consequently, the knowledge of the South African professionals regarding SLD (DD) was largely unaffected by existing misconceptions. Nonetheless, the misconception that SLD (DD) results from a visual impairment is still widely accepted locally.

Our findings correspond to those of Thorwarth (2014) and Wadlington and Wadlington (2005). Both these studies were carried out in the USA, and the respondents included SLTs and psychologists. These professionals agreed that individuals with SLD (DD) do not have below-average intelligence. The misconceptions that SLD (DD) is primarily indicated by letter reversals and that SLD (DD) results from a visual impairment were nevertheless supported (Thorwarth 2014; White et al. 2019). Thorwarth (2014) indicated that many of the respondents remained 'neutral' when these questions were presented to them, which was not the case for the research conducted by Wadlington and Wadlington (2005). A smaller sample size used by Thorwarth (2014) could assist in explaining the discrepancies in the findings, and Thorwarth's (2014) results might not be a true reflection of professional knowledge and the misconceptions associated with SLD (DD).

Studies conducted by Yilmaz (2021) and Sadosky et al. (2021) aimed to identify the misconceptions amongst the fourth-year Turkish SLT students and Australian psychologists, respectively, regarding SLD (DD). The findings coincide with the present results, as all psychology respondents, as well as 87% of the student SLTs participants, aptly agreed that individuals with SLD (DD) do not present with below-average intelligence. Still, the misconception regarding letter reversals is prevalent amongst the SLT respondents as 36.9% of the participants believed it (Yilmaz 2021).

Objective 2: To investigate the perspectives of South African professionals relating to the identification of specific learning disorder (developmental dyslexia)

The perspectives regarding the professionals' own ability to identify SLD (DD) were evaluated by including statements relating to the ability to identify the indicators of SLD (DD) (Table 3). A *p*-value of 0.001 (Fisher's exact test) suggested a significant difference amongst professionals in their perceived ability to accurately identify symptoms and characteristics of SLD (DD) in children.

Findings indicated that 56.7% of psychologists 'strongly agreed' with the notion that they could identify characteristics of SLD (DD), as opposed to 14.3% of SLTs and OTs. In contrast, 59.5% of SLTs and 66.7% of OTs only 'agreed' to having the ability in this regard, whilst 2.4% of SLTs, 9.5% OTs and 3.3% psychologists 'disagreed' with this statement. The respondents who voiced their uncertainty regarding the matter included 23.8% of SLTs, 9.5% of OTs and 3.3% of psychologists. Results further revealed that 50% of SLTs were unsure of their capability to distinguish between the characteristics of SLD (DD) compared to a general learning disability. These opinions were echoed by 33.3% of OTs and 11.1% of psychologists. Discrepancies in the professionals' perceived assessment capabilities were identified, as respondents (45.2% of SLTs, 61.9% of OTs and 31.0% of psychologists) indicated that they could identify children in need of an SLD (DD) assessment. We thus conclude that South African professionals are confident in their ability to identify the characteristics of SLD (DD) but lack the confidence to assess and provide a differential diagnosis of SLD.

Discrepancies regarding the perceived capabilities of South African professionals to assess SLDs such as SLD (DD) do not correlate with their apparent adequate knowledge and high

TABLE 3: The identification of specific learning disorder (developmental dyslexia).

Participant statements		Profession			<i>p</i>
		ST (%)	OT (%)	Psychologist (%)	
'I am able to identify the symptoms and characteristics of SLD (DD).'	Strongly agree	14.3	14.3	56.7	0.001
	Agree	59.5	66.7	36.7	-
	Disagree	2.4	9.5	3.3	-
	Unsure	23.8	9.5	3.3	-
'I am able to identify the characteristics of a child with SLD (DD) as opposed to one with a learning disability.'	Strongly agree	2.4	4.8	29.6	0.083
	Agree	42.9	57.1	55.6	-
	Disagree	4.8	0.0	3.7	-
	Unsure	50.0	33.3	11.1	-
'I am able to identify a learner who is in need of a diagnostic assessment for a possible diagnosis of SLD (DD).'	Strongly agree	40.5	33.3	65.5	0.240
	Agree	45.2	61.9	31.0	-
	Disagree	4.8	0.0	0.0	-
	Unsure	7.1	4.8	3.4	-
'I am confident that I am able to recognise the indications of SLD (DD).'	Strongly agree	19.0	14.3	51.7	0.024
	Agree	61.9	57.1	41.4	-
	Disagree	7.1	4.8	0.0	-
	Unsure	11.9	23.8	6.9	-

SLD (DD), specific learning disorder (developmental dyslexia); SLT, speech-language therapists; OT, occupational therapists.

confidence in their ability to identify the characteristics of the SLD (DD). Geertsema and Le Roux (2020) found that only 31% of the South African SLTs who participated in their study conducted assessments of SLD (DD).

The limited number of SLTs involved in these assessments could possibly be explained by the absence of standardised assessment materials that are culturally and linguistically appropriate for the South African context (Nel & Grosser 2016). Mazibuko, Flack and Kvalsvig (2019) further noted that the inadequate functioning of medical and educational support structures across professions negatively affects the integration of allied services regarding the assessment of SLDs such as SLD (DD).

International studies reflected both similar and contradictory findings to those regarding the identification of SLD (DD) in South Africa. According to Kohli et al. 2018, Sharma and Padhy (2018), identifying SLD (DD) amongst children in India is also challenging, as the assessment batteries are not linguistically appropriate to serve this multilingual country and lack well-established norms. As a result, approximately 100.4 million children who are at risk for SLDs such as SLD (DD) remain underdiagnosed. Yuen (2015) also emphasised the need for assessment tools that are sensitive to the language and cultural differences of children in China who present with learning disabilities.

Contradicting information regarding the idea that psychologists present with sufficient knowledge regarding learning disabilities including SLD (DD) was, however, revealed in a study conducted by Ryder and Norwich (2018). These authors evaluated the knowledge of psychologists in the UK about the assessment of SLD (DD). It was found that the respondents were unable to reach consensus regarding the diagnostic criteria of the disorder. Moreover, 30% – 50% of the participants voiced uncertainties about their ability to provide a differential diagnosis for SLD (DD). Additional research relating to psychologists in the UK concurred with this view (Cottrell & Barrett 2017).

Objective 3: To determine the perspectives of South African professionals regarding the management of specific learning disorder (developmental dyslexia)

Table 4 summarises the information regarding perspectives on the management of SLD (DD) and the confidence of professionals in their own management capabilities. Specific statements aimed to identify the approaches and strategies used by professionals when treating a child with SLD (DD). The results revealed divergence regarding the belief that SLD (DD) should be managed by developing phonological processing skills, as it results from phonological processing difficulties. Only 50% of the SLTs and psychologists agreed with the statement, whilst 66.7% of OTs indicated that they were unsure about the statement.

TABLE 4: The management of specific learning disorder (developmental dyslexia).

Participant statements		Profession			p
		ST (%)	OT (%)	Psychologist (%)	
'SLD (DD) stems from phonological processing difficulties and should therefore be managed by developing phonological processing abilities'.	Strongly agree	15.8	0.0	18.2	0.044
	Agree	50.0	16.7	50.0	-
	Disagree	2.6	8.3	9.1	-
	Unsure	31.6	66.7	22.7	-
'In my opinion, I use a variety of different intervention methods'.	Strongly agree	21.1	33.3	31.8	0.842
	Agree	65.8	66.7	54.5	-
	Disagree	2.6	0.0	0.0	-
	Unsure	7.9	0.0	13.6	-
'Multisensory instruction is paramount to enable individuals with SLD (DD) to learn'.	Strongly agree	-	-	-	-
	Agree	89.0	-	-	-
	Disagree	9.2	-	-	-
	Unsure	1.8	-	-	-
'Individuals with SLD (DD) require direct instruction during learning tasks'.	Strongly agree	-	-	-	-
	Agree	81.7	-	-	-
	Disagree	2.8	-	-	-
	Unsure	6.4	-	-	-

SLT, speech–language therapists; OT, occupational therapists.

This is supported by findings that phonological awareness intervention is usually applied by SLTs in general reading approaches (Geertsema & Le Roux 2020). Speech–language therapists and psychologists are, however, not clear on the necessity of this type of intervention specifically for SLD (DD). Nevertheless, no significant differences were found between intervention approaches that are being used and the relevant profession.

The use of a variety of intervention methods when treating a child with SLD (DD) is supported by most professionals as 65.8% of SLTs, 66.7% of OTs and 54.5% of psychologists agreed, whilst 31.8% strongly agreed that this practice was appropriate. Only 2.6% of SLTs disagreed with this statement, whilst 13.6% indicated their uncertainty regarding the matter. Multisensory instruction was also identified by 89% of respondents as being paramount in the process of treating SLD (DD), whilst 81.7% agreed that individuals affected by the disorder require direct instruction during all learning tasks. These results are encouraging as multisensory and structured literacy approaches are of supreme importance in managing SLD (DD).

Mbatha (2018) and Al Otaiba, Rouse and Baker (2018) supported the view that best practice for SLD (DD) management includes following a multisensory approach. Explicit reading instruction is also necessary in treating SLD (DD) but is not sufficient on its own (Thompson et al. 2018). Signor, Claessen and Leitão (2020) further identified four areas of intervention to be addressed for individuals with SLD (DD). These areas are phonological-based intervention, reading and writing development, auditory processing training and the development of visual–motor skills. Handwriting practice may also improve reading ability through encouraging orthographic learning, which involves multisensory representation of identifying letters. Individuals who present with handwriting difficulties

TABLE 5: Additional training needs of professionals.

Participant statements		Profession			<i>p</i>
		ST (%)	OT (%)	Psychologist (%)	
Preservice training received, training or educational institution in SLD (DD)	Yes	46.2	21.1	72.4	0.002
	No	53.8	78.9	27.6	-
'I believe that my preservice training prepared me adequately to address SLD (DD) in children'.	Strongly agree	0.0	33.3	9.5%	0.051
	Agree	16.7	33.3	38.1	-
	Disagree	37.5	33.3	42.9	-
	Unsure	12.5	0.0	4.8	-
'I believe that the preservice training I received in the field of SLD (DD) made me confident in my ability to identify SLD (DD) indicators'.	Strongly agree	0.0	33.3	9.5	0.049
	Agree	20.8	33.3	47.6	-
	Disagree	41.7	33.3	38.1	-
	Unsure	16.7	0.0	0.0	-
'I am confident that the preservice training I received in the field of SLD (DD) gave me adequate tools and/or strategies to manage SLD (DD) in my profession'.	Strongly agree	0.0	33.3	14.3	0.303
	Agree	25.0	33.3	33.3	-
	Disagree	45.8	33.3	42.9	-
	Unsure	8.3	0.0	4.8	-
'I have additional training needs with regard to SLD (DD)'.	Strongly agree	29.2	0.0	25.0	0.560
	Agree	50.0	33.3	30.0	-
	Disagree	8.3	33.3	15.0	-
	Unsure	8.3	33.3	20.0	-

SLT, speech–language therapists; OT, occupational therapists; SLD (DD), specific learning disorder (developmental dyslexia).

should therefore be assisted by a psychomotor therapist or OT. Additionally, psychotherapy or psychological intervention should be provided in the treatment of SLD (DD).

Results of the current study are supported by the findings of Geertsema and Le Roux (2020), as South African SLTs reported addressing the development of phonemic and phonological awareness skills in treating SLD (DD). Additional areas of intervention were also included and relate to the improvement of auditory processing abilities, sound–letter associations, vocabulary expansion, spelling and writing abilities and reading comprehension and accuracy. These reported additional areas of intervention further support the finding that professionals make use of a variety of intervention methods when addressing SLD (DD).

Geertsema and Le Roux (2020), however, revealed that only 52% of South African SLTs are said to be actively involved in the management of SLD (DD). Only 45% of SLTs felt adequately equipped to provide intervention to children who display literacy difficulties (Erasmus et al. 2013). The majority of SLTs (65.8%) nevertheless indicated that management of SLD (DD) falls within the scope of practice of an SLT (Geertsema & Le Roux 2020).

Only a small body of research is available regarding the intervention methods used by SLTs, OTs and psychologists in the treatment of learning disabilities including SLD (DD). The use of structured literacy intervention approaches was not supported by professionals in the USA, as Tambyraja and Schmitt (2020) reported that SLTs in the USA rarely

target literacy skills during intervention sessions. It is further suggested that these SLTs may not feel equipped to address literacy difficulties in children because the current research base does not provide sufficient guidance to do so.

Tambyraja et al. (2014) concurred with this view, as the authors reported that only 34% of the intervention sessions provided by SLTs were allocated to literacy development. The use of a variety of intervention approaches for the treatment of SLDs such as SLD (DD) is, however, reported by Brown, Brown and Roever (2006), who revealed that OTs in Australia employ multiple intervention approaches when treating learning disabilities, including SLD (DD). These approaches typically include sensory integration techniques, cognitive or psychosocial approaches and visual perceptual techniques.

Objective 4: To identify additional training needs in the field of specific learning disorder (developmental dyslexia)

The research aimed to determine existing needs and perspectives regarding training in SLD (DD) (Table 5). The researchers intended to establish whether preservice training was provided to the professionals working with children with SLD (DD). In addition, the researchers investigated whether professionals feel equipped and confident in their ability to assist children with SLD (DD) in the process of treating the disorder. Lastly, the study sought to pinpoint the needs of the professionals regarding training and additional support.

The results highlighted certain differences amongst professionals regarding preservice training and SLD (DD) (Fisher's exact tests, $p = 0.002$). Many of the psychologists (72.4%) indicated that they had indeed received preservice training in SLD (DD). The nature of the training included undergraduate degrees, postgraduate degrees, coursework and professional development. In contrast, most of the OTs (78.9%) and 53.8% of SLTs revealed that they had not received preservice training in SLD (DD).

We further determined that 45.8% of SLTs indicated that they feel ill-equipped to correctly manage SLD (DD), with 33.3% of OTs and 42.9% of psychologists who agree. Consequently, many professionals working with children with SLD (DD) indicated a clear need for additional training in the field of SLD (DD). Only 33.3 % of respondents provided feedback regarding the specific areas in which additional training is required (Figure 1). These categories of training include the assessment of SLD (DD), assessment and treatment, management and interdisciplinary training. Additional training in structured literacy approaches as well providing additional classroom, learning and sensory profile support could be added.

The preservice training findings are supported by local and international literature. Geertsema and Le Roux (2020)



SLD (DD), specific learning disorder (developmental dyslexia).

FIGURE 1: Specified additional training needs of professionals.

reported that the poor confidence levels regarding the management of SLD (DD) amongst South African SLTs can be attributed to a lack of training and exposure to the condition during preservice training. This view is further strengthened by Erasmus et al. (2013) as 45% of their SLT respondents were of the opinion that undergraduate training in the management of written-language difficulties should be encouraged. Khoza-Shangase and Mophosho (2018) further stated that the training of South African professionals in the field of speech and hearing difficulties remains insufficient, with a lack of culturally and linguistically relevant resources. Thus, a need exists for undergraduate training courses to be transformed in a manner that represents the diverse needs of the South African population.

The additional training needs of SLTs, OTs and psychologists are echoed across the world. Blood et al. (2010) also reported that 63.8% of the participants in their USA study resorted to personal development training as they felt that their formal education provided limited training in the management of writing disorders and therefore did not prepare them to work with individuals with SLD (DD). Additionally, Hogan (2018) reported that a lack of knowledge regarding SLD (DD) is widely acknowledged amongst SLTs in the USA, as only 50% of school-based SLTs felt prepared to assist children affected by this disorder.

Additional training needs were also identified in Australia, as SLTs reported not having received comprehensive undergraduate or postgraduate training in concepts relating to literacy and working within a school setting. Agho and John (2017) emphasised the urgent need for the development of international occupational therapy services but especially across Africa. Psychologists in Australia also regard training

and professional development opportunities in the field of SLDs necessary to ensure optimal professional service delivery (Sadusky et al. 2021).

Conclusion

The information obtained from the respondents showed that, at least for the sample population, psychologists are significantly more experienced than SLTs and OTs with regard to working with children with SLD (DD). They coincidentally also present with higher qualifications, as they had acquired PhDs and more master's degrees than in the case of SLTs and OTs. The research also found that professional services are mainly being rendered in English and Afrikaans, with limited data regarding service delivery in African languages. Speech-language therapists and psychologists displayed better knowledge about the facts of SLD (DD), but psychologists are more confident in their ability to identify and manage the symptoms and characteristics of the disorder, compared to the other professionals. The research shows that most of the psychologists did receive preservice training in SLD (DD), which was not the case for the majority of SLTs and OTs. All professionals, however, indicated a need for additional training in the assessment, treatment and management of SLD (DD), as they feel ill-equipped to work with children affected by this disorder.

Strengths and limitations

The researchers were able to include respondents from various disciplines (STs, OTs and psychologists) in this research study. It provided an opportunity for new information regarding SLD (DD) to be gathered within the South African context. It also offered insight into the roles and responsibilities of professionals within a multidisciplinary team in effectively diagnosing and managing the condition in children.

The researchers were, however, unable to obtain information relating to the knowledge, needs and perspectives of SLTs, OTs and psychologists providing services in African languages, as well as the perspectives of paediatricians regarding SLD (DD). Ongoing research in this regard is therefore necessary as SLD (DD) affects the individuals across all languages in South Africa. Furthermore, paediatricians form part of the multidisciplinary team and are often the first to encounter children at risk.

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The authors have declared that no competing interest exists.

Authors' contributions

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Data availability

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

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