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Occupational markers and supportive structures in individuals with developmental dyslexia: An occupational therapy perspective

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A research dissertation submitted in fulfilment of the requirements for the degree Magister in Occupational Therapy (MOTR8900)

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DECLARATION

I, *Hendrika Augustha (Helé) Engelbrecht*, declare that the master's degree research dissertation in the form of two interrelated publishable manuscripts **'Occupational markers and supportive structures in individuals with developmental dyslexia: An Occupational Therapy Perspective'** at the University of the Free State, School of Health and Rehabilitation Science, is my independent work with no previous submission for qualification at another institution of higher education.

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To God all the glory

Philippians 4: 6-7

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CONCEPT CLARIFICATION

Term	Definition with supporting citation
Developmental Dyslexia	For the purpose of this study **developmental dyslexia** refers to "a neuro-developmental disorder with a biological origin and behavioral signs, influenced by environmental factors, which extend beyond problems with written language, existing from birth, with different manifestations over the lifetime of an individual" (Frith, 1999:192), but currently mainly identified by the difficulties an individual experience in manipulating the phonological component of language (Schatschneider & Torgesen, 2004:759)
Occupational markers	Occupational markers will be defined as all the behavioural signs observed in a dyslexic individual preventing optimal occupational engagement and performance (Boop et al., 2020:80) in meaningful activities (occupational challenges) or behaviour that enables the individual to excel in a unique manner (occupational strengths). during participation in meaningful activities (Boop et al., 2020:74)
Occupational Therapy	For the purpose of this study **Occupational Therapy** will be defined as described in the OTPF 4th edition: *Therapeutic use of everyday life occupations with persons, groups, or populations (i.e., clients) for the purpose of enhancing or enabling participation. Occupational therapy practitioners use their knowledge of the transactional relationship among the person, their engagement in valued occupations, and the context to design occupation-based intervention plans. Occupational therapy services are provided for habilitation, rehabilitation, and promotion of health and wellness for clients with disability- and non-disability-related* *needs. Services promote acquisition and preservation of occupational*

	identity for those who have or are at risk for developing an illness, injury, disease, disorder, condition, impairment, disability, activity limitation, or participation restriction (adapted from American Occupational Therapy Association, 2011) (Boop et al., 2020:80)
Occupation	For the purpose of this study **Occupation** will be defined as described in the OTPF 4th edition: *Everyday personalized activities that people do as individuals, in families, and with communities to occupy time and bring meaning and purpose to life. Occupations can involve the execution of multiple activities for completion and can result in various outcomes. The broad range of occupations is categorized as activities of daily living, instrumental activities of daily living, health management, rest and sleep, education, work, play, leisure, and social participation* (Boop et al., 2020:79)
Occupational performance	For the purpose of this study occupational performance will be defined as described in the OTPF 4th edition: *Accomplishment of the selected occupation resulting from the dynamic transaction among the client, their context, and the occupation* (Boop et al., 2020:80)
Supportive structure	For the purpose of this study supportive structures can be defined as the structures for the purpose of supporting the occupational performance of a dyslexic individual. When applied to Occupational therapy and for the purpose of this study, these supporting structures (enablers) would refer to tailored structures designed by occupational therapy intervention to provide support to dyslexic individuals, enhancing occupational performance and participation through the use of occupation to enable the experience of occupational competence (Christiansen, CH; Baum, 2005:245).

	These structures may incorporate a multi-disciplinary approach to the management of dyslexia with a holistic and client centred view.

LIST OF ABBREVIATIONS AND ACRONYMS

ADHD	Attention deficit hyperactivity disorder
CMOP - E	Canadian Model of Occupational Performance and Engagement
DSM – 5 – TR	Diagnostic and Statistical Manual of Mental disorders fifth edition Text revision
EF	Executive function
FAL	First additional language
ICD 10 MIT 2021	International Statistical Classification of Disease and Related Health Problems (WHO 'vanilla' version applicable to South Africa) MIT – Master Industry Table
LOLT	Language of learning and teaching
MDT	Multi-disciplinary team
MP3	MPEG Audio Layer 3
OP	Occupational Performance Model
OTPF	Occupational Therapy Practice Framework: Domain and Process Fourth Edition
PEOP	Person-Environment-Occupation Model
RAN	Rapid Automatized Naming
RD	Reading disability
SAJOT	South African Journal of Occupational Therapy

SAL	Second additional language
SLD	Specific learning disability
SSD	Speech sound disorder

SUMMARY

Background: Early identification leading to appropriate intervention and support for individuals with developmental dyslexia is paramount in the optimal management of this neurodevelopmental disorder. In the absence of clearly defined genetic markers, developmental dyslexia are currently noted through the behavioural signs (in the current study referred to as occupational markers) displayed by an individual with developmental dyslexia. Despite the call of international researchers for the development of a dyslexic profile as opposed to a single deficit in the identification of developmental dyslexia, a gap in research defining a dyslexic profile still exists. This indicated the need for further research to aid in the identification of occupational markers that may contribute to the compilation of a possible dyslexic profile as well as identification of possible supportive structures for individuals with developmental dyslexia. The aim of the study was to identify possible occupational markers for developmental dyslexia as well as supportive structures that may guide intervention.

Method: The study followed the guidelines provided by Arksey and O'Malley to conduct a scoping study utilizing the 5 Stage framework.

Findings: The first scoping study revealed the presence of possible occupational markers that may be indicative of the presence of developmental dyslexia in an individual. Dyslexic strengths were also noted and may contribute to a possible dyslexic profile. The second scoping study investigated the supportive structures available to individuals with developmental dyslexia, noting social support (as described in the PEOP model) as a major contributor. The results also indicated that early identification served as means of support thus highlighting the importance of timely identification.

Implication: The results of the research may inform the compilation of a dyslexic profile thus enabling early identification of individuals with developmental dyslexia. The use of a profile will also enable identification irrespective of language and culture thus promoting inclusion and occupational justice.

Recommendations: Further research should be conducted to investigate the use of occupational markers to aid in the compilation of a dyslexic profile as well as supportive structures available to individuals within the South African context. The knowledge of occupational markers could also guide research within the South African context to develop a

screening tool. The current research may also inform the development of an interdisciplinary working model to foster interprofessional communication and guide future research.

Key terms: Developmental dyslexia, occupational markers, supportive structures

CHAPTER 1: INTRODUCTION AND ORIENTATION TO THE STUDY

1.1 INTRODUCTION

Defining dyslexia proves to be complex and problematic. Frith (1999) suggests that "Dyslexia can be defined as a neuro-developmental disorder with a biological origin and behavioural signs which extend far beyond problems with written language" and later added to the definition "existing from birth, with different manifestations over the lifetime of an individual" (Frith, 1999:209). Literature also indicates the use of the term specific learning disability (SLD) when referring to dyslexia (Schatschneider & Torgesen, 2004:759; Youman & Mather, 2013:134). In the context of SLD the focus of the manifesting problems as a result of dyslexia tends to be on the individual's inaccurate word recognition, poor spelling and difficulty with decoding; thus, a deficit in the phonological component of language (Schatschneider & Torgesen, 2004:759). Dyslexia may also be referred to as a reading disability (RD) (Pennington & Lefly, 2001:816; Youman & Mather, 2013:138). Dyslexia may be used to refer to individuals with poor reading or spelling abilities that may not directly be linked to any other disability or disadvantage (Annett, 2011:417).

Some authors argue that dyslexia may only be on the lower end of the continuum of poor readers and that there is no need to identify dyslexia as a syndrome or specific condition. Elliot and Gibbs (2008:488) states that dyslexia are a social construct lacking scientific evidence to justify a diagnosis. Without a clear set of essential features, no valid or reliable diagnosis can be made that sets dyslexia apart from poor or average readers (Elliott & Gibbs, 2008:488). Stanovich (1994:589-590) adds to Elliot's argument by stating that dyslexia have no supporting evidence to be distinguished from other reading disabilities or poor readers.

As indicated by Frith a consensus with regards to the specific definition of dyslexia has not been reached (Frith, 1999:192-193). African researchers also indicate that professionals use the term dyslexia to refer to persistent difficulties experienced in reading writing and spelling (Iwuagwu et al., 2022:2). South African research involving psychologists, speech-language pathologists as well as occupational therapists indicated a lack of knowledge as well as misconceptions regarding dyslexia (Altin, Geertsema, Le Roux, & Graham,

2023:1). The scholar defining dyslexia does so to clarify dyslexia according to his or her needs. The definition of a researcher, health care practitioner, teacher or parent may not be exactly alike or share the same content. The result is the inconsistent and unclear use of terminology and subsequently vague definitions of dyslexia.

The Diagnostic and Statistical Manual of Mental disorders fifth edition Text revision DSM – 5 – TR (American Psychiatric Association, 2022:76-86) clarifies the description of dyslexia by referring to dyslexia as an alternative term used to describe a pattern of learning difficulties primarily noted by a decrease in accurate and fluent word recognition, decrease in decoding abilities followed by poor spelling abilities and including the specification of additional difficulties like decrease in reading comprehension and mathematical reasoning (American Psychiatric Association, 2022). This description clearly delineates the areas in which an individual with dyslexia may experience difficulty and can be described as the core or primary symptoms of dyslexia (Tønnessen, 1997). Although these may be the indicators for a diagnosis, individuals with dyslexia may also have secondary symptoms that may not show prevalence in all individuals but are more likely to be found amongst dyslexics than in the general population (Tønnessen, 1997).

Dyslexia can thus be defined by indicating the biological origin of this neuro-developmental disorder that presents with different manifestations over the lifetime of an individual and noted through the behavioural signs which extends beyond problems with written (Frith, 1999) and phonological components of language (Schatschneider & Torgesen, 2004) but currently still primarily identified as the inability to master key academic skills despite adequate instruction (American Psychiatric Association, 2022).

According to the DSM-5-TR these learning difficulties manifest as a range of observable, descriptive behaviours or symptoms (American Psychiatric Association, 2022). This viewpoint is echoed in researcher indicating that the diagnosis of dyslexia is seen more as a behaviourally defined condition explaining a cognitive profile (Bishop, 2014). Utilizing a behavioral profile to describe dyslexia as opposed to an isolated diagnosis will allow a shift toward the inclusion of co-occurring problems in the description of dyslexia. This shift will

lead to the recognition of a pattern of strengths and weaknesses in dyslexic individuals thus a dyslexic profile (Brimo et al., 2021).

Within the context of the occupations of an individual, behavioural signs indicative of the presence of dyslexia, also might have an influence on the engagement of an individual in activity or activity patterns that may be observed in their roles, habits, and routines (Amini et al., 2014:51). Occupational markers thus refer to all the behavioural signs observed in a dyslexic individual preventing optimal occupational engagement and performance in meaningful activities, and those markers that clearly allows an individual to excel in a unique manner in meaningful activities. The behavioural signs (in the current study referred to as occupational markers and discussed in depth in Chapter 2) described in literature can broadly be summarized as follows:

Possible occupational markers					
					
Inability to effectively manipulate the phonological component of language	Psychological difficulties	Executive function	Environmental factors	Dyslexic strengths	Co-morbidities
					
Phonological deficit	Behavioural problems	Strengths and		Creative problem solver	ADHD

		weaknesses observed			
Reading deficit	Emotional difficulties			Out of the box thinker	SLD
Spelling difficulties					Dyscalculia
Handwriting difficulties					

Figure 1.1: Summary of possible occupational markers

The purpose of this study is to identify possible indicators (in this study referred to as occupational markers) that could aid in the accurate early identification of dyslexia from an occupational perspective as well as the identification of possible supportive structures to aid dyslexic individuals in their occupational performance and participation. The current research aims to contribute to research in the field of dyslexia, specifically to delineate the position of occupational therapy as a key role player in the early identification of individuals with dyslexia as well as a provider of intervention to support individuals with dyslexia especially within the South African context. The study may also indirectly highlight challenges experienced in South Africa associated with early identification, treatment, and support of individuals with dyslexia.

1.2 RESEARCH QUESTION, AIM AND OBJECTIVES

Even though occupational therapy is ideally positioned to identify dyslexia and to facilitate tailored intervention, occupational therapists within the South African context are hesitant to identify and treat individuals with dyslexia. This can mainly be attributed to occupational therapists indicating that they do not possess adequate knowledge regarding early identification and treatment of individuals with developmental dyslexia (Altin, Geertsema, Le Roux, & Graham, 2023:1). The question remains whether there are universal occupational markers present amongst dyslexic individuals including but also stretching beyond the well-known phonological deficit, that can be used to identify individuals that may have developmental dyslexia. With the knowledge of these occupational markers, will occupational therapists be able to create a supportive structure, explained and supported by

a proposed interdisciplinary working model, for intervention to promote the occupational performance of dyslexic individuals?

The research questions for this study:

What occupational challenges and strengths (referred to as occupational markers), experienced by dyslexic individuals, are described in literature?

What structures are identified in literature as supportive to individuals with developmental dyslexia?

The aim of this study was to

a) Identify the occupational markers of dyslexia as described in literature.
b) Apply the knowledge gained in the identification of the occupational markers to identify supporting structures that could guide tailored occupational therapy intervention within the South African context.

To achieve the main aim, the following objectives were set:

- To identify the early occupational markers that literature indicates as present in individuals with developmental dyslexia through conducting a scoping review.
- To utilize the knowledge gained regarding occupational markers in individuals with dyslexia to guide research in the identification of possible supportive structures that may direct occupational therapy intervention to promote occupational performance and participation.

1.3 RESEARCH DESIGN AND METHODOLOGY

For the methodology of this dissertation a scoping study was chosen to guide the researcher in answering the research questions. A scoping study addresses broader topics with different study designs without the aim of addressing a specific research question or design (Dijkers, 2011:1). A scoping study will enable the researcher to systematically search, select and synthesize existing knowledge pertaining to the research questions. Thus, key concepts will be identified, evidence provided and gaps in research described within the theme of the current research question (Colquhoun et al., 2014).

The current study focused on the examination of the extent, range and nature of research activity thus exploring the research landscape in terms of studies conducted over a broad spectrum as well as identification of existing gaps in literature (Arksey & O'Malley, 2005:21) on occupational markers associated with dyslexia as well as support structures for dyslexic individuals. The framework proposed by Arksey and O'Malley was used to guide the researcher in the conduct of the scoping study. The 5 stages outlined in the framework were used. Literature indicates a 6th phase as optional for a scoping study (Arksey & O'Malley, 2005:22-23). The researcher did not utilize this phase that includes consultations due to time constraints as well as the rich and diverse literature already available for the study. Further consultations may however be recommended when the result of the study is known.

Before the onset of the study, ethical approval was obtained from the Health Science Research Ethics Committee of the University of the Free State (reference UFS-HSD2021/0431-0003) (Appendix A).

1.4 OVERVIEW OF THE CHAPTER CONTENT

This dissertation consists of six chapters each with a specific focus (see Figure 1.2 below).

The chapters in the dissertation are outlined as follows:

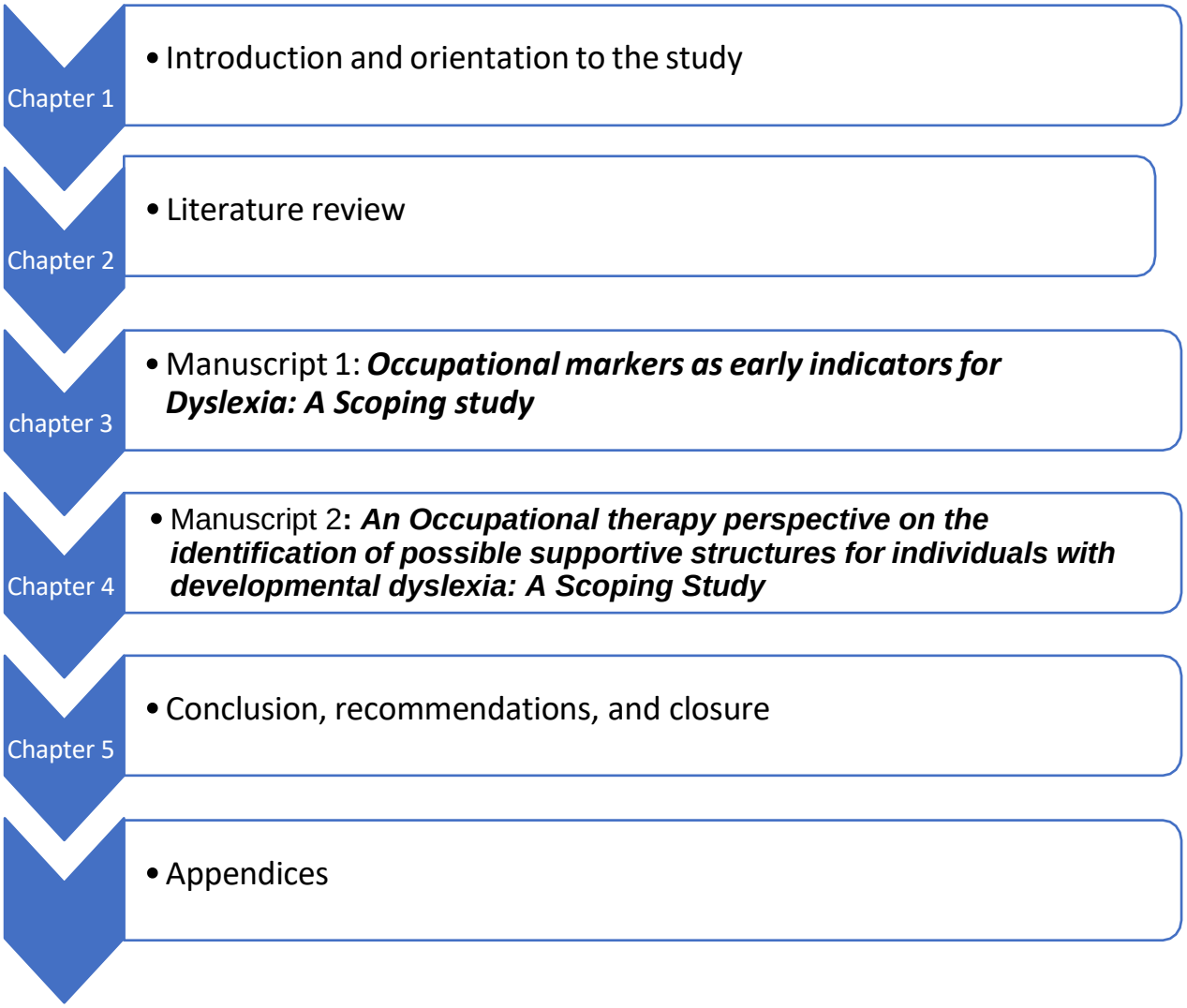

Figure 1.2: Dissertation chapter layout

1.4.1 Chapter 1: Introduction and orientation to the study

This chapter provides a brief overview of the study that underlines the formulation of the research questions followed by the aim and objectives for the study. Linking to the aim and objectives of the study, the study design and methodology were discussed. An overview of manuscript 1 and manuscript 2 is provided and the chapter layout concludes chapter 1. A complete list of references is included.

1.4.2 Chapter 2: Literature review

Chapter 2 covers a comprehensive literature review and concludes with a summary derived

from literature. The knowledge synthesized form literature is presented according to the following headings:

Table I: Outline of Chapter 2

Heading	***Content addressed***
Basis of dyslexia	Exploration of the origin of dyslexia accompanied by the theories and models underpinning the explanation of the deficit. Introduction to the use of the POEP as occupational therapy model in the explanation of occupational markers.
The importance of early identification of dyslexia	Discussion on the importance of a diagnosis, or the use of a '*label*'. Guidance provided by the DSM – 5 – TR included in the discussion.
The importance of language in developmental dyslexia	An outline of phonological awareness followed by the importance of the orthography of a language initiates the literature discussion in this section. The following concepts were addressed: bilingualism, multilingualism, and language acquisition.
Occupational markers	Definition of Occupational markers provided, and discussion follows according to the headings below.
a) The phonological deficit	Phonological deficit explained as well as the impact it has on the individual with dyslexia.
b) Reading as occupation	A discussion on reading as occupation and the consequent impact developmental dyslexia has on the different domains of an individual with developmental dyslexia.

c) Executive function and memory	Brief explanation regarding the areas within executive function that may be compromised in an individual with developmental dyslexia
d) Emotional impact	Developmental dyslexia reach beyond the well know phonological deficit and the emotional impact are discussed.
e) Environmental factors	The influence of different environmental factors is highlighted with the reference to the environment as described in the PEOP as supportive structure
f) Dyslexic strengths	The importance of the knowledge on dyslexic strengths underpins this discussion.
g) Possible co-morbidities	Although not the aim of this dissertation, the knowledge of possible co-morbidities is briefly discussed.
Occupational therapy intervention and developmental dyslexia	This section highlights the scope of practice of occupational therapy as indicate by the OTPF and furthers the discussion with the indication of occupational therapy intervention in individuals with developmental dyslexia utilizing the PEOP model.
Supportive structures for individuals with dyslexia	The PEOP model is used as guideline for the description of supportive structures for individuals with developmental dyslexia.
The South African context	The South African context are discussed with reference to linguistic and cultural diversity.
Conclusion derived from literature.	A summary of the literature provided.

Chapter 3: Manuscript 1

Topic: ***Occupational markers as early indicators for Dyslexia: A Scoping study***

The chapter is delineated by the note to reader, abstract of the manuscript as well as key words, a publishable manuscript prepared according to the guidelines provided by SAJOT (Addendum B) and a reference list.

The current study applied the 5-stage framework outlined by Arksey and O'Malley to answer the guiding research question ***Does literature provide a comprehensive description of the occupational challenges and strengths (referred to as occupation markers in this study) experienced by dyslexic individuals?***

The focus of this manuscript was to provide a comprehensive yet well-organized overview of current literature related to the topic. The scoping study framework guided the formation of a clear research question. Guided by the research question, relevant studies were identified followed by the study selection where the search strategy were refined, and articles were reviewed for inclusion. Data obtained from the search was charted and grouped according to 18 themes that emerged from literature. The prevalence of occupational markers as described in literature were provided in this manuscript. The manuscript includes recommendations to address the identified research gaps as well as application of occupational markers in the scope of practice for occupational therapists.

1.4.3 Chapter 4: Manuscript 2

Chapter 4 covers manuscript 2: An Occupational therapy perspective on the identification of possible supportive structures for individuals with developmental dyslexia: A Scoping Study. This chapter contains a note to reader, abstract of the manuscript as well as key words, a publishable manuscript prepared according to the guidelines provided by SAJOT (Addendum B) and a reference list.

As mentioned above, the research followed the 5-stage framework as described by Arksey and O'Malley starting with the guiding research question for the current study: ***What does literature describe as possible supportive structure for individuals with developmental dyslexia?*** The research question guided the identification of studies for selection, refinement of the search was applied to identify articles for inclusion. Data obtained was charted and grouped

according to the environmental or extrinsic factors described in the Person-Environment-Occupation (PEOP) model thus according to 5 overarching themes with subdivisions as descriptors. Supportive structures as described in literature were provided as well as further recommendations to address the supportive structures within the South African context. Suggestions for further research was also included.

1.4.4 Chapter 5: Conclusion, recommendations, and closure

The dissertation is concluded with this chapter outlining the conclusion, recommendations, and closure. This chapter reviews the research aims and how they were met by the study, a summary of the main findings of each manuscript is provided and recommendations for the implementation of results within the South African context as well as future research are outlined. Reflection of the researcher is included.

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CHAPTER 2: LITERATURE REVIEW

Literature will be discussed according to the basis of dyslexia including the theories that developed to explain the origin of dyslexia, the application of an occupational therapy model to illuminate the impact of dyslexia, the importance of early identification accompanied by the importance of the knowledge of language in development dyslexia. The behavioural signs observed in individuals with dyslexia – in this study referred to as occupational markers- will also be outlined. The role of occupational therapy in developmental dyslexia according to the scope of practice will be described followed by supportive structures for individuals with dyslexia. To gain a comprehensive understanding of the impact and challenges faced by individuals with dyslexia within South Africa, the South African context with reference to language and culture was investigated. The chapter concludes with a summary derived from the literature.

2.1 BASIS OF DYSLEXIA

The neurobiological basis of dyslexia (Frith, 1999; Habib, 2000; Stein, 2001; Ozernov-palchik & Gaab, 2016; D'Mello & Gabrieli, 2018; Kearns et al., 2018) – including the genetic origin (Habib, 2000; Siegel, 2006; Snowling, 2013; Thompson et al., 2015) as well as the behavioural signs (Frith, 1999; Habib, 2000; Stein, 2001; Reiter et al., 2005; Bacon et al., 2013; Snowling, 2013; Cancer et al., 2016; Carawan et al., 2016; Esmaili et al., 2017; Łodygowska et al., 2017; Ozernov-palchik & Gaab, 2016) have been widely researched. Currently only limited gene identification could be verified as possible contributor toward dyslexia (Bishop, 2009; Habib, 2000).

Even with this limited evidence of the genetic origin of developmental dyslexia, dyslexia is still viewed as a heritable neurodevelopmental disorder (Snowling, 2013:1) or neurobiological syndrome (Fisher & DeFries, 2002:767; Ramus et al., 2003:841). Familial clustering of dyslexia may partially be because of genetic factors (thus heritable) but it also allows for environmental influences a family may be subject to (Fisher & DeFries, 2002:767-768; Pennington & Lefly, 2001:813; Siegel, 2006:583) or even the prenatal environment of an

individual (Stein, 2001:30). Therefore, family history is as regarded the strongest risk factor for developing dyslexia due to the hereditary nature of dyslexia (Ozernov-palchik & Gaab, 2016:5; Thompson et al., 2015:982-983).

To aid in the understanding and unravel the complexity of developmental dyslexia, different theories developed.

The phonological processing theory implies that the core deficit lies in the impaired oral language rather than visual perception. According to this theory the dyslexic individual has a deficit in manipulating an abstract form from the sound constituents – thus phonological awareness (Habib, 2000; Gabay et al., 2015:935). Although the phonological deficit may stand central in the identification of dyslexia, it lacks to explain the dyslexic profile described in literature thus leaving no room for any secondary symptoms or behavioural signs linked to dyslexia (Tønnessen, 1997; Brimo et al., 2021)

The 'magnosystem' theory refers to the deficit in visual perception. This theory was derived from the clinical studies that indicated that dyslexics confuse symmetrical (b/d) or visually close (m/n) letters and that this confusion stems from perceptual rather than phonological impairment (Habib, 2000:2382). Although reversal may be present as stated by the theory, it restricts the explanation of dyslexia to a single component contrary to the indications by the Diagnostic and Statistical Manual of Mental disorders fifth edition Text revision (DSM-5-TR) that clearly indicates that the cognitive profile indicative of dyslexia is also recognized by behavioural signs (American Psychiatric Association, 2022).

The Temporal(rate)-processing theory of dyslexia may reconcile the theories describing the phonological and visual deficits. The theory involves the rate at which the brain is unable to process and react to rapidly changing or rapid successive stimuli in either the visual or auditory field (Habib, 2000:2383). This theory gives a more detailed explanation of dyslexia, yet the comprehensive inclusion of a dyslexic profile is lacking.

The Magnocellular theory, like the magnosystem theory, explains the origin of dyslexia as an impairment in the visual magnocellular system leading to impaired motion sensitivity, unsteady binocular fixation, poor visual localization and even left side neglect, including auditory or phonological problems a dyslexic face (Stein, 2001:12-13). The magnocellular

theory thus include the visual, auditory as well as tactile systems (Ramus et al., 2003:843) and leans more toward the inclusion of a dyslexic profile as opposed to an isolated component on which diagnosis are built. The magnocellular theory may be the best theory to use in the explanation of developmental dyslexia.

In an attempt to better understand, summarize or explain the different theories, models were developed to delineate the origin and effect of dyslexia.

Although genetic profiling for dyslexia may not be perfect yet, a model where genetic and environmental risk factors are instrumental for early identification, intervention and support of dyslexic individuals may be considered (Brett Miller, PhD, Peggy McCardle, PhD, 2014:2) or a multi-factorial model as proposed in literature (Bishop, 2009:3). The three- level framework developed by Frith (1999) supports the concept of a multi factorial ethology of dyslexia. This model includes the biological (genetic contribution and neuro-anatomical factors), cognitive (information-processing mechanisms) and behavioural component (learning to read and write) of dyslexia but also includes the influences the environment has on all three of these levels (Frith, 1999:194). (See Figure 2.1)

The aim in the development of this model was to create a neutral framework for the comparison of different theories regarding the origin of developmental dyslexia (Frith, 1999:193). The model thus excels in testing different hypothesis regarding the origin of developmental dyslexia with acknowledgement of the influence the environment may have on any said level. The model was thus not primarily developed to illuminate the impact developmental dyslexia may have on an individual but rather to encourage the exploration of the different areas impacted by dyslexia (Frith, 1999:211).

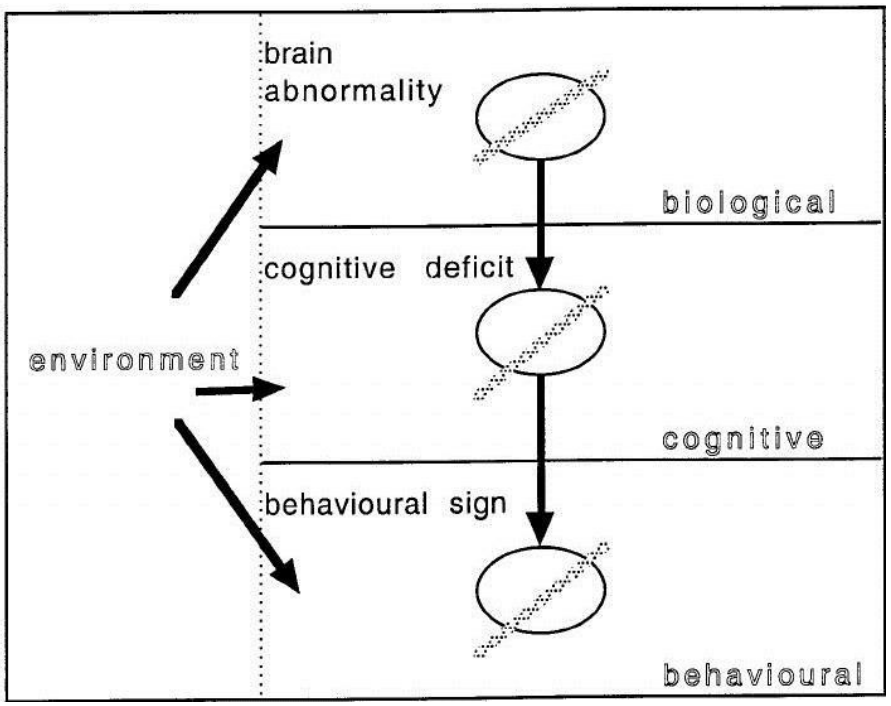

Figure 2.1: General causal model of a developmental disorder of neuro-cognitive origin (Frith, 1999:196).

South-African researchers Holmes and Fourie developed the Multi-dimensional Interactive Model (Holmes, Lynn C.; Fourie, 2021). This model also allows for neurological factors, interpersonal as well as intrapersonal factors without neglecting the importance of emotional and behavioural factors (Holmes, Lynn C.; Fourie, 2021:305 - 325). The model underpins the difficulty of accurate diagnosis and highlights five barriers and individual with developmental dyslexia face. The strength of this model includes the emphasis on the role of the environment in the management of developmental dyslexia (Holmes, Lynn C.; Fourie, 2021:326).

These models highlight the fact that dyslexia is not only the inability to read according to age expected norms but is far more complex.

From an occupational therapy perspective, a model that includes the intricate balance between an individual and the environment may be key in understanding the occupational participation and performance of an individual with dyslexia. A better understanding of the different models and how to apply these models in a correct and effective manner also form

the basis of good practice (Turpin & Iwama, 2011). Occupational Therapy models that describe the complex interaction of the individual and the environment include:

The ***Occupational Performance (OP) model*** was designed by Lorraine Williams Pedretti and colleagues and focusses on occupational performance as the main outcome for intervention. To facilitate occupational performance an individual would need adequate opportunities to engage in the learning process of skills and the practice thereof to fulfil occupational roles and developmental tasks. Within this model Occupational therapy features as the means to identify the aspect responsible for a decrease in occupational performance in any of the following three elements: performance area (Activities of daily living, work, and productive activities, as well as play/leisure activities), performance component (sensorimotor, cognitive, and cognitive integration, psychosocial and psychological) and performance context (temporal and environment). The model suggests the use of either remediation or compensation as an approach to better occupational performance (Turpin & Iwama, 2011:50-58)

This model may however not be suitable to use because the model is no longer formally published.

The Canadian Model of Occupational Performance and Engagement (CMOP-E) developed by Townsend and Polatajko emphasizes the relationship between the person (cognitive, affective, and physical with spirituality at the core), environment (cultural, institutional, physical, and social) and occupation (self-care, productivity, and leisure) where occupation serves as a bridge between person and environment. The model further highlights the importance of not only occupational participation but also occupational engagement with the role of Occupational therapy as an enabler through the use of occupation in the engagement of an individual in everyday life, performance of occupation as well as being a role player in the creation of a just society that would enable people to participate. The CMOP-E focusses on client centred practise (Turpin & Iwama, 2011:117 - 121).

The ***Person-Environment-Occupational Performance (PEOP) model*** created by Charles Christiansen and Carolyn Baum serves as a bridge between the OP model and the environment. The OP model has a diminished focus on the influence of the environment where the PEOP model has the same focus on the environment and the individual as well as

the interaction between these components. The PEOP model presents the person and environment as joined by occupational performance and participation, emphasizing the role of occupation, thus enabling participation in the social, cultural, financial, and political spheres where individuals exist. The main function of this model is the emphasis on its acknowledgement that occupational performance facilitate participation and is thus not an end in itself. (Turpin & Iwama, 2011:90).

The key to the value of this model in the understanding of the importance of Occupational therapy for dyslexic individuals lies in the focus of the model – the complex interaction that exists between a person (Intrinsic factors) and the environment (extrinsic factors) that forms the basis for occupation. These factors can either form a supporting structure, enable, or restrict an individual in their occupational performance and participation (Turpin & Iwama, 2011:91).

Although the models mentioned are not the only models used by occupational therapists, they may best be suited to describe the influence of occupational markers observed as behaviour in dyslexic individuals. The positioning of occupational markers on a model may assist occupational therapists to better understand the effect and influence on the occupational performance of an individual. A better understanding may enable accurate and tailored intervention specially to create a supportive structure for individuals with developmental dyslexia.

The PEOP model may be best suited to accurately explain the presence of occupational markers as well as a provision of a structure to create tailored intervention and supportive structures for individuals diagnosed or suspected of developmental dyslexia and can be explained as per the diagram below:

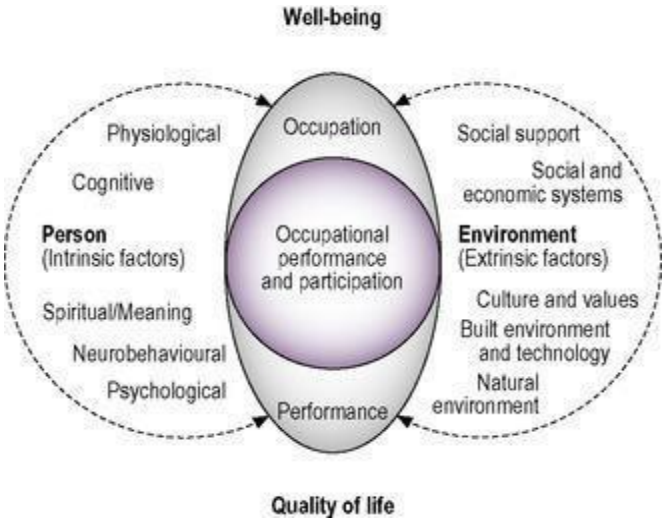

Figure 2.2: Person-Environment-Occupational-Performance (PEOP) model (https://musculoskeletalkey.com/the-person-environment-occupational-performance-peop-model)

The interplay between the intrinsic and extrinsic factors leads to the manifestation of occupational performance and participation. This begs the question: How will the pattern of occupational performance and participation present in an individual with dyslexia and will an observer or assessor be able to note these occupational markers?

Before the Occupational markers are discussed, the importance of early identification should first be clarified.

2.2 THE IMPORTANCE OF EARLY IDENTIFICATION

Research involving dyslexia concludes that early identification and intervention (Snowling, 2013; Colenbrander et al., 2018) are of utmost importance. Yet, using terminology in the description of unexplained language problems (including dyslexia) raised some issues (Bishop, 2014). The use of so called “labels” may have advantages as well as disadvantages. A disadvantage may include that the focus shifts more towards the individual’s inability to perform (failures). Thus, ignoring the contribution of the environment, may lead to stigmatization, social disadvantage, and exclusion. The focus may be more on the label rather than assessing the individual’s real needs and if the same label is used but with different meanings it leads to confusion.

Labels however may have advantages. When a label is linked to a specific problem it immediately explains the difficulty and creates legitimacy, thus removing the blame from the parent, teachers and above all the children. Thus, promoting understanding, removes discrimination, gives a sense of belonging and creates an environment where the focus may be on the positive attributes of the individual. A label also promotes targeted intervention and optimal professional communication. Research also benefits from a label because more continuity can be achieved in the research process (Bishop, 2014:383-384).

The ideal would be if a diagnosis can be made according to a specific biomarker rather than behaviour. Currently the diagnosis of dyslexia is viewed more as a behaviourally defined condition explaining a cognitive profile (Bishop, 2014:385).

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5 TR) (American Psychiatric Association, 2022) mention dyslexia under F81.0 as an alternative term to indicate a pattern of learning difficulties characterized by an impairment in reading and specifically accurate and fluent word recognition, poor decoding as well as poor spelling while acknowledging the biological origin of dyslexia. A diagnosis of dyslexia can only be made in the absence of other developmental disorders that may impact learning (e.g., intellectual disability or global developmental delay, hearing, or vision disorders or neurological or motor disorders) and in the absence of any environmental factors that might contribute to difficulty in acquiring academic skills. Depending on the impact on the academic domain, the difficulties may be indicated as mild, moderate, or severe. The diagnosis may however be made in individuals that only experience difficulty in one academic domain and may seem intellectually 'gifted' in other domains. Dyslexia can only be diagnosed after six (6) months of adequate intervention and in the absence of impaired intellectual abilities, psychosocial adversity or inadequate instruction. (Colenbrander et al.,2018).

Locally the South African ICD 10 MIT 2021 describe dyslexia as "R48- Dyslexia and other symbolic dysfunctions, not elsewhere classified"(Department: Health Republic of South Africa, 2023). The vague descriptions within the diagnostic toolbox and the large number of definitions given to describe dyslexia enhance the difficulty of identification. Dyslexia is not described as a disorder or a syndrome but rather a dysfunction, except in the conclusion of

the study by Tamboer et al. (2016) explaining dyslexia as the result of an evolved and unnoticed different way of information processing established over thousands of years (Tamboer et al., 2016:482).

Despite inconsistency in defining dyslexia, it remains important to identify dyslexia and provide unique and individually tailored intervention. The importance of "labelling" the deficit is primarily to enable the individual with dyslexia to identify the problems that they face and simultaneously free them from negative constructs that they may deal with such as being called "lazy" or "stupid" (Brante, 2013:79).

Accurate diagnosis is essential to ensure that all children at risk can be identified, yet it should not leave room for overidentification that may lead to time and money wasted on intervention. (Colenbrander et al., 2018). In order to plan resources and provide intervention it is important to know how many individuals need to cope with dyslexia (Bishop, 2014).

A further advantage of diagnosis is the ability of professionals to advocate for accommodation within the school system and optimize the participation and academic performance of the individual (Bishop, 2014), because dyslexia does not stop with only reading impairment but extends towards the occupations of the individual. This emphasizes the importance of in-depth evaluation of all occupational domains of an individual. Ideally this should be done before the child goes to school and the problem causes academic failure and despair.

Unfortunately, individuals only become aware of the problem after they start school and consequently struggle to read and learn new words thus leading to the described dyslexia paradox (Ozernov-palchik & Gaab, 2016:2). Bishop also indicates that ideally children at risk for dyslexia should be identified before they start school. This however is not possible due to the lack of specific genetic tests for dyslexia (Bishop, 2009:10). Snowling suggests that timely intervention is of greater importance than waiting for a diagnosis (Snowling, 2013). Thus, early identification can be described as a trade-off between specificity and sensitivity (Ozernov-palchik & Gaab, 2016). Even the use of non-literacy measures in the process to identify dyslexia are suggested (Elbeheri et al., 2006:150).

Early identification by means of evaluation in the learner's home language, is of utmost importance to facilitate early intervention. Elbeheri *et al.* describes the importance of occupational markers, the knowledge of all the domains of an individuals' occupations as well as the key role language and culture plays in the evaluation process (Elbeheri et al., 2006:150-151). Utilizing a behavioural profile in the diagnosis of dyslexia as opposed to an isolated marker for the diagnosis of dyslexia will allow for the inclusion of co-occurring problems thus including a pattern of occupational weaknesses and strengths. This shift will lead to the creation of a dyslexic profile to assist in the identification of dyslexia (Brimo et al., 2021).

The notion of acknowledging a profile is supported by African researchers. Primary caregivers, that may include parents or teachers are often able to describe the symptoms (thus profile) exhibited by children although they may lack the knowledge to link the profile to the diagnosis of dyslexia (Iwuagwu et al., 2022).

The knowledge occupational therapists have of occupational performance and participation as well as the importance of occupation, position therapist central in the early identification of individuals with dyslexia.

Yet a recent study done in South Africa indicate that local occupational therapists are not able to timely and accurately identify individuals with dyslexia. This is further complicated by the intricate yet dynamic landscape of language and culture in South Africa as well as additional factors like poverty and lack of educational programs (Fourie et al., 2018; Altin, Geertsema, Le Roux, & Graham, 2023:2).

If therapist's knowledge regarding occupational markers for dyslexia increase, they will be able to utilize this knowledge to identify individuals with dyslexia. Before the presence of occupation markers can be discussed, the importance of language in identifying individuals with dyslexia needs to be illuminated.

2.3 THE IMPORTANCE OF LANGUAGE IN DEVELOPMENTAL DYSLEXIA

The impaired phonological awareness of an individual, is most often the first occupational marker for the presence of dyslexia (D'Mello & Gabrieli, 2018:801). All words are composed of different phonemes. A phoneme represents the smallest sound unit in a word and could make a difference in the meaning of a word thus assisting an individual to distinguish words from one another to identify each word linked with the meaning of the word (Peterson & Pennington, 2012).

The acquisition of the complex skill of reading starts with the ability to distinguish one phoneme from another and simultaneously understand that phoneme representation can be one or several letters. Even more complex is the fact that each letter can present different sounds. The combination of written letters leads to various sounds and in combination they form words. The meaning of the words depends on the reader's knowledge of the world. The ability to read successfully relies on the reader's ability to 'simultaneously processes text visually, phonologically and semantically' (Brante, 2013:79)

The orthography of a language plays a vital role in the presentation of occupational markers with regards to reading in developmental dyslexia. Orthography is the written system for a language. An orthography may be alphabetic where letters are used to represent sounds or logographic where pictorial representations are used to present units of meaning. Using alphabetic orthographies can vary in their representation of letter-sound mapping (Peterson & Pennington, 2012:1999).

Languages can then, according to the regularity in the orthography, be described as transparent or shallow opposed to opaque or deep (Joshi & McCardle, 2018:420). A transparent language is characterized by a direct phoneme-grapheme correspondence. Dyslexic individuals usually have less trouble with these languages because of easier decoding and encoding. Languages that fit the description of transparency is Italian, Spanish, Welsh, German, Maltese, Czech, Turkish and Southern Indian languages Kannada and Malayalam (Miles, 2000:194-197). Opaque languages do not have a direct or clear phoneme-grapheme correspondence. English is a good example of an opaque language (Miles, 2000:197). The relationship between the letters and the sounds they represent are complex. Researchers

concluded that the orthography of a specific language has a direct influence on the severity of the reading or spelling deficit (Elbeheri et al., 2006:144).

Especially in South Africa, bilingualism and even multilingualism is common. English is regarded as a language with an opaque orthography in contrast to the transparent nature of the other official languages (de Sousa et al., 2011:52; Schroeder, 2013) (Schroeder, 2013). Bilingualism and multilingualism further complicate the identification of dyslexia in individuals. Problems experienced in mastering a second or third language may be the result of an individuals' dyslexia, or it may be developmental issues associated with second language acquisition (Hedman, 2012:529). The accurate identification of dyslexia amongst bilingual and multilingual individuals is complicated by the fact that tests for dyslexia are primarily developed for a specific language. The language that the tests are developed for, may be the test subject's second or even third language. Thus, over or under identification of dyslexia takes place (Hedman, 2012:530).

Therefore, it is important to have knowledge of an individual's home language, language of teaching and learning as well as first or second additional language to accurately identify developmental dyslexia.

The importance of early identification as well as the role of language has been clarified. This leads to the understanding of the different behavioural signs, referred to as occupational markers in this study, in the recognition of dyslexia in an individual.

2.4 OCCUPATIONAL MARKERS

Occupational markers refer to all the behavioural signs observed in a dyslexic individual preventing optimal occupational engagement and performance in meaningful activities (occupational challenges) or behaviour that enables the individual to excel in a unique manner during participation in meaningful activities (occupational strengths).

Bishop (2014) explains that, to determine intervention, functional disability plays a key role. Functional disability in this context, refers to evidence that an individual's problems are interfering with his ability to perform activities in everyday life or achievement on an academic level. The functional disability should be regarded just as important as the score on a standardized test (Bishop, 2014:387). The explanation of functional disability underlines the importance of the use of occupational markers to determine developmental dyslexia in individuals. If, like Bishop suggests, the occurrence of developmental dyslexia has specific behavioural traits, can these behavioural signs be used to identify children with developmental dyslexia?

Literature indicates some of these occupational markers that have been observed among dyslexic individuals.

a) The phonological deficit

First would be the well described phonological deficit noted in individuals who had the opportunity for learning to take place and in which learning is not hampered by other factors like low IQ scores (Frith, 1999; Habib, 2000; Stein, 2001; Ramus et al., 2003; Siegel, 2006; Bacon et al., 2013; Colenbrander et al., 2018). The phonological deficit may be noted as a range of symptoms arising from the individual's inability to successful master the phonology and morphological awareness of a language (Colenbrander et al., 2018). New or non-sense words poses a problem for the dyslexic individual because letters (graphemes) need to be translated into sounds (phonemes). Homophones are difficult to distinguish, and dyslexics need to recognise the word visually and learn them specifically (Annett, 2011:418-419). The orthography of language is problematic in dyslexia (Frith, 1999). The process of reading and spelling starts when an individual translates graphemes (letters) into phonemes (sounds). The sounds need to blend to form different words represented by different graphemes. The process of obtaining the knowledge to do letter-sound mapping, blending and segmenting is referred to as phonics (Colenbrander et al., 2018:819). The transparency or opaque character of a language has a direct influence on phonetics and thus also the presentation of dyslexia in an individual. Al Otaiba (2018) also states that the dyslexic individual experience difficulty with phonemic awareness, rapid naming, spelling, decoding, encoding and fluency despite having typical intelligence (Al Otaiba et al., 2018:830).

b) Reading as occupation

Not only is knowledge regarding reading important, but also the acknowledgement that reading can be regarded as an occupation (Candler et al., 2021:1). When reading difficulties are experienced by an individual, as with dyslexia, this inability to accurately read according to the age expected norm also influence the occupational engagement of the individual.

In a study done by Candler et al (2021) regarding reading as occupation, the analysis of the research indicated three (3) distinct categories each with different themes. The first entails the reading patterns of individuals with themes including setting (with the academic setting regarded as the most demanding), time spent in reading (dyslexic individuals need more time to read), social context and the process of reading (reading was a challenge for dyslexic individuals).

The second refers to the reading product with seven categories identified: academic product, achievement, skill, emotions, escape, increased struggle, and limitations. The third category noticed where the meaning of reading lies, and this linked to everyone that participated in the study, perceived as multidimensional and changed over time.

Yet three (3) themes emerged: emotions, self-confidence, and effort. Emotions were closely linked with reading. Success was followed by positive emotions (excitement and joy) and failure by negative emotions (dread, humiliation, frustration, anger, boredom, and nervousness). The inability to read according to expected norms leads to negative self-confidence. This however changed with improvement in reading ability and a sense of mastery. Individuals with reading difficulties, like dyslexia, had to put more effort in acquiring the ability to read fluently and perseverance was required to obtain a goal (Candler et al., 2021:7-9). Reading can thus be regarded as a significant human occupation and due to the presence of dyslexia in an individual, reading may require constant accommodation and adaptations (Candler et al., 2021).

With regards to the reading patterns, the academic setting is the one arena where individuals with dyslexia are challenged, especially with the time demand the inability to read fluently

imposes. The social context may be complex yet critical to assess. This also includes the perspective of the struggling reader on their ability to read. The product of reading occurs over time and may include academic achievement and skills gained. The individuals' emotions, struggle and limitations are important to recognize as this may be strong elements in the reinforcement of reading behaviour - clearly indicating the possibility of Occupational therapy intervention. If the Occupational therapist understands what the meaning of reading is to the individual, a tailored intervention approach can be designed (Candler et al., 2021:10). This emphasizes the need to view reading as an occupation rather than a skill to promote accurate and individually designed intervention.

c) Executive function and memory

Individuals with dyslexia may also experience problems with working memory, attention, and organization (Snowling, 2013; Brante, 2013). Esmaili *et al* suggest a difference in the executive function (EF) that include flexibility, working memory, planning, and monitoring (Ward 2006 in Esmaili). Poor EF in children is best observed in their everyday occupation (play) and may be evident in their social interaction, completion of school related tasks, activities, and group interaction (Meltzer & Krishnan, 2007; Esmaili et al., 2017). Bacon (2013) studied visuospatial memory in dyslexic individuals and concluded that the deficit is rather one of executive functioning although dyslexic individuals may experience problems with memory during everyday activities (Brante, 2013). However, these individuals make use of inherently visual metacognitive awareness to create effective recall strategies (Bacon et al., 2013). Research confirms this by indicating that dyslexic individuals are often visual thinkers and that they draw on this strength to enable optimum functioning (Davis, 1997:100 - 101). Dyslexic individuals have difficulty with planning, that may include the multi-dimensional processing of time (time passing, the processing of the sequence of successive events and duration judgement) (Habib, 2000; Brante, 2013).

d) Emotional impact

Dyslexia has an impact on an individuals' affect and may lead to emotions ranging from sadness, depression, stress, anxiety, and insecurity (Mcnulty, 2003). Prejudice that may lead

to low self-esteem is also described amongst dyslexic individuals (Carawan et al., 2016; Brante, 2013). The study by Łodygowska *et al.* (2017) highlights the importance of motivation of dyslexic children as well as the consequence of repeated failure, which may include the development of emotional and conduct disorders (Al Otaiba et al., 2018; Łodygowska et al., 2017). This may be enhanced by peers branding them as lazy or stupid (Brante, 2013:79). The loss of self-esteem often leads to depression and misery spiralling downward into frustration, aggression, and delinquency (Stein, 2001). Children may also respond to this by developing school phobia or display somatic complaints when they need to attend school (Siegel, 2006).

There may also be a co-morbidity of psychological symptoms in children presenting with developmental dyslexia. The psychological symptoms may be both internalizing (depression, anxiety disorders, substance abuse, suicide, behavioural and emotional problems including more loneliness, more victimization, and less social satisfaction than peers) and externalizing (attention deficit hyperactivity disorder, oppositional defiant disorder, and conduct disorder) (Dahle et al., 2011:162). These psychological symptoms may not necessarily meet the minimum threshold as described in the DSM-IV in order to make a diagnosis (Padhy et al., 2015). Children at risk for language difficulties may experience problems in areas of behavioural regulation and receptive language that may indicate poor social outcomes and social development (Aro et al., 2012).

e) Environmental factors

Occupational markers may also be enhanced or influenced by environmental factors such as gender, ability, motivation, resources, and personality (Frith, 1999). The importance of the environment to support, enable or restrict occupational performance and participation is well described in the PEOP model (Christiansen, CH; Baum, 2005). Within this model the complex interaction between the intrinsic and extrinsic or environmental factors leads to the manifestation of occupational performance and participation patterns (Turpin & Iwama, 2011) also referred to as occupational markers within the current study. The POEP model indicate the environmental or extrinsic factors as the sphere in which occupation takes place and may include built (including tools or assistive devices as well as technology), natural (geographic

features) and cultural (values, beliefs, customs, and behaviours that are specific to a group of people and passed on from one generation to the next) environment, social and economic systems (resource availability) and social interaction (Christiansen, CH; Baum, 2005:250).

The importance of the extrinsic or environmental factors are also acknowledged by researchers especially noting the role of cultural factors. Cultural factors have an influence on how dyslexia present in an individual over time. Dyslexia does not start with the onset of formal education, nor does it end once education is completed. Environmental factors are primary indicators for the role and type of remediation (thus supportive structure) that should be provided to an individual with dyslexia. Frith (1999) describes culture as the single most important factor in the remediation of dyslexia. Here, with specific reference to the language spoken by an individual and the writing system used within the culture of the individual with dyslexia (Frith, 1999). This notion is also supported by researcher with the focus on non-alphabetic writing systems (Elbeheri et al., 2006). Further environmental support may include the use of technology (Frith, 1999). Thus, indicating the type of environmental support needed to ensure optimal occupational performance and participation will enhance the well-being and quality of life for an individual with dyslexia.

f) Dyslexic strengths

Apart from the seemingly endless list of limitations that individuals with dyslexia face, little research focuses on or acknowledges the strengths of an individual with dyslexia. Creativity is described among dyslexic individuals – even referred to as a "peculiar tendency" (Cancer et al., 2016:10) with an ability to combine unusual ideas. This may be due to the fact that they seek the relationship between different or opposite elements as well as finding alternative solutions (Cancer et al., 2016:11). Individuals with dyslexia also tend to have good visual memory and intuitive and original strategies assisting them in the identification of alternative solutions (Cancer et al., 2016:11). Bishop (2014) advocates for the evaluation and development of the strengths of a dyslexic individual – either in activities that they prefer or something that they are likely to succeed in. These activities may include sport, cooking, arts and crafts, working with animals, music or horticulture (Bishop, 2014). This approach will

challenge all professionals to shift the focus from problem identification toward strength development. The individual and unique nature in which dyslexia presents in each person also attributes to the statement that the weakness of an individual may be the strength of another (Brante, 2013:84).

The conclusion by Stein (2001) that a weak magnocellular system leads to the emerging of a well-developed parvocellular system may aid to explain the holistic talents of dyslexics. This emerges in their ability to think laterally and "see the big picture" – skills needed by politicians, artists and entrepreneurs (Stein, 2001:13). To summarize the importance of the focus on the strengths of the dyslexic individual:

> *The challenges of dyslexia are real, but they are limiting only to the extent that we allow them to be. The moment we start defining a person by deficits, we undermine their capacity to be successful, and there is no space to develop strengths and positively adapt. If we instead build the capacity of students with dyslexia to both improve on their areas of weakness, as well as build on their individual and unique areas of strength, we begin to create the foundation for thriving in learning and life.* (Rappolt-Schlichtmann et al., 2018:872)

g) Possible co-morbidities

Apart from the occupational markers described above, attention also need to be given to possible co-morbidities in the process of determining the presence of dyslexia due to their role in the presentation of developmental dyslexia. Comorbidity of other neurodevelopmental disorders may be present in 40% of dyslexic school aged children (McArthur et al., 2000:872-873; Willcutt & Pennington, 2000; Rochelle et al., 2009). School aged children with reading difficulties may already as pre-schoolers have struggled with language impairments (Bishop & Snowling, 2004). Smith suggests that recent molecular genetic research determining the underlying deficits of dyslexia indicates a possible genetic basis for co-morbidity with Speech sound disorder (SSD) and Attention deficit hyperactivity disorder (ADHD) (Smith, 2007).

Considering the occupational markers mentioned, the scope of practice of Occupational Therapists needs to be clarified.

2.5 OCCUPATIONAL THERAPY AND DEVELOPMENTAL DYSLEXIA

2.5.1 The scope of practice of occupational therapy

Occupational therapy can be described as the therapeutic use of everyday life occupations to support occupational performance and participation. Clients may be at risk for optimal occupational participation, or they may have an impairment or limitation that prevents them to engage in optimal occupational performance and participation. Occupational therapy intervenes to support occupational performance through the provision of skilled services with the focus on engagement in everyday activities (Dorsey, 2021). This can only be achieved if the clinician applies clinical reasoning as well as professional judgement in the evaluation, analysis, and identification of occupational challenges.

The *domain* of occupational therapy can be described as the "everyday life occupations that people find meaningful and purposeful" (Dorsey, 2021:2). The everyday life occupations refer to everyday life activities that a person would perform to take care of one's body or participate in daily routines. These activities can be supported by additional activities that may be more complex in interaction. Everyday life occupations also include health management, rest and sleep, education, play, leisure activities and social participation (Dorsey, 2021:3).

Within the domain of occupational therapy practice the occupational therapist also considers the client's engagement in a range of occupations, the context of these occupations and the performance patterns and skills needed to enable engagement according to the demands of the occupation. This includes the body functions and structure of the client. Enabling the client to have restored occupational participation (with aspects that may include but are not limited to emotional, psychosocial, cognitive, and physical) in meaningful activities, the Occupational Therapist need to utilize skill, knowledge, and the therapeutic use of self. Through meaningful occupational participation, the health, well – being and life satisfaction of the client increase (Dorsey, 2021:3).

Knowing the domain of occupational therapy, the process of occupational therapy refers to "the delivery of services and includes evaluating, intervening, and targeting of outcomes" (Dorsey, 2021:3). Occupational therapy services may be rendered in a direct or indirect manner, but it will always be client centred with occupation central to the process. The occupational therapy client may then also be an individual, group of people or a specific population. The process includes the following components: evaluation of the client, intervention planning and implementation as well as the formulation of outcomes of occupational therapy intervention (Dorsey, 2021:3-5). Occupational therapy intervention can be provided to any client – irrespective of age – in a variety of settings that may include inpatient settings, outpatient settings, home, and community settings as well as research facilities.

Referring to the above outline of the scope of occupational therapy practice and integrating this knowledge with the proposed research, it is clear that occupational therapy is ideally positioned to assist with the identification and support of individuals with dyslexia. Despite indications that occupational therapists are ideally positioned to assist with early identification as well as support of individuals with dyslexia, South African occupational therapists feel ill equipped to assist with the identification of dyslexia as well as providing appropriate intervention to individuals with dyslexia (Altin, Geertsema, Le Roux, & Graham, 2023).

2.5.2 Occupational therapy intervention and developmental dyslexia

The main purpose of occupational therapy is to use everyday life activities (also known as occupations) in such a therapeutic manner that it enhances or enable an individual to participate in meaningful roles, habits and routines in a variety of settings (Amini et al., 2014:51). To achieve this, an occupational therapist needs to understand the interplay among client factors, performance skills, and performance patterns. All occupations occur in a specific

context, have meaning to the client and may be observed by others or only be known to the individual involved (Amini et al., 2014:56).

The ability to analyse the occupations of an individual to determine their occupation performance in meaningful activities enables the occupational therapist to not only observe and respond to the occupational markers displayed by a dyslexic individual but to also understand the influence thereof on all other domains. The understanding of the interrelated aspects of the occupational markers in a dyslexic individual, enables intervention in all domains and restoring occupational balance and performance in all aspects of occupation.

Currently a diagnosis of dyslexia is only based on behaviour (Bishop, 2014:385). In the absence of any biological marker a thorough knowledge of occupational markers displayed by dyslexic individuals will enable early identification and intervention. Occupational therapy can be instrumental in this process due to the nature of the profession – the ability to analyse occupational participation of an individual and design tailored intervention through occupation.

The Occupational Therapy Practice Framework or OTPF can be used to describe the domains as well as the process to facilitate occupational engagement, but this structure was not intended to serve as a model for occupational therapy intervention (Boop et al., 2020). To better understand how these domains as well as the process will be visible in a specific client scenario, various occupational therapy models may be used. A better understanding of the different models and how to apply these models in a correct and effective manner forms the basis of good practice (Turpin & Iwama, 2011).

The Person-Environment-Occupational Performance (PEOP) model was created by Charles Christiansen and Carolyn Baum to present the person and environment as joined by occupational performance and participation with the role of occupation central to the process. The focus of the PEOP model is centred in the delicate and complex interaction between the person (intrinsic factors) and the environment (extrinsic factors) visible through the occupational participation and performance of the individual. The intrinsic and extrinsic factors can either form a supportive structure for an individual with dyslexia, enable occupational performance and participation or restrict the individual to participate in

meaningful occupations thus limiting the experience of occupational well-being and quality of life (Turpin & Iwama, 2011).

Applying this model to practice will enable occupational therapist to effectively identify the factors (referred to as occupational markers in the current study) that inhibit optimal occupational performance and participation. The model will however also allow for the identification of strengths that may serve as supportive structures in the management of dyslexia. The PEOP model will thus enable identification of dyslexia but will also allow the occupational therapist to design tailored intervention for the individual with dyslexia. Although the model was designed for the use by occupational therapists, the intervention process should follow a multi-disciplinary approach. The ideal should thus be the creation of an interdisciplinary model that acknowledges the importance of the intrinsic factors as well as the extrinsic factors in the management of dyslexia without neglecting the complex interaction between these factors. To demonstrate the value of applying the model to the identification and management of an individual with dyslexia, please refer to the description and figure below.

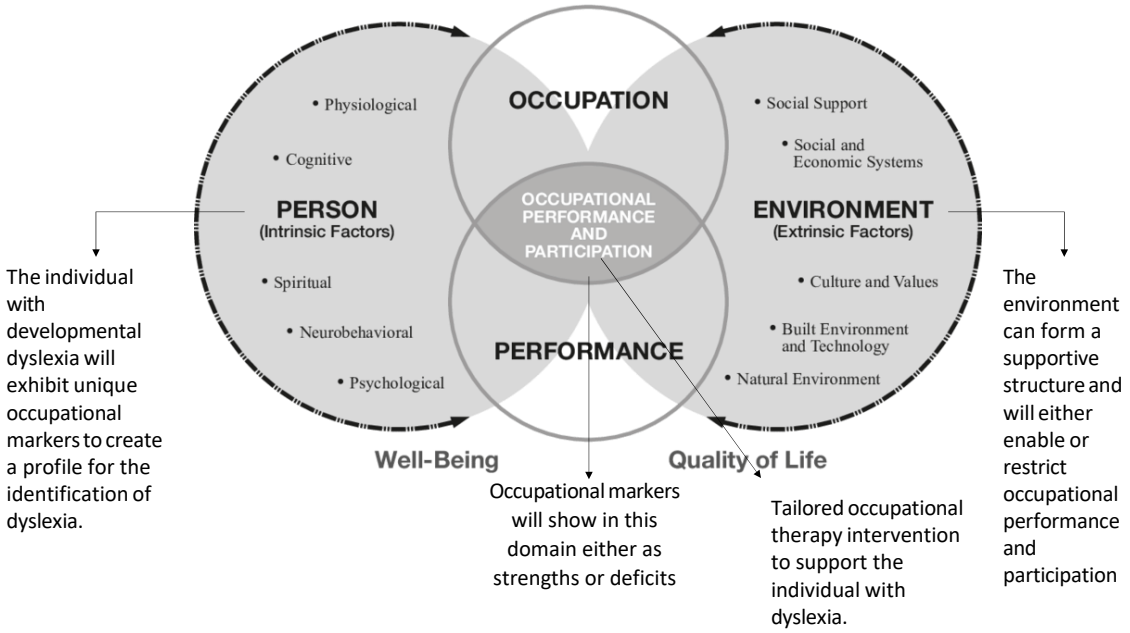

Figure 2.3: Adapted PEOP model for developmental dyslexia

Currently a diagnosis of dyslexia is only based on behaviour (Bishop, 2014, p385). This is supported by African researchers indicating that the most noticeable symptom of dyslexia would be failure within the classroom setting accompanied by behavioural and psychological issues (Iwuagwu et al., 2022). Again, indicating the presence of a dyslexic profile as opposed to an isolated diagnostic feature.

This begs the question: If, with the knowledge of occupational markers observed in dyslexic individuals, would occupational therapists be better equipped to recognize and understand the effect and influence on the occupational performance of an individual? A better in-depth understanding of these occupational markers and the integrated manner in which they may be intertwined may lead to the development of a supportive structure for dyslexic individuals especially within the South African context.

2.6 SUPPORTIVE STRUCTURES FOR INDIVIDUALS WITH DELVELOPMENTAL DYSEXIA

2.6.1 Application of the PEOP model

A supportive structure may be described as tailored structures designed by occupational therapy intervention to provide support to dyslexic individuals, enhancing occupational performance and participation through the use of occupations to facilitate the experience of occupational competence (Christiansen, CH; Baum, 2005:245). These structures need to incorporate a multi-disciplinary intervention in the management of developmental dyslexia with a holistic and client centred approach.

If the PEOP model is used as guideline to describe the presence of occupational markers it may also aid in the accurate description of the presence of supportive structures for dyslexic individuals or allow for the identification of areas where supportive structures lack, but the following needs to be illuminated first.

The PEOP model developed from the work done by Christiansen and Baum that started in 1985 and was first published in 1991 and gives a detailed account of the complex interaction between an individual and their environment through occupation. Engagement in occupation requires enablers or may be restricted by barriers. The interaction between the person factors

(intrinsic) and the environment (extrinsic) factors can either "support, enable, or restrict the performance of the activities, tasks, and roles of the individual, organization, or community" (Christiansen, CH; Baum, 2005:244). The model further recognises the position of Occupational Therapy as a provider of tailored intervention through client centred strategies that engage either an individual or group to engage in occupational performance. The environment may also contribute to the occupational performance of an individual or group either by supporting participation or by limiting participation (Christiansen, CH; Baum, 2005:244).

To better understand the enablers and barriers the different component of this model needs to be clarified. The model refers to the person or intrinsic factors as the 'Intrinsic enablers of performance" (Christiansen, CH; Baum, 2005:246) and include the following: neurobehavioral, physiological, cognitive, psychological, emotional, and spiritual factors. With the current study in mind the cognitive factor should be viewed in detail.

Cognition is the component that may be influenced the most by developmental dyslexia due to the inclusion of language (comprehension and production), task organization and memory. Learning is supported by intact cognition (Christiansen, CH; Baum, 2005:247). In the case of an individual with developmental dyslexia, these cognitive functions are impaired thus creating a barrier to effective learning. The individual will therefore need to learn or adapt to alternative ways of learning.

The consequences of developmental dyslexia (as described in the occupational markers) often have an impact on the psychosocial and emotional factors of the individual as well. Psychosocial factors include personal traits, internal processes and motivational influences and may influence emotions through the perception of events (Christiansen, CH; Baum, 2005:247). The emotional impact of dyslexia on an individual has already been highlighted and contributes to the notion that Occupational therapy stands central in the identification of the extent of the impact of development dyslexia on an individual as well as designing tailored intervention that may include the positioning of supportive structures, all within a client centred framework.

2.6.2 Supportive structures as described in the PEOP model.

The PEOP model also describes the environment in which occupations takes place. This may include the built (including tools or assistive devices as well as technology), natural (geographic features) and cultural (values, beliefs, customs, and behaviours that are specific to a group of people and passed on from one generation to the next) environment, social and economic systems (resource availability) and social interaction (Christiansen, CH; Baum, 2005:250). In the case of dyslexic individuals social support can either be a big enabler of a barrier to occupational performance.

Using the PEOP model it is clear that dyslexic individuals may experience either barriers to occupational performance or supportive structures that may enhance or facilitate meaningful occupational performance. These structures may be present in different factors as described by the model. The presence of supportive structures for dyslexic individuals should thus be further investigated to determine the extent of the current structures in place or lack thereof. It remains important to note if the structures mentioned internationally will also be applicable to the South African context. African researchers may also provide insight into different supportive structures on the continent as well as the management thereof. One such study indicated that primary caregivers play an important role in the management of dyslexia by increasing their support to children diagnosed with dyslexia. The primary caregivers indicated that special education would be the best option to support the children with dyslexia, but most individuals could not afford the high tuition fees and resorted to alternative means of support including but not limited to faith-based beliefs as coping strategies (Iwuagwu et al., 2022).

In order to gain a better understanding of dyslexia in South Africa, the South African context should be delineated.

2.7 The South African context

The **South African context** includes the geographical boundaries marking the borders of South Africa (Byrnes, 1997; Alexander,2018) as well as the rich linguistic (Alexander, 2018a) and cultural diversity (Booysen, 2007; Magubane, 2020) of the people living within South Africa.

Within this setting, unique challenges are present in the identification and management of developmental dyslexia.

2.7.1 Linguistic diversity

South Africa has a rich **linguistic diversity** (Alexander, 2018a). The Constitution of South Africa recognises 12 official languages (Magwenya, 2023) – however there are 34 historically established languages. Four of these languages are extinct Khoesan languages. The remaining 30 languages are living languages. The 9 official African languages can broadly be divided in two groups:

Nguni-Tsonga languages: isiNdebele, isiXhosa, isiZulu, siSwati and Xitsonga

Sotho-Makua-Venda languages: Sesotho, Sesotho sa Leboa (also known as Sepedi), Setswana and Tshivenda.

This division can be better understood if the family tree of the languages is observed (see Figure 2.4)

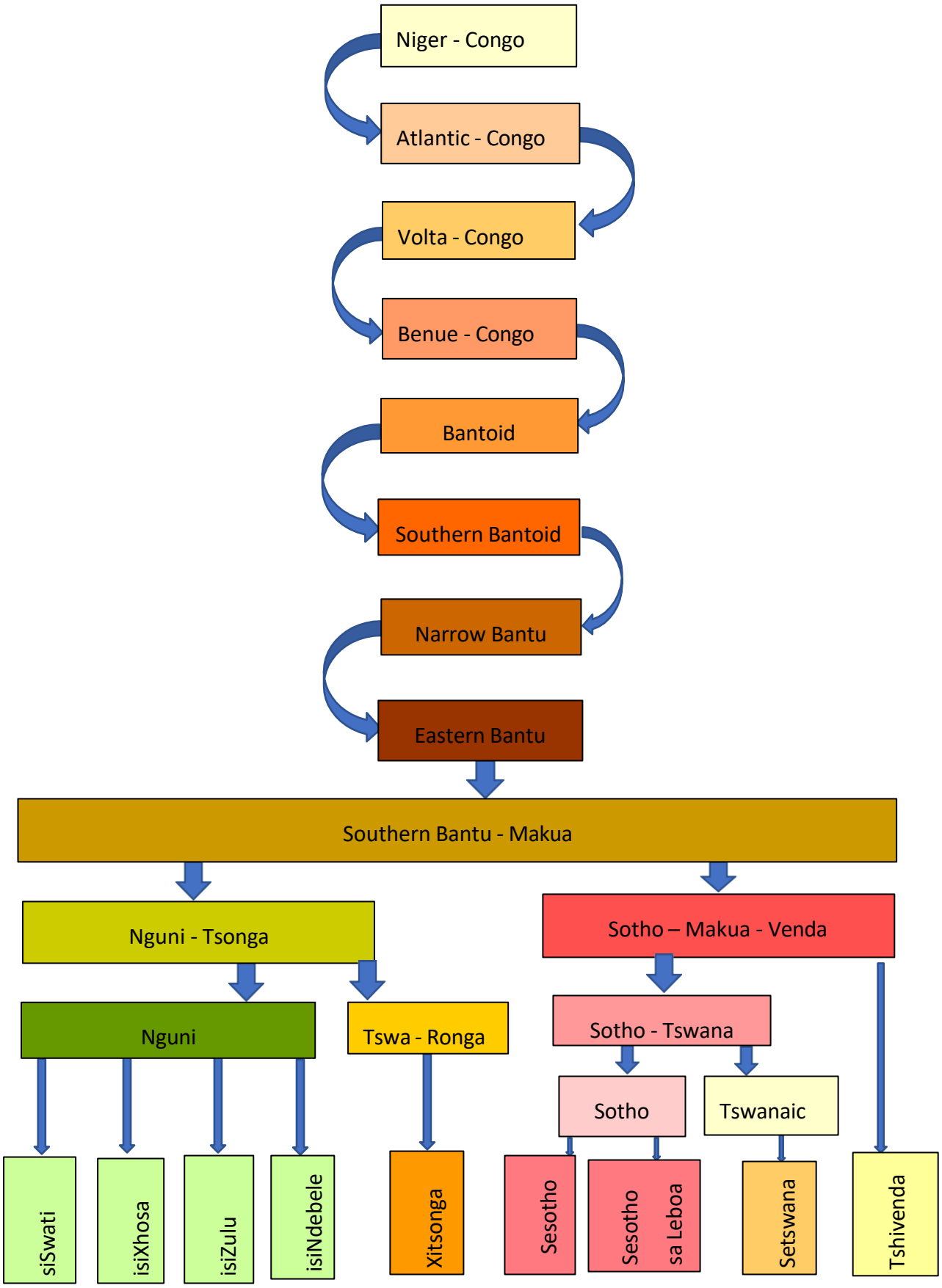

Figure 2.4: The family tree of the nine major languages in South Africa (Adapted from Alexander, 2018a)

All African languages as well as Afrikaans, have a transparent orthography (de Sousa et al., 2011; Schroeder, 2013) which has a direct influence on the presence and presentation of dyslexia (Elbeheri et al., 2006). Afrikaans evolved from Dutch and included words or phrases from European colonial languages such as English, French, and German as well as African languages. Within the South African context English is widely used as second language and regarded as the language of communication in media, business, and government (Alexander, 2018a).

The distribution of languages amongst the South African population can be illustrated by the following diagram:

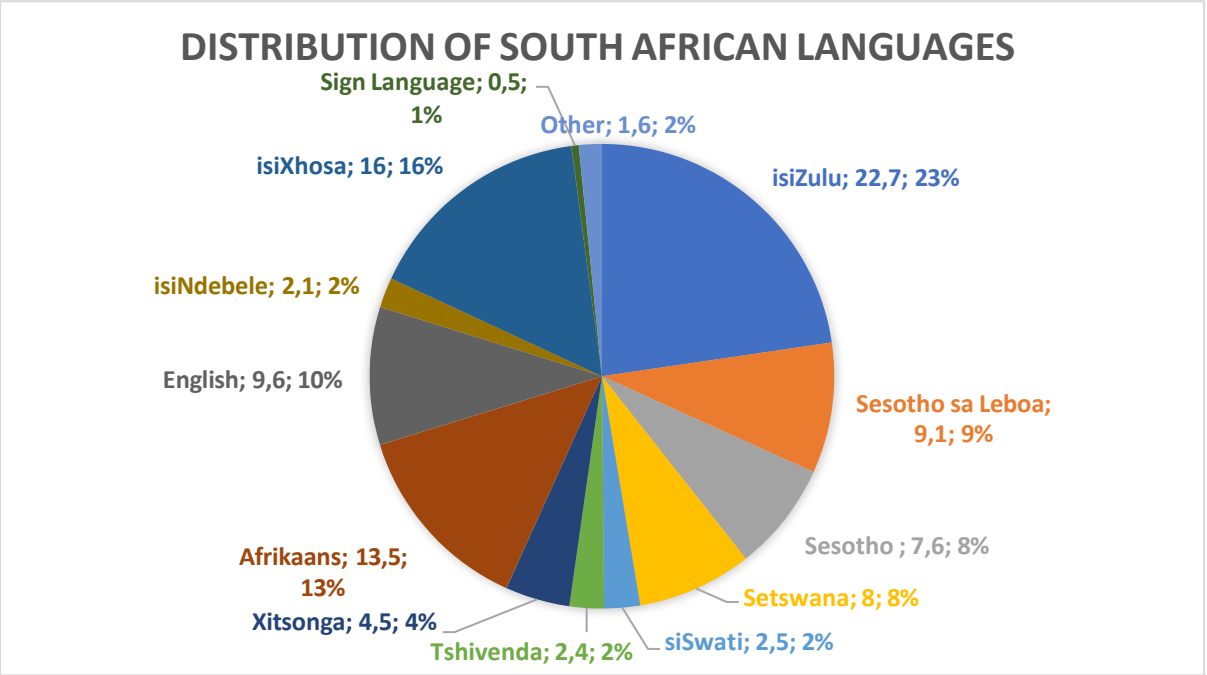

Figure 2.5: The distribution of languages amongst the South African population (Adapted from Alexander, 2018a)

This chart indicates the home language of individuals; however, South Africans tends to be more than bilingual. The ability to communicate in more than two languages is described as multilingualism and is a common achievement amongst the South African population. “Code Switching” is also common practice. This refers to more than one language used in the same

sentence (Alexander, 2018a). Languages in South Africa has a direct influence on each other creating fluency and growth fostered by migration and urbanization, friendships, and marriages, as well as education and work. (Alexander, 2018a).

Within a multilingual country it is important to understand how language in education is managed. The first concept is the language of learning and teaching (LOLT) or language of instruction in the classroom. This refers to the languages the teacher will use for instruction as well as the language used for evaluation of learners (Stein, 2017). The home language of learners or mother tongue is included in the learners' curriculum and refers to the language in which the learner is most comfortable for reading, writing, and speaking. The home language may differ from the language spoken at home. The curriculum also includes a first additional language (FAL) and refers to a second language in which the learner may be less fluent but will later advance to a stage where the learner will be comfortable reading, writing, and speaking this language. The curriculum also includes the possibility for a second additional language (SAL). The inclusion of different languages in the curriculum is referred to as additive multilingualism and is in line with government policies. This differs from language immersion where the learners' home language and LOLT are different – this implies that the learner needs to simultaneously accomplish adequate language skills and master the content of the learning area. Section 29(2) in the Constitution clearly states that all learners have the right to receive education in one of the official languages in a public school setting where it is reasonably practicable (Stein, 2017:207-208). In South Africa 77% of primary school learners receive education in their home language in grades 1 to 3 (Schaefer & Kotzé, 2019), but from grade 4 most learners receive their education in English (Pretorius & Spaull, 2016).

Which language learners should select as LOLT, home language and FAL, is debatable. Usually, parents chose LOLT to be the same as their home language for various reasons including their ability to assist with homework and communication with the teacher and the school. English remains a favourite for LOLT because most tertiary institutions use English as LOLT. Thus, parents chose English to enable children at a young age to become fluent in English. If English is not the LOLT, most learners choose English as FAL to enable them to be proficient in order to enter a competing job market where English is the main language of communication (Stein, 2017:213-214).

This poses a particular problem in the identification of dyslexia because the inability to meet age specific requirements for reading might well be due to the fact that the learner is evaluated in his second language and the tests are designed to assess proficiency (Hedman, 2012). The inherent nature of a language may also contribute to the phonological difficulty. Thus bilingualism (or even multilingualism) should be taken in consideration when evaluations for dyslexia is conducted in the South African context (Hedman, 2012).

With this scenario in mind and the knowledge we have thus far with regards to the opaque or transparent nature of South African languages as well as the effect thereof on the manifestation and detection of dyslexia, identifying dyslexia within the South African context may be challenging. Besides language, culture also plays an important role.

2.7.2 Cultural diversity

Culture in South Africa is rich, diverse, and dynamic (Booysen, 2007; Senghor, 2019; Magubane, 2020). Traditionally culture defined the way of life for a specific group of people including their values, belief systems and religion. Culture also indicates the way people dress, personal decoration and social relationships as well as symbols and codes (Senghor, 2019). Edward Burnett Taylor already described culture in 1871 using the following definition:

Culture or civilization, taken in its wide ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society (Senghor, 2019: sahistory.org.za/article/defining-culture-heritage-and-identity).

Defining culture within the South African context may be a contentious issue. Contained within our geographical borders there are many different people, speaking 30 or more different languages. Yet all of these people call South Africa home and form part of the rich and diverse background on which our country's identity and culture is built (Senghor, 2019).

The above emphasizes the importance of knowledge of an individual's culture as well as context. The context here may also include the identity of an individual. Identity may be

formed by numerous factors (like the culture of an individual) and yet it remains fluid. Identity however influences greatly which part of themselves an individual will present to the world (Senghor, 2019)

The assessment used to identify dyslexia should not only take language into consideration but should also be sensitive to the culture of the individual as well as the role of identity. In order to ensure culture fair assessment, the assessor should be cognisant of the different learning environments an individual may be subjected to. Early intervention can only be facilitated if early identification in the home language of the learner takes place (Clark, A., Naidoo & Lilenstein, 2019). Commercially developed instruments standardised abroad may thus not yield effective results and provision of complete assessment when used in the South African context (Elbeheri et al., 2006, p145; Clark, A., Naidoo & Lilenstein, 2019, p3).

2.8 CONCLUSION DERIVED FROM LITERATURE

To conclude the current literature review, it was evident that a lack of agreement regarding the definition and basis for diagnosing developmental dyslexia poses a problem in the early identification of this condition. The biological origin of this neuro-developmental disorder should be noted as well as the behavioural signs that may present over the lifetime of an individual including the extending beyond the difficulty with written (Frith, 1999) and phonological components of language (Schatschneider & Torgesen, 2004). Currently dyslexia is still primarily identified as the inability to master key academic skills despite adequate instruction (American Psychiatric Association, 2022).

Early identification is vital especially to prevent the dyslexia paradox (Ozernov-palchik & Gaab, 2016). Currently the diagnosis of dyslexia is viewed more as a behaviourally defined condition explaining a cognitive profile (Bishop, 2014, p385). The DSM – 5 – TR also note that dyslexia manifest as a range of observable, descriptive behaviour or symptoms (American Psychiatric Association, 2022). These descriptions clearly indicate that a single and isolated indicator for dyslexia cannot be used thus the application of a profile to identify individuals with dyslexia may be the answer. Utilizing a behavioural profile will also allow the inclusion of co-occurring problems but will also leave room to include strengths. Thus, a comprehensive profile

describing a pattern of weaknesses and strengths to assist in identification of dyslexia (Brimo et al., 2021).

A multi factorial aetiology of developmental dyslexia that includes the biological (genetic contribution and neuro-anatomical factors), cognitive (information-processing mechanisms) and behavioural components (learning to read and write) as well as the influence of the environment will comprehensively view dyslexia. (Frith, 1999;194).

Individuals utilize different occupations to engage in occupational performance and participation enabling the individual to fulfil meaningful roles, habits, and routines (Amini et al., 2014:51). In this context the behavioural signs displayed by an individual indicative of the presence of dyslexia has a direct influence on their occupational performance and participation. Occupational markers thus refer to all the behavioural signs observed in a dyslexic individual preventing optimal occupational engagement and performance in meaningful activities, and those markers that clearly allows an individual to excel in a unique manner in meaningful activities. Thus, creating a dyslexic profile with a unique pattern of strengths and weaknesses.

The knowledge of occupational markers displayed by individuals with dyslexia and the way these markers can be observed in the individual's occupational performance and participation, ideally position occupational therapy as an indispensable member of the multi-disciplinary team. Not alone will an occupational therapist have the knowledge and skill to assist with accurate identification and diagnosis of individuals with dyslexia, but the professions holistic approach to intervention will favour occupational therapy involvement in managing the effect of dyslexia on the occupational performance and participation of the individual. Thus, addressing the functional ability of the individual (Bishop, 2014).

Literature indicates a variety of behavioural signs (in this study referred to as occupation markers) that may be indicators for the presence of dyslexia. One of the aims of the current study is to identify these markers as described in literature that could aid in the accurate early identification of dyslexia by occupational therapists within the South African context. Currently a gap in the availability of language specific as well as culturally relevant assessment

exists within the South African context. Assessment tools standardized abroad may not answer to the South African needs.

Occupational therapy can be instrumental in this process due to the nature of the profession - understanding the interplay among client factors, performance skills, and performance patterns all occurring in a specific context that has meaning to the client and may be observed by others or only be known to individuals involved (Amini et al., 2014:56). This enables occupational therapists to skilfully intervene by analysing the occupational performance and participation of an individual followed by designing tailored intervention through occupation. The PEOP model can be used in this process determining the intrinsic and extrinsic factors as well as assessing the occupational participation and performance.

Although identification may be the first step in assisting individuals with dyslexia, knowledge regarding possible supportive structures to aid dyslexic individuals in their occupational performance and participation is important. In order to render an optimal service to clients, an occupational therapist should have the knowledge of these structures as well as the availability and accessibility within the South African context.

Thus, the purpose of this study is to identify possible indicators (in this study referred to as occupational markers) that could aid in the accurate early identification of dyslexia from an occupational perspective as well as the identification of possible supportive structures to aid dyslexic individuals in their occupational performance and participation within the South African context. In doing so, the study hopes to contribute to positioning the profession of Occupational Therapy as a vital role player in the early identification and intervention of dyslexia in South Africa. The study may also indirectly aid to illuminate some of the unique challenges associated with assessment, treatment, and support of dyslexic individuals within the South African context.

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Chapter 3: **Constructing Occupational Markers through an Exploration of the Developmental Dyslexia Profile: A Scoping study**

Note to the reader.

The author intends to submit the article to the *South African Journal of Occupational Therapy (SAJOT)* for the following reasons:

- SAJOT welcomes scoping reviews.
- The scoping study addresses a marginalized group of learners that, due to a lack of language-specific and culturally relevant assessment tools available within the South African context, are not accurately identified and supported.
- Introduce the term '*Occupational markers*' to occupational therapists to describe the profile of a dyslexic person as obtained from the scoping review using the Occupational Therapy Practice Framework fourth edition (OTPF-4) as a reference.

The article was compiled according to the guidelines provided by SAJOT namely:

A manuscript with the content presented in MS Word format, 1.5 line spacing and a legible font (Arial 11 with italic rather than underline suggested). The language should be set to South African English. The limit of the abstract is 200 words, with a 5000 – 7000-word count (16 – 19 typed pages) for the article (excluding tables and references). A maximum of 60 references are permitted and indicated in the Vancouver referencing style (in text reference indicated with number in subscript without brackets). Each reference should also show the DOI number in one line (if available). Tables should have a heading at the top and labelled with Roman letters. Figures should be labelled at the bottom with Arabic numbers. Tables and figures should not be scanned but formatted and included in place in the manuscript.

Also included for submission should be a supplementary file that contains a prepared title page as per guideline, author contribution, 15 multiple choice questions as per HPCSA guidelines with answers clearly indicated as well as a plagiarism check report. For this purpose, Turnitin will be used.

The current length of the article is 20 pages with a word count of 186 words for the abstract and 4818 words for the remainder of the article (excluding the tables, figure, and reference list) and there are two tables and one figure. The article has 55 references.

TITLE: **Constructing Occupational Markers through an Exploration of the Developmental Dyslexia Profile**: A Scoping study

Abstract: Timely and accurate identification of individuals with dyslexia in a multi-lingual, multicultural context remains elusive. Viewing dyslexia according to a profile will enable early identification irrespective of language and culture thus promoting effective intervention and provision of support will enable occupational performance and participation. ***Aim:*** To utilize a scoping study to review literature for occupational markers indicative of developmental dyslexia. ***Method***: A scoping study was conducted according to the 5-stage outline provided by Arksey and O'Malley. Fifteen electronic databases were searched for articles published between January 2010 and June 2023 resulting in the review of 179 articles. ***Results***: Eighteen overarching themes relating to occupational markers were identified, each with its own subdivisions of occupational markers to illuminate the content of the theme. Primary contributors to occupational markers include the phonological deficit and difficulty with reading and executive functioning. ***Conclusion:*** Occupational markers may delineate a dyslexic profile thus enabling inclusive early identification in a multi-cultural, multilingual context with clear indications of the domains where occupational performance and participation may not be optimal. Recommendations for further research are made as well as the implementation of occupational markers.

Keywords: Occupational markers, developmental dyslexia, dyslexic profile

Introduction

Globally, developmental dyslexia is prevalent amongst 5 to 10%[1,2,3,4,5] of the population yet accurately defining dyslexia proves to be complex and problematic. Dyslexia can be delineated by indicating the biological origin of this neuro-developmental disorder that presents with different manifestations over the lifetime of an individual and noted through the behavioural signs that extend beyond problems with written[3] and phonological components of language[6]. Currently the diagnosis of dyslexia is viewed more as a behaviourally defined condition explaining a cognitive profile[7]. Unfortunately, the struggle to read and learn new words only becomes noticeable after the onset of formal schooling leading to the well described dyslexia paradox [8]. Ideally early identification should take place before entrance into the formal schooling system but due to a lack in genetic specific tests, this is currently not possible[9]. Early identification could be described as a trade-off between specificity and sensitivity [8] to ensure timely intervention as opposed to a specific diagnosis[5]. Even the use of non-literacy measures in the evaluation process are suggested[10].

Recent research supports the concept of behavioural profiles as opposed to an isolated diagnosis as this shift will allow the inclusion of co-occurring problems in the description of the occupational strengths and weaknesses individuals with dyslexia face. This viewpoint will allow the recognition of a pattern of strengths and weaknesses in dyslexic individuals thus a dyslexic profile[11].

Completing the occupational profile of the client, occupational therapists may also notice difficulty with performance patterns and skills not directly related to the reading or spelling skill of the individual thus behavioural signs or occupational markers may be noted. Occupational markers can be defined as the behavioural signs observed in a dyslexic individual preventing occupational engagement and performance in meaningful activities (occupational challenges) or behaviour that enables the individual to excel in a unique manner during participation in meaningful activities (occupational strengths).

The important role of occupational markers in the identification of dyslexia in individuals in South Africa can only be highlighted if the South African context is well defined. The South African context includes the geographical boundaries marking the borders of South Africa [12,13] as well as the rich linguistic [14] and cultural diversity [15,16] of the people living within South Africa. Within this setting, unique challenges are present in the identification and management of developmental dyslexia. South Africa has a rich linguistic diversity [14] with the Constitution of South Africa recognising 12 official languages[17]. All of the indigenous languages as well as Afrikaans, has a transparent orthography [18,19] which has a direct influence on the presence and presentation of dyslexia[10]. English has an opaque orthography and is widely used as second language as well as in communication, media, business and government [14]. Multilingualism is a common achievement amongst the South African population. “Code Switching” is also a known practice where more than one language is used in the same sentence. Due to all the influences the languages in South Africa have on each other, the languages are fluid and grow and change all the time. The assessment used to identify dyslexia should take language and culture into consideration as well as acknowledging the role of identity. The assessor needs to be aware of the different learning environments individuals may be subject to as well as the learning preference of the individual to enable culture fair assessment. Early identification by means of evaluation in the learner’s home language, is of utmost importance to facilitate early intervention[20]. This implies that commercially developed instruments standardised abroad may not be able to provide a complete assessment when used in South Africa[10, 20].

This study aims to review literature scoping for the description of occupational markers amongst individuals with dyslexia. Elbeheri *et al.* describes the importance of occupational

markers, the knowledge of all the domains of an individuals' occupations as well as the key role language and culture plays in the evaluation process[10]. Bishop[7] adds to this notion by explaining that, to determine intervention, functional disability plays a key role. Functional disability in this context refers to evidence that an individual's problems are interfering with the individual's ability to perform activities in everyday life or achievement on an academic level. The functional disability should be regarded just as important as the score on a standardized test[7]. This explanation of functional disability underlines the importance of the use of occupational markers to determine the presence of developmental dyslexia in individuals.

Apart from the seemingly endless list of inabilities little research focuses on or acknowledges the strengths of a dyslexic individual with some researchers advocating for strength assessment as well as development[7]. This approach will challenge all professionals to shift the focus from problem identification toward strength development. The individual and unique nature in which dyslexia presents in each person also attributes to the statement that the weakness of an individual may be the strength of another[21]. If, like Bishop suggests, the occurrence of developmental dyslexia has specific behavioural traits, can it be used to identify children with developmental dyslexia[7]?

Utilizing occupational markers to compile a profile of an individual with dyslexia, may assist in the early identification of individuals with dyslexia living within the South African context. Tønnessen[22] indicates that dyslexia may display primary as well as secondary symptoms. Primary symptoms may be described as the core symptoms present at 100% of the individuals. Secondary symptoms may not show prevalence in all individuals but are more likely to be found amongst dyslexic individuals than in the general population[22].

Currently a gap in the research exists in the description of dyslexia in terms of a profile. Ideally early identification should take place, leading to accurate diagnosis followed by the provision of adequate support relating to all the occupational domains of the individual. In the case of an individual with dyslexia, the occupational markers will indicate the ability or inability of the individual to effectively participate in occupation, performance patterns or performance skills. These traits will then form the basis for the profile of an individual with dyslexia.

The current study's research objectives were to conduct a scoping review with the purpose of identification of early occupational markers, as indicated by literature, present in individuals with developmental dyslexia.

Methodology

Before the onset of the study, ethical approval was obtained from the Health Science Research Ethics Committee of the University of the Free State (reference UFS-HSD2021/0431-0003) Scoping studies aim to address broader topics with different study designs[23] to enable the process of knowledge synthesis[24]. Knowledge synthesis is gained through systematically searching literature aiming to answer an exploratory research question formulated to identify and map either key concepts or types of evidence in the field of study but could also serve to identify existing gaps in research related to the outlined study area[24]. Arksey and O'Malley[25] identified four reasons to conduct a scoping study with the current study focussing on examining the extent, range and nature of research activities thus exploring the research landscape regarding the identification of occupational markers associated with dyslexia[25]. Using the basic framework proposed by Arksey and O'Malley[25] the scoping study will be conducted in 5 stages:

Stage 1: Identifying the research question.

To enable effective research, the research question should be broad yet clearly define the scope of inquiry[26]. The guiding research question for this article was:

What occupational challenges and strengths (referred to as occupational markers), experienced by dyslexic individuals, are described in literature?

Stage 2: Identifying relevant studies.

Through the scoping study the topic outlined in the research question should be comprehensively investigated[25]. The assistance of a medical librarian was enlisted and a search was conducted utilising fifteen electronic databases (Academic Search Ultimate, Africa-Wide Information, APA PsycArticles, APA PsycInfo, CAB Abstracts, CINAHL with Full Text, Communication & Mass Media Complete, ERIC, Health Source - Consumer Edition, Health Source: Nursing/Academic Edition, Humanities Source Ultimate, MasterFILE Premier, MEDLINE, OpenDissertations, Sociology Source Ultimate, SPORTDiscus with Full Text) using the following or combination thereof as search terms: environment* or "executive function*" or behavio* or influenc* or perform* or strength* or sign or signs or indicat* or comorbidit*) n2 dyslex*. and ti dyslex*. Only peer reviewed articles published in English between January 2010 and June 2023 available were included. Studies including a geriatric population[27] as well as studies broadly referring to learning disabilities without specific reference to developmental dyslexia were also excluded.

Stage 3: Selecting articles.

Article selection is outlined in Figure 1. The initial electronic data base search provided 5933 abstracts with 2 762 after automatic system deduplication. Reviewing of the titles and abstracts commended and an additional 2171 records were excluded guided by the exclusion criteria for the study (articles not available in English, studies done on a geriatric population, studies indicating learning disability or impairment without directly referencing or including developmental dyslexia, books or chapters thereof and articles not available through interlibrary loans). Aligned with the inclusion criteria for the study (all studies indicating behavioural signs in individuals with developmental dyslexia either as focus of their study or outcome of the study, studies discussion the influence of developmental dyslexia on an individual as well as studies indicating the strengths of individual with developmental dyslexia or linking dyslexia and behaviour, describing early signs of dyslexia), 591 records were sought for retrieval of which 131 could not be retrieved (Appendix D) Of the 460 records obtained, 179 records were reviewed before saturation was reached. The review process yielded 71 of the 179 records that was not suitable for inclusion in the study (Appendix D). The scoping study consists of 108 records with full reports on each study (Appendix E(A) and E (B). A second researcher assisted to prevent bias and to ensure that the inclusion and exclusion criteria were applied consistently.

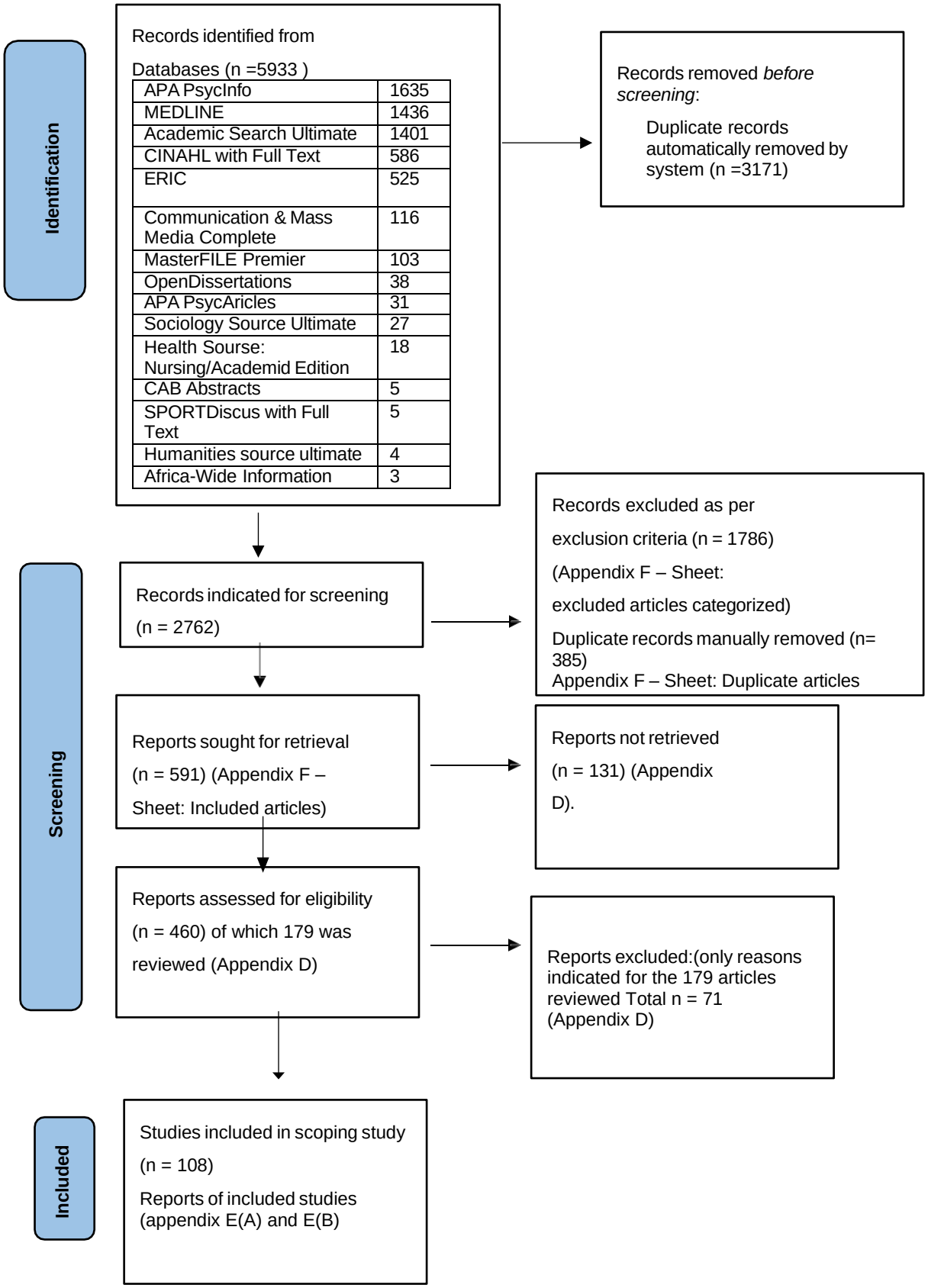

Figure 1: Article selection process

Stage 4: Charting the data

The purpose of charting the data is to provide a logic and descriptive summary of the results obtained in the research, indicating the relationship to the research question as well as objectives of the study[28]. A scoping review was conducted including 179 articles published in 31 different developed as well as developing countries. The abstracts of the records indicated for screening that adhered to the inclusion criteria and obtained through the application of the search terms, were noted on an excel document on different sheets - either as articles to be excluded (with reasons indicated), articles for inclusion or duplicate articles (Appendix F). The articles indicated for inclusion that could be obtained, were reviewed with reports of each article noted on an excel document (Appendix E).

Eighteen overarching themes relating to occupational markers were identified, each with their own subdivisions of occupational markers to illuminate the content of the theme. The themes can be outlined as illustrated in Table 1.

Table I: Overview of the descriptive overarching themes relating to occupational markers described in literature.

No	Theme	Brief description of the theme	Relevance of the theme as occupational marker.
1	Phonological deficit n = 179	The inability to fluently and accurately recognize words, poor spelling and decoding difficulties[6]	Formal education forms part of occupation and is visible in the everyday activity of a child attending school. The ability to read and spell correctly and accurately are expected outcomes of formal education. A phonological deficit will thus hinder the learner to effectively engage in the occupation of formal education to achieve the desired outcome with a sense of competence[29]
2	Reading n = 146	The ability to read successfully relies on the reader's ability to 'simultaneously process text visually, phonologically and semantically'[21]	Reading can be regarded as an occupation and the inability to read according to age expected norms may influence the occupational engagement of the individual resulting in a constant need for accommodation and adaptation with regards to reading[30]
3	Spelling and handwriting n = 70	Effective letter-sound mapping, blending and segmentation is needed to spell correctly. Phonological awareness should be intact.	Expected outcome of the occupation of formal education
4	Executive function n = 108	Executive functions are presented by three core skills (inhibition, working memory and cognitive flexibility)[31] that sets the foundation for the higher order executive skills like reasoning, problem solving and planning[32]	Executive function skills may either support (cognitive flexibility) or hinder (inhibition and working memory) in the occupational engagement and participation of a dyslexic individual.

5	Behavioural problems n = 25	Noted by internalizing as well as externalizing behavioural patterns yet not limited to the above[33] [34]	Mainly observed in the performance patterns of an individual but may also be visible in the way individuals engage in occupations.
6	Emotional difficulties n = 70	In this study emotional difficulties refers to a spectrum of negative emotions experienced by dyslexic individuals[35] [36]	The client factor of emotions represents the mental or affective component of body functions and is key in the way an individual will engage in performance patterns and occupations[29]
7	Roles and responsibilities n = 34	Roles and responsibilities relate to the expectations of individuals regarding roles with the emphasis on the academic expectations from learners in formal education	The effect dyslexia has on the occupational engagement as well as performance patterns of individuals are highlighted[29]
8	Social and interpersonal implications of dyslexia n = 26	Social interaction skills can be explained as the ability of an individual to communicate verbally as well as non-verbally in a situation that requires social interaction[29]	The impact of dyslexia on social interaction skills are noted as well as the negative consequences on the individual with dyslexia.
9	Auditory n = 15	In this study auditory is limited to the effect of decreased auditory engagement from the individual resulting in a decrease in occupational engagement and participation.	Needed for optimal occupational engagement
10	Visual n = 46	This study only refers to the implication of visual spatial or perceptual difficulties as well as deficits in audio visual processing.	Needed for optimal occupational engagement
11	Memory n = 20	Challenges with different aspects of memory noted – working memory addressed as a division of executive function[37]	Memory can be regarded as key in the involvement of the individual in different occupations, performance patterns as well as performance skills (process skill)[29].

12	Mathematical Difficulties n = 17	Focus on the dyslexic individual's difficulty with arithmetic as well as mathematical tasks[38]	Although mathematical skills are used in everyday activities it is also an expected outcome of formal education.
13	Processing skills n = 25	In this study the focus was on time perception and management as well as processing difficulties experience by an individual with dyslexia.	Process skills are part of the performance skills and include the ability of an individual to effectively manage time and organize objects as well as adapt performance accordingly[29]
14	Speech and speaking n = 25	Although delayed speech may be seen as a co-morbidity in dyslexia, the focus was on the different aspects in the manipulation of spoken language that may be indicative of dyslexia[39]	Effective verbal communication forms the basis for social interaction skills and a lack in ability may affect participation in the occupations of education, work, leisure and social participation[29]
15	Sleep and rest n = 11	Although some sleep disturbances where noted the results were more indicative of the energy spent (decrease in rest) due to dyslexia.	Rest and sleep are seen as an occupation that may influence effective participation in all other occupational domains[29]
16	Motor coordination n=27	Although motor coordination may also be viewed as a co-morbidity, the results does not indicate a specific disorder but rather aspects noted during activity participation.	Motor coordination can be viewed as a motor skill and form part of performance skills needed to effectively participate in occupations and performance patterns[29]
17	Co-morbidity n=9	These may include but are not limited to ADHD, impulsivity and dyscalculia[34].	The knowledge of possible co-morbid disorders ensures that over or underdiagnosis of dyslexia does not occur and may even assist in compiling a dyslexic profile.
18	Dyslexic strengths n=27	Dyslexic strengths focus on the unique abilities seen in dyslexic individuals as displayed in effortless activity participation[40], [36],	The knowledge of the strengths of individuals with dyslexia will challenge health care providers to move from problem identification toward strength development[41]

Stage 5: Collating, summarizing, and reporting the results.

Eighteen themes relating to occupational markers were identified in the scoping study. These themes were carefully selected after the researcher identified the key markers each of the authors indicated as the basis or result of their research. The results are tabulated followed by a description of the occupational markers.

Results

Through the process of article selection, 108 studies were identified for inclusion in the scoping study with reports on each study. Articles suitable for inclusion were reviewed, and occupational markers described were linked to the author as *a) the basis of research or b) the result of research* and were noted. Deducted from the results (appendix E) a summary was generated indicating the relevant theme, subdivisions within the theme accompanied by the number of articles describing the subdivision as stated above.

Table II: Summary of data per theme

Summary of data Theme 1-6					
Theme 1	Theme 2	Theme 3	Theme 4	Theme 5 and Theme 6 (Psychological symptoms or behaviour)	
Phonological Deficit **n = 179**	**Reading** **n =150**	**Spelling and handwriting** **n= 70**	**Executive function** **n = 108**	**Behavioural problems** **n = 25**	**Emotional difficulties** **n = 70**
Phonological awareness/ processing/ difficulties n= 68	Vocabulary n=12	Spelling n=52	Working memory n=42		Anxiety n= 18
Decoding n= 43	Reading fluency/ accuracy n=72	Written communication n= 3	Inhibitory control n= 32		Self-esteem/ confidence/ efficacy n=26
Rapid Automatized Naming (RAN) n= 36	Reading profile n=28	Handwriting n=15	Cognitive flexibility (Dyslexic Strength) n=11		Emotions observed in dyslexic individuals n=26
Pseudo word reading n = 6	Reading profile related to orthography n=22		Planning n=6		
Automaticity n= 12	Reading comprehension n=16		Reasoning n=0		
Rhyming difficulty n = 6			Problem solving		

			(Dyslexic Strength) n=4		
Difficulty blending sounds/ encoding n = 4			Impaired executive function n=13		
Difficulty with syllabication n=4					

Summary of data Theme 7-12					
Theme 7	Theme 8	Theme 9	Theme 10	Theme 11	Theme 12
Roles and responsibilities n =34	**Social implications n =26**	**Auditory n = 15**	**Visual n = 46**	**Memory n = 20**	**Mathematical difficulty n = 17**
General n = 7	Social/interpersonal related implications of dyslexia n=26		Audio visual deficit n = 15	Prospective memory n = 3	
Academic n = 27			Visual problems/impairments n = 1	Memory long term n = 9	
			Visual perceptual/ visio-spatial difficulties. n =21	Memory other n = 8	

Summary of data Theme 13-18					
Theme 13	Theme 14	Theme 15	Theme 16	Theme 17	Theme 18
Process skill n =25	**Speech and speaking n = 25**	**Sleep and rest n = 11**	**Motor-coordination n = 27**	**Co-morbidity n = 9**	**Dyslexic strengths n = 27**
Processing difficulties n = 18					
Time n = 7					

The review of the articles leads to the identification of 18 themes describing occupational markers. Phonological Deficit (n = 179) emerges as the most common theme, with a total of 179 studies related to phonological deficits. Theme 2 represented Reading (n = 146) with 146 studies thus indicating reading as the second prominent theme. Spelling and Handwriting (n = 70) were noted in 70 studies. According to the results, Executive Function (n = 108) was

indicated as the third most prominent theme with deficits as well as strengths noted. Behavioural Problems (n = 25) and Emotional Difficulties (n = 70) emerged as two separate themes yet could be viewed as phycological difficulties with a total of 95 studies describing these two themes. A total of 34 studies related to roles and responsibilities (n = 34) followed by 26 studies describing the social implications (n = 26) of developmental dyslexia. Auditory (n = 15): Auditory-related aspects are the focus of 15 studies.

Within each of the first nine main themes, there are several sub-themes, including phonological awareness/processing/difficulties, vocabulary, spelling, working memory, anxiety, general issues, social/interpersonal implications, decoding, reading fluency/accuracy, written communication, inhibitory control, self-esteem/confidence/efficacy, academic concerns, RAN (Rapid Automatized Naming), reading profile, handwriting, cognitive flexibility (Dyslexic Strength), emotions observed in dyslexic individuals, pseudo-word reading, reading profile related to orthography, planning, automaticity, reading comprehension, reasoning, rhyming difficulty, difficulty blending sounds/encoding, difficulty with syllabication, and impaired executive function.

Theme 10-18 included the following occupational markers: Visual aspects (n = 46) are the focus of 46 studies. The working memory deficit was already reported as a subdivision of executive function yet additional memory deficits (n = 20) were noted and indicated by 20 studies. Mathematical Difficulty (n = 17): Mathematical difficulties are explored in 17 studies.

Process Skill (n = 25) and speech and speaking (n = 25) were also noted as themes for occupational markers and featured in 25 studies each. The implication of Sleep and Rest (n = 11) on individuals with developmental dyslexia are explored in 11 studies. Motor Coordination (n = 27) is indicated as the subject of 27 studies. Co-morbidity (n = 9) was indicated in 9 studies as possible co-occurring with developmental dyslexia. The results revealed that 27 studies noted Dyslexic strengths (n = 27). Sub-Themes for themes 10-18 include audio-visual deficit, prospective memory, processing difficulties, visual problems/impairments, long-term memory, time-related issues, visual perceptual/ visio-spatial difficulties, and other memory- related topics.

The number of studies (n) varies for each theme, indicating the frequency of research on each topic.

Discussion

The objective of this study was to identify occupational markers, as described in literature, in individuals with developmental dyslexia. The results were aligned with the occupational domains as described in the Occupational Therapy Practice Framework fourth edition (OTPF 4)[29]. Eighteen themes emerged indicating the presence of occupational markers in multiple occupational domains thus supporting the notion by researchers that a dyslexic profile may assist in the early identification of developmental dyslexia.[11]

The first theme centred on the decreased ability of individuals with dyslexia to manipulate the phonological component of written language and was noted in all the reviewed studies. A phoneme is the smallest sound unit in a word and represented in written text with a corresponding grapheme or letter. Phonological awareness thus forms the basis for the complex art of reading. Phonological deficits are visible when an individual has difficulty with identification of individual sounds, blending, encoding as well as decoding and may also display an inability to recognise patterns in language (rhyming difficulties)[42],[43],[1].It could thus be deducted that phonological awareness, the ability to interpret and manipulate sounds, stands central in the identification of developmental dyslexia[2] and can be regarded as a primary occupational marker. This finding correlates with similar research results[2]

In order to read, individuals need to understand that sounds are represented by letters and that a combination of letters may contribute to the formation of different sounds[43]. This leads to the ability to accurately and fluently read thus enabling good comprehension. Yet to understand the complexity of reading the assessor should be aware of the language spoken by the individual as well as the orthography of the language[43]. Especially within the South African context this would be very important.

South Africa is home to a rich linguistic diversity[12] with the recognition of 12 official languages[17], but more languages or dialects of a language are spoken within the South African context. Multilingualism is common practice and may coincide with language acquisition – both adding to the complexity to accurately identify dyslexia in the South African context[44].

Furthermore, a difference in the orthography of languages spoken in South Africa influence the way dyslexia presents.

Not only is knowledge regarding reading important, but also the acknowledgement that reading can be regarded as an occupation delineated by the reading pattern, reading product and the meaning of reading to an individual[30]. With regards to the reading patterns, the academic setting is the one arena where individuals with dyslexia are challenged, due to the expectation to read fluently and accurately with adequate speed and comprehension.

The social context of reading may be complex yet critical to assess. This also includes the perspective of the struggling reader on their ability to read. The product of reading occurs over time and may include academic achievement and skills gained. The individuals' emotions, struggle and limitations are important to recognize as this may be strong elements in the reinforcement of reading behaviour[30] - clearly indicating the possibility of Occupational therapy intervention. If the Occupational therapist understands what the meaning of reading is to the individual, a tailored intervention approach can be designed[30]. This emphasizes the need to view reading as an occupation rather than a skill to promote accurate and individually designed intervention.

Dyslexia is a lifelong condition and may need constant accommodation and adaptation with regards to reading[30]. Reading cannot stand alone and influence more than one occupational domain. If reading is viewed as an occupation, it implies that reading can be regarded as an occupational marker informing occupational therapists of their role in the occupational adaptation for these individuals. A deficit in fluent and accurate reading with good comprehension can thus be regarded and supported by the results as a primary indicator for the presence of developmental dyslexia[42],[45].

Spelling difficulties are linked to reading and may present as an inability to accurately decode and encode words that may result in spelling mistakes visible in inaccurate and inconsistent spelling, decreased ability to apply spelling rules or spell words according to a phonemic representation[1]. The Diagnostic and Statistical Manual of Mental disorders fifth edition Text revision (DSM-5-TR) also indicate poor spelling as diagnostic criteria for dyslexia[45]. Handwriting difficulties may also occur with specific reference to decrease in writing speed and accuracy as well as poor handwriting with larger character size. Both spelling and handwriting has an impact on occupational participation and performance in different domains and can be primary occupational markers for developmental dyslexia[42].

Executive function can be seen as an overarching term describing core as well as higher level executive functions[46]. Working memory (including verbal and spatial working memory) and inhibitory control (a complex composition of interference control, including cognitive inhibition and selective or focused attention as well as response inhibition that includes self-control and discipline) can be defined as core executive functions and are a weakness in individuals with dyslexia with and impact on multiple occupational domains. The third core executive function, cognitive flexibility presents as a strength in individuals with dyslexia and is visible in their ability to change spatial perspective and may include viewing of an object form a different perspective or being able to view a scenario from someone else's perspective. Reasoning and problem solving are combinedly referred to as fluid intelligence and represent higher level executive functions. The literature search did not indicate any specific reference to reasoning, but problem solving was indicated as a dyslexic strength. Another higher-level executive function, planning, is deficient in individuals with dyslexia. Executive function allow an individual to focus, take time to think before acting impulsively, practice creative thinking and problem solving, adapt to changing circumstances and utilize working memory in everyday tasks[46]. The profile of an individual with dyslexia however gives a mixed image of struggling and highly successful components of executive function thus occupational markers indicating strengths as well as weaknesses may be observed. The knowledge an occupational therapist has regarding this image may clarify expectations set in therapy as well as support provided to optimize occupational engagement.

Psychological symptoms include behavioural and emotional problems. Behavioural problems can mainly be described as internalizing (social withdrawal, sadness, loneliness, fear, anxiety, suicidal ideation, depression and somatic complaints) or externalizing (aggression, rule breaking behaviour, destroying property, lying, stealing, cheating, threatening people, bad temper, lack of guilt and substance abuse)[33] and can be visible in the manner in which occupational engagement takes place, the prominent performance patterns of the individual as well as social interaction skills displayed by the individual. Emotional difficulties in dyslexic individuals may not meet the threshold for a formal diagnosis, yet as client factor it influences the optimal functioning of the individual visible in occupational participation, performance patterns as well as social interaction skills.

The behavioural and emotional difficulties individuals with dyslexia face cannot be viewed in isolation but serves as occupational markers in establishing the profile of an individual with dyslexia. Unlike the difficulty with phonological awareness, behavioural and emotional

difficulties may not be present in all dyslexic individuals, and they do not meet the threshold for an official diagnosis (e.g., anxiety disorder)[34]. Yet they have a devastating impact on the occupational engagement of a dyslexic individual if not addressed. In the absence of a well described dyslexic profile, emotional and behaviour difficulties may not be addressed as part of a profile, but rather as separate entities- leaving the source (dyslexia) of the manifestation untouched.

Dyslexia also impacts the way an individual fulfil – or is unable to fulfil- their roles and responsibilities. This occupational performance component is especially visible during formal education years and range from feeling different that peers[47] to low perceived academic ability and slow working speed[48]. These occupational markers could easily add to the well described dyslexia paradox[8] leaving the learner with a feeling of failure.

Social or interpersonal implications of dyslexia emerged form results ranging from difficulty with social interaction, social discomfort as well as social acceptance[49]. Although the visible social implications may not be a primary marker for dyslexia it will contribute to how an individual with dyslexia conducts social interaction. Assessing social interaction skills will assist the health care practitioner to design and apply client centred intervention to address this secondary marker of dyslexia.

Individuals with dyslexia may experience difficulty with processing speed[50] as well as their time perception, time management[50] and temporal processing[51]. This describes limitation in the process skills of an individual and forms part of the performance skills of the occupational domains.[29]

The presence of auditory and visual difficulty can only be included as an occupational marker if they are not directly responsible for the inability to read or write. If a learner presents with poor vision leading to inaccurate reading, the primary indicator for poor reading would be decreased vision. If a learner however has adequate vision and still struggle to read, a diagnosis of dyslexia may be valid. The same would apply to auditory deficits. A diagnosis of dyslexia can only be warranted in the absence of visual and auditory impairment[45].

Impaired auditory functioning may lead to visible occupational markers as seen in difficulty with auditory processing[52], a decrease in listening comprehension[53] and difficulty in following cues and may add to a detailed description of an individual with dyslexia.

Although difficulty in working memory has already been discussed as an occupational marker, individuals with dyslexia experience difficulties with other components of memory including prospective and long-term memory. Prospective memory can be described as the memory for delayed intentions and are composed of a prospective or planning component as well as a retrospective component that should provide an individual with detail of an intended behaviour[37]. The above can be applied to a single event or a habit that may take place in a short space of time (ranging from seconds to hours) or longer term (ranging from days to months). The prompts for effective prospective memory may be event or time based. Impaired prospective memory may hinder the effective development of habits or routines thus disruption in the performance patterns of an individual takes place[37]. In isolation a deficit in memory could be attributed to numerous disabilities, but as an occupational marker it plays an important role in the early identification of dyslexia.

Mathematical difficulties within the context of dyslexia in literature does not meet the threshold for a diagnosis of dyscalculia and include the difficulties experienced to interpret written language describing the desired outcome of a mathematical calculation. This may include the reading of word sums as well as number transcoding[52]. In South Africa mathematics is compulsory until Grade 12 and can be viewed as an expected outcome of formal education. The ability to do basic calculations also forms part of various occupations and may be included in some performance patterns.

Within this study speech and speaking, refers to the general observations that can be made regarding speech and speaking. Results vary from poor verbal ability[53], mispronunciation of words to avoidance of public speaking[54]. Speech and speaking form an integral part of communication and it can be deducted that a decrease in the ability to use verbal expressions effectively hinders occupational participation in all occupational domains. Due to the occupational therapy scope of practice[29], treatment for speech difficulties may not be offered but the decreased ability should be noted, and appropriate referral should take place.

Sleep and rest are important for all individuals to effectively participate in the occupations of their choice. Individuals with dyslexia spend more time working[47] and tires easier than their peers[54]. Sleep disturbances may also occur[55]. Knowing that these components may be part

of the dyslexic profile, the occupational therapist will be able to include this in assessment and consider the sleep and rest pattern of the individual in treatment planning[29].

The ability to perform coordinated motor movement is a performance skill[29]. A deficit in this skill will have a direct effect on the engagement of an individual in occupations as well as performance patterns. It may also have an influence on the way that the individual chooses to interact with his contextual factors. Motor control may also be affected in individuals with dyslexia and can be seen in poor balance, clumsiness, decrease in fine motor abilities and impaired complex sequential motor abilities[52]. Again, in isolation these deficits may be attributed to other diagnosis, not considering dyslexia at all. But if a child presents with an inability to tie shoelaces (impaired complex sequential motor ability), mispronounce words and struggles with reading, a profile slowly starts to emerge.

Before adding the dyslexic strengths to the growing profile, possible co-morbidities should be noted. This may include ADHD, impulsivity, dyscalculia, and sensory motor deficits.

Although the aim of the study did not include the expansion on knowledge regarding co-morbidity, literature still indicated that four fields of co-morbidity may be prevalent when assisting individuals with dyslexia and these co-morbid factors may alter the profile of the individual with dyslexia. The co-morbid factors form part of the performance skills of an individual[29]

To complete the possible profile of an individual with dyslexia, strengths should be noted. Individuals with dyslexia are curios, “gifted” and have excellent visio-spatial abilities. They excel in tasks requiring cognitive flexibility and creative problem solving. Including the identification of strengths in a profile, will allow an individual with dyslexia to grow and flourish, while neglecting to do so will inhibit their capacity to excel, achieving success and positively adapt[41].

The occupational markers derived from literature, outlined and described in this research clearly answers the research question. Occupational markers described in literature can be use in the early identification (not diagnosis) of developmental dyslexia. The importance remains in how these markers are used and interpreted. Isolated use of the markers will be of no value in early identification of individuals with dyslexia. Using the occupational markers to contribute to a dyslexic profile may however be valuable for early identification to allow for effective referral and accurate diagnosis to take place.

Occupational markers are not bound to a specific culture or language thus inclusivity and occupational justice are promoted. This is especially valuable within the South African context where 12 official languages are acknowledged and different cultures forms part of the rich heritage of this country. The knowledge of occupational markers will allow for timely intervention as well as the responsible use of valuable resources.

Conclusion

In his research Tønnessen concluded that despite years of research dyslexia remains elusive to accurately define. A common goal with a clear set of guidelines may assist researchers to constructively contribute toward defining dyslexia. Guidelines proposed include the identification of primary markers supported by secondary markers[22]. The current scoping review aims to contribute toward the development of a dyslexic profile to assist in the early identification of learners that may be dyslexic. The advantage of using a profile include that irrespective of language or cultural background identification can take place. This does not imply a formal diagnosis but rather early identification to enable effective intervention while applying resources effectively and responsibly in assisting individuals with dyslexia.

Not alone will a dyslexic profile aid in early identification, but it will also be able to inform good practice and holistic client management. This may include appropriate referral, timely intervention accompanied by constructive research and evidence-based practice. In the South African context, a profile will cross linguistic and cultural boundaries and enable early identification of individuals with dyslexia.

Limitations

The extend of the available literature and the time constraint to conduct the study, guided the researcher to identify a point of saturation. Thus, not all the literature indicated for inclusion were reviewed.

Recommendations

The result of the current study indicates that further research on the topic of a dyslexic profile for early identification may be needed. The current results may however already assist occupational therapists in treatment planning and support for individuals with developmental dyslexia. The knowledge of occupational markers may also influence further research. The ideal would be to utilize the current knowledge regarding occupational markers and investigate the screening tools used abroad to identify individuals with dyslexia with the focus to develop a screening tool that will be relevant in the South African context.

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Chapter 4: *An Occupational therapy perspective on the identification of possible supportive structures for individuals with developmental dyslexia: A Scoping Study*

Note to the reader.

The author intends to submit the article to the *South African Journal of Occupational Therapy (SAJOT)* for the following reasons:

- SAJOT welcomes scoping reviews.
- The scoping study addresses a marginalized group of learners that, due to a lack of knowledge regarding the availability of supportive structures, may be deprived of much needed support.
- Introduce different supportive structures reported on as per the extrinsic or environmental factors described in the PEOP model.

The article was compiled according to the guidelines provided by SAJOT namely:

A manuscript with the content presented in MS Word format, 1.5 line spacing and a legible font (Arial 11 with italic rather than underline suggested). The language should be set to South African English. The limit of the abstract is 200 words, with a 5000 – 7000-word count (16 – 19 typed pages) for the article (excluding tables and references). A maximum of 60 references are permitted and indicated in the Vancouver referencing style (in text reference indicated with number in subscript without brackets). Each reference should also show the DOI number in one line (if available). Tables should have a heading at the top and labelled with Roman letters. Figures should be labelled at the bottom with Arabic numbers. Tables and figures should not be scanned but formatted and included in place in the manuscript.

Also included for submission should be a supplementary file that contains a prepared title page as per guideline, author contribution, 15 multiple choice questions as per HPCSA guidelines with answers clearly indicated as well as a plagiarism check report. For this purpose, Turnitin will be used.

The current length of the article is 19 pages with a word count of 188 words for the abstract and 4908 words for the remainder of the article (excluding the tables, figure, and reference list) and there are six tables and one figure. The article has 50 references.

Topic An Occupational therapy perspective on the identification of possible supportive structures for individuals with developmental dyslexia: A Scoping Study

Abstract: Although early identification and diagnosis of individuals with dyslexia is important, the role of supportive structures to enable optimal occupational performance and participation cannot be neglected in the holistic management of individuals with dyslexia. ***Aim:*** Through the application of a scoping study, literature will be reviewed to identify supporting structures that could guide tailored occupational therapy intervention within the South African context. ***Method***: A scoping study was conducted according to the outline provided by Arksey and O'Malley. Fifteen electronic databases were searched for articles published between January 2010 and June 2023 resulting in the review of 78 articles. ***Results***: The environmental (extrinsic) factors of the Person-Environment-Occupation Model (PEOP model) were used to delineate five themes descriptive of supportive structures each with subdivisions to illuminate the theme's content with social support as major contributor. ***Conclusion***: One of the major contributors to support individuals with dyslexia is the social support system that may include support from family and peers as well as practical support. The prevalence as well as implications of different support systems are discussed. Recommendations for further research are made.

Keywords: Supportive structures, developmental dyslexia, PEOP model.

Introduction

Dyslexia affects an estimated 5-10%[1],[2],[3] of the global population and may be defined as a neuro-developmental disorder[3] with a genetic origin characterized by a cognitive profile and noted by behavioural signs[4]. Although difficulty in the phonological component of language may be one of the primary indicators of dyslexia, the behavioural signs noted extends beyond linguistic difficulties and will manifest over the lifespan of an individual[3].

Different theories have developed to unravel the complexity of developmental dyslexia with explanations ranging from a phonological awareness deficit[5],[6], confusion that stems from a perceptual deficit[5], the deficit in processing rapidly changing or successive visual or auditory stimuli[5] or a more integrated deficit including the visual, auditory and tactile systems[7].

The attempt to summarize or explain the different theories lead to the development of models to aid in the description of the origin of dyslexia. From an occupational therapy perspective, a model will aid in the understanding of the challenges faced by a dyslexic individual. Although genetic profiling of dyslexia may not be perfect yet, a model where genetic and environmental risk factors are instrumental for early identification, intervention and support of dyslexic children may be considered[8]. A multi-factorial model may be the answer[9] or the three- level framework developed by Frith (1999)[3] – supporting the concept of a multi-factorial ethology of

dyslexia. This model includes the biological (genetic contribution and neuro-anatomical factors), cognitive (information-processing mechanisms) and behavioural component (learning to read and write) of dyslexia but also includes the influences the environment has on all three of these levels.[3]

South-African researchers Holmes and Fourie developed the Multi-dimensional Interactive Model. This model also allows for neurological, interpersonal as well as intrapersonal factors without neglecting the importance of emotional and behavioural factors[10]. These models highlight the fact that dyslexia are not only the inability to read according to age expected norms but is far more complex.

Within occupational therapy the *Person-Environment-Occupation (PEOP) model* created by Charles Christiansen and Carolyn Baum[11] presents the person and environment as joined by occupational performance and participation emphasizing the role of occupation. The complex interaction that exists between a person (intrinsic factors) as well as the environment (extrinsic factors) that forms the basis for occupation, highlights the importance of occupational therapy involvement in individuals with dyslexia. Noting that these factors can either form a supporting structure, enable or restrict an individual in their occupational performance and participation[11].

Before the interplay of intrinsic and extrinsic factors leading to occupational performance and participation can be understood in the context of an individual with dyslexia, it will be important to note the occupational markers that may be present. Occupational markers can be defined as the behavioural signs observed in a dyslexic individual preventing occupational engagement and performance in meaningful activities (occupational challenges) or behaviour that enables the individual to excel in a unique manner during participation in meaningful activities (occupational strengths). Currently literature will only refer to the markers as ‘behaviour’ or ‘behavioural signs’, thus only viewing certain traits in isolation as diagnostic for dyslexia. If, however the diagnosis of developmental dyslexia is viewed as a behavioural profile, it would allow the inclusion of co-occurring occupational weaknesses and strengths, thus creating a dyslexic profile[12].

The knowledge an occupational therapist has regarding a dyslexic profile, as well as the occupational markers contributing to the profile, will enable better understanding of the effect and influence of the occupational performance of an individual. A better in-depth understanding of these occupational markers and the integrate way they may be intertwined may lead to the development of a supportive structure for dyslexic individuals especially within the South African context.

A supportive structure may be described as tailored structures designed by occupational therapy intervention to provide support to dyslexic individuals, enhancing occupational

performance and participation through the use of occupations to facilitate the experience of occupational competence[13]. These structures need to incorporate a multi-disciplinary approach to the management of developmental dyslexia with intervention that is holistic and client centred.

If the PEOP model[13] is used as a guideline to describe the presence of occupational markers, it may also aid in the accurate description of the presence of supportive structures for dyslexic individuals or allow for the identification of areas where supportive structures lack, but the following needs to be illuminated first.

The PEOP model developed from the work done by Christiansen and Baum gives a detailed account of the complex interaction between an individual and their environment through occupation. Engagement in occupation requires enablers or may be restricted by barriers. The interaction between the person (intrinsic) factors and the environment (extrinsic) factors can either "support, enable, or restrict the performance of the activities, tasks, and roles of the individual, organization, or community"[13]. The model further recognises the position of occupational therapy as a provider of tailored intervention through client centred strategies that engage either an individual or group in occupational performance. The environment may also contribute to the occupational performance of an individual or group either by supporting or limiting participation.[13]

To better understand the enablers and barriers, the different component of this model needs to be clarified. The model refers to the person or intrinsic factors as the 'intrinsic enablers of performance"[13] and include the following: Neurobehavioral, physiological, cognitive, psychological, emotional, and spiritual factors. With the current study in mind the cognitive as well as psychological and emotional factors deserve more attention.

Cognition is the component that may be influenced the most by developmental dyslexia due to the inclusion of language (comprehension and production), task organization and memory that becomes visible through occupational markers when an individual participates in an occupation. When intact, learning is supported[13]. In the case of an individual with developmental dyslexia, these cognitive functions are impaired, thus creating a barrier to effective learning visible in the learners decreased ability to read fluently with good speed and accuracy while retaining good comprehension of the text[14]. These deficits can also be accompanied by a decrease in spelling ability[2]. These phonological deficits become visible when sounds need to be interpreted or manipulated thus the recognition of individual sounds, blending, decoding as well as encoding needs to take place and language patterns should be recognized[14],[15]. The phonological deficits are a known primary occupational marker for the

presence of dyslexia[15].

Memory deficits[16] are also noted in literature. The individual will therefore need to learn or adapt to alternative ways of learning[10].

The influence of developmental dyslexia reaches beyond the phonological component of written languages to include the performance patterns and skills of an individual thus preventing successful occupational engagement and performance.

Dyslexia also impacts the psychological and emotional factors that may include the self-identity (self-concept, self-esteem, and self-efficacy) of an individual as well as their sense of well-being, interests, values and attitudes that may shape their behaviour and interpretation of events. The profile of an individual with dyslexia may thus include internalizing (social withdrawal, sadness, loneliness, fear, anxiety, suicidal ideation, depression and somatic complaints) or externalizing (aggression, rule breaking behaviour, destroying property, lying, stealing, cheating, threatening people, bad temper, lack of guilt and substance abuse)[17] behaviour and may differ in the manner they present. The individual may display these behaviours in their occupational engagement or as part of prominent performance patterns. The negative behavioural traits may also be visible in their social interaction skills. Not all individuals with dyslexia face psychological and emotional difficulties, but if present these difficulties have a negative influence on the individual's occupational performance and participation.

The impact of dyslexia thus reaches beyond the well described phonological deficit and includes different intrinsic factors, that may either be enabled or disabled, by the support received from the environmental or extrinsic factors.

Apart from the intrinsic factors the PEOP model also allows the extrinsic or environmental factors to influence the occupational performance and participation of an individual[11]. The extrinsic factors entail the environment in which occupations take place and may include the build (including tools or assistive devices as well as technology), natural (geographic features) and cultural (values, beliefs, customs and behaviours that are specific to a group of people and passed on from one generation to the next) environment, social and economic systems (resource availability) and social interaction.[13]

Applying the PEOP model, individuals with dyslexia may experience either barriers to occupational performance or supportive structures that may enhance or facilitate meaningful occupational performance. These structures may be present in different factors as described by the model. The presence of supportive structures for dyslexic individuals should thus be

further investigated to determine the extent of the current structures in place, or lack thereof, as described in international literature.

The current research is preceded by an initial scoping review to determine occupational markers for the early identification of individuals with dyslexia. With the knowledge of these occupational markers, the current study aimed to apply the knowledge of occupational markers in the identification of supportive structures, as described in literature, to guide tailored occupational therapy intervention specifically within the South African context.

Methodology

Scoping studies enable knowledge synthesis[18] by addressing broader topics with different study designs[19]. Knowledge synthesis is gained through systematically searching literature aiming to answer an exploratory research question formulated to identify and map either key concepts or types of evidence in the field of study but could also serve to identify existing gaps in research related to the outlined study area[18]. Arksey and O'Malley[20] identified different reasons to conduct a scoping study. The exploration of the research landscape by examining the extent, range and nature of research will be applicable to the current research with the aim to identify supportive structures for individuals with dyslexia.

Using the basic framework proposed by Arksey and O'Malley[20] the scoping study was conducted in 5 stages:

Stage 1: Identifying the research question.

To enable effective research, the research question should be broad yet should clearly define the scope of inquiry[21]. The guiding research question for this article was: ***What structures are identified in literature as supportive to individuals with developmental dyslexia?***

Stage 2: Identifying relevant studies.

Through the scoping study the topic outlined in the research question should be comprehensively investigated[20]. The assistance of a medical librarian was enlisted, and a search was conducted utilizing fifteen electronic databases (Academic Search Ultimate, Africa-Wide Information, APA PsycArticles, APA PsycInfo, CAB Abstracts, CINAHL with Full Text, Communication & Mass Media Complete, ERIC, Health Source - Consumer Edition, Health Source: Nursing/Academic Edition, Humanities Source Ultimate, MasterFILE Premier,

MEDLINE, OpenDissertations, Sociology Source Ultimate, SPORTDiscus with Full Text) using the following or combination thereof as search terms: environment* or “executive function*” or behavio* or influenc* or perform* or strength* or sign or signs or indicat* or comorbidit* n2 dyslex*. and ti dyslex* to initially identify articles relevant to occupational markers thus defining the research population. To determine if literature describe supportive structures for individuals with developmental dyslexia, noted by the presence of occupational markers, the search term *support* was applied.

Only peer reviewed articles published in English between January 2010 and June 2023 available were included. Studies including a geriatric population[22] as well as studies broadly referring to learning disabilities without specific reference to developmental dyslexia were also excluded.

Stage 3: Selecting articles.

Article selection is outlined in Figure 1. The current study furthers research by investigating the presence of supportive structures for individuals with developmental dyslexia as noted in the presence of occupational markers in these individuals. The initial electronic data base search provided 5 933 abstracts with 2 762 after automatic system deduplication to identify the presence of occupational markers. Review of the titles and abstracts commended, and an additional 2 171 records were excluded Enabling the identification of the presence of supportive structure for individuals with developmental dyslexia, noted by the presence of occupational markers, the search term *support* was added as this would include support as well as supportive structures. Another 1936 articles were excluded based on the search terms. To determine eligibility 235 records were sought for retrieval of which 80 could not be retrieved. The remainder of the studies (155) were assessed for eligibility of which 77 were excluded. The scoping study consists of 78 records with full reports on each study.

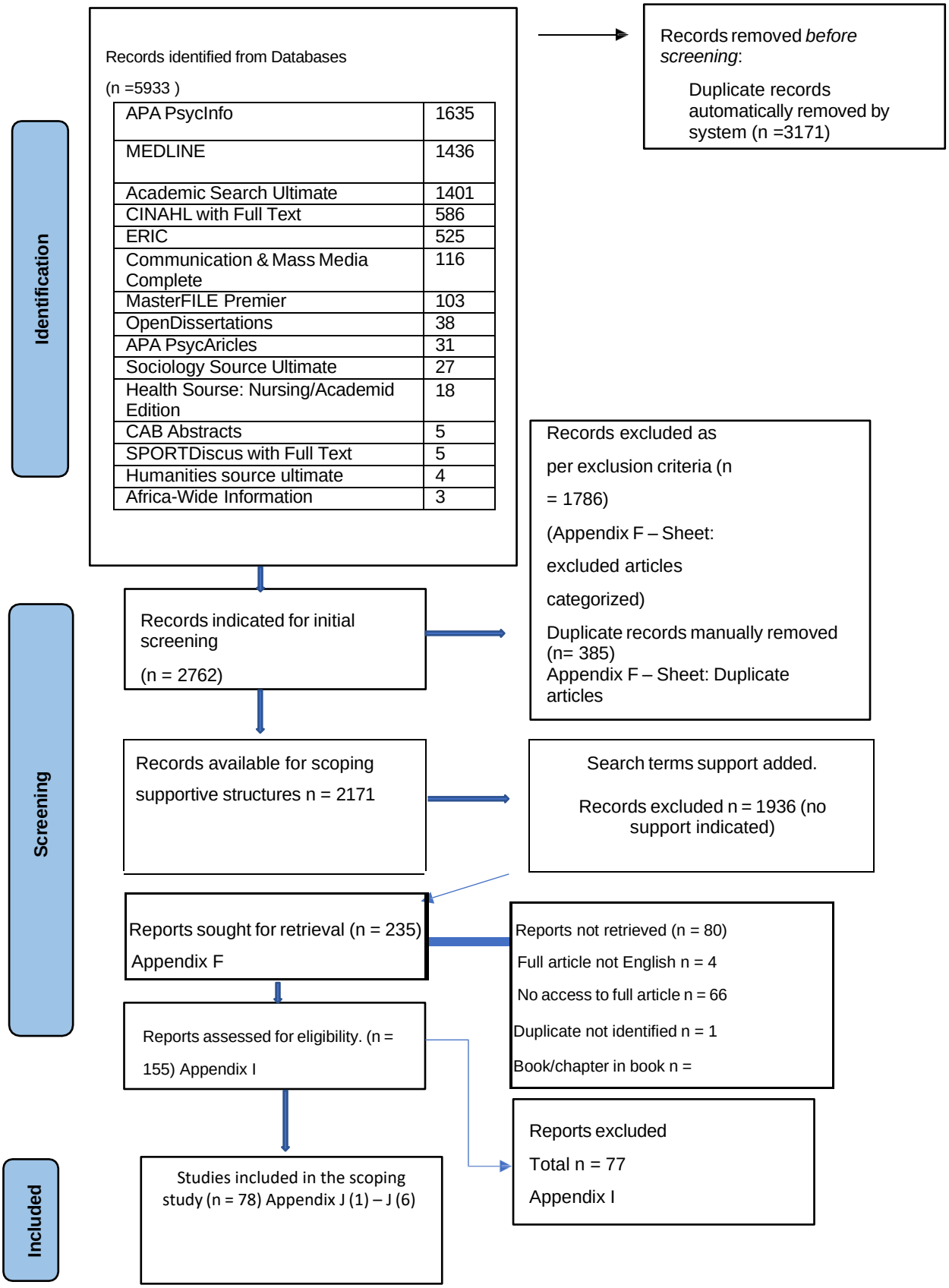

Figure 1: Article selection process

Stage 4: Charting the data

Data charting aims to provide a logical and descriptive summary of research results with the purpose of aligning the results with the initial research question as well as the objectives of the study[23]. The supportive structures described in literature were noted on an excel sheet (appendix J 1-6) according to the PEOP model's descriptors for extrinsic factors (environment) as supportive structure to enable occupational performance and participation[11]. The extrinsic or environmental descriptors include social support, social and economic systems, culture and values and the built environment and technology as well as the natural environment as overarching themes with their own subdivisions to illuminate the content of the theme. Themes can be outlined as illustrated in Table 1.

Table I: Overview of the descriptive overarching themes relating to supportive structures for individuals with dyslexia as described in literature (reported according to the PEOP model)

Supportive structures identified for individuals with dyslexia N= 323										
Theme 1: Social support n= 252			Theme 2: Social and economic systems n=34			Theme 3: Culture and values n=2	Theme 4: Built environment and technology n= 35			Theme 5: Natural environment n=0
Subdivision of theme			Subdivision of theme				Subdivision of theme			
Practical/Instrumental support/Tangible support n= 116	Information support: Advice, guidance, knowledge, skills training n=63	Emotional support: communicating regard, sense of belonging, emotional guidance n= 73	Available resources (including special schools n=3	Government and employment policies/ Institution policies n=28	Support from disability unit at university n=3	n=2	Physical buildings n= 3	Tools and appliances that supports activity and rest (Including assistive devices) n=31	Environmental support n=1	n=0

Stage 5: Collating, summarizing, and reporting the results.

The headings of the themes were determined through the application of the extrinsic or environmental factors in the PEOP model. Each of these factors were noted as a theme in the current research. Subdivisions in each theme were also obtained from the PEOP model as they identify and describe the content of each overarching theme[11]. Within each subdivision components were indicated as these components emerged from scoping the literature. Results will be tabulated followed by a description of the literature trends observed.

Results:

From the initial 5933 articles identified with the indicated search terms, 3171 duplicates were removed automatically, and the remainder 2762 articles were indicated for screening. A further 1768 articles were excluded, and 385 articles were manually removed due to duplication. The search continued with the focus on supportive structures. The search term *support* was applied as this would also include the search for supportive structures resulting in 235 articles eligible for inclusion in the scoping study of which 78 articles were included with full reports. The results are reported per identified theme with subdivisions and components and summarized in Table II to XI below.

Table II: Social support

Theme 1: Social support n= 252		
Subdivision of theme		
Practical/Instrumental support/Tangible support n= 116	Information support: Advice, guidance, knowledge, skills training n=63	Emotional support: communicating regard, sense of belonging, emotional guidance n= 73
Components identified in each subdivision		
Screening /Assessment n= 15	Study skill support/ learning program support n= 9	Capacity building/using strengths n= 2

Accommodation and access arrangements (time/reader/scribe) n=11	Literacy support programs n=1	Teacher-student relationship n=6
Out of class additional support n=6	Dyslexia remediation programs n=1	Socio-emotional support n=5
Mentoring /supervision n=11	Support from associations (e.g., DAS and other dyslexia organizations) n=4	Peer acceptance and support n=11
Curriculum support n= 19	Organization and time management skills support n=4	Family support (including advocacy, acceptance and validation n=19
Visual aids n=6	Exam preparation skills n=1	Support/support network of similar others n=11
Auditory support n=11	Teacher facilitation of academic support n=16	MDT support n=6
Adapted written material/lexical simplification n=5	Professional development or staff development and training n=15	Disclosure by choice n=5
Visual representation to accompany text/colour coding n=3	Self-taught strategies for support in education environment n=1	Self-advocacy n=5
Prior to lecture handouts n=7	Strength development n=6	Support of co-workers n=2
Alternative assessment of students n= 5	Knowledge of strength and weaknesses n=1	Teacher-teacher support to enable support to learners n=1
Verbal presentation as assessment n=2	Model as guideline for support (e.g., RTI) n=3	

Multi-sensory learning/Accommodation of learning styles n=8	Learning music n=1	
Use of templates/check lists n=3		
Accommodation in the workplace n=1		
Groupwork n=1		
Play therapy n=1		

Theme 1 (n = 252) described social support delineated by practical or instrumental support (n = 116), information support (n = 63) or emotional support (n = 73)[11]. Within the subdivision of instrumental support, results indicated that assessment or screening as well as accommodation and access arrangements (specifically referring to additional time, reader, or scribe), mentoring or supervision, curriculum and auditory support, multi-sensory learning, or the accommodation of learning styles where the types of instrumental or tangible support mostly indicated by literature as means of support to learners with developmental dyslexia. Screening and assessment can be singled out in this subdivision as a major contributor.

Informational support includes advice, guidance, knowledge, and skills training[11]. Study skill or learning program support, teachers as facilitators of academic support and professional development or staff development and training were noted as the primary contributors in this section of support to dyslexic individuals.

Emotional support is noted as a communicating regard, creating a sense of belonging or emotional guidance[11]. Within this section family support that includes advocacy, acceptance and validation was the major contributor with peer acceptance and support as well as the support or supportive network of similar others also largely contribute to this subdivision.

Table III: Social and Economic systems

Theme 2: Social and economic systems n=34
Subdivision of theme

Available resources (including special schools n=3	Government and employment policies/ Institution policies n=28	Support form disability unit at university n=3

The results in theme 2 (n = 34) referred to social and economic systems and could be divided in available resources (n = 3) - with specific reference to schools accommodating learners with dyslexia, government and employment policies or the policies upheld by institutions (n = 28) and the support from disability units at tertiary training institutions (n = 3). The different policies regarding developmental dyslexia either provided by government or employment policies of a specific institution was the major contributor toward dyslexia support in this division.

Table IV: Culture and values

Theme 3: Culture and values n=2
No subdivisions for this theme

Theme 3 (n = 2) refers to culture and values. Very limited reference to culture and values as a contributor toward support for dyslexic individuals could be found.

Table V: Built environment and technology.

Theme 4: Built environment and technology n= 35		
Subdivision of theme		
Physical buildings n= 3	Tools and appliances that supports activity and rest (Including assistive devices) n=31	Environmental support n=1

The built environment and technology (n = 35) described in theme 4 is noted in the subdivision's physical buildings (n = 3), tools and appliances that supports activity and rest including assistive devices (n = 31) and environmental support (n = 1). Tools and appliances

that supports activity and rest were noted most in literature as supportive structures for individuals with dyslexia and include the provision of tailored assistive devices.

Table VI: Natural environment

Theme 5: Natural environment n=0
No articles found

Within the scope of this study and with the search terms used, no study indicated that the natural environment (n = 0) as described in theme 5 could provide a supportive structure for individuals with developmental dyslexia.

Discussion

The objective of this study was to identify supportive structures, as described in international literature, for individuals with developmental dyslexia. The PEOP model indicated 5 overarching external descriptors[11]. These descriptors – social support, social and economic systems, culture and values, built environment and technology and natural environment - were used as indicators to identify 5 themes for supportive structures derived from 78 articles representing 24 countries form across the globe, confirming these supportive structures' presence across international borders.

The first theme describes social support as means of support for individuals with developmental dyslexia and was strongly represented in literature. Social support within the PEOP model can be described as the support experienced rather than observed by an individual and the amount of support may vary between individuals[11]. The first subdivision refers to *practical support*. Practical support is tangible and can also be described as instrumental support. Results indicate that curriculum support[24],[25] was the biggest contributor and could include how theory was translated into practice. Screening or assessment[26], [25] was also seen as a positive contributor to the social support individuals with dyslexia receive. Early identification proves to be valuable especially in predicting positive outcomes on tertiary level[25]. Arrangements to accommodate and give individuals with developmental dyslexia access to learning material or assessment opportunities are also regarded as a big contributor toward social support. This may include but is not limited to oral examinations, discussions sessions or dialogue opportunities[25]. The provision of extra time to complete assessments opportunities or the provision of a reader or scribe may also be beneficial to the individual with dyslexia[26]. According to literature individuals with dyslexia indicated mentoring and supervision as valuable social support[26],[27],[28] with auditory support also featuring as one of the important social support structures. This may include the recording of classes[26], dictating notes, using internet-based audio resources, using speech -to -text recognition programs and speech recognition software[29].

Research also indicates multi-sensory learning or accommodation of learning styles as well as prior lecture handouts[27] as valuable resources for individuals with dyslexia. Although not common, out of class additional support,[27] as well as visual aids[29] have been described as social support. Additional social support may also include adapted written material or material with lexical simplification[29], visual representation to accompany text or colour coding[29], use of templates or check lists[29], accommodation in the workplace[29] as well as groupwork and play therapy. Practical support includes a variety of supportive structures to enhance occupational performance and participation in individuals with dyslexia.

The second subdivision describes *information support* that may include advice, guidance, knowledge and skills training[11]. Teachers or lecturers as primary role players in the facilitation of academic support was highlighted in this subdivision[25],[28]. The results of the research also indicate professional development or staff development and training as a dominant contributor to information support[30],[31]. With increased knowledge about dyslexia, support for individuals with dyslexia will increase, thus enhancing the occupational performance and participation of an individual with dyslexia. Adaptation in the way learning material is presented or alternative ways to study was also indicated as study skill support or learning program support[27],[25],[32] and may differ between institutions. As part of the profile of an individual with dyslexia, strengths are listed. The acknowledgement and development of the unique strengths possessed by an individual with dyslexia are also regarded as a supportive structure[33],[34]. Individuals with dyslexia may have difficulty with organization and time management and may require support in this regard[27],[26]. Students also acknowledge the role of dyslexia organizations as a supportive structure[25]. Informational support may also include literacy support programs[35], dyslexia remediation programs[35], exam preparation skills[27], self-taught strategies for support in education environment[36], knowledge of strengths and weaknesses, model as guideline for support[37] and learning music[38].

Emotional support concludes the third subdivision within the theme of social support and include aspects describing the communication of regard, sense of belonging as well as emotional guidance. Family support that includes advocacy, acceptance as well as validation proves to be the biggest contributor to the theme of social support[39]. Apart from family support the support of similar others[39] as well as peer acceptance and support were noted[25]. This emotional support also extends toward the teacher-student relationship as support within the academic environment[40] accompanied by socio-emotional support[35],[41]. Support from the multi-disciplinary team, including the involvement from school nurses[42], are indicated in literature. Disclosure of the dyslexic identity, if by choice, also serves as emotional support[26] linking to self-advocacy[43] by the individual with dyslexia. Indirect emotional support was noted by teacher-to-teacher support in order to enable learners as well as co-worker support.

Within this theme family support as well as the support provided by a curriculum was noted to be the biggest contributors toward social support. Underlining the above was the importance of early identification and screening, the involvement of teachers arranging academic support, mentors, and supervisors as well as the support provided by peers and similar others. This clearly indicates the importance of the variety of social supportive structures available to individuals with dyslexia and noting the important role of family, teachers (and the education system, especially the role of curriculum support) as well as peers and similar others.

The second theme revolves around the social and economic systems as means of social support and can be described as the available infrastructure, policies and legislation that may affect participation, the availability as well as access to resources and economic security and independence[11]. The current results described government and employment policies, institutional policies, availability of resources and the support from disability units at universities. The biggest contributor was indicated as policies (either on government or institutional level) in place to assist individuals with dyslexia[27],[28],[25].

Culture and values were indicated as theme 3 and included societal factors. The cultural environment can be recognized as expected norms for time and space use, behaviour, and activities as well as the expectations of a specific society regarding age and gender roles. It may also extend to the shared explanations of health, well-being, and ill health. The societal factors' focus is on social acceptance, stereotyping and attitudes toward differences or social prejudice[11]. Only two articles indicated the cultural environment as supportive structure for individuals with dyslexia. If, however, the description of culture and values as delineated in the PEOP model are reviewed, it underlines the importance of the knowledge of the culture of an individual in the identification, assessment and support given to an individual with dyslexia [44]. This knowledge would also be of vital importance in the planning of tailored and client centred occupational therapy intervention.

Theme 4 describes the build environment and technology that includes physical buildings as well as tools and appliances that supports activity and rest (including assistive devices)[11]. Within this theme the importance of assistive technology was noted as a particular supportive structure for individuals with dyslexia[45],[46],[47].

Theme 5 indicates the contribution of the natural environment, noted as the geographical features like terrain, sunlight, climate and air quality, as supportive structure[11]. Within the current research no literature was found that could indicate that the natural environment could act as supportive structure to individuals with dyslexia.

Although supportive structures were indicated over a broad spectrum of themes with subdivisions, social support remains the biggest contributor and could thus be best applied as supportive structure for individuals with dyslexia. Within this theme the practical support included the provision of curriculum support, screening, and assessments, mentoring or supervision as well as accommodation and access arrangements that may include extra time, the use of a reader or a scribe. Provision of these supportive structures are closely linked to government and employment policies or policies provided by a specific institution[4] – also indicated as a supportive structure. Without much needed guidelines provided by governing bodies, support for individuals with dyslexia cannot be claimed. This leads back to screening and assessment of individuals with dyslexia. Support can only be provided once an individual with dyslexia has been identified[4],[48]. The understanding of the dyslexic profile and the impact dyslexia has on the occupational participation and performance of an individual[3],[12] will always be the starting point for the provision of support thus underpinning the results of the research indicating screening or assessment as a contributor toward support. Once an individual with dyslexia has been identified, the additional practical supportive structures can be deployed if the governing bodies allow and underpin the support needed. The knowledge of the possible practical support available internationally thus begs the question: Are these supportive structures also available in South Africa promoting occupational participation and performance and upholding social justice?

Knowledge and a clear understanding of the scope of dyslexia remains important. This was echoed by information support that includes advice, guidance, knowledge, and skills training especially indicated for professionals who will directly be involved in the management of individuals with dyslexia. Individuals with dyslexia will thus also benefit from indirect support provided to staff and professionals assisting them. This leans to a shift in attention of occupational therapists from direct client intervention toward case management and staff training in order to promote better understanding of dyslexia and support needed. Through research, the knowledge of South African professionals directly working in institutions where individuals with dyslexia may prominently feature (thus facilities of teaching and learning) would indicate the availability of social support available. The results may inform governing bodies toward the development of training programs as supportive structures for individuals with dyslexia as well as the provision of guidelines for assistance.

As per research results the core of social support for individuals with dyslexia remains within their family or peer group. Again, the support provided by families within the South African context and their knowledge and perception of dyslexia should be investigated. Although culture was not indicated as a supportive structure for individuals with dyslexia, the perception of what dyslexia entails, and the management thereof may greatly be influenced by cultural

perceptions of dyslexia[44]. This knowledge should then also inform the occupational therapist on the intervention and support that should be provided to an individual with dyslexia.

Apart from social support, technology may also contribute as a supportive structure for individuals with dyslexia and may include online programs[45] as well as different social media and digital platforms. These digital platforms may not only assist with work and education as occupation but will support social and leisure engagement while promoting independence as well[46]. Although most of these digital platforms were not designed with dyslexia in mind, the support they offer to individuals with dyslexia are invaluable.

Conclusion

Four different themes each outlined by their own subdivisions contribute to the overview of supportive structures internationally available to individuals with dyslexia. With these supportive structures at their disposal individuals with dyslexia navigate through the daily challenges that they may face. This however begs the questions: Are these supportive structures also available to individuals within the South African context? And if so, is the support easily accessible and supported by governing an institutional guideline to promote support and awareness?

What would the role of occupational therapy in South Africa be in the identification and provision of supportive structures for individuals with dyslexia? First and foremost, occupational therapists should acknowledge the comprehensive impact of dyslexia on an individual by examining the complex interaction between the person (intrinsic factors) and the environment (extrinsic factors) without neglecting the role and influence of language and culture. These factors can either form a supporting structure, enable or restrict an individual in their occupational performance and participation.[11] A supportive structure should be tailored to the needs of the individual, enhance occupational performance and participation and facilitate the experience of occupational competence through the use of occupation[13], [49],[50]. The results of this research give guidelines of the type of support that can be provided to an individual with dyslexia – either through direct or indirect intervention. Occupational therapy is further ideally situated to continue with research relevant and applicable to the South African context considering the rich linguistic and cultural landscape and the influence t supportive structures may have on all individuals in South Africa.

Recommendations

This study intended to investigate the landscape of supportive structures available to individuals with dyslexia. The results, however, indicate an international landscape. Further research will be needed to determine the availability as well as accessibility of these structures

to all South Africans. Occupational therapy is well positioned to lead research in the field of supportive structures for individuals with developmental dyslexia within the South African context. The management of developmental dyslexia will however involve multi-disciplinary team members. To optimally support individuals with dyslexia and promote interprofessional communication, a model for the interdisciplinary management of developmental dyslexia within the South African contexts should be investigated.

Limitations

Due to time constraints and the design of the current research, only studies available online were included. Further research should be conducted to determine the presence of supportive structures specific to the South African context.

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Chapter 5 – Conclusion, recommendations, and closure

5.1 Introduction

The previous two chapters introduced the research results pertaining to the prevalence of occupational markers in individuals with dyslexia (*cf* Chapter 3, manuscript 1) as well as supportive structures for individuals with developmental dyslexia (*cf* Chapter 4, manuscript 2). The aim of this chapter will be the summary of the main findings of the studies, the impact of the results, recommendations derived from the research findings, limitations of the studies and a conclusion. This final chapter closes with the reflection of the researcher.

5.2 Summary of the study and main findings

Early identification of individuals with dyslexia, leading to the provision of timely intervention and support, thus preventing the dyslexia paradox remains paramount in the management of individuals with dyslexia. This study set out to identify possible occupational markers (*cf* Chapter 2, 2.4 Occupational markers; Chapter 3, manuscript 1, Results and Discussion) to aid in the illumination of a dyslexic profile as well as the identification of possible supportive structures (*cf* Chapter 2, 2.6 Supportive structures for individuals with developmental dyslexia; Chapter 4, manuscript 2, Results and Discussion) for individuals with developmental dyslexia.

The main aim of the dissertation was the identification of occupational markers, thus observable behaviour that may prevent an individual from experiencing occupation engagement in meaningful activities (occupational challenge) or enable the individual to uniquely excel in occupational participation and performance (occupational strength), as described in the literature. The second aim was the application of the knowledge of occupational markers in determining the presence of supportive structures that may be utilized within the South African context.

The first objective of the study was the identification of early occupational markers indicated by literature as present in individuals with developmental dyslexia, through conducting a scoping study. This objective was reached using the structure provided by Arksey and O'Malley guiding the conduct of a scoping study. The results obtained described occupational markers according to 18 overarching themes with subdivisions in each theme to delineate the content of the theme.

This scoping study identified possible occupational markers that include difficulty with phonological awareness but also extends to occupational markers observed in reading, speech and speaking, spelling, emotional and behavioural difficulties as well as occupational strengths. These occupational markers answer the call by international researchers that the identification of dyslexia should be viewed as a profile and that non-literacy-based indicators should also be included in the identification of individuals with dyslexia. The main contribution of this study is the knowledge synthesis in the identification of occupational markers that may be used by a multidisciplinary team irrespective of language and culture. Thus, promoting inclusion and occupational justice.

The second objective of the study addressed the identification of supportive structures to guide intervention and enhance the occupational performance and participation of individuals with dyslexia with a specific focus on the South African context. To determine possible supportive structures available to individuals with dyslexia, international literature was reviewed by applying the scoping study framework of Arksey and O'Malley. Results were noted to align with the environmental or extrinsic factors described in the Person-Environment-Occupation (PEOP) model by Christiansen and Baum. According to the PEOP model, five themes were identified, but only four of the themes were indicative of supporting structures for individuals with dyslexia.

5.3 Impact of the study

The impact of the current research is two-fold yet intertwined: In order to provide support to individuals with dyslexia, early identification is needed (also noted as a form of support) (*cf* Chapter 4, Manuscript 2, Results Theme 1 – Social support) and occupational markers contributing to a dyslexic profile may be used in this regard. Early identification alone cannot provide adequate support and should be supplemented by intervention with a holistic approach. Thus, the general knowledge of supportive structures available as well as the identification of specific structures that will be most applicable to support the individual with dyslexia is of the utmost importance.

The current research contributed towards the development of a dyslexic profile but also assisted with provision of knowledge to professionals assisting individuals with developmental dyslexia. This may especially be valuable within the South African contexts as the knowledge

of possible occupational markers will enable professionals to confidently assist with the early identification of individuals with developmental dyslexia.

Not alone will this be an application of occupational markers, but it will also create a supportive structure by training professionals to better support individuals with dyslexia. Thus, enabling informed decisions regarding the type of intervention and support that can be provided.

The provision of support to individuals with dyslexia will always follow a multidisciplinary and interprofessional approach. The parents, family, and peers are regarded as a strong social support system (*cf* Chapter 4, manuscript 2, Results Theme 1 Social support -Emotional support) and should thus be regarded as part of the interprofessional team. The knowledge all professionals, parents, peers, and above all the individuals with dyslexia may have regarding supportive structures will enable optimal use of said structures.

One of the early challenges in the accurate identification of dyslexia is the definition or diagnostic criteria, that should be applied to identify this condition. Current research results indicate the use of a profile as opposed to a single deficit approach. The most effective way to incorporate this knowledge as well as identification of suitable supportive structures may be the use of an appropriate interdisciplinary model or structure. Although the current study did not aim to provide such a structure, the following recommendations can be made:

5.4 Recommendations

As result of the current research the following recommendations are proposed:

a) It is recommended that the possible occupational markers identified in the current research, be used to add to the creation of a profile to assist all professionals in identifying individuals with dyslexia at an early stage. This will promote timely intervention with a better long-term outcome for the individual with dyslexia. (*cf* Chapter 2, 2.2 The importance of early identification)

b) The use of occupational markers is especially relevant in the South African context. The use of occupational markers will not be language or culturally specific thus promoting inclusivity to all South Africans. (*cf* Chapter 3, manuscript 1, Discussion and Conclusion)

c) The use of possible occupational markers can be utilised as a supportive structure to individuals with dyslexia as the scoping study indicated the early identification, setting the provision of intervention and support in motion, serves as a supportive structure. (*cf* Chapter 4, manuscript 2, Results)

d) The results of the current study indicated that training of members of the MDT working with individuals with developmental dyslexia forms a supportive structure for these individuals. It is thus recommended that training should be conducted, supported by institutional or government guidelines.

e) The current knowledge regarding occupational markers may inform further research. It is recommended that the current research should inform the development of a screening tool specifically designed for the South African context.

Recommendations for the use of supportive structures

a) Guidelines provided by the government regarding support have a direct influence on the support structures available, filtering down to the availability of support within institutions. It is thus recommended that further research should investigate the current legislation and application thereof in support of individuals with developmental dyslexia.
b) A gap in research still exists regarding the availability of supportive structures within the South African context. The current knowledge of possible supportive structures may inform further research within the South African context determining not only the availability but also accessibility of supportive structures to all South Africans with developmental dyslexia.
c) Although not the aim of the study, the researcher noted the value of a possible interdisciplinary, and inter professional model that may aid in determining the impact developmental dyslexia has on a specific individual, the supportive structures needed to optimally engage in occupations as well as the outcome of intervention. It can

therefore be recommended that further research should be done to determine the feasibility of such a model specifically designed for the South African context.

Value of combining the results obtained from both scoping reviews:

The contribution of occupational markers, as well as supportive structures, have been discussed. In combination, however, these results may lead to the conceptualization of an interprofessional model to aid in the understanding of the impact of dyslexia on the occupational performance and participation of an individual. Such a structure may be used to plan and monitor intervention, but it will also aid in understanding the current research landscape, shaping the contributions of prospective researchers.

Currently the PEOP model may best suit the needs of Occupational therapists in South Africa in understanding the impact developmental dyslexia has on an individual as well as informing evidence based targeted intervention to support a person with developmental dyslexia.

As dyslexia is a lifelong condition with different manifestations over the lifetime of an individual, there will be a constant and never-ending interaction between the person and their environment seeking balance and optimal occupational performance and participation.

The way in which this dynamic and ever-changing interaction takes place will be visible through the occupational markers presented by an individual with dyslexia. If the environment provides enough support, occupational markers for dyslexia may be diminished or very small. If, on the other hand, the environment does not provide adequate support, occupational markers may be very prominent. Thus, irrespective of the number of occupational markers present in an individual, there will always be a dynamic interaction between the person and the environment. If research progress and specific genetic or other markers are defined to identify dyslexia, the interaction visible as occupational markers will still guide intervention and provision of support, as these markers will clearly indicate the spheres in which an individual may need assistance.

The arena of occupational markers is thus fluid and constantly indicates interaction with the environment indicative of the support an individual needs to ensure optimal occupational performance and participation. This could thus be applied to any individual with dyslexia, irrespective of age, language, or culture.

If a person has trouble with fluent and accurate reading, with decrease in speed and comprehension (occupational marker) support systems may be identified by the teacher (multi-sensory reading instruction) or guided by the regulatory systems in the institution (extra time, reader, MP3 format of exam papers). Applying the supportive structures may alleviate the intensity of the initially observed occupational marker and upon reassessment altered independence may be present, thus not indicating reading as a barrier to occupation anymore. The fact that the barrier to occupation has been removed does not indicate that dyslexia is absent, but it would then indicate that the intervention or application of a specific supporting structure was successful.

Utilizing a model to monitor the effectiveness of intervention may provide the ideal measure for evidence-based practice and provide the opportunity to identify possible research topics, thus, promoting research within the field of occupational therapy and beyond.

5.5 Limitations of the study

The framework developed by Arksey and O'Malley indicated stage 6 as optional in the conduct of a scoping study. Due to time constraints this stage could not be implemented. Further research could investigate the availability of the identified structures within the South African context. As this suggestion entails a different research approach as opposed to a scoping study, the extend of the research could not be accommodated in the current study.

5.6 Closure

This study confirms the need and management of early identification of individuals with dyslexia by means of the application of occupational markers and the use of supportive structures. From this initial research, an inclusive screening tool specific to the South African context may be developed, constructive research can be conducted and an interprofessional model may be developed focussing on the observable occupational markers and provision and monitoring of support provided to individuals with dyslexia within the South African context.

5.7 Reflection of the researcher

My personal journey with dyslexia unknowingly started on Friday, 13 June 2003. For the first few years of Enya's life, we realized that she approached problems differently with out-of-the-box thinking and the solution of problems that her older siblings struggled with. It was only with the onset of formal schooling that we realized how difficult it was for her to read simple one-syllable sight words. Already, at grade 1 level, it was evident that she not only had to

master all the school related requirements but on top of that we had to find a way to deal with dyslexia – although no diagnosis could be made at that stage.

This journey made me realize the vulnerability of young learners and the struggles they face just to get through a typical school day. Reading with fluency and good comprehension, spelling accurately, maintaining good social interaction (without friends ridiculing you for pronouncing words wrong) and keeping your head up to face another day.

There were times during my research that I felt overwhelmed and unsure if the data gathered could or would make a difference. Now, in the final stages of the process, I came to the realization of how much I have grown during the past few years, and I am now more passionate than ever before to ensure that all young learners in South Africa should have the opportunity for early identification, intervention, and support if they are identified as an individual with dyslexia. Additionally, that we will be aware of their strengths and allow them the opportunity to grow and flourish. I would like to conclude with the words of Rappolt-Schlichtmann:

> *The challenges of dyslexia are real, but they are limiting only to the extent that we allow them to be. The moment we start defining a person by deficits, we undermine their capacity to be successful, and there is no space to develop strengths and positively adapt. If we instead build the capacity of students with dyslexia to both improve on their areas of weakness, as well as build on their individual and unique areas of strength, we begin to create the foundation for thriving in learning and life.*
> (Rappolt-Schlichtmann et al., 2018:872)

APPENDICES

Appendix A	Health Sciences Research Ethics Committee Approval
Appendix B	SAJOT author guidelines
Appendix C	Title page manuscript 1
Appendix D	Summary of articles indicated for retrieval manuscript 1
Appendix E (A and B)	Data capture form occupational markers (separate excel form)
Appendix F	Publication selection occupational markers manuscript 1 (separate excel form)
Appendix G	Multiple choice questions accompanying manuscript 1
Appendix H	Title page manuscript 2
Appendix I	Articles for inclusion support - summary
Appendix J (1) – J (6)	Data capture form supportive structures (Separate excel form)
Appendix K	Multiple choice questions accompanying manuscript 2.
Appendix L	Proof of language editing
Appendix M	Letter from librarian
Appendix N	Turnitin submission receipt
Appendix O	Turnitin similarity report

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Health Sciences Research Ethics Committee

25-Oct-2021

Dear **Mrs Hendrika Engelbrecht**

Ethics Clearance: **Early occupational markers in young children with Developmental Dyslexia in Bloemfontein, South Africa**

Principal Investigator: **Mrs Hendrika Engelbrecht**

Department: **Occupational Therapy Department (Bloemfontein Campus)**

Submission Page

APPLICATION APPROVED

Please ensure that you read the whole document

With reference to your application for ethical clearance with the Faculty of Health Sciences, I am pleased to inform you on behalf of the Health Sciences Research Ethics Committee that you have been granted ethical clearance for your project.

Your ethical clearance number, to be used in all correspondence is:**UFS-HSD2021/0431/3011**

The ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

Approval is granted for PHASE 1 of this study.

Note that Phase 2 of the study will be approved separately.

Upon completion of phase 1, please submit the following updated documents pertaining to PHASE 2. These documents will be approved at that stage.

- Data privacy notice (can be separate from the information document)
- Information document to the principal
- Information document to the participant
- Consent form to the principal
- Consent form and questionnaire to the participants
- Advertisements
- Guide to completing the questionnaire

The following will also be required when applying for PHASE 2

- Updated timeline
- Updated budget

We request that any changes that may take place during the course of your research project be submitted to the

HSREC for approval to ensure we are kept up to date with your progress and any ethical implications that may arise. This includes any serious adverse events and/or termination of the study.

A progress report should be submitted within one year of approval, and annually for long term studies. A final

report should be submitted at the completion of the study.

Research conducted in any Department of Health facility: Researchers are required to sign and return the HSREC approval letters to the provincial Department of Health where they applied. It is also a requirement for researchers to submit electronic copies of their final research findings, and/or make a presentation of their findings and recommendations at departmental research days when and where indicated.

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; International Council for Harmonisation (ICH) Harmonised Guideline, Integrated Addendum to ICH E6(R1), Guideline for Good Clinical Practice (GCP) E6(R2), 2016, SAHPRA Guidelines as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours Sincerely

Prof. A. Sherriff
Chairperson: Health Sciences Research Ethics Committee

Health Sciences Research Ethics Committee
Office of the Dean: Health Sciences
T: +27 (0)51 401 7795/7794 | E: ethicsfhs@ufs.ac.za
IRB 00011992; REC 230408-011; IORG 0010096; FWA 00027947
Block D, Dean's Division, Room D104 | P.O. Box/Posbus 339 (Internal Post Box G40) | Bloemfontein 9300 | South Africa
www.ufs.ac.za

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Health Sciences Research Ethics Committee

23-Sep-2022

Dear **Mrs Hendrika Engelbrecht**

Ethics Number: UFS-HSD2021/0431-0003

Ethics Clearance: **Occupational markers and supportive structures in individuals with Developmental Dyslexia: An Occupational Therapy perspective**

Principal Investigator: **Mrs Hendrika Engelbrecht**

Department: **Occupational Therapy Department (Bloemfontein Campus)**

Submission Page

SUBSEQUENT SUBMISSION APPROVED

With reference to your recent submission for ethical clearance from the Health Sciences Research Ethics Committee. I am pleased to inform you on behalf of the HSREC that you have been granted ethical clearance for your request as stipulated below:

Major amendment:
* TITLE CHANGE -Study title change FROM Early occupational markers in young children with Developmental Dyslexia in Bloemfontein, South Africa TO Occupational markers and supportive structures in individuals with Developmental Dyslexia: An Occupational Therapy perspective

Please note that all change is clearly indicated in the protocol. The following for easy interpretation of the changes:
* All changes marked in yellow and strike through will be omitted from the study and is no longer relevant
* All sections indicated in green will be changes or additional literature added to support the changes in the study.

The following changes were made to the study:
* Mrs. Jansen remains the study leader - no Co study leader or biostatistician (due to change in study design) is involved in the current study.
* The study design changed and will now only be a scoping review. Thus phase 2 will be omitted along with all relevant documentation regarding this section of the study.
* The current proposed scoping review aim to answer 2 research questions - thus the inclusion of additional literature to highlight the relevance of the second research question (especially evident in 5.5 and 5.6 of the literature study).
* The problem statement changed to accommodate the second research question.
* To align with the change in study design as well as research questions, the aim and objectives also changed.
* The study design changed to a scoping study with the aim of answering 2 distinct research questions. Thus Phase 2 of the original protocol will no longer be part of the current study (indicated with yellow in the protocol).
* Support/Supportive structures are included in the inclusion criteria to accommodate the second research question.
* Please note the additional information provided regarding measurement instruments and measurement procedure
* A clear description is also provided regarding the expectations of the primary and secondary researchers.

* Supportive documentation is available in the appendix of the protocol.
* The budget changed due to the change in study design with a remarkable cut in costs.
*Please note that the current reference list still includes all the references used in the sections that will be omitted from the protocol. The reference list will automatically update as soon as these sections are removed.

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2020); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; International Council for Harmonisation (ICH) Harmonised Guideline, Integrated Addendum to ICH E6(R1), Guideline for Good Clinical Practice (GCP) E6(R2), 2016, SAHPRA Guidelines as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

The Principal Investigator (PI) bears final responsibility for the RIMS application. In the event of any misconduct or improper activities perpetuated by a third party, the PI will be held vicariously liable. The HSREC will bear no responsibility or liability for any actions of a PI and/or third party or breach of confidentiality caused by the PI and/or third party.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this request for ethical clearance and we wish you continued success with your research.

Yours Sincerely

Prof. A. Sherriff
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rehabilitation; primary health care; occupational health; mental health; child development; occupational therapy; education; vocational rehabilitation; community-based therapy

Author Guidelines

Guidelines for Publishing in the South African Journal of Occupational Therapy

The South African Journal of Occupational Therapy (SAJOT) accepts scientific articles, scientific letters, scoping /systematic/integrative reviews, commentaries, opinion pieces and book reviews for publication.

The language of the Journal is South African English (abstracts may be provided in Afrikaans or the Vernacular as well as in English).

All articles that are published in SAJOT may be found at www.sajot.co.za, www.sceilo.org.za, EBSCOHost, Google Scholar or OTDBASE. In addition, articles are preserved via Portico which is a digital preservation service provided by ITHAKA, a not-for-profit organisation with a mission to help the academic community use digital technologies to preserve the scholarly record and to advance research and teaching in sustainable ways.

Post-acceptance publication fees:

In line with the policy of most Open Access Journals, all submissions to the SAJOT are subject to a publication fee of R5000-00 (Approx US$350) per article once the submission is accepted for publication.

This post-acceptance publication fee will be applied to cover both retrospective and prospective processes involved in peer-reviewed articles, including:

- Peer-review management
- Manuscript preparation (e.g., copy editing)
- Journal production (e.g., layout)
- Open-access online publication and hosting
- Indexing (e.g., PubMed)
- Archiving

The fee is waivered in the following instances:

- If at least one of the listed authors of the article is a member of the Occupational Therapy Association of Southern Africa (OTASA). (Proof of OTASA membership will be verified by the OT office prior to)
- If an application for exemption is submitted and subsequently granted by the OTASA Chairman of the Publications Committee (see details below).
- If the submission is either a book-review, commentary, or opinion

Applications for exemption from the publication fee can be made to the chair of the publications committee Helen Buchanan (helen.buchanan@uct.ac.za)

Those authors eligible for payment of fees will receive an invoice from the OTASA office and payment will need to be made to OTASA within the stipulated time.

GUIDELINES FOR SUBMISSION

The following are included in these instructions:

1. General guidelines and instructions – procedure and presentation
2. Summary of Guidelines for authors
    - Guidelines for authors of scientific articles
    - Guidelines for authors of scientific letters
    - Guidelines for publishing a literature, scoping or systematic review
    - Guidelines for writing an opinion piece

- Guide to writing a commentary
- Instructions for reviewers of books

3. Guide to submitting an article online.

The relevant guidelines to authors (which follow) must be consulted for the layout and the format of the article, tables, diagrams and referencing.

1. GENERAL GUIDELINES & INSTRUCTIONS – PROCEDURE AND PRESENTATION (APPLICABLE TO ALL SUBMISSIONS)

- Manuscripts must be submitted via the SAJOT web site (sajot.co.za); the author must retain a copy of the script.

- New authors must submit the title page of the submission to the editor at sajot@otasa.org.za. A username and password will then be provided to enable the author to complete the online article submission. (See Guide to submitting an article online). Users already registered as authors do not need to go through a repeat of the registration process but simply use their existing username and password.

- Users who are having problems with the username and password should contact the Editor-in-Chief at sajot@otasa.org.za.
- Please insert a note in the 'footer' that gives the title of the article and the date at each submission. This is important for tracking purposes and will ensure that the correct version of the script is used for This footnote will be removed at publication.
- Submission of the following separate files needs to be

- The Manuscript (scientific article, scientific letter, scoping/systematic review, commentary, opinion piece) including the illustrations, tables, graphs

- 4 Supplementary files:

- A Title page
- 15 multiple choice questions (MCQ's) (not for book reviews)
- Contribution of Authors
- Plagiarism Check report / certificate

The Manuscript

1. The manuscript needs to be uploaded first. This should include the abstract if applicable and all the illustrations, tables, graphs should be included in the correct place within the manuscript.
2. Please include the **ethics clearance number** if applicable to the The ethical clearance certificate must be available if requested. The ethical clearance number must also be recorded in the article when it is submitted for publication **as part of the methodology section of the article.**

Supplementary files

1. Title Page

Each Manuscript must include a separate Title Page loaded as a Supplementary File. When submitting the article do not include any author information on the article itself.

This page **must** include:

The title of the article	
For each author	Full name
	All academic degrees and where these were obtained
	Present post held
	Status as undergrad student or postgrad student at time of research and affiliation
	Complete address
	Telephone number
	e-Mail address
	ORCID number
	HPCSA number and OTASA membership number if applicable
	Ethical clearance number and Institution where obtained
	Acknowledgments, sources of funding and conflict of interests

The **ORCID** number must also be recorded in the relevant place on the SAJOT web site when the article is being submitted using **http//: and not https://** on the electronic submission page**.** To obtain an ORCID reference number and to learn about the benefits of being registered, go to: **www.orcid.org .** The orchid number will be included as part of the metadata of your article when it goes to publication. Please check that the ORCID number resolves to each of the authors' names.

2. Contribution of the authors

Contribution of the author in the manuscript/research process needs to be described in a separate document to be uploaded as a supplementary file. This is a requirement of SciELO. All listed authors must meet all four the criteria as set out in our Policy Document

3. The Multiple-Choice questions (MCQs)

- For CPD purposes 15 multiple choice questions with the correct answer clearly marked should be set.
- Criteria for the setting of the MCQ content as prescribed by the HPCSA are that they should be
    - clear and concise, reflecting understanding
    - each MCQ question must contain a minimum of three options, and may be
        - multiple choice stem with alternate answers,
        - single-correct answer or single-best formats
        - matching
        - true/ false – maximum 20%

should not contain commercial product promotion and/ or satire

4. Plagiarism Check report / certificate

'Cross Ref' or 'Turn-it-in' or 'Authenticate' certificate must be attached with an acceptable level (usually 15% or less depending on the use of terminology in the manuscript)

Referencing

Vancouver style referencing is used and each reference in the text must be indicated by a number in the text. This number should be inserted in superscript without brackets

e.g.**12**. A reference list should be provided on a separate numbered page following the article text. References must be cited **in the order that they appear in the tex**t. Please check references from predatory journals are avoided. Predatory journals can be checked at https://predatoryjournals.com/journals/ or https://beallslist.net/.

ALL references must be linked through **CrossRef i.e., each reference must show its DOI number** (if it has one). To find the DOI number go to **https://search.crossref.org/**. A window that askes to copy and paste or type in the title of the article or book and search. The full information on the article will appear. **Please note** that the DOI reference must be spaced so that it falls on one line and is not split between two lines. See examples of referencing below:

In **Mendeley** - the ***Council of Science Editors – Citation Sequence (numeric)*** provides the correct referencing. DOI numbers must be entered with the http://dx.doi.org/ prefix into the Mendeley programme and these need to be linked in the reference list using CNTL K in the reference list. All **date of access, URLs and publishers** must be **removed** from Mendeley reference programme for journal articles.

In **Endnote** - use ***Council of Science Editors (CSE***) or ***PLOS*** *(you will need to change the style to remove brackets and superscript numbers:* https://libguides.library.cqu.edu.au/c.php?g=760903&p=6317474) to provide the correct referencing. In endnote DOI numbers will also have to be added to references in Endnote with a http://dx.doi.org/ prefix.

Examples of referencing

Journal article

Format: Author. Article title. Journal. Year; Volume (No): Page numbers. DOI number
Barnard-Ashton P, Adams F, Rothberg A, McInerney P. Digital apartheid and the effect of mobile technology during rural fieldwork**.** *South African Journal of Occupational Therapy*. 2018; 48(2): 20-25. doi: http://dx.doi.org/10.17159/23103833/2018/vol48n2a4.

Journal names must be written out in full and italicised. Please not that this format must be used NOT doi:10.17159/23103833/2018/vol48n2a4

Book

Format: Author(s)**.** Book title. Edition. City: Publisher; Year. DOI if one is available
De Vos AS, Strydom H, Fouché CB, Delport CSL. Research at Grass Roots: A primer for the Social Sciences and Human Service Professions. Pretoria: Van Schaik Publishers; 2011. https://doi.org/10.4102/hsag.v2i3.337

Chapter (Section) in a Book

Format: Author(s). Chapter title. Book title. Editor. City: publisher; Date/Year published: page numbers. DOI number

Amis, M. Silk, M. Eisenhart, M. Freeman, K. deMarrais, J. Preissle, R. Roulston, E. St. Pierre, K. Howe, P. Lather, Y. Lincoln, G. C. In: Annella, D. Polkinghorne & H. Torrance.

Chapter 10, Standards for Evaluating Qualitative Research. In: Understanding and Evaluating Qualitative Educational Research. M Lichtman, Editor. New York: Sage Knowledge; 2011: 253-260.

doi: https://dx.doi.org/10.4135/9781483349435.n10

Webpages

Format: Author(s)(may be corporation or organisation).Name or title of webpage. the date accessed and the URL.

South African Government. Special Needs Education: Education White Paper 6. 2021 [accessed 2021 Jan 12]. https://www.gov.za/documents/special-needs-education-education-white-paper-6

General Requirements

Type of manuscript	Abstract (words)	Pages	Tables and figures	Words (without tables and references)	References
Scientific Articles	200	±16-19	8	5000- 7000	Max 35 for the literature review section. Max 60 references
Scientific Letters	n/a	±5-8	2	1400-2500	Max 15
Integrative, Scoping or Systematic Review	200	±16-19	8	5000- 7000	Max 60 references
Opinion Piece	200	±5-8	2	1500-2000	Max 15
Commentary	200	±5-8	2	1500-2000	Max 15
Book Reviews	n/a	n/a	n/a	500	

Manuscripts must be clearly typed in **MS Word 1.5 spacing with a legible font (Arial, size 11 is preferable)**. Set English (South Africa) as the default language. Occupational therapy and occupational therapists should not be capitalised or abbreviated.

If quoting from a reference the following format must be used: Gibson2:30 stated that "Occupational therapy is an important service for the rehabilitation of persons suffering from HIV/AIDS". where 2 is the reference number and 30 is the page number

on which the quote appears. All quotes from literature must be in quotation marks " ". Quotes from participants in qualitative research should be in quotation marks *and* italics

Tables should have the heading at the top of the table and labelled with Roman letters

e.g., Table II.

Figures should be labelled at the bottom of the figure with Arabic numbers e.g., Figure. 2.

Tables and figures (which may include graphs) **should not be scanned** but formatted and included in place in the manuscript. Figures should be clear to the reader when photocopied.

Figures which consist of illustrations, diagrams or photographs may be of any size. They must be very sharp, taken close-up, and photographs should have a lightish over-all tone and without dark backgrounds. If the photograph, diagram, and illustrations photocopy well, they will print well. Please check this before you send the manuscript.

The following web sites may be helpful for authors to consult either during the research process or during the write up process:

1. Equator Network (http://www.equator-network.org/), a database library that allows you to find and use reporting guidelines for different study designs. Provides a decision tree and examples that assist you with choosing the most appropriate reporting guideline for your study.
2. Typeset (https://www.typeset.io/), an online research communication platform that autoformats documents and helps ensure they are 100% compliant with journal submission guidelines.
3. Authoraid (http://www.authoraid.info/en/), a free global network that provides online mentoring, collaboration, and support for researchers in low and middle-income countries.
4. Standards for Reporting Qualitative Research: A Synthesis of Recommendations (https://journals.lww.com/academicmedicine/fulltext/2014/09000/standards_for_reporting_qualitative_researcha.21

Article processing

Once a manuscript has been submitted, it will be subject to a pre-review desk edit procedure to check whether all criteria as outlined in this document have been met. The outcome of this procedure may be one of the following:

- Accept for peer-review
- Soft reject – author(s) requested to revise the document in line with requirements prior to peer-review
- Hard reject – not accepted for review

Peer-Review of submissions

When accepted for review, all manuscripts undergo an anonymous double blind peer review process. The reviewers are required to comment on the scientific worth of the article and its suitability for publication in SAJOT. (To ensure a blind review see section below). The comments and recommendations of each reviewer are returned to the authors by the editor with a directive for further action required. Articles may be accepted without change; changes may be requested, article needs to be revised and sent for a second round of reviews, or the article may be rejected.

Editing

Please note that the article will be checked by the Editor and the English Language editor and when necessary, the author(s) before going to print.

Intellectual Property and Copyright

The author(s) retain(s) intellectual property rights over original material, in keeping with South African IP legislation and the policy of the employing body/training institution where relevant. SAJOT adheres to Creative Commons licensing as follows:

All work is published under a Creative Commons Attribution 4.0 Non-Commercial International Creative Commons (CC-BY-NC – ND 4.0) License. Under this license, authors agree to make articles available to users, without permission or fees, for any lawful, non-commercial purpose. Users may read, copy, or re-use published content provided that the author and original place of publication are properly cited. See http://userguide.sajot.co.za/wp-content/uploads/2019/10/FINALPublication-Ethics-Practice-comments.pdf

Checking the Manuscript before Submission

Confirmation that the following items **have been attended to** will be required as part of the submission process.

- The submission has not been previously published, nor has it been before another journal for consideration (or an explanation has been provided in Comments to the Editor).
- The submission file is in Microsoft Word file format.
- All references have been checked to see that they comply with the requirements (see References above).
- The text is Arial 11, 5 spaced; employs italics, rather than underlining (except with URL addresses); and all figures, tables have been placed in the text.
- The text adheres to the stylistic and bibliographic requirements outlined above
- The instructions for **Ensuring a Blind Review** have been
- A colleague has read the article to provide objective peer input, inconsistencies, spelling, and grammar in addition to running a spell-check with English, South Africa as the default setting. Authors for whom English is a second language should have their article edited by a professional English-language editor or editing During the review process, articles may be returned to the author to arrange such a service, if improvements to language and clarity are required.

- 15 Multiple Choice Questions (MCQs) based on the article content are prepared in the supplementary file section of the article submission. In addition, it is advisable to email these to the managing editor at sajot@otasa.org.za . **NB The article will not be sent for review until these have been received or posted on the web site.**
- The details of all the authors have been included in the
- Ethical approval for the study has been sought and explained in the article and an approval number is given but the institution where obtained is replaced by XXX to ensure a blind review.
- The title of the article is on the article submission- see Title page
- The abstract has separately been included in the submission block on the webpage and is also included in the
- The article has undergone a **plagiarism**
- Permission has been obtained from the co-authors to publish the article and to use their names.
- The relevant acknowledgements have been provided at the end of the
- As a special request the author is asked to provide the names, place of work, and email contact details of two people who they believe have the skills and expertise to review the article.

Ensuring a blind review

To ensure the integrity of the blind peer review of the submission to this journal, every effort is made to prevent the identities of the authors and reviewers from being known to each other.

It is the primarily the duty of the author to remove any possible identification from the text submitted as indicated below. The reviewer is obliged to keep his/her comments/opinions about the article confidential and communicate these only to the editor; should the reviewer have prior knowledge of or involvement with (incidental or otherwise) the author or the article in question, the editor should be informed of the situation and the situation reviewed if needed.

The editor is the only person who has access to all the information about authors and reviewers. Any issues concerning a review / edit/ authorship / copyright etc. about a SAJOT submission must be brought to the attention of the editor directly – the editor is the only person authorised to deal with these issues and will do so in a strictly confidential manner.

This process applies to the authors, editors, and reviewers (who upload documents as part of their review), checking to see that the following steps have been taken regarding the text and the file properties:

- The authors of the document have deleted their names from the text and substituted with "Author". This includes ensuring that the names used in the acknowledgements section have also been substituted with an Names will be inserted just prior to publication.
- With Microsoft Office documents, author identification should also be removed from the properties of the file.

For **Microsoft 2010-2019**(Windows):

- Under the File menu select "Info".
- Click on the "Inspect Document"
- Uncheck all the checkboxes except "Document Properties and Personal information".
- Run the document inspector, which will then do a search of the document properties and indicate if any document property fields contain any
- If the document inspector finds that some of the document properties contain information it will notify you and give you the option to "Remove all," which you will click to remove the document properties and personal information from the document.
-

For **MacIntosh Word** (and future versions)

- Under the File menu select "Properties."
- Under the Summary tab remove all of the identifying information from all of the fields.
- Save the
- For **PDF files**:
- With PDFs, the authors' names should also be removed from Document Properties found under File on Adobe Acrobat's main menu.

Continuing education points

CEU points are accredited as follows:

- Principal authors of a scientific article, literature (scoping/systematic/integrative) review: 15 CEUs and co-authors 5 CEUs.
- Principal authors of scientific letters, commentaries, book reviews or opinion pieces: 5 CEU's and co-authors 3 CEU's.

2. SUMMARY OF GUIDELINES FOR AUTHORS

2.1 GUIDELINES FOR AUTHORS OF SCIENTIFIC ARTICLES

Articles submitted to the SAJOT must be original and must not have been published elsewhere. Articles should contain new information, add to existing knowledge, resolve controversy, or provoke thought and discussion. The content of the article must justify the length, which should be about **16-19 pages (**between **5000- 7000 words)**.

Authors should consult the article "The pitfalls of "salami slicing": focus on quality not quantity of publications" by Fenseca M. Editage Insights. Nov 4; 2013. https://www.editage.com/insights/the-pitfalls-of-salami-slicing-focus-on-quality-and-not-quantity-of-publications

Abstract and Key Words

The article must be accompanied by an abstract not **exceeding 200 words** in length. The abstract must contain a succinct structured summary of the study- headings may be used in the abstract (introduction, methodology, results, conclusion). There should be no references or abbreviations in the abstract.

Key words: a list of "key words" which contain words that might be helpful for tracking your article. Try not to 'repeat' key words from the title of the article, as this will limit the search opportunities.

Introduction

This should provide a brief rationale for the study and an outline of the aims or questions. The introduction should present a clear indication of the need for, and purpose addressed by the article. Authors should not assume that the readers know the **context** in which the article is set. The content needs to be organised in a coherent and logical manner and may require concise descriptions and definitions of terms to elucidate the content as well as the aim of the study. The literature review may be included in the introduction.

Literature Review

A separate review of the **relevant literature** can be provided. This should be a **critical** appraisal of the current relevant literature identifying the limitations in the work already conducted on the subject and a rationale for the study. **A maximum of 35** references should be included.

The aim or objectives of the study should appear at the end of the literature review

Method

The section on **research methods** should include if appropriate:

- the research design used,
- the population and manner of selecting the population sample,
- the research tools used,
- the method of data collection,
- the methods used to analyse the data including details of the statistical methods, information on validity, reliability, trustworthiness, and credibility.

Details of the ethical clearance and informed consent must be provided without the name of the institution at this stage (replace name with XXXX)

Results/Findings

The results must be presented in a way that makes them accessible to the readers and are clearly linked to the aims and methods of the research.

Discussion

The discussion should summarise the main findings and explore the reasons for these. New knowledge must be highlighted, and the limitations of the study given. The implications for occupational therapists and or other health professionals/groups/ contexts must be outlined and the contribution that the study makes to the current state of knowledge of the profession/s stated. Limitations must also be discussed.

Conclusion

The conclusion must be brief, drawing the article to a close by relating the results to the aim of the research and indicating the key findings this research has added.

Acknowledgements and conflict of interests

All assistance and funding for the research must be acknowledged and any conflict of interests stated.

Tables and figures

Articles may include up **to eight (8) tables or figures** and should be numbered and **clearly labelled and included in the manuscript** in the appropriate place.

2.2 GUIDELINES FOR AUTHORS OF SCIENTIFIC LETTERS

Letters submitted to the SAJOT must be original and must not have been published elsewhere. Letters should contain new information, add to existing knowledge, resolve controversy, or provoke thought and discussion. Use the outline of the scientific article as a guide.

Requirements

The requirements of a scientific letter are as follows:

- The letter must have the same scientific format as an article, but should be much shorter -. **1400 - 2500 words**, to fill only a few pages of the Journal but does not have an abstract.
- It may have only **two (2) tables** of
- There should not be more than **15 references**.
- It must be original

Peer evaluation will take place as with all other articles submitted to SAJOT.

2.3 GUIDELINES FOR PUBLISHING AN INTEGRATIVE, SCOPING OR SYSTEMATIC REVIEW

Literature reviews including integrative, scoping reviews and systematic reviews submitted to the SAJOT must be original and must not have been published elsewhere. The content of the article must justify the length, which should be about **16-19 pages, with 1.5 spacing (5000-7000 words)**

Follow the PRISMA requirements/guidelines for when submitting an integrative, scoping or systematic review. The manuscript should contain the following:

Title

The title must be concise enough to reflect the 'Population', 'Concept', and 'Context' (PCC) of the review, which are the elements of a scoping review used to establish a priori inclusion and exclusion criteria.

Abstract and Key Words

Then review must be accompanied by an abstract not **exceeding 200 words** in length. The abstract must contain a succinct structured summary of the study- headings may be used in the abstract (background, aim, methods, results, conclusion). There should be no references or abbreviations in the abstract.

Key words: a list of "key words" which contain words that might be helpful for tracking your article. Try not to 'repeat' key words from the title of the article, as this will limit the search opportunities.

Background

The background of the review should be comprehensive and should cover the main elements of the topic, important definitions, and the existing knowledge in the field. An integrative review would identify and organise a combination of diverse methodologies into themes or a framework whereas a scoping review would examine emerging evidence and a systematic review would identify and synthesise existing evidence.

Review question/objective

The review objective(s) must be clearly stated. The objective will guide the scope of the enquiry.

Method

Include the framework on which the review was based. Depending on the framework headings may include –

- Inclusion and exclusion criteria (PCC)
- Search strategy,
- Study selection,
- Extracting and charting the results,
- Validity

Results

This section should present the main evidence and a summary of the quality of research.

Discussion

This section should outline the implications of the findings for occupational therapy practice, the methodological limitations of the review, identify gaps in the literature and recommend future action.

Conclusion

A clear summary of the main findings should be provided.

Illustrations

Articles may include up **to eight (8) tables or figures** and should be numbered and clearly labelled with their place in the text indicated as a guide to the editor. These must include a diagram of the search strategy as well as a summary of the articles/ publications included in the review.

2.4 GUIDELINES FOR WRITING AN OPINION PIECE

Opinion pieces provide authors with the opportunity to express an opinion concerning any aspect of occupational therapy. They are designed to encourage topical debate and the exchange of ideas. Contributors may discuss specific aspects of occupational therapy practice or debate the impact of occupational therapy on the health of people. Opinion Pieces may also deal with health care and relevant social practice/issues in general such as consumer rights that may impact on the profession. They may also debate the impact of the current political and financial climate on the practice of the profession and its ability to meet all in need.

The following provides some guidance:

Focus tightly on the issue or idea – in your first paragraph. Be brief.

- Express your opinion, and then base it on factual, researched or first- hand information.
- Be timely, controversial, but not Be the voice of reason.
- Be personal and conversational; it can help you make your No one likes a stuffed shirt.
- Be humorous, provided that your topic lends itself to humour. Irony can also be effective.
- Have a clear editorial viewpoint – come down hard on one side of the Do not equivocate.
- Provide insight, understanding; educate your reader without being
- Near the end, clearly re-state your position and issue a call to Do not philosophise.
- Have verve, and "fire in the gut" indignation to accompany your logical
- Do not ramble or let your piece unfold slowly, as in an
- Use clear, powerful, direct
- Avoid clichés and
- Appeal to the average Clarity is paramount.

1. **Collect research to support your opinion.** Make sure that your supporting statements match the topic. You should include examples and evidence that demonstrate a real understanding of your topic. This includes any potential counterclaims. To truly understand what you are arguing for or against, it is imperative that you understand the opposing arguments of your topic.
2. **Acknowledge the previous opinions or arguments that have been made.** More than likely, you are writing about a controversial topic that has been debated Look at the arguments made in the past and see how they fit in with your opinion in the context in which you are writing. How is your point of view similar or different from previous debaters? Has something changed in the time others were writing about it and now? If not, what does lack of change mean?

3. **Use a transition statement that shows how your opinion adds to the argument or suggests those previous statements and arguments are incomplete or faulty.** Follow up with a statement that expresses your opinion.

4. **Next, list supporting evidence to back up your position.** It is important to keep the tone of your essay professional, by avoiding emotional language and any language that expresses an Use factual statements that are supported by sound evidence.

5. **Note:** Any time you develop an argument, you should start by thoroughly researching your opposition's point of view. This will help you to anticipate any potential holes or weaknesses in your own opinion or argument.

6. **Lastly there must be a conclusion** in which you restate your opinion using different words.

In summary: Irrespective of the topic discussed, opinions should be supported by evidence or theory. They should include:

- An abstract **(200 words**)

- Headings which give structure to the paper **(1400-2000 words)**
- References **(a maximum of 15).**

Opinion pieces are subject to the same critical review process as other submissions.

The following references were consulted, and the information incorporated into the above guidelines:

- Shapiro 10 Rules For Writing Opinion Pieces. Writer's Digest. July, 2009.www.writersdigest.com/writing-articles/by-writing-goal/improve-my-writing/10-rules-for-writing-opinion-pieces.
- Ten tips to write an opinion piece people read. Climate system science. Australian Government, 2010 ttps://www.climatescience.org.au/content/1053- ten-tips-write-opinion-piece-people-read. (Sept 2010).
- Opinion Essays. Academic writing. http://academicwriting.wikidot.com/opinion-essays.

Opinions are not necessarily those of the Occupational Therapy Association of South Africa nor SAJOT but never-the-less may provide information for debate.

2.5 GUIDELINES FOR WRITING A COMMENTARY

These are similar to opinion pieces, but a commentary is written on a current event or topic by a person with the background to make an informed comment and should report on an issue or topic of interest and relevance to OT practitioners, educators, and researchers.

Commentaries usually bring to the attention of the reader new ideas and advances in a particular subject or field of practice. In this case the commentary will compare past practices and new ideas and will point out any research related to it. The commentary may also present criticism of the new in relation to the old or vice versa. Personal experiences with the new can also be presented and add to the discussion. Commentaries do not include original data or the research findings of the author but are dependent on the author's perspective.

The commentary will also examine the way in which the subject or intervention can be applied to local settings and circumstances and comment on the value that the new idea may have in relation to the past. A final statement or conclusion must be provided ie there must be a "take home" message.

Irrespective of the information being commented upon, commentaries **(1400-2000 words)** should include:

- An abstract **(200 words)**
- Introduction
- Coherent body with headings that give structure to the paper

- Recommendations and conclusion
- References (**a maximum of 15**).

Commentaries are subject to the same critical review process that other submissions undergo.

The following reference was consulted while drawing up these guidelines:

- Berterö C. Guidelines for writing a commentary. Int J Qual Stud Health Well-being. 2016; 11:10. https://doi.org/10.3402/qhw.v11.31390

2.6 INSTRUCTIONS FOR BOOK REVIEWS

A book review (700 words) published in SAJOT should be focused on the relevance of the book's content to occupational therapy, withing the South African and African context but also beyond this. It should contain the following information:

- The full title of the book
- A book cover illustration
- Information on the author(s) / editor(s)
    - Qualifications, positions they
    - Their connection with occupational therapy
- Information on the
    - Publication date
    - Name of publisher and city of publication
    - ISBN number
    - Price in Rand (ZAR) and formats it is available in; paperback, hardcopy, e-version
    - Number of pages
- The Review
    - Give the context and aim of the This is usually in the form of a ***brief***

summary of the book.

- The way in which the content is
- Discus the most important aspects of the book. Either in chapter format or themes or as it appears to Include short quotes to illustrate, if/ as relevant to the review.
- Brief discussion on its relevance to occupational therapy, within the African context, and in general.
- If relevant mention similar books or books along the same theme
- Conclude the review with a professional opinion of the The positive and negative aspects thereof.

- Information on the Reviewer
    - Title, name, qualifications, affiliation, and work position at the time of
    - Contact details: email
    - Declaration of bias towards the author(s) or any relevant parties mentioned in the book.

3. GUIDE TO SUBMITTING AN ARTICLE ONLINE

The Guide to submitting an article online is featured under the tab Guide for authors in the header of the SAJOT web site.

Prepare the article as described above. The following are the steps to follow:

Go to www.sajot.co.za. Log in using the "username" and "password" that has been given to you. Click on the tab **"New Submission"**. The following are the steps as enumerated on the web site:

Step I – Starting the submission

Journal section

Select the relevant category of the submission in this section from the drop-down box.

Submission check list

Ensure that you, the author, have done **ALL t**he things mentioned in the submission check list and confirm this by placing a check in the relevant box. See the section **Checking the manuscript before submission** . Please note that failure to comply with all the items mentioned could result in the article being returned to you and thus an unnecessary delay in the publication process.

Copyright notice

Click to accept the copyright provisions as seen on the web site. You may also send a note to the editor in the box provided.

Click **save and continue** at the bottom of the page, this will enable you to move on to the next stage of the submission process.

Step 2 – Upload the submission

Follow the steps for uploading your article.

Upload manuscript file

NB it is important that you upload the file containing the complete article here. Do not include any information about the authors on the article.

To upload – Click on the browse button, locate the file containing the article on your computer, click on it so that the name of the file appears in the window, and then click the **upload** button. This is the only place where the main article can be uploaded.

Click **save and continue.**

Step 3 – Entering the submissions metadata:

Authors– Information about **all** the authors must be provided here.

The bio statement box should be used to complete the details of all the qualifications of the authors (i.e., degree and where obtained.) as well as the place of work and position held. Please include each author's ORCID number in the relevant box.

Title and abstract – Please copy / type in the full title of your article into the box provided. Paste in a copy of the abstract into the block provided.

Indexing –ignore this section.

Supporting agencies – complete if relevant e.g., funding organisation. Click **save and continue**

Step 4 – Uploading supplementary information:

Please note that there are two steps here:

Step 4 and Step 4a. In step 4 all four (4) Supplementary files must be uploaded: a title page, plagiarism report, the 15 MCQs, and a document outlining the role of the authors and any other information that you wish to give the editor. Each file is uploaded separately and saved. Click save and continue to upload each file which will bring up

step 4a where you can add the information needed to identify the supplementary information. The only compulsory window is the title window.

Click save and continue. This will bring you back to step 4 again where another file can be uploaded. Each supplementary piece of information is added as new file

Step 5 – Confirming the Submission

Click **Finish Submission**. Please remember to do this otherwise your submission will not be recorded. It is very important to note that once you have confirmed the submission you will be unable to make changes to your main document. However, you will be able to add supplementary files. This should be done before the article is sent into the review stage by the editor.

Any changes that you wish to make to the article itself will need to be done via a completely new submission.

Resubmission of Manuscript after Desk Edit

The article will be desk edited by the journal editor after submission. The article may be returned to you by email within a week to amend issues such as formatting, referencing and obvious issues with content. The article or may require major revision or be rejected at this stage if it is not suitable for SAJOT.

If there are issues that need to be addressed before the manuscript can be sent for peer review and you should be complete these and return the manuscript to the editor by email ass soon as possible (2 weeks) so the review process can start.

Resubmission of Article after Revisions/Amendments

The outcome of the review will be emailed to you and will be available on the SAJOT webpage under **Review** on your article page. **A list of changes made or highlighted changes in the text of the article must be included so revisions can be reviewed or edited.** The article should be resubmitted within 4 weeks.

Once the author has dealt with these amendments suggested by the editor, a new version of the article must be uploaded. Scroll to the section at the bottom of the **Review page** of your article to the section labelled **Editor Decision.** There you will see the box **Upload author version**. Please post your revised copy here **-.**

Help with this submission process can be obtained by emailing the managing editor at www.sajot.co.za.

Appendix C - Title page manuscript 1

TITLE: Constructing Occupational Markers through an Exploration of the Developmental Dyslexia Profile: A Scoping study

By

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Ethical clearance number: UFS-HSD2021/0431-0003 for the dissertation titled:

Occupational markers and supportive structures in individuals with developmental dyslexia: An occupational therapy perspective

Appendix D - Summary of articles indicated for retrieval: manuscript 1

Articles: Search 1A for inclusion

Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded
2	Not found				168	yes	yes	x		400	Article not found		
5	Not found				169	Similar to 168	x	Yes		411	Yes	Yes	x
8	Yes	Yes	X		170	Also include this article for support	Yes	x		412	Also screen for support	yes	x
11	Not found				171	Not found				414	Article not found		
13	Test screened for use	X	Yes		172	Not found				416	Article not found		
16	Not found				174	Also screen for support	Yes	x		432	Article not found		
17	French only				178	Not found				435	Article not found		
20	Not found				180	Not found				437	Yes	Yes	X
22	Support/ Strengths	yes	x		185	yes	yes	x		438	Article not found		

23	Ideas about the view of Dyslexia – valuable for model Support / no support	yes	x		206	Article not found				445	Co morbidity ID	x	yes
24	Yes	Yes	x		207	Focus on Dx of dyslexia in limited population	x	yes		449	MRI based study	x	yes
26	Importance of early identification	yes	x		208	Article not found				453	Article not found		
28	Importance of early identification	Yes	x		210	Focus on teaching – may be included for support	x	Yes		455	NB Article	yes	x
32	Not found				219	Not found				469	Article not found		
34	Not found				220	Screen for support	yes	x		470	Yes	Yes	x
35	Support/ reading/ implication on family	Yes	X		222	TVPS used for visual perception	yes	x		471	Article not found		
39	yes	yes	x		227	Not found				473	Also screen for support	Yes	x

42	yes	yes	x		229	IMPORTANT – study done in SA Also screen for support	Yes	x		474	Only editorial/ summary available		
45	Not found				231	VERY important article				476	Also screen for support	yes	x
49	yes	yes	x		232	memory	Yes	x		478	MRI study	x	Yes
55	Not found				238	Article not found				480	Yes	yes	x
62	Not found				243	Article not found				482	Article not found		
70	Yes – Excellent!!	Yes	x		254	Also screen for support	yes	x		484	Also screen for support	Yes	x
73	Pilot study				259	yes	yes	x		485	Article not found		
75	yes	yes	x		261	Article not in English	x	yes		488	Article not found		
78	Yes	yes	x		264	n/a indicate at risk for dyslexia without definite dx	x	yes		489	Article not found		
88	Yes Tailored support - conclusion	yes	x		266	Article not found				491	Screen for support	yes	x

89	Not found				273	yes	yes	x		492	yes	Yes	x
94	Not found				279	Article not found				494	Article not found		
99	Bot found				281	yes	yes	x		498	yes	yes	x
100	Not found				282	Should be viewed as support							
101	Not found				285	Should also be viewed as support	yes	x		76	Yes	yes	x
107	Unfortunately, only available until page 12	Yes	x		286	Yes	Yes	x		230	Not applicable to occupational markers	x	Yes
110	Should be viewed as support				293	Article not found				424	Reading related to anatomy and not occupational markers	X	yes
111	Excellent explanation of PM; PM support p3 and 14; Recommendations for therapy p14	yes	x		295	Also screen for support	Yes	x		441	Article not found		

113	Not found				314	Article not in English				451	Article not found		
115	yes	yes	x		315	Article not found				14	Article not found		
117	Results not conclusive	x	yes		317	Article not found				112	yes	yes	x
118	Not found				318	Only editorial available				183	Article not found		
122	Results not conclusive	x	Yes		319	Yes	Yes	x		393	Children at risk for dyslexia		
124	Also screen for support	Yes	x		320	Article not found				499	yes	yes	x
134	Single case study – results per individual	x	Yes		323	Article not found				130	yes	yes	x
137	yes	X	yes		336	yes	yes	x		440	Article not found		
141	yes	Yes	x		338	Article not found				44	Definition dyslexia		
145	Yes – focus on distance learning	x	Yes		348	yes	yes	x		379	Article not found		
146	VALUABLE	yes	x		372	Article not found				468	Subtypes of dyslexia	x	yes
147	Also screen this article for Supportive structures	yes	x		380	Dyslexia higher prevalence in addicts – not	x	yes		268	Subtypes of DD - orthography	Yes	x

						relevant for OM							
156	Mental action experiment – no carry over in real life situation	x	Yes		381	Only comments available – not whole article				439	French only	x	yes
160	yes	Yes	x		384	Also screen for support	yes	x		47	yes	yes	x
161					391	Article not found				366	Yes	Yes	X
164	Also screen this article for Supportive structures	Yes	X		392	Article not found				447	Article not found		
165	Results of experiment related to speech and auditory – no direct occupational marker link	x	Yes		396	yes	yes	x		162	Screen for support	X for OM	
167	Yes	yes	x		398	Screen for support as well	yes	x		29	Interaction of different component in WM	yes	x
										336	Abstract only		

										387	Very important regarding differences in Chinese as well as compiling a check list for behavioural signs	yes	x

Articles: Search 2B for inclusion

Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded
3	Yes	Yes	x		289	Not found				196	Not found		
4	focus on IQ test	no	yes		291	Not found				250	yes	yes	no
13	Inconclusive results	no	yes		293	Not found				316	Exploration of similarities DD and SLI		

16	Not found				308	Thesis focused on mindfulness training				344	Not found		
17	Not found				310	Focus on transport – review for supporting structures				365	Not found		
18	Co-morbidity	no	yes		311	Musical difficulties dyslexics encounter – keep for future reference. Possible supportive intervention ?				441	Not found		
20	Not found				313	Music teaching and dyslexia				152	Not found		
23	Not found				315					8	Not found		
26	Not found				317	Study explore substance use – not indicated as OM				10	yes	yes	no

30	yes	yes	no		320	Not found				11	L1 And L2 comparison	no	yes
34	Not found				321	yes	yes	no		145	Not found		
40	Metaphoric language investigated	no	yes		322	yes	yes	no		157	yes	yes	no
44	Co-morbidity dyscalculia; also focus of study and reporting of results	no	yes		327	Screen for support				410			
46	Not indicated for inclusion	no	yes		328	Also screen for support				147	Not found		
49	Also screen for support VERY IMPORTANT	Yes	No		329					179	Not found		
50	yes	yes	no		333	Not found				267	Not found		
57	yes	yes	no		335	genetic				120	Not found		
60	Not found				351	Not found				278	Not found		
61	Also screen for support VERY	yes	no		353	support				411	Not found		

	IMPORTANT												
62	Not found				355	Not found				416	No direct link to OM		
63	yes	yes	no		360	Screening test development in arabic				54	Not found		
66	ALSO SCREEN FOR SUPPORT	yes	no		362	Not found				214	Not found		
69	Correction to published article				378	Not found				453	Not found		
80	Screen for support				381	Not found				190	Reference to reading difficulties in literature study – not specifically dyslexia		
84	Not found				382	Not found				194	yes	yes	no
95	Not found				385	Not found				45	Not found		
96	Also screen for support				390	support				175	Not found		
102	yes	yes	no										
119	Not found				391	Suppport OOK NB in				176	yes	yes	no

						beskrywing van die kompleksiteit van disleksie							
122	yes	Yes	no		392	Support				192	Not found		
126	Not found				395	Focus on co-morbidity				379	Not found		
127	Results not conclusive				397	Not found				380	Not found		
128	Not found				404	Also screen for support				383	Not found		
137	Screen for support				406					359	Not found		
141	Not found				413	Not found				400	Not found		
142	Not found				418	Not found				98	Focus on handwriting		
150	yes	yes	no		421	Support				273	yes	yes	no
163	yes	yes	no		422	Support				412			
168	Introduction NB VERY IMPORTANT ARTICLE	yes	no		427	Not found				215	Also screen for support	yes	no
169	Not found				430	Book review				327 (b)	Note the article on positive dyslexia referred to in this article.		

											Entrepreneurial family =support			
171	Not found				439	Results not indicative of OM								
172	ASLO screen for SUPPORT GOOD summary of findings VERY IMPORTANT ARTICLE	yes	no		448	Support								
173	Not found				449									
181	At risk and co-morbidity	no	yes		450	Not found								
187	yes	yes	no		456	Support								
197	No clear indicator for OM – only indicated verbally gifted students perform better	No	Yes		470	Not found								

199	Also screen for support	Yes	No		471	Not found							
202	Training program	no	yes		483	No clear OM							
217	Not found				492	Not found							
220	Not found				493	Not found							
222	Not found				495	Not found							
226	Not found												
227	Focus on neural networks				87	Not found							
230	yes	yes	no		207	Not found							
231	Focus on motor sequence learning				237	Not found							
244	yes	yes	no		6	yes	yes	no					
246	Handwriting and SUPPORT	yes	no		102								
247	Co-morbidity	no	Yes		155	yes	no	yes					
254	Results not relevant to scoping review				177	Yes	Yes	No					
269	yes	yes	no		221	Re-analysis of articles							
274	Not found				224	Not found							

282	Promotion for workshop	No	Yes		238	Focus on reading experience							
283	Yes Screen for support (activities to promote rhyme)	yes	no		384	Commentary piece							
284	Not found				389	Defining the role of optometry in the MDT to Tx dyslexia							
285	Not found				462	Effect of dual tasks on postural control in Dyslexics							
286	Not found				153	yes	yes	no					

Articles: Search 3C for inclusion

Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded
12					353					229			

13					359					281			
14					362					334			
22					363					374			
24					364					403			
42					372					493			
48					373					198			
52					377					351			
62					380					500			
67					386					400			
71					393					427			
78					399					59			
79					402					284			
80					405					103			
82					420					239			
84					426					127			
85					428					230			
86					429					60			
89					432					259			
90					445					260			
95					453					396			
100					459								
104					465								
105					468								
106					470								
112					476								
116					483								
122					484								
125													
126					366								

132					19								
134					34								
137					91								
139					145								
143					194								
151					226								
154					264								
157					446								
158					240								
160					285								
173					316								
195					338								
196					360								
200					387								
214					41								
215					203								
217					339								
231					341								
236					418								
245					472								
254					17296								
271					340								
275					456								
286					475								
289					384								
314					406								
315					45								
343					76								
347					117								

Articles: Search 4D for inclusion

Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded
13					438					466			
14					440					339			
15					447					25			
31					456					131			
33					468					183			
34					497					214			
35					498					227			
36					121					257			
43					173					266			
51					490					471			
55					54					120			
74					174					139			
88					291					186			
89					347					206			
100					355					322			
116					371					421			
117					460					105			
124					462					140			

125					465					47			
158					469					282			
176					476					58			
177					481					224			
178					485					237			
182					486					300			
193					494					314			
203					500					60			
211					142					408			
216					143					398			
218					174					96			
222					296					175			
235					297					180			
247					302					290			
248					305					321			
249					306					443			
251					309					42			
258					310					106			
263					311					109			
267					316					111			
270					353					112			
277					400					273			
278					403					399			
283					449					279			
293					450					87			
294					76								
295					78								
319					79								
320					82								

331					85								
332					387								
334					392								
336					394								
338					444								
351					404								
390					97								
395					10								
422					239								
427					241								
428					244								
429					245								
430					352								
432					365								
433					377								
435					455								

Articles: Search 5E for inclusion

Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded
3					316					29			
11					328					394			
22					330					395			
37					336					465			

39					342					170			
59					343					194			
60					347					258			
62					348					15			
72					349					76			
77					350					120			
93					351					138			
94					352					139			
97					354					172			
101					370					192			
108					388					294			
109					401					497			
110					402					449			
111					405					473			
122					408					125			
123					421					220			
126					422					222			
133					426					129			
137					427					40			
140					433					141			
144					455					143			
147					462					218			
152					481					396			
155					484					491			
157					487					107			
160					489					177			
167					500					179			
168										242			
169					145					243			

175					4					68			
181					116					185			
195					180					299			
204					273					154			
240					274					70			
250					275					71			
262					317					429			
266					318								
267					403								
272					485								
276					112								
278					188								
279					424								
300					174								
306					200								
313					206								
					207								
					209								
					210								
					211								
					213								
					214								
					307								
					483								

Articles: Search 6F for inclusion

Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded		Article Number	Screened for scoping review	Included	Excluded
21					252					95			
22					258					124			
23					260					141			
28										162			
36					5					181			
39					46					145			
41					72					146			
43					115					169			
44					120					170			
45					135					59			
50					144					121			
62					151					171			
74					177					239			
78					184					241			
86					194					242			
90					233					244			
91					89					246			

110					118					247			
114					176					20			
138					6					168			
161					24					96			
164					55								
165					187								
172					193								
175					253								
207					255								
212					127								
221					15								
222					30								
230					131								
245					136								
250					153								

TITLE: Constructing Occupational Markers through an Exploration of the Developmental Dyslexia Profile: A Scoping study

(Multiple choice questions)

Correct answers indicated in bold for each question

1. Globally developmental dyslexia are prevalent in ……. of the population
   A – 3%
   B – 7%
   C – 5 to 10 %
   D – a third
   E – less than 7 %

2. Signs and symptoms of dyslexia
   A – will always link to reading and emotional difficulties
   B – may include reading difficulties, impulsivity and poor eating habits
   C – will always include reading and spelling difficulties
   D – will only be seen in disruptive behaviour in class
   E – may include difficulty with performance patterns and skills not directly linked with reading

3. The use of a dyslexic profile in the identification of dyslexia may
   A – allow for the inclusion of a pattern of strengths and weaknesses
   B – allow for the inclusion of co-occurring problems
   C – will shift diagnostic criteria toward a profile as opposed to a single diagnostic feature
   D – all of the above
   E – none of the above

4. The diagnosis of dyslexia should ideally be made:
   A – before formal schooling starts
   B – as soon as the dyslexia paradox is noted
   C – only when a decrease in reading speed is noted
   D – can only be at the age of 10 years
   E – before the learner fails a grade

5. The role of language in the assessment of individuals with dyslexia is important because:
   A – the assessor needs to know which language the assessment should be conducted in
   B – the assessor should be aware if language acquisition may play a role in reading or spelling difficulties

C – The assessor should take note if the home language differs from the LOLT
D – A, B and C is correct
E – A and B is correct

6..... can be regarded as a primary marker for dyslexia irrespective of the home language of the learner
A – a decreased phonological awareness
B – reversals when reading (b/d)
C - co-occurrence of ADHD
D – psychosocial difficulties
E – illegible handwriting

7. Executive functions are affected in individuals with dyslexia in the following manner:
A – impaired working memory
B – increased cognitive flexibility
C – increased planning skills
D – All of the above
E – A and B

8. Internalizing behavioural problems may include:
A – anxiety, suicidal ideation, and social withdrawal
B – sadness, loneliness, and somatic complaints
C – rule breaking behaviour, lying, and stealing
D – A and B
E – B and C

9. Emotional difficulties in individuals with dyslexia meet the threshold for a formal diagnosis.
A – True
B – False

10. Emotional and behavioural difficulties in individuals with dyslexia can be regarded as a primary marker due to the presence in all dyslexic individuals.
A – True
B – False

11. Individuals with dyslexia may have trouble with processing speed, time perception as well as time management.
A – True
B – False

12. Individuals with dyslexia may experience a decrease in prospective memory with a direct impact on the formation of habits or routines.
    A – True
    B - False

13. Occupational markers as indicated in literature could guide early identification of individuals with dyslexia.
    A – True
    B – False

14. Occupational markers are:
    A – Language specific
    B – Not culturally specific
    C – promotes inclusivity
    D – all of the above
    E – B and C

15. The knowledge of a dyslexic profile may be used in
    A – early identification
    B – to inform good practice
    C – promote constructive research
    D – promote timely intervention
    E – all of the above

Appendix H - Title page manuscript 2

Developmental dyslexia and supportive structures: A Scoping Study.

By

HA Engelbrecht (B Occupational Therapy), Junior lecturer, University of the Free State, Bloemfontein, South Africa

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082 928 1502

ANB Jansen (M Occupational Therapy), Senior Lecturer, University of the Free State, Bloemfontein, South Africa

JansenANB@ufs.ac.za

082 444 1955

Ethical clearance number: UFS-HSD2021/0431-0003 for the dissertation titled:

Occupational markers and supportive structures in individuals with developmental dyslexia: An occupational therapy perspective

Appendix I Articles for inclusion support summary

Support/supportive structures

Articles: Search 1A for inclusion

Article number	Screened for scoping review	Included	Excluded		Article number	Screened for scoping review	Included	Excluded
2	Article in German				243	NB article for types of support (parents)		
20	No access				249			
23	No access				277	Important info regarding the reporting /disclosing of dyslexic identity		
27	Duplicate of article 2				279			
28					324			
33	No access				367			Focus on music intervention
58					392	NB statement regarding uniqueness of dyslexia – Singleton 1999		
70					398			
83	No access				403	No access		
94			No access to full disseration		416			Focus on intervention
111			Limited reference to support for		437	Access denied		

			Prospective memory					
118	No access				438	No Access		
146			Highlighted the negative experiences of learners - Need for support explained		473	Access denied		
170					482			
171	No access				492			Focus on cognitive function
172	No access				497			Focus on Neuroscience
185			Study focusses on procedural memory consolidation and ways to possibly support memory.					
206					219			Focus on picture book as means to facilitate learning in dyslexic individuals

215	NB article for the importance of adapting text as well as multi media learning							
217								
227								
238								

Articles: Search 2B for inclusion

Article number	Screened for scoping review	Included	Excluded		Article number	Screened for scoping review	Included	Excluded
10			Focus on cognitive linguistic profiles		354	No access		
43			No clear indication that support for dyslexia only		360	No access		
62	No access				361	BOOK		
75	No access				362	No access		
82	No access				366	BOOK		
133			No clear indication of type of support		372	Chapter in book		

137					378	Not found		
168	No access				388			Editorial
174					390			
214		NB information regarding front type, front size, line spacing and line length as well as web navigation			392			
220					394			Focus on genes
243					423			
246		No access			429			Explore the concept of “lexism”
255					457	No access		
284	No access				480		Cognitive theory of multi media learning. Audio support may increase study time	
289	No access				500	Not found		
291	No access							
340			Focus on MRI		26	Not found		
343					61			
351	No access				142			
					453			Does not indicate supportive structure

					380			Does not clearly indicate supportive structure
					359	No access		
					Add 1		Very relevant SA article VERY IMPORTANT ARTICLE	
					Add 2		Very important for cultural relevance.	
					Add 4		Support document for students	

https://www.dyslexia.org.sg/get-involved/research/877-list-of-past-research.html (list of articles applicable to support)

Articles: Search 3C for inclusion

Article number	Screened for scoping review	Included	Excluded		Article number	Screened for scoping review	Included	Excluded
					379			Full text not available – VALUABLE article as it addresses cultural difference with the use of Arabolexia.

11			Personality disorder included		393		IMPORTANT dyslexic strengths	
12					428			No clear description as to the value of support
14	No access				445			Article only available in French
31			Erratum to article		462			Focus on early vs late identification
71					467			
89	No access				470			Results of study only advocates for how support should be given
101					476		Strong focus on failing support form institutional level that lead to development of own supporting structures	
106			Focus on self concept of students		481			No clear indication on the type of support

121		Important info regarding the use of technology special reference facebook						
125					95	No access		
149					104	No access		
151					236			No clear indication for specific support
154		NB article strengths			271			No clear indication for support – focus on impact of late diagnosis
158	No access				364	No access		
195	No access				380			Focus on self regulation strategies
197	Not found				399	No access		
225			Focus on genetic analysis		296			Bilingualism should be supported – not a supportive structure
231								
235		NB article to explain the						

		interaction of different support						
242			commentary					
257			Focus on detail of intervention					
262			Thesis focus on teachers support					
263	No access							
307								

Articles: Search 4D for inclusion

Article number	Screened for scoping review	Included	Excluded		Article number	Screened for scoping review	Included	Excluded
					230			
29		No access			249	No access		
36	Book				258			Focus on EF
38		NB article on model for support librarians			259	No access		
60	No Access				261			Focus on parents
66			Model focused on motivation of students for e learning		270			
67					277	No access		

88	Article not in English				294	No Access		
107			Focus on music training		295			Thesis already reviewed
125			Thesis explaining academic journey – no detailed description of specific supportive structure		324	No access		
164			Focus on genes		349			Focus on diagnostic models
178					380	No access		
185					382			Focus on teacher's knowledge on early DD signs
187			Study to determine if evidence based were practiced – no direct relevance to support		409			

194			Focus on homeless population and advocate for support		428			Focus on Covid 19
203		Numerous supportive structures identified			433	Not found		
208			Focus on teachers knowledge on reading					
216		OT Artikel!!BELANGRIK Occupational Science			328	No access		
222					372			Knowledge about dyslexia
223			Editorial letter		374			Knowledge about dyslexia
					425			
					426	Not found		

Articles: Search 5E for inclusion

Article number	Screened for scoping review	Included	Excluded		Article number	Screened for scoping review	Included	Excluded
21					343	No access		

39					348		Already included search 2 B add 1	
62	Book review				350			
69			Focus on music training as possible support		356			Not clear if audio support will be beneficial
101			Focus on secondary symptoms of DD		367	No access		
102	No access				392			
147					414			Focus on neuroanatomy
157			LD and DD		418	No access		
248					427			
249	No access				440	No access		
250					454			Focus on underdx of dyslexia
251	No access				455	No access		
262					458			
265	Book							
266					437	No access – download failed		
267					420			
309		No access			386			
321	Book				377			

328		NB artikel wat skuif van Dx na behavioural profiles	Neurodevelopmental overlap with other disabilities		352			
340	Book				109			Focus on self-efficacy
					236	No access		
					286	No access		
					289			
					298	Only Spanish		
					308	No access		
					342	No access		

Articles: Search 6F for inclusion

Article number	Screened for scoping review	Included	Excluded		Article number	Screened for scoping review	Included	Excluded
21			Focus on parents		114	Not available in English		
41			Focus on prospective memory		175			Focus on teachers
53			Focus on the label of Dyslexia		191			Focus on teachers
62	No access				198			Knowledge about dyslexia

91					212			No clear indication of supportive structure
138			Comorbidity		219	No access		
165			Focus on eye tracking					
180			No direct reference to specific supportive struvture					
196			Research to inform possible support					
204			Focus on the use of the term dyslexia					
218								
221	Book							
250			Focus on spelling					
258		SA Article						
4								
22			No clear report on supportive structures					
40	No access							
78			Co-morbidity					

98		NB Cultural implication of having dyslexia						

Appendix K - Multiple choice questions accompanying manuscript 2.

Topic: Developmental dyslexia and supportive structures: A Scoping Study.

(Multiple choice questions)

Correct answers indicated in bold for each question.

1. One of the primary indicators for the presence of dyslexia is:
   A – processing difficulties
   B - visual difficulties
   C – auditory deficit
   D - phonological difficulties
   E – confusion when reading

2. Occupational markers indicative of the presence of dyslexia can be defined as behavioural signs preventing occupational engagement and performance in meaningful activities or behaviour that enables an individual to excel in a unique manner in occupational engagement and performance.
   A – True
   B - False

3. According to the PEOP model personal or intrinsic factors may include:
   A – Neurobehavioral
   B – Psychological
   C – Emotional and spiritual
   D – All of the above
   E – None of the above

4. Dyslexia impacts on the psychological and emotional factors of an individual and may include:
   A – Self-identity and well – being
   B – Interests, values, and attitudes
   C – internalizing and externalizing behaviour
   D – All of the above
   E – Only A and B

5. The environment or extrinsic factors, according to the PEOP mode, include:
   A – the build environment
   B – cultural environment
   C – natural environment
   D – social interaction
   E – all of the above

6. The natural environment is a valuable contributor to the support of individuals with dyslexia.
   A – True
   B – False

7. Social support may include:
   A – practical or instrumental support
   B – Government and employment policies
   C – information support
   D – All of the above
   E – A and C

8. Informational support includes advice guidance, knowledge as well as skills training.
   A – True
   B – False

9. Family support are valuable but not noted as a big contributor of emotional support to individuals with dyslexia
   A – True
   B – False

10. Early screening and assessment to determine the presence of dyslexia is important and also noted as practical support within the social support system.
    A – True
    B – False

11. Individuals with dyslexia may benefit from:
    A –screening and assessment once the dyslexia paradox is noted
    B – indirect services like staff and professional development and training
    C – changes in the natural environment
    D – change in language of learning and teaching
    E – all of the above

12. Occupational therapists in South Africa can contribute to the support of individuals with dyslexia by:
    A – acknowledging the comprehensive impact of dyslexia
    B – noting that there will always be an intricate interaction between the individual and their environment
    C – acknowledge the role of language and culture in the process of identification and intervention
    D – all of the above
    E – none of the above

13. Governing bodies and the regulations put in place to support individuals with dyslexia plays a major role in the support of individuals with dyslexia.
    A – True
    B – False
14. Information support to individuals with developmental dyslexia may include:
    A – facilitation of academic support
    B – training opportunities for staff to enable support given to individuals with dyslexia.
    C – organization and time management support ot dyslexic individuals
    D – A and B
    E – All of the above

15. Practical support to individuals with dyslexia is tangible and may include:
    A – curriculum support
    B – oral examinations and extra time
    C – auditory support including recording of classes and dictating notes
    D – multi-sensory learning and prior lecture handouts
    E – all of the above

Appendix L - Proof of language editing

33 Nerina Street
Gardenia Park
Bloemfontein
9301

24 November 2023

Subject: Letter of Confirmation for Language Editing Services

Dear Sir/ madam,

Please find this letter as confirmation that I, Britney Jansen, provided language editing services for the dissertation titled" Occupational markers and supportive structures in individuals with developmental dyslexia: An occupational therapy" authored by Hendrika Augustha Engelbrecht. This dissertation was submitted as part of the requirements for the [Degree Master's Occupational Therapy at University of the Free State.

I was engaged to review and edit the language, grammar, and overall clarity of the content in accordance with academic standards. The editing process involved careful attention to detail, ensuring that the text adhered to the prescribed style guide and maintained consistency throughout.

I am confident that the language editing performed on the dissertation has contributed to the overall quality of the document and has enhanced its academic presentation. I have made every effort to respect the author's voice and maintain the integrity of the research while addressing language-related issues.

If you require any further information or clarification, please do not hesitate to contact me at britneyjansen3@gmail.com.

I appreciate the opportunity to contribute to the success of this academic endeavor and am available for any future language editing needs.

Thank you for your attention to this matter.

Sincerely,

Briney Jansen

Appendix M - Letter from librarian

Frik Scott Health Sciences Library
University of the Free State
PO Box 12327
Bloemfontein
9300
051 401 7786

23/11/2023

To whom it may concern

INFORMATION LIBRARIAN INVOLVEMENT: SCOPING REVIEW

Scoping reviews describe existing literature and other sources of information commonly include findings from a range of different study designs and methods. As such, the information search is a critical step in the review process.

In order to effectively conduct a scoping review, the skills of an experienced information librarian are required.

With regards to the following study:

OCCUPATIONAL MARKERS AND SUPPORTIVE STRUCTURES IN INDIVIDUALS WITH DEVELOPMENTAL DYSLEXIA: AN OCCUPATIONAL THERAPY PERSPECTIVE by Hendrika Augustha (Helé) Engelbrecht, student number 1991074525, supervisor Anthea Jansen.

The information librarian, in conjunction with the investigators, has developed the following search string:

((environment* or "executive function*" or behavio* or influenc* or perform* or strength* or sign or signs or indicat* or comorbidit*) n2 dyslex*)
and
dyslex*
and
"occupational therap*"

If the string does not yield the desired results, the search string may be reformulated.

Only articles published after 2010 will be considered for inclusion.

The following databases have been identified as suitable for this search:

- Academic Search Ultimate
- Africa-Wide Information
- APA PsycArticles
- APA PsycInfo
- CAB Abstracts
- CINAHL with Full Text
- Communication & Mass Media Complete
- ERIC
- Health Source - Consumer Edition
- Health Source: Nursing/Academic Edition
- Humanities Source Ultimate

- MasterFILE Premier
- MEDLINE
- OpenDissertations
- Sociology Source Ultimate
- SPORTDiscus with Full Text

The information librarian will assist in obtaining the full text of included articles, if necessary, and will assist in writing the “sources and search methodology” section, if required.

The investigator(s) will complete the screening and inclusion/exclusion analysis of articles with the assistance of the supervisor, and conduct the analysis.

I hope you find this in order.

Yours sincerely,

Annamarie du Preez
Head: Frik Scott Health Sciences Library

turnitin

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This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

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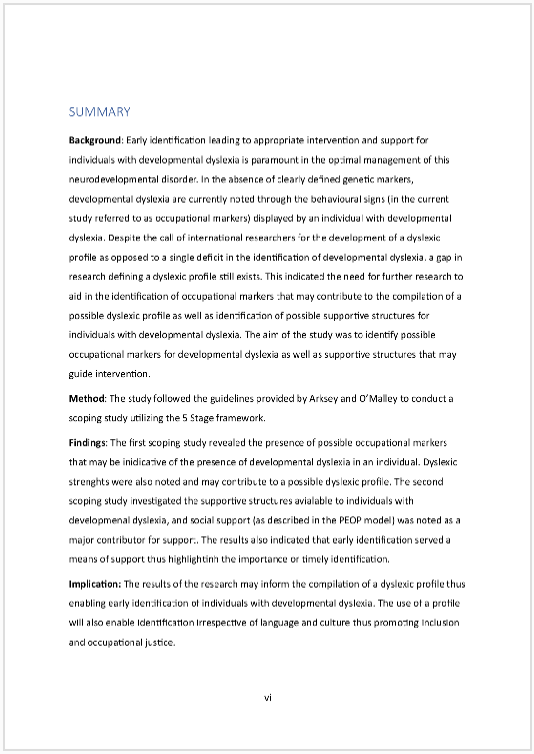

SUMMARY

Background: Early identification leading to appropriate intervention and support for individuals with developmental dyslexia is paramount in the optimal management of this neurodevelopmental disorder. In the absence of clearly defined genetic markers, developmental dyslexia are currently noted through the behavioural signs (in the current study referred to as occupational markers) displayed by an individual with developmental dyslexia. Despite the call of international researchers for the development of a dyslexic profile as opposed to a single deficit in the identification of developmental dyslexia, a gap in research defining a dyslexic profile still exists. This indicated the need for further research to aid in the identification of occupational markers that may contribute to the compilation of a possible dyslexic profile as well as identification of possible supportive structures for individuals with developmental dyslexia. The aim of the study was to identify possible occupational markers for developmental dyslexia as well as supportive structures that may guide intervention.

Method: The study followed the guidelines provided by Arksey and O'Malley to conduct a scoping study utilizing the 5 Stage framework.

Findings: The first scoping study revealed the presence of possible occupational markers that may be indicative of the presence of developmental dyslexia in an individual. Dyslexic strengths were also noted and may contribute to a possible dyslexic profile. The second scoping study investigated the supportive structures available to individuals with developmenal dyslexia, and social support (as described in the PEOP model) was noted as a major contributor for support. The results also indicated that early identification served a means of support thus highlightinh the importance or timely identification.

Implication: The results of the research may inform the compilation of a dyslexic profile thus enabling early identification of individuals with developmental dyslexia. The use of a profile will also enable identification irrespective of language and culture thus promoting inclusion and occupational justice.

Appendix O - Turnitin similarity report

Dissertation Turnitin.docx

ORIGINALITY REPORT

6%	5%	3%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	scholar.ufs.ac.za Internet Source	1%
2	musculoskeletalkey.com Internet Source	<1%
3	pubs.asha.org Internet Source	<1%
4	www.researchgate.net Internet Source	<1%
5	sajce.co.za Internet Source	<1%
6	ujcontent.uj.ac.za Internet Source	<1%
7	sajp.co.za Internet Source	<1%
8	www.migna.ir Internet Source	<1%
9	medbib.com Internet Source	<1%

10	"Occupational Therapy Scope of Practice", The American Journal of Occupational Therapy, 2021 Publication	<1%
11	Submitted to University of Edinburgh Student Paper	<1%
12	www.researchsquare.com Internet Source	<1%
13	Submitted to Curtin University of Technology Student Paper	<1%
14	Smith, Diane, and Stan Hudson. "Using the Person–Environment–Occupational Performance conceptual model as an analyzing framework for health literacy", Journal of Communications In Healthcare, 2012. Publication	<1%
15	revistas.uautonoma.cl Internet Source	<1%
16	epdf.pub Internet Source	<1%
17	berks.psu.edu Internet Source	<1%
18	academic.oup.com Internet Source	<1%

19	Bishop, D. V. M.. "Ten questions about terminology for children with unexplained language problems : Terminology for children with language problems", International Journal of Language & Communication Disorders, 2014. Publication	<1%
20	Mariam Fatehi, Sheri E. Miller, Leila Fatehi, Orion Mowbray. "A Scoping Study of Parents With a History of Childhood Sexual Abuse and a Theoretical Framework for Future Research", Trauma, Violence, & Abuse, 2021 Publication	<1%
21	kc.edu Internet Source	<1%
22	Submitted to Coventry University Student Paper	<1%
23	Robin L Peterson, Bruce F Pennington. "Developmental dyslexia", The Lancet, 2012 Publication	<1%
24	dc.uwm.edu Internet Source	<1%
25	etd.uwc.ac.za Internet Source	<1%
26	Submitted to University of Stellenbosch, South Africa Student Paper	<1%

27	uir.unisa.ac.za Internet Source	<1%
28	files.eric.ed.gov Internet Source	<1%
29	"Multilingual Education Yearbook 2021", Springer Science and Business Media LLC, 2021 Publication	<1%
30	open.uct.ac.za Internet Source	<1%
31	peerj.com Internet Source	<1%
32	watermark.silverchair.com Internet Source	<1%
33	Submitted to Chicago State University Student Paper	<1%
34	Submitted to Liberty University Student Paper	<1%
35	M. Habib. "The neurological basis of developmental dyslexia: An overview and working hypothesis", Brain, 12/01/2000 Publication	<1%
36	vdoc.pub Internet Source	<1%

37	www.healio.com Internet Source	<1%
38	www.slideshare.net Internet Source	<1%
39	9pdf.net Internet Source	<1%
40	prism.ucalgary.ca Internet Source	<1%
41	"Contributions of Behavior Analysis to Reading and Writing Comprehension", Springer Science and Business Media LLC, 2023 Publication	<1%
42	Submitted to Glasgow Caledonian University Student Paper	<1%
43	Submitted to Utica College Student Paper	<1%
44	www.ebay.com Internet Source	<1%
45	Submitted to Mary Immaculate College Student Paper	<1%
46	Submitted to William Carey University Student Paper	<1%
47	Submitted to University of South Australia Student Paper	<1%