PROGRESSIVE MUSCLE RELAXATION AS PART OF THE HOME PROGRAMMES FOR CHILDREN WITH LEARNING DISABILITIES AND ANXIETY

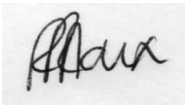
Ruda Nicolene Roux

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy applied to Perceptual Disorders.

Johannesburg, 2020

DECLARATION

I, Ruda Nicolene Roux, declare that this research report is my own work. It is being submitted for the degree of Master of Science in Occupational Therapy applied to Perceptual Disorders at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.



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Ruda Nicolene Roux (Signature of candidate)

On this 3rd day of November 2020 in Pretoria

Dedicated to my husband

Eksteen Roux

and children

Karli Diedericks and Milan Roux

ABSTRACT

This study explored the effect of progressive muscle relaxation (PMR), as a home programme, on anxiety levels and functional activity participation of children with learning disabilities (LD) and anxiety, attending occupational therapy (OT) intervention.

In this multiple case study research design, three participants' anxiety levels and functional activity participation were measured at three study intervals, by parents, teachers and the researcher (who was also the treating OT). The PMR home programme was in the form of a 12-minute audio CD, produced by the researcher, and demonstrated in one training session with each parent and participant. The home programme was then followed three times a week, for a period of 16-weeks, while the participants continued to attend OT intervention as usual at the researcher's private practice.

Results indicated that anxiety levels did improve, but only marginally on the measurement scales, with no complete alleviation of anxiety. Overall functional activity participation improved from parents and researcher perspective, but not at school, where a decline in functional activity participation was noted for two of the three participants. The PMR technique was not applied as a coping strategy by any of the participants.

This research showed that PMR, as a stand-alone home programme, was not applied by participants as a coping skill and thus did not significantly improve their anxiety levels or functional activity participation at school.

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DEFINITION OF TERMS

Anxiety: "A general frightened response to a source that is not readily identifiable or that poses no immediate threat" (Dacey, Mack and Fiore, 2016).

Client factors: Individuals' capacities, characteristics and beliefs that influence their performance of activities. This includes body functions, body structures, values, beliefs and spirituality (American Occupational Therapy Association, 2014).

Cognitive behavioural intervention: This intervention aims at changing thoughts, beliefs and behaviours to improve emotional regulation and to develop coping strategies (Gosch *et al.*, 2006).

Emotive functions: Mental functions that are related to feelings and affect, including happiness, sadness, fear, anger, anxiety and lability of emotions (Bickenbach *et al.*, 2012).

Frame of reference: Theories are predictions of outcomes that guide practice. A frame of reference is the manner in which theories are translated into intervention methods for practice (Kramer and Hinojosa, 2010, p3).

Home programmes: Home programmes are sets of activities or exercises, suggested by therapists, to be performed at home by clients (Segal and Beyer, 2006).

Learning disabilities: Learning disabilities is an umbrella term used to describe problems that affect children's ability to master school work, process and integrate information as well as communicating (Rogers, 2010, p176).

Functional activity participation: In the context of this research study, 'functional activity participation' is used synonymously and instead of 'occupational performance' (which is a specific term used in occupational therapy). Functional activity participation refers to the manner in which people perform meaningful and purposeful everyday activities and how they occupy their time (American Occupational Therapy Association, 2014). The term better compliments the terminology used in the data collection/ measurement tools and was therefore preferred.

Occupational therapy intervention: "The therapeutic use of everyday life activities/ occupations with individuals or groups for the purpose of enhancing or enabling participation

in roles, habits and routines in home, school, workplace, community and other settings" (American Occupational Therapy Association, 2014).

Progressive muscle relaxation: Progressive muscle relaxation is a stress management technique that is said to reduce stress and anxiety by the alternate tensing and relaxing of muscle groups (Varvogli and Darviri, 2011).

Sensory integration: "The organization of sensory information for use" (Pollock, 2009).

Sensory modulation: Sensory modulation refers to the way in which individuals react to sensory stimuli in the environment, with regards to the nature and intensity of the experience (Kramer and Hinojosa, 2010, p112).

Visual perception: Visual perception is the process involved when visual stimuli is received and organized for use (Kramer and Hinojosa, 2010, p349).

ABBREVIATIONS

ADHD - Attention Deficit Hyperactivity Disorder

ADL - Activities of Daily Living

APD – Auditory Processing Disorder

ASD - Autism Spectrum Disorder

CAPS – Curriculum Assessment Policy Statements

CD - Compact Disk

Conners CBRS-P - Conners Comprehensive Behavior rating Scales- Parent version

Conners CBRS-T - Conners Comprehensive Behavior rating Scales- Teacher version

DSM - Diagnostic and Statistical Manual of Mental Disorders

FOR – Frame of Reference

GA - Generalised anxiety

ICF - International Classification of Functioning, Disability and Health

ICF-R - International Classification of Functioning, Disability and Health- Researcher version

ICF-T - International Classification of Functioning, Disability and Health- Teacher version

ILP – Individual Learner Plan

ISP – Individual Support Programme

LD - Learning Disability

LDs – Learning Difficulties

LPD - Language Processing Disorder

LSEN - Learners with Special Educational Needs

NVLD - Non-verbal Learning Disability

OCD - Obsessive Compulsive Disorder

OT - Occupational Therapy

OTs - Occupational Therapists

PA - Panic Agoraphobia

PAS – Preschool Anxiety Scale

PAS-T - Preschool Anxiety Scale- Teacher version

PMR - Progressive Muscle Relaxation

PTSD – Posttraumatic Stress Disorder

RCT - Randomised Control Trial

RD – Reading Disability

SA - Separation Anxiety

SCAS-P - Spence Children's Anxiety Scale- Parent version

SI - Sensory Integration

SLD – Specific Learning Disorders

SMD – Sensory Modulation Disorder

SOR - Sensory Over-responsivity

SP - Social Phobia

VLD - Verbal Learning Disability

ABBREVIATIONS SPECIFIC TO DATA ANALYSIS AND DATA COLLECTION TOOLS

Abbreviations that are specific to the data analysis and data collections tools were added, because some of the phrases describing elements on the data collections tools are very long. To include the long phrases in figures unnecessarily increased the size of the figures. It was thus decided to use abbreviations instead. These abbreviations were thus only used in figures and not in the text.

AK - Applying knowledge

Att. - Attention functions

Calc. – Calculating

DA - Defiance/ aggression

Emot. - Emotions

ER - Emotional regulation

HLCF - Higher level cognitive functions

HY - Hyperactivity/ Impulsivity

IN - Inattention

LE - Learning problems/ executive functioning

Mem. - Memory functions

OP - Organization and planning

PIF - Physical Injury Fears

Play - Playing

PR - Peer relations

Pre.Ed. - Preschool education

PS - Problem solving

Read - Learning to read

Rout. - Carrying out daily routine

Social - Socializing

Stress - Handling stress

TM - Time management

VSP - Visuospatial perception

Write - Learning to write

CHAPTER 1 : INTRODUCTION

1.1. Introduction

Terms such as learning difficulties (LDs), learning disability (LD) and learning impairment are used interchangeably in the context of children who experience barriers to learning (Nel and Grosser, 2016). Some literature suggest that LDs are more extrinsic in nature (environmental or systematic) and can be alleviated (Nel and Grosser, 2016), whereas LD can be a combination of extrinsic and intrinsic (genetics, risk factors, developmental) factors and children continue to experience problems despite intervention (Nel and Grosser, 2016). Learning disability is included in the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5), referred to as Specific Learning Disorders (SLD). Children diagnosed with SLDs were usually placed into special education settings, before implementation of inclusive teaching and learning (Nel and Grosser, 2016). Not all children identified by the educational system with LDs meet the DSM-5 criteria of a diagnosis of SLD (Tannock, 2018). For the purpose of this study, using the term LDs does therefore not specifically refer to children with a clinical diagnosis of LD or SLD according to the DSM-5, but children with either LDs, LD and SLD present with similar problems. The focus of this study is on children who attend mainstream schools and experience barriers to learning, referred to as LD in this research report, but with no formal diagnosis of a LD or SLD, according to DSM-5 criteria, at inception of the study.

After examining literature with regards to the classification of LD, it was found that the Learning Disability Association of America presented a detailed description of LD and related disorders in 2012. It was considered unnecessary to limit a description of LD to the DSM-5's narrow criteria. Learning disabilities can be described as neurologically-based problems with information processing which interfere with scholastic skills including reading, writing and/ or mathematics (ldaamerica.org, 2012). Early signs of LD can be seen in preschool years, but children are often only referred to specialists when entering formal education (ldaamerica.org, 2012). Learning disabilities can persist into adulthood (ldaamerica.org, 2012). The Learning Disabilities Association of America identified the following conditions as part of LD and related disorders, summarized in Table 1.1.

Table 1.1 Learning disabilities and related disorders

Learning disability	
Specific learning disabilities	**Related disorders**
Auditory processing disorder (APD)	Attention deficit hyperactivity disorder (ADHD)
Dyscalculia	Dyspraxia
Dysgraphia	Executive functioning problems
Dyslexia	Memory problems
Language processing disorder (LPD)	
Non-verbal disabilities	
Visual perceptual-/Visual motor deficit	

Adapted from the Learning Disabilities Association of America (ldaamerica.org, 2012).

Yu and Buka refer to two subtypes of LD, verbal learning disability (VLD) or non-verbal learning disability (NVLD) (Yu *et al.*, 2006). They identify VLD by poor basic reading, reading comprehension and spelling skills. While NVLD, by definition, is identified by poor competence in arithmetic and mathematics. Their study, which examined behavioural problems in children with LD, found that children with VLD and children with NVLD exhibited different kinds of behavioural problems. Children with VLD presented with more externalising behavioural problems, including aggression and attention problems. Significant associations with anxious/depressed and withdrawn behaviours were also identified. No significant association was found between children with NVLD and any type of behavioural problems. Furthermore, they reported that children with VLD were four times more likely to exhibit anxious and depressed (internalising) behaviours, than children with no VLD (Yu *et al.*, 2006).

Anxiety is often a comorbidity in children diagnosed with ADHD, which is a LD-related disorder (Bilgiç *et al.*, 2013). Research has showed that approximately 25-50% of children with ADHD have a comorbid anxiety disorder (Reynolds and Lane, 2009; Coughlin *et al.*, 2015). Furthermore, they found that sensory over-responsivity (SOR), a type of Sensory Modulation Disorder (SMD) was related to increased anxiety levels in children diagnosed with ADHD. Thus, when comparing children with ADHD and SOR to children with or without ADHD without SOR, higher levels of anxiety have been found in the first group (Reynolds and Lane, 2009). It is evident that anxiety is frequently a comorbidity in children experiencing barriers to learning, but it is often overlooked (Barrett and Turner, 2001; Yu *et al.*, 2006; Reynolds and Lane, 2009).

Children with LD/ LDs are often referred to occupational therapists (OTs) for evaluation and intervention, because LD adversely affect a child's ability to functionally participate in activities, including play, school and socialising - more so when coupled with anxiety (Rogers, 2010). Intervention for LD thus aims at addressing a child's functional participation in activities by means of various frames of reference (FOR), which include sensory integration (SI), sensory-based strategies, sensory stimulation and sensorimotor and perceptual- motor approaches (Roley *et al.*, 2007). In these approaches, the comorbid anxiety is usually a secondary intervention outcome and not treated specifically nor measured as an intervention outcome (Miller *et al.*, 2007; Storch *et al.*, 2013). In fact, there is a dearth of literature with regards to anxiety-specific intervention for children with LD.

Anxiety has been explored in studies with children and adults with SOR and comorbid anxiety. A study done by Edelson *et al*. (1999) introduced a 'hug machine' developed by Temple Grandin, providing lateral pressure on the body. The lateral pressure was found to decrease tension, hyperactivity and anxiety in children diagnosed with autism spectrum disorder (ASD) (Green and Ben-Sasson, 2010). These results appear consistent with the findings in a study exploring the impact of SI intervention in adults with sensory defensiveness and co-existing anxiety (Pfeiffer and Kinnealey, 2003). The 'hug machine' study and the study on adult sensory defensiveness' results showed a decrease in the anxiety but not complete alleviation, thus necessitating intervention aimed at addressing anxiety itself. Anxiety can be managed pharmacologically or behaviourally.

As pharmacological intervention is outside the scope of OT, the focus throughout this report will be on the behavioural management of anxiety. In OT progressive muscle relaxation (PMR) is used to manage anxiety behaviourally. Progressive muscle relaxation is a technique that is used to reduce stress and anxiety by alternately tensing and relaxing the muscles of the body in stress management intervention (Varvogli and Darviri, 2011). Progressive muscle relaxation will be discussed in greater detail in the literature review in Chapter 2.

1.2. Problem statement

In the various FOR that OTs use in intervention with children with LD and comorbid anxiety, OT techniques do not specifically address anxiety as a separate entity. Analogous to adults, it is believed that in general OT programmes anxiety is decreased, but not completely

alleviated (Pfeiffer and Kinnealey, 2003). Green and Ben-Sasson suggest integrated intervention approaches where sensory strategies as well as anxiety specific strategies are employed in cases where children show symptoms of anxiety and SOR (Green and Ben-Sasson, 2010).

There is a dearth of research introducing a PMR home programme as treatment option for children with LD and resultant anxiety, despite the existence of a script designed specifically for young children (Koeppen, 1974). This technique, or variations thereof, is successfully applied by OTs in the adult field of stress management and pain rehabilitation (Courtney and Escobedo, 1990; Vickers, Zollman and Payne, 2001; Jones, Tanigawa and Weiss, 2003). The question then arises whether OTs can teach the PMR technique to children with LD and related anxiety, in order to address anxiety directly, in conjunction with LD specific intervention.

1.3. Purpose of the study

The purpose of this study was to explore the effect of the PMR technique as part of the home programmes of children aged five to 13 years with LD already receiving OT intervention, on the anxiety that they experience and their functional activity participation. The effect was measured in terms of different types of anxious behaviours as well as areas of activity participation that included school performance, peer relationships, play and carrying out a daily routine reported by parents, teachers and the researcher. Some client factors that influence the functional activity participation were also measured and included executive functioning (memory, organisation and planning, time management and applying knowledge), attention and visuospatial skills.

1.4. Research question

How does following a PMR home programme, in conjunction with OT intervention, affect the anxiety levels and functional activity participation of children with LD?

1.5. Aim

The aim of this study was to explore the effect of a PMR home programme, in conjunction with OT intervention, on anxiety levels and functional activity participation of children with LD.

1.6. Objectives

The objectives of this study were:

1. To determine whether implementing a PMR home programme in conjunction with OT intervention after a period of 16- weeks affects the anxiety levels of children with LD.

2. To determine whether implementing a PMR home programme in conjunction with OT intervention after a period of 16- weeks affects the client factors and functional activity participation of children with LD.

1.7. Justification

There is a dearth of research and literature regarding LD and comorbid anxiety, measuring anxiety as one of the outcomes. There is a paucity of studies on LD which addressed anxiety *per se* -or included PMR as an anxiety management technique in children with LD. Previous paediatric studies using PMR specifically focused on a PMR programme's effect on pain- and headache management and functional gastrointestinal disorders in children (Engel, 1992; Christaki and Yfandopoulou, 2014), test anxiety and self-esteem (Wachelka and Katz, 1999) and reducing behavioural problems in children (attention, aggression and trait anxiety) (Lopata, 2003; Nickel *et al.*, 2005; Srilekha, Soumendra and Chattopadhyay, 2013). The aforementioned studies mostly included children from the general population, children with emotional- behavioural disorders, with only specific mention of children with LD in the study by Wachelka and Katz (1999). Other studies included the introduction of stress management interventions, such as deep/diaphragmatic breathing, stretching and movement, and guided imagery in mainstream, primary school children who experience anxiety (Bothe, Grignon and Olness, 2014; Lozada *et al.*, 2014). All the above-mentioned studies yielded positive results; indicating that stress management can influence, to some extent, other aspects of a child's

functioning by reducing the stress/ anxiety that the child experiences as a result of a condition.

The PMR technique can be taught to any person and, after some practise, can be self-administered. This can take place anywhere resulting in immediate relaxation (Varvogli and Darviri, 2011). While children with LD experience anxiety, there is limited evidence at present whether OTs are directly addressing anxiety. Therefore, this study aims to contribute to the literature whether a PMR technique, as a home programme, can be helpful to children who experience LD as an aid in reducing anxiety.

Findings from this study will contribute to the body of evidence regarding the use of PMR in OT. It will aid OTs understanding of using PMR as a home programme. Findings of the study will be disseminated through peer-reviewed journals.

1.8. Outline of the research report

Chapter 1: Introduction

In this chapter LD and related anxiety is introduced, followed by stating the problem, purpose, aim and objectives of the study.

Chapter 2: Literature review

Relevant literature is reviewed in this chapter. This includes a detailed review of LD, looking at the presence of anxiety in children with LD, examining other causes of anxiety in children and examining how LD and anxiety affect a child's functional activity participation. In the following sections OT intervention for LD and anxiety is explored respectively and includes FOR of sensory integration (SI), acquisitional/ visual perceptual, sensory-motor and perceptual- motor approaches. Progressive muscle relaxation as an intervention approach for anxiety is reviewed. Lastly, home programmes as an adjunct to intervention will be discussed.

Chapter 3: Methodology

This chapter presents the research design, participant selection and measurement tools used in the study. Next the research procedure is presented with data analysis, study rigour, validity and ethical considerations concluding this chapter.

Chapter 4: Results

In this chapter the findings of the study are displayed. First, demographics are examined, followed by anxiety and functional activity participation results for each participant. Anxiety and functional activity participation are also compared across the three participants.

Chapter 5: Discussion

In this chapter, findings are discussed in relation to the relevant literature. Demographics and prevalence of LD and anxiety are discussed, followed by a discussion of the two objectives in answering the research question. To conclude this chapter, strengths and limitations of the study are discussed.

Chapter 6: Conclusion

A summary of the research report is presented in this chapter. Implications for practice are discussed and recommendations for future research are made.

CHAPTER 2 : LITERATURE REVIEW

2.1. Introduction

This literature review consists of three main sections. In the first section, LD is discussed, also examining the prevalence in South African statistics. In addition, functional activity participation and LD, and OT intervention for LD are addressed, showing that residual anxiety remains when only LD are treated.

In the second section, the prevalence of children with LD and co-morbid anxiety will be explored. Other causes of anxiety in children are then considered, as anxiety is a very common problem during childhood (Barrett, Lock and Farrell, 2005; Hudson *et al.*, 2009; Rapee, Schniering and Hudson, 2009). The impact of anxiety on children's functional activity participation will then be highlighted. Anxiety specific intervention will then be addressed, including PMR as an evidence-based intervention method.

In the third section, the efficacy of and adherence to home programmes are explored to conclude this literature review.

Some of the literature that was considered during this literature review, dates from the 1980s and 1990s. This information was included in the review as some seminal studies on SI and PMR were published in those time periods.

The following is a list of databases that were accessed in the literature review:

- CINAHL
- PubMed
- PsychiatryOnline
- EBSCO
- Google Scholar

Specific journals that were hand-searched include:

- Journal of Learning Disabilities:

    - Vol 44, issue 1, 2011 and
    - Vol 49, issue 2, 2016
- American Journal of Occupational Therapy
    - Vol 36, issue 9, 1982 to vol 72, issue 1 2018 (A total of 14 of the issues)
- South African Journal of Occupational Therapy
    - Vol 41, issue 1, 2011 to vol 45, issue 1, 2015 (A total of 4 of the issues)

Specific books and other grey literature include:

- Crouch, R. and Alers, V. (2014) *Occupational Therapy in Psychiatry and Mental Health*. 5th edn. Wiley Blackwell. Chapters 15, 16, 18 and 23.
- Kramer, P. and Hinojosa, J. (2010) *Pediatric Occupational Therapy*. 3rd edn. Philadelphia: Lippincot Williams and Wilkins. Chapters 1, 6, 11 and 14.
- Case-Smith, J. and O'Brien, J. (2010) *Occupational Therapy for Children*. 6th edn. Mosby Elsevier. Chapters 6, 11, 12, 13 and 18.
- Silverman, W. K. and Field, A. P. (2011) *Anxiety Disorders in Children and Adolescents*. 2nd edn. Cambridge University Press.
- Occupational Therapy Now- Canadian Association of Occupational Therapy Magazine, Volume 11 Issue 5, 2009.

When conducting the literature search, the following search strings were used:

(learning) AND (disability OR problems OR difficult*) AND (children)

(learning) AND (disability OR problems OR difficult*) AND (anxiety)

(learning) AND (disability OR problems OR difficult*) AND (academic performance OR school performance OR education)

(learning) AND (disability OR problems OR difficult*) AND (intervention OR treatment)

(sensory integration) AND (intervention), (occupational therapy) AND (sensory integration)

(occupational therapy) AND (visual perception) AND (intervention OR treatment OR theory)

(perceptual- motor) AND (frame of reference OR theory OR model)

(sensori- motor) AND (frame of reference OR theory OR model)

(children) AND (anxiety) AND (intervention OR treatment)

(progressive muscle relaxation) AND (anxiety) AND (children)

(progressive muscle relaxation) AND (sleep OR benefits)

(home programmes) AND (occupational therapy)

(home programmes) AND (compliance OR efficacy OR adherence)

2.2. Learning disability

Various terms are used to discuss children who struggle to master school education, process information and communicate effectively. Terms such as learning problems, LDs, LD and learning disorders are commonly found in literature and textbooks. These terms are most often used to describe the same type of problems that children experience. For the purpose of this literature review, the term LD will be used when studies specifically refer to children with LD, otherwise the term LDs will be used.

The DSM-5 refers to a SLD with which a child can be diagnosed. A SLD encompasses deficits in specific skills, referred to as specifiers in the DSM-5, related to either reading, writing, language skills or mathematics or a combination of the aforementioned skills (Sadock and Sadock, 2003; Medina, 2020). A learning disorder is a specific diagnosis that is made and children are usually eligible for special educational services (Sadock and Sadock, 2003). In Table 2.1, SLD specifiers, according to DSM-5, are summarized.

Table 2.1 Diagnostic and Statistical Manual of Mental Disorders-5 classification of specific learning disorder specifiers

Disorder	Description
Specific learning disorder with impaired reading	A child's reading achievement is below the expected level with regards to age, intelligence and education. Problems include: • Word reading accuracy problems • Rate and fluency of reading problems • Reading comprehension problems Dyslexia is alternatively used for problems with spelling, word recognition and decoding of words.
Specific learning disorder with impairment in mathematics	Learning and remembering numbers, numeral facts and calculation difficulties are considered as mathematics disorder. Dyscalculia is also used synonymously.
Specific learning disorder with impairment in written expression	Writing skills are affected and include poor spelling, grammar and punctuation errors and poor handwriting. Dysgraphia is also used synonymously.

Adapted from Johnna Medina (Medina, 2020)

Table 2.1 differs from Table 1.1 introduced in Chapter 1.

Table1.1 Learning disabilities and related disorders

Learning disability	
Specific learning disabilities	**Related disorders**
Auditory processing disorder (APD)	Attention deficit hyperactivity disorder (ADHD)
Dyscalculia	Dyspraxia
Dysgraphia	Executive functioning problems
Dyslexia	Memory problems
Language processing disorder (LPD)	
Non-verbal disabilities	
Visual perceptual-/Visual motor deficit	

Adapted from the Learning Disabilities Association of America (ldaamerica.org, 2012).

Table 1.1 includes the Learning Disability Association of America's classification of LD and related disorders. Even though Table 1.1 also includes the SLD of dyslexia, dyscalculia and dysgraphia, it is a broader view of LD and the related disorders that can be observed in children. All children who suffer from LDs are not formally diagnosed with a SLD, and therefore the Learning Disability Association of America's classification of LD is preferred for

use with this research report. Especially the mention of visual perceptual-/ visual motor deficits and ADHD in the classification in Table 1.1 is relevant to the children with LD who were included in the study.

Learning- problems or difficulties are synonyms and also referred to as problems associated with extrinsic barriers to learning that children experience (Rogers, 2010; Nel and Grosser, 2016). These problems can originate from socioeconomic- or psychosocial problems, systemic factors, pedagogical factors and also sensory deficits such as blindness or deafness (Rogers, 2010; Nel and Grosser, 2016). Socioeconomic- and psychosocial factors are linked to poverty, violence, crime and abuse (Nel and Grosser, 2016). These factors have a negative impact on the physical- emotional and intellectual development of children and disrupt their ability to learn (Nel and Grosser, 2016). Environmental factors are also said to either enable or limit occupational engagement (Law *et al.*, 2010). A child's home environment (characteristics and activities) and parenting styles are contributing factors to the development of cognition and reading abilities (Molfese, Modglin and Molfese, 2003).

Learning disabilities is the term that is more widely used in literature. A LD is not usually associated with a neurological injury, but it can be associated with neurological problems, such as ADHD (Rogers, 2010). Approximately 4% to 5% of school children suffer from LD with a boy: girl ratio of 4:1 (Rogers, 2010). Learning disabilities can be the result of a combination of intrinsic- and extrinsic factors. Extrinsic factors have already been mentioned, intrinsic factors include: genetics, teratogenics, medical risk factors, developmental factors and organic factors (Nel and Grosser, 2016). When referring to genetics, often times a similar history of parental LD can be observed (Nel and Grosser, 2016). An incidence of 35 to 45% of children with LD have a parent who also experiences LD (Nel and Grosser, 2016). Teratogenics is a term used to describe prenatal exposure to harmful substances that negatively influence fetal development (Nel and Grosser, 2016). Harmful substances can include drugs, nicotine in cigarette smoke, alcohol, lead poisoning and pesticides (Nel and Grosser, 2016). These substances have been linked to children who experience behaviour problems, ADHD, intellectual disabilities and also sensory processing problems (Nel and Grosser, 2016). Medical risk factors that lead to the development of LD can include premature births, anoxia, perceptual- and motor disorders, epilepsy, physical disabilities and chronically sick children (Nel and Grosser, 2016). Some children mature at a slower rate when compared to their peers, which leads to delayed development in visual- and auditory perceptual skills and is linked to the development of LD (Nel and Grosser, 2016). Organic factors are described as an imbalance in neurotransmitters in the central nervous system

and ineffective metabolism of proteins and vitamins which result in attention- and behavioural problems (Nel and Grosser, 2016).

As a result of the combined intrinsic- and extrinsic factors that lead to LD, children could display behaviours as summarized in the following nine categories in Table 2.2.

Table 2.2 Behavioural categories observed in children with learning disabilities

Problems	Description of problems
1. Disorders of motor function.	Clumsiness, poor gross- and fine motor skills, dyspraxia, equilibrium deficits and sensorimotor problems.
2. Educational disorders.	Transcription, cursive writing, organizing time and materials, understanding directions, reversing letters, cutting, colouring, drawing and figure ground perception.
3. Disorders of attention and concentration.	Short attention span, restlessness, impulsivity and perseveration.
4. Disorders of thinking and memory.	Abstract reasoning, concept formation, poor short- and long-term memory capacity.
5. Speech and communication problems.	Slurred words, articulation problems, difficulty with small talk and sequencing words and sentences.
6. Auditory difficulties.	Auditory-perception and memory problems.
7. Sensory integrative and perceptual disorders.	Laterality and directionality and poor visual perception skills, including spatial difficulties.
8. Psychosocial problems.	Temper tantrums, antisocial behaviour, poor self-esteem and self-concept.
9. Specific learning difficulties.	Dyslexia, dyscalculia and dysgraphia.

Adapted from Occupational Therapy for Children (Rogers, 2010, p173-174)

From clinical experience, the researcher has noted that LDs are often identified in educational settings, but not always formally diagnosed as SLD according to DSM-5 criteria. The Department of Education introduced Education White Paper 6 in 2010, with guidelines for inclusive teaching and learning in our schools (Department of Basic Education, 2010). White Paper 6 explains the differentiation of learning programmes, work schedules and lesson plans to achieve inclusive teaching (Department of Basic Education, 2010). Individual Support Programmes (ISPs) (developed by a multi-disciplinary team, including psychologist, speech therapist, occupational therapist and educator) and Individual Learning Plans (ILPs) (differentiated lessen plans and therapeutic intervention) are suggested for children who experience barriers to learning (Department of Basic Education, 2010). From 2012, children

follow a set curriculum (Curriculum Assessment Policy Statements/ CAPS), with predefined guidelines for educators on what to teach and assess for Grades R to 12 (Department of Basic Education, 2010). It is thus encouraged that children who experience LDs should be accommodated in their mainstream schools, as far as possible, with adaptations to their lesson plans, assessments and receiving therapeutic intervention. Occupational therapists concerned with all areas of a child's functional activity participation. The impact of LDs on a child's functional activity participation will be discussed in greater detail in the following section.

2.3. Functional activity participation related to learning disability

Children with LD have a compromised quality of life (Thakkar *et al.*, 2016). A child's quality of life refers to how a child perceives their overall wellbeing in relation to their ability to participate in chosen, meaningful activities (Case-Smith, 2010). Children with LD experience various problems during activity participation, which include their activities of daily living (ADL), play/leisure, sleep and school performance (Ben-Sasson *et al.*, 2007; Schneck, 2010).

Children who experience problems during activity participation could be referred to OTs for evaluation and intervention. Evaluation in OT is a top-down, occupation- centred approach whereby OTs determine what a child wants and needs to do, followed by identifying aspects that facilitates or limits participation (Stewart, 2010). Functional activity participation is related to specific client factors, the demands of an activity and the context/ environment (Stewart, 2010). An evaluation then typically includes standardized- and non- standardized tests, skilled observation during activity participation (including naturalistic observation), interviews (with the child, parents, teachers or others who has contact with the child) and environmental assessments. Examples of tests used to evaluate client factors include: Developmental test of Visual Perception, Sensory Profile, Test of Visual-Perceptual Skills, Sensory Integration and Praxis Tests etc. Functional activity participation tests could include Knox Preschool Play Scale, School Function Assessment, Pediatric Evaluation of Disability Inventory, Canadian Occupational Performance Measure etc. Specific environmental/ context tests could include, for example, the Home Observation for Measurement of the Environment. Skilled/ naturalistic observations are made during a child's participation in standardized and non-standardized tests. Observations are also made when a child participates in functional activities (ADL, playing, socializing and schoolwork) in order to determine their level of

participation as well as barriers to their participation. These activities would also be observed in various environments in order to determine the environment's influence on activity participation. When doing interviews with adults who are involved in caring for a child, informal open- or closed ended questions could be asked. Interviews can also be complimented with questionnaires like the Conners Comprehensive Behaviour Rating Scales (Conners CBRS), International Classification of Functioning, Disability and Health core sets (ICF core sets) etc., which could be completed on various occasions in order to have a subjective measure of progress.

Following a comprehensive evaluation, barriers in terms of functional activity participation are usually observed for children with LDs. The specific barriers will be discussed in the following paragraphs.

Problems associated with ADL include grooming difficulties (combing/ styling hair, difficulty obtaining supplies, applying toothpaste, fasteners on clothing, tying shoes and matching clothing). Instrumental ADL activities might also pose difficulties, including managing the home (making bed, tidying room, sorting clothes) and pocket money, using telephones or computers and taking care of personal belongings (Schneck, 2010).

Difficulty in performing play occupations may include problems with drawing, colouring, cutting, and construction games such as building puzzles. Children with LD also tend to play with a limited number of toys for very short periods (Fallon and Maccobb, 2013). For a substantial amount of time, they observe other children playing instead of engaging in play themselves (Fallon and Maccobb, 2013).

Children with LD achieve school grades which do not correspond to their actual potential/ability (Mammarella *et al.*, 2016; Thakkar *et al.*, 2016). Children tend to fail more grades and perform poorly on academic achievement tests, always experiencing that reading and spelling are areas of difficulty (Kavale and Forness, 1996; Loe and Feldman, 2007). Reading comprehension, writing and listening skills, as seen in children with ADHD, also have a negative impact on their school performance (Rogers, 2010; Schneck, 2010).

Persistent problems with social participation are indicated for children with LD (Loe and Feldman, 2007; Mammarella *et al.*, 2016; Thakkar *et al.*, 2016). Children diagnosed with ADHD can demonstrate inappropriate social behaviour due to their impulsiveness (Davidson, 2010; Rogers, 2010). Forgetfulness and being disorganized also negatively impact their peer

relationships, especially by not following through on commitments that they make (Davidson, 2010; Rogers, 2010).

When examining the impact of untreated ADHD, one can relate It to different life stages (Harpin, 2005). In preschool children, oppositional behaviour and poor social skills are prominent. Throughout primary school years the following stand out: academic failure, peer rejection, low self-esteem, poor sleep patterns, strained family relationships and difficulties with carers at home or on outings. When examining the impact on adolescents, the following are prominent: increased antisocial behaviour and diagnosis with oppositional defiant disorder, conflict at home, dropping out of school or college, teenage pregnancy, traffic violations and criminal behaviour. As an adult, vocation is affected. Adults with ADHD may need to choose specific types employment, are more likely to be dismissed and have interpersonal difficulties with employers and co-workers (Harpin, 2005).

In longitudinal research studies of children with LD, the conclusion suggest that a high risk of lasting deficits exists (Kavale and Forness, 1996; Loe and Feldman, 2007). Children with LD always experience that reading and spelling are areas of difficulty for them and they are also at risk for low self-esteem. In follow-up studies, it is evident that fewer adults with LD (the grown-up children with LD) are employed. When they do attain employment, it is usually part-time with minimal wage and related to less job satisfaction. It is evident that the nature of the problems changes with age and that there are problems that are more particular to adults (Kavale and Forness, 1996).

In conclusion, the functional activity participation of children with LDs are affected across all spectrums. The literature indicates that education, social participation, ADL, sleep and play are areas of activity participation reflecting poor outcomes. The poor outcomes seem to continue into adolescence and adulthood. Early identification and intervention is thus necessary to influence the poor outcomes and improve the quality of life of children with LDs.

2.4. Learning disability and occupational therapy intervention

As described earlier, specific LD include APD, LPD, dyscalculia, dysgraphia and dyslexia (ldaamerica.org, 2012). Occupational dysfunction specific to children's occupation of school/education and learning, including specific client factor and performance skills deficits have been described.

Early OT intervention is focused on SI, play as well as parent education (Rogers, 2010). Later in school, SI may continue with additional intervention for social, play, perceptual-motor integration and also writing skills intervention (Rogers, 2010).

2.4.1. Frames of reference for occupational therapy intervention in learning disabilities

All healthcare professionals ought to use theory to guide practice (Kramer and Hinojosa, 2010). Different theories are made practical and useful in the form of a FOR. A FOR thus organizes theoretical information and explains the practical application thereof (Kramer and Hinojosa, 2010). In OT, LDs are addressed using various FOR including, SI, a frame of reference for visual perception/ acquisition and sensorimotor- and perceptual motor FOR (Molineux, 1993; Kramer and Hinojosa, 2010).

2.4.1.1. Sensory Integration

Sensory integration was originally described by Ayres as “the ability to organize sensory information for use.” (Griffer, 1999). Ayres discussed the complex relationship between learning, language acquisition and SI. Sensory integration intervention was justified for children diagnosed with LDs, language-, learning- and reading problems (Griffer, 1999; Leong, Stephenson and Carter, 2014). In fact, the majority of Ayres’ research was conducted with children diagnosed with LDs (Griffer, 1999).

The goal of providing SI intervention is to enable a child to participate successfully in meaningful daily occupations, within a natural context (Pollock, 2009). Sensory integration intervention entails the provision of controlled sensory stimulation (Leong, Stephenson and Carter, 2014). This stimulation can be to any one of the body’s senses, but especially tactile, proprioceptive and vestibular senses (Leong, Stephenson and Carter, 2014). These sensory experiences are then matched with a ‘just right challenge’, which elicits from a child an ‘adaptive response’ (Pollock, 2009). The intervention modality is play. Play activities are set up in a therapy room, also involving large pieces of equipment such as rollers, suspended equipment, trampolines, etc. A therapist uses activities and the equipment to enable the child to use the sensory input obtained from the equipment and activities to organize an adaptive response (Pollock, 2009). The interaction between sensory systems provide

integrated information, which facilitates learning and more complex behaviours (Kramer and Hinojosa, 2010).

Sensory integration intervention is said to be able to remediate underlying neurological difficulties that influence sensory processing in children, due to neural plasticity (Leong, Stephenson and Carter, 2014). When sensory information in tactile, proprioceptive and vestibular systems is integrated, theory suggests that there are also higher order effects on learning skills including reading and writing (Leong, Stephenson and Carter, 2014), resulting in improved functional activity participation.

Since its inception, a variety of findings on the efficacy or impact of SI, with different methodologies, have been published. Importantly, more than 70 articles have been published which documents this history (Parham *et al.*, 2011).

In an early meta-analysis, Ottenbacher found that SI intervention was most effective when the dependent variable was a motor- or reflex measure and least effective when the dependent variable was a type of language measure (Ottenbacher, 1982). Additionally, Ottenbacher indicated that SI intervention was most effective with children diagnosed as 'at risk' for LD and least effective with a diagnosis of mental retardation. Importantly, Griffer criticized this meta-analysis for not comparing the efficacy of SI to other treatment modalities (Griffer, 1999).

Schaffer, in 1984, criticized the methodology of early SI studies (Schaffer, 1984). Schaffer reviewed five outcome studies and reported Type I errors in four of the studies as well as Type II error in the remaining study. He concluded that some of the earlier research is fraught with methodological errors and that the need exists for more controlled and systematic investigation into SI as an intervention method (Schaffer, 1984).

In 1992, Polatajko, Kaplan and Wilson reviewed randomized control trials (Polatajko, Kaplan and Wilson, 1992). Their findings suggested that the reviewed literature did not support SI as an effective intervention for children with LD and academic problems. It could also not be determined whether or not SI is more effective than perceptual-motor approaches. They concluded that more research is necessary in order to determine whether SI is more effective than maturation alone (Polatajko, Kaplan and Wilson, 1992). This is in line with another study done in the same year. Sensory integration therapy was compared to tutoring in a study by Wilson et al. (Wilson *et al.*, 1992). Participants were included in either SI sessions or individual tutoring for 75 sessions. Findings suggested that there was no significant

difference after a period of six and then 12 months between the outcomes of the two groups. Reading and academic measures displayed equal improvements. Surprisingly motor function also improved in the tutoring groups (Wilson *et al.*, 1992).

In 2007, a randomized control trial (RCT) of 24 participants, comparing OT-SI to an activity protocol and no treatment groups of children diagnosed with sensory modulation disorder (a type of sensory integrative disorder resulting in learning and functional difficulties) was conducted (Miller *et al.*, 2007). The intervention was manualized, and they did adhere to a self-constructed fidelity-to-treatment measure, which was not previously implemented when measuring the effectiveness of SI. Their findings suggested that OT-SI was significantly more effective than the activity protocol and the no treatment conditions (Miller *et al.*, 2007). Internalizing emotional behaviours also improved in the OT-SI group of children (Miller *et al.*, 2007).

In 2010, a systematic review of 27 studies, to determine the effectiveness of SI was conducted (May-Benson and Koomar, 2010). Results were positive and indicated gains made in children's ability to attend, sensorimotor skills, reading-related skills etc. Some gains were maintained from three months up to two years after discontinuing intervention (May-Benson and Koomar, 2010). However, the study's findings may be limited due to Type II errors. Sample sizes were small, there were no fidelity-to-treatment measures and intervention dosages varied.

A fidelity measure for evaluating the use of SI intervention was developed in 2011, and included essential components for deeming an intervention as SI (Parham *et al.*, 2011). After identifying core SI intervention elements, they then analysed 34 SI intervention studies for consistency of their descriptions of intervention against these identified core elements. Inconsistencies of intervention descriptions in the analysed studies were found, indicating that the validity of outcome studies is threatened by weak fidelity (Parham *et al.*, 2011).

In more recent studies employing the fidelity measure when utilising SI intervention, results are positive and indicate improvements in functioning (Schaaf *et al.*, 2012, 2018).

While early studies were methodologically flawed, it appears that more recent studies have reiterated the value of SI, also when compared to other interventions.

2.4.1.2. Visual perceptual/ acquisitional frame of reference

As set out in Table 2.2, Shapiro characterised the behaviour of children with LD to include poor visual perceptual skills. Visual perceptual function is described as the interpretation of visual sensory information, which affects functional activity participation in all areas and especially school performance and a child's role as student (Kramer and Hinojosa, 2010). Visual perceptual- and perceptual motor skills are integral for academic performance in reading and writing. According to Kramer and Hinojosa (Kramer and Hinojosa, 2010), visual perception comprises of receptive and cognitive components. Receptive components include: acuity, accommodation, binocular fusion, convergence, ocular motor skills, stereopsis and visual field. While visual cognition includes: visual attention, visual memory, visual discrimination (form constancy, visual closure and figure ground), visual spatial skills (position in space, spatial relations, depth perception and topographic orientation) and visual motor integration (Kramer and Hinojosa, 2010). In the remediation of visual reception, optometrists and OTs collaborate on common goals.

Repeated drills and exercises, environmental adaptations and specific teaching-learning techniques including setting task parameters, grading tasks, modelling, practice as well as reinforcement during tasks, are applied to shape behaviours that contribute to skill acquisition (Dankert, Davies and Gavin, 2003; Kramer and Hinojosa, 2010).

In a 2003 study by Dankert, Davies et al. (Dankert, Davies and Gavin, 2003) preschool children with developmental delays received OT intervention for visual-motor skills with the focus on an acquisitional FOR. These children demonstrated significant gains in terms of visual-motor skills and also at a rate that exceeded typical development (Dankert, Davies and Gavin, 2003).

While there are numerous studies examining SI as a FOR, fewer studies exist that examine the utility of the visual perceptual FOR, as described by Kramer and Hinojosa.

2.4.1.3. Sensory-based-, Sensorimotor- and perceptual motor approaches

Similar to SI, sensory-based-, sensorimotor-and perceptual motor approaches also emphasize the importance of the integration of sensory information for optimal activity participation. Key differences include SI's focus on helping a child maintaining an appropriate level of alertness, collaborating with the child with regards to activity choices as well as the

emphasis on a 'just right challenge' (Parham *et al.*, 2011). With the sensory-based approaches, a therapist controls the type and amount of sensory input to the child's body, with components of repetition and practice being key. There is more child directedness with regards to type, amount and intensity of sensory input when using a SI approach. Sensory-based and sensorimotor approaches were derived from work by Roodt and Bobath respectively (Molineux, 1993).

Sensory-based approaches are referred to in literature as impairment-orientated approaches meaning that these approaches aim to improve functional activity participation by correcting/ improving underlying impairments in body structure or function (Polatajko and Cantin, 2010). Sensory-based approaches provide specific sensory stimulation. Sensorimotor and perceptual motor approaches provide a variety of motor activities where sensory stimuli also vary. The assumption underlying these approaches is that a motor system cannot function optimally without the integration of sensory information (Polatajko and Cantin, 2010).

Degangi and Goodin in 1984, found that structured sensorimotor therapy was effective in improving gross motor and functional skills (self-care, visual-motor skills) in children with sensorimotor problems (Degangi and Goodin, 1993).

In most of the reviewed literature, a firm conclusion suggests that there is an urgent need for stronger, well-controlled study designs when examining the efficacy of treatment FOR (Griffer, 1999; Miller *et al.*, 2007; May-Benson and Koomar, 2010; Polatajko and Cantin, 2010).

In none of the above critiqued studies concerning LD intervention was anxiety measured as one of the outcomes after an intervention. Sensory integration as a FOR is also utilized when intervening with children with sensory modulation disorder and co-existing anxiety. Even in studies examining the efficacy of SI for treating sensory modulation, anxiety is not always measured as an intervention outcome, even though OT-SI was proven to improve internalizing behaviours as measured by the Child Behavior Checklist in a study by Miller et al. (Miller *et al.*, 2007). Studies examining intervention for children diagnosed with ASD does measure intervention efficacy and the impact on anxiety (Storch *et al.*, 2013). One adult study relating to sensory defensiveness and secondary anxiety also measured anxiety as a treatment outcome (Pfeiffer and Kinnealey, 2003). The intervention was based on SI principles and did not include anxiety- specific intervention. However, in the above studies anxiety was reportedly not completely alleviated and residual anxiety remains. There is thus a paucity of literature measuring intervention effect on anxiety present in children with LDs. It

is unclear whether LDs intervention has the effect of also decreasing/ alleviating anxiety experienced by children diagnosed with LDs.

In the following section, the prevalence of children with LDs and co-morbid anxiety will be discussed in more detail.

2.5. Learning disability and anxiety

In several studies the co-existence of LD and anxiety have been stated (Yu *et al.*, 2006; Beauchemin, Hutchins and Patterson, 2008; Nelson and Harwood, 2011; Mammarella *et al.*, 2016; Thakkar *et al.*, 2016). In studies of school-aged children with diagnosed LD compared to their peers, higher mean scores of anxiety were identified on anxiety measures (Thakkar *et al.*, 2016). In a South African context, based on census results, LD is implicated in 0.4% of children, whereas behavioural and emotional problems are indicated for 0.2% of children (Nel and Grosser, 2016). These problems are also more prevalent in boys compared to girls (Nel and Grosser, 2016).

Three theories exist in the literature to explain the link between specific LD and anxiety. The first and most accepted theory is that anxiety develops secondary to difficulties that learning disabled students experience in academics (Beauchemin, Hutchins and Patterson, 2008; Nelson and Harwood, 2011; Thakkar *et al.*, 2016). Secondly, it is theorised that there are innately higher levels of anxiety in some students, leading to the development of LD. Thirdly, it is theorised that anxiety and LD are connected due to a third factor of genetics or biology, leading to frequent co-occurrence (Nelson and Harwood, 2011; Thakkar *et al.*, 2016). Little evidence to either back or disconfirm any of the three theories is available (Nelson and Harwood, 2011). The literature appears to favour the first theory, which is most commonly assumed to explain the co-occurrence of LD with anxiety and other emotional difficulties.

The theory that anxiety develops as a result of LD is also referred to as secondary reaction theory (Nelson and Harwood, 2011). In their meta-analysis, Nelson and Harwood examined the comorbidity of LD and anxiety in 58 studies. A total of 3336 children with LD were included in this meta-analysis. Findings suggested that 70% of children with LD experience anxiety when compared to their peers who do not have LD (Nelson and Harwood, 2011). This is consistent with literature comparing children with NVLD to children with reading disabilities (RD) and typically developing children. Children with NVLD and RD were reported

to have more anxious symptomology than typically developing children (Mammarella *et al.*, 2016). In childhood the mastery of academic skills (reading, writing, mathematics) is a developmental task (Nelson and Harwood, 2011). Children are aware of the fact that their teachers and parents place a high level of importance on their educational achievement (Nelson and Harwood, 2011). Therefore, if a child struggles to master these skills, they could expect possible academic failure and therefore develop anxiety (Nelson and Harwood, 2011; Mammarella *et al.*, 2016). High levels of anxiety in turn then also impacts a child's cognitive processes and academic performance (Nelson and Harwood, 2011).

Children with LD often present with co-morbid diagnoses, which could include ADHD, Anxiety Disorders and SMD (Reynolds and Lane, 2009; ldaamerica.org, 2012; Tauby, 2016). Furthermore, in a South African contexr, anxiety symptoms are often present in children with SMD, as these children are at higher risk for developing anxious behaviour (Tauby, 2016). Anxiety scores are especially associated with children with LD and sensory avoidance behaviours (a sub-type of SMD) (Tauby, 2016).

Literature thus illustrates that children with LD experience anxiety and that this anxiety has a snow-ball effect on their academic performance. It is however important to note that children experience anxiety due to other factors, which could also negatively impact their functional activity participation. Other causes of anxiety during childhood will be examined in the next section.

2.6. Other causes of anxiety in children

Fear, anxiety and worry are common during childhood (Silverman and Field, 2011; Broeren *et al.*, 2013; Dacey, Mack and Fiore, 2016). In most children, fear and anxiety seem to be guided by their developmental level, especially cognition, and is transitory (Silverman and Field, 2011).

Typical fears that lead to the experience of 'normal' anxiety during childhood include the fear of separation from caregiver, darkness, noise, animals, physical harm, danger, strangers, pain, ghosts, and monsters (Silverman and Field, 2011). A study was conducted to explore the presence of age patterns in the expression of anxiety symptoms in children. Findings indicated that separation anxiety symptoms decrease as children get older (Broeren *et al.*, 2013). Generalized anxiety is more prevalent during adolescent years, and not really seen

during early childhood (Broeren *et al.*, 2013). Mixed results are reported for social anxiety; some studies report an increase in symptoms throughout childhood, whereas other studies report no distinct pattern (Broeren *et al.*, 2013). The consensus remains that anxiety symptoms remain relatively stable in typical developmental trajectories of children (Broeren *et al.*, 2013).

In order to determine whether anxiety is of clinical significance, the anxiety symptoms of children are compared to diagnostic criteria of defined phobias and anxiety disorders (in relation to either DSM-IV TR or DSM-5 criteria, depending on which set of criteria were applicable at the time of the study) (Silverman and Field, 2011). Anxiety disorders are among the most common disorders of childhood and adolescence, and said to affect 4% to 13% of children (Barrett and Turner, 2001; Rapee, Schniering and Hudson, 2009; Davidson, 2010). A combination of three factors are believed to lead to the development of anxiety disorders and include biological/ genetic-, psychological/ environmental- and social- and factors, with reference to a biopsychosocial model (Dacey, Mack and Fiore, 2016).

There is a genetic tendency toward anxiety which suggests that anxiety is a familial occurrence (Silverman and Field, 2011; Dacey, Mack and Fiore, 2016). Other biological factors include temperament type and hormonal imbalance (Dacey, Mack and Fiore, 2016).

Psychological factors that lead to the development of anxiety disorders are the result of traumatic experiences or events and affect the way that a child sees the world (Silverman and Field, 2011; Dacey, Mack and Fiore, 2016). Traumatic events can include vehicle accidents, illness, natural disasters, violence, abuse and assault (Silverman and Field, 2011). An anxious child becomes hypervigilant and finds it difficult to relax, with an inaccurate view of reality (Dacey, Mack and Fiore, 2016).

Social factors that influence the development of anxiety are related to a child's interactions with family and friends and also include parenting styles (Dacey, Mack and Fiore, 2016).

The aforementioned factors lead to physiological arousal, especially the fight-or-flight response. This can include an increased heart rate, breathing faster, sweating, fainting/ dizziness, increased motor ability and decreased mental ability (Dacey, Mack and Fiore, 2016). There is also growing evidence that suggest that children with anxiety disorders display alterations to physiological systems when compared to 'normally' anxious children (Silverman and Field, 2011).

Types of anxiety disorders are displayed in Table 2.3 below.

Table 2.3 Types of anxiety disorders

Anxiety disorder	Description
Specific phobia	Different types exist and can include animals, environmental, blood-injection-injury types, situations etc. Examples include acrophobia (fear of high places), hypochondria (fear of getting sick), zoophobia (fear of animals).
Social phobia	A child can become shy and withdrawn to the extent of avoiding public exposure or situations. Children are very self-conscious and are excessively worried about how other people evaluate them.
Separation anxiety (SA)	Experiencing excessive and persistent anxiety when being separated from parents or caregivers.
Generalized anxiety disorder (GAD)	Children who experience persisting and unrealistic worries in various situations.
Panic disorder	Children experience panic attacks, which is short episodes of extreme anxiety with mental- and physical sensations.
Agoraphobia	Agoraphobia is used in the place of social phobia when anxiety is very severe, and children are unable to participate in most social circumstances.
Obsessive compulsive disorder (OCD)	Children experience recurring thoughts/ obsessions, which compel them to perform repetitive behaviours/ compulsions, with no functional purpose, which is accompanied by exaggerated anxiety.
Posttraumatic stress disorder (PTSD)	This is caused by a traumatic event, which is re-experienced as thoughts.

Adapted from: Your anxious child, Dacey, Mack and Fiore (Dacey, Mack and Fiore, 2016, p26-37) and Occupational Therapy for Children (Davidson, 2010).

Anxiety problems tend to be chronic and has an intense impact on a child's life (Broeren *et al.*, 2013). Anxiety disorders are diagnosed by a psychiatrist or psychologist. Management includes medication and also psychotherapy (Davidson, 2010).

The presence of sub-clinical levels of anxiety negatively influence children's functional activity participation, which will be discussed in the following section.

2.7. Effect of anxiety on functional activity participation

Anxiety symptoms debilitate children and cause problems across the different areas of activity participation, including ADL, sleep, social participation, play and school performance.

Children who experience anxiety have been known to have impaired social skills as well as daily living skills (Storch *et al.*, 2013; Sciberras *et al.*, 2019). When children experience social anxiety, they are unable to participate in activities which they would normally enjoy or are expected to participate in (Davidson, 2010). This is a consequence of being extremely self-conscious and feeling at risk for embarrassment or criticism (Davidson, 2010). The physiological symptoms of anxiety that children experience (blushing, increased heart rate, sweating, feeling out of breath etc.) can overwhelm a child and lead to behavioural reactions of crying or having a tantrum, which in turn draws negative attention from others, implicating poor peer relations and social participation (Davidson, 2010).

Children with OCD especially experience problems in terms of balancing daily activities (Davidson, 2010). They spend a large amount of time on their obsessive- compulsive rituals, limiting time available for other activities. Activities of daily living that are typically affected include bathing, dressing, using the toilet, studying or packing school bags (Davidson, 2010). Children with OCD also tend to rather spend time alone instead of being confronted with others' reactions to their behaviour and thoughts, which negatively impacts social participation (Davidson, 2010).

Anxiety disorders during childhood affect school performance, social- and behavioural skills of children (Ginsburg *et al.*, 2020). Persistently high levels of anxiety are related to negative educational outcomes of failing to complete school (Mammarella *et al.*, 2016).

Clinically anxious children suffer from sleep disturbances (Dacey, Mack and Fiore, 2016). Some of the specific sleep disturbances that they struggle with include: Night terrors/ nightmares, sleep walking and problems with sleeping alone or sleeping away from home (Hudson *et al.*, 2009) There is a link between anxiety and sleep problems in children diagnosed with ADHD (Sciberras *et al.*, 2019).

Early identification and intervention is thus necessary in an attempt to improve the above mentioned outcomes and the quality of life for these children. Anxiety specific evaluation and intervention is discussed in the following section.

2.8. Evaluation of and intervention for anxiety in occupational therapy

The evaluation of children who present with emotional and/ or behavioural difficulties, is potentially challenging (Davidson, 2010). This can be due to the complex nature of certain evaluation tasks, but also due to the difficulty that a child might have in cooperating with traditional evaluation methods (Davidson, 2010). In these cases, teacher and parent questionnaires and checklists are especially helpful tools and can include: The Spence Children's Anxiety Scale (SCAS- parent, teacher and child versions), The Screen for Child Anxiety Related Disorders (SCARED- parent and child version) and The Revised Children's Manifest Anxiety Scale (RCMAS- self- report). Naturalistic observations in contexts like the school and home are important components of the evaluation (Davidson, 2010). Observing children while they perform functional activities (informal or through completing structured observational measures) like ADL, play, socializing and while doing school work provides multi-faceted information with regards to emotional-, social-, motor- and cognitive development (Davidson, 2010). Observations of a child's behaviour (e.g. avoidance, nail biting etc), reactions (e.g. sweating, fast breathing, flushed appearance) and participation during the administration and completion of other evaluation materials and activities provide valuable information of a child's emotional state and experience of anxiety.

In occupational therapy literature pertaining to children, for example Case-Smith's Occupational Therapy for Children, anxiety specific intervention is not described. Anxiety is discussed as forming part of sensory modulation/ integration difficulties or as secondary to LDs (Parham and Mailloux, 2010; Rogers, 2010). When intervention is discussed, it is in relation to the 'primary' diagnosis and not specifically aimed at anxiety *per se*. When searching for studies in OT for anxiety intervention for children, studies again revert anxiety back to having a sensory or LD root and intervention then describe the interventions listed for treating LD or sensory modulation (Parham and Mailloux, 2010; Rogers, 2010).

When treating specific anxiety disorders and planning stress management intervention, OTs use principles from behavioural, cognitive behavioural and psychodynamic theories as well as OT models (Crouch and Alers, 2014). Intervention could then include relaxation therapy, social skills training, systematic desensitization and psycho- education (Crouch and Alers, 2014).

Meditation techniques are numerous and vary among different disciplines (Beauchemin, Hutchins and Patterson, 2008). One type of meditation is described as movement meditation and is based on yoga-type principles. Progressive muscle relaxation also utilizes some

similar principles. These principles include assuming a relaxed posture, control of breathing, contracting and relaxing specific muscle groups and also focusing on sensation during a relaxation phase (Beauchemin, Hutchins and Patterson, 2008). Beauchemin, Hutchins et al. provided positive outcomes for using meditation and relaxation to reduce anxiety and improve academic performance in children with LDs (Beauchemin, Hutchins and Patterson, 2008).

Cognitive behavioural intervention is described by Barrett and Turner, i.e. 'Friends for Children', a group-based program for clinically anxious children (Barrett and Turner, 2001). This program's focus is on teaching the children and their parents, skills and techniques for coping with and managing their anxiety. The techniques include relaxation, cognitive restructuring, attention training, parent-assisted exposure and family support (Barrett and Turner, 2001). Children who received this school-based intervention demonstrated improvements in self- report measures of anxiety (Barrett and Turner, 2001). Test anxiety in children with LD is also addressed by cognitive behavioural intervention. Post-intervention positive results were indicated for reducing test anxiety and improving academic self-esteem of high school- and college students (Wachelka and Katz, 1999). The treatment consisted of an eight-week program including PMR, guided imagery, self-instruction training and training in study methods and test-taking skills. Significant reduction in test anxiety and also improvement in study skills and academic self-esteem was seen in the treated group as compared to the control group (Wachelka and Katz, 1999).

In another study, childhood obesity and the connected prolonged activation of the stress system's snowball effect on weight, growth and bone mass were explored (Stavrou *et al.*, 2016). As a part of their intervention (including diet, physical training and stress management), the children attended eight individual sessions and participated in stress management techniques. The techniques included PMR, diaphragmatic breathing, guided imagery and cognitive restructuring. The children received CDs with the recorded instructions, performed the techniques daily for eight weeks and completed a diary to record their efforts. The results from an anxiety questionnaire indicated that there was a significant decrease in anxiety symptoms (Stavrou *et al.*, 2016).

From the literature search it is evident that PMR is included in a considerable number of stress management programmes and has promising effects of reducing anxiety (Wachelka and Katz, 1999; Barrett and Turner, 2001; Beauchemin, Hutchins and Patterson, 2008;

Stavrou *et al.*, 2016). Progressive muscle relaxation will be discussed in more detail in the following section.

2.9. Progressive muscle relaxation

Varvogli describes PMR as a stress management technique that reduces anxiety with the alternate tensing and relaxing of muscles (Varvogli and Darviri, 2011). This technique was developed in the 1920s by a physician, Edmund Jacobson. He argued that muscle tension co-exists with anxiety, thus anxiety can be reduced by relaxing muscle tension. (Varvogli and Darviri, 2011). Progressive muscle relaxation is used extensively in stress management of adults with anxiety disorders (Conrad & Roth 2007).

The mechanism by which PMR is said to reduce anxiety is based on research into the general stress response (Conrad & Roth 2007). In the autonomic nervous system, sympathetic activation forms part of the 'fight or flight' response, which is associated with anxiety provoking situations (Conrad and Roth, 2007). The 'fight or flight' response is associated with an increased heart rate and blood pressure, more blood flow to muscles responsible for movement (voluntary muscles) and hyperglycaemia (Conrad and Roth, 2007). Parasympathetic activation results in opposite actions and leads to rest and relaxation; heart rate and blood pressure decreases, muscles relax and the digestive system is more active (Conrad and Roth, 2007). When doing PMR exercises, parasympathetic activation is attempted by reducing the muscle tension and other physiological signs of the 'fight or flight' response in order to achieve relaxation (Conrad and Roth, 2007).

2.9.1. Progressive muscle relaxation as an evidence-based approach

Progressive muscle relaxation is evidenced to be a popular intervention method for stress-related conditions in school settings (Wachelka and Katz, 1999; Heffner, Greco and Eifert, 2003; Lopata, 2003; Nickel *et al.*, 2005; Srilekha, Soumendra and Chattopadhyay, 2013). In various studies of its application, PMR was found to be beneficial for improving headaches, asthma and anxiety in children and adolescents (Conrad and Roth, 2007; Varvogli and Darviri, 2011; Hashim and Zainol, 2015; Jong *et al.*, 2019).

It is important to note that the non- specific use of PMR is not as effective as it's use for specific medical conditions (Lohaus and Klein-Hessling, 2003; Hashim and Zainol, 2015). In two studies who included 'normal' primary school children, 10- and 11-years-olds and fourth-

to-six-graders respectively, the results indicated no significant effects on emotional distress variables, including anxiety, throughout the different groups (Lohaus and Klein-Hessling, 2003; Hashim and Zainol, 2015). Progressive muscle relaxation was used as a preventative measure in both studies, as the participants' anxiety levels when entering the study were normal. Although some short term effects of relaxation were noted, no medium-to-long-term effects remained (Lohaus and Klein-Hessling, 2003). Continued exposure to PMR and follow-up studies when children are in high school, with more stressors and test anxiety, could be helpful in determining whether PMR can be taught as a preventative measure.

Positive effects after people (adults and children) with elevated levels of anxiety attend PMR sessions include: tension reduction, decreased physiological arousal, less aggression, reduced levels of salivary cortisol, lower heart rates, less test anxiety and improved attention (Wachelka and Katz, 1999; Lohaus and Klein-Hessling, 2003; Lopata, 2003; Pawlow and Jones, 2005; McCallie, Blum and Hood, 2015).

Procedural differences and the number of sessions of PMR seem to generate varying results. From the reviewed literature studies on PMR, many differences could be observed in terms of duration of PMR training sessions and the frequency of training. Training periods varied from four weeks to eight weeks. Duration of the PMR sessions ranged from 15-minutes daily- three- times a week, to 30- minutes twice weekly, to one- hour weekly (Wachelka and Katz, 1999; Nickel *et al.*, 2005; Srilekha, Soumendra and Chattopadhyay, 2013). Studies which included direct instruction by a trained professional and combined home practise over a period of eight-weeks had more promising results than studies only including PMR over a few sessions (five to 10) with no home practise (Wachelka and Katz, 1999; Lohaus and Klein-Hessling, 2003; Lopata, 2003; Nickel *et al.*, 2005; Srilekha, Soumendra and Chattopadhyay, 2013). Direct instruction by a trained professional led to more lasting effects than instruction via audiotape at home (Wachelka and Katz, 1999; Lohaus and Klein-Hessling, 2003; Nickel *et al.*, 2005). Further research is suggested to examine the optimal number of sessions (Hashim and Zainol, 2015).

Progressive muscle relaxation is commonly used in conjunction with other intervention modalities. Examples include PMR and- guided imagery, meditation, biofeedback as well as cognitive-behavioural interventions (McCallie, Blum and Hood, 2015; Tsitsi, Charalambous and Papastavrou, 2017). The type of intervention PMR is combined with, is dependent on the type of problem or condition that the client presents with and is tailored to individual needs (McCallie, Blum and Hood, 2015).

There is thus evidence of effectiveness of PMR as an appropriate and helpful tool when used in intervention with children or adults experiencing anxiety. In the following section the use of PMR for treating anxiety in children will be elaborated on.

2.9.2. Treating stress and anxiety in children using progressive muscle relaxation

King, Ollendick et al. (1998) report that before employing relaxation training as an intervention procedure, a conceptually-sound rationale should exist (King *et al.*, 1998). Headaches and test anxiety have been known to result from physiological arousal and tension. Increases in heart rate have also been noted for test anxious children. Thus, the rationale for employing relaxation training with children is aimed at reducing physiological roots of anxiety and tension (King *et al.*, 1998). Procedural issues for utilizing PMR with children should be taken into consideration. Tone of voice as well as timing the presentation of instructions are important considerations. Evidence exists that live training is more beneficial than taped instruction. It is suggested that live training be done initially, followed by taped instruction (King *et al.*, 1998). For a child to master relaxation skills, practice is important and should be encouraged by parents at home (King *et al.*, 1998). Relaxation should be taught as a coping skill and the use thereof encouraged when a child is faced with stressful situations at home or school (King *et al.*, 1998). Parents thus play a pivotal role in assuring adherence to relaxation exercises at home.

Koeppen (1974) developed a PMR script specifically for young children. A fantasy component was included so that the child's interest is maintained (King *et al.*, 1998). Research has been done to determine literal use versus the use of metaphors for PMR with children. Children were compliant to both forms of PMR, but preferred the use of metaphors (Heffner, Greco and Eifert, 2003). It was also determined that it is important to assess a child's cognitive level of functioning, which influences their understanding of metaphors and consequently how they apply PMR (Heffner, Greco and Eifert, 2003).

Once learned, PMR can be used at any place and time to reduce anxiety and stress and for calming down (Christaki and Yfandopoulou, 2014). It is a self- regulation strategy that was found to be remembered and practised by children after a long- term follow-up as a coping skill used during stressful circumstances (Bothe, Grignon and Olness, 2014). Progressive muscle relaxation is a pre-occupational modality and is used extensively in occupational therapy in South Africa (Crouch and Alers, 2014).

As described in the literature above, PMR is instructed to participants directly, over a few sessions, where after they practice at home. As attending direct OT intervention can be very costly (Molineux, 1993; Ozonoff and Cathcart, 1998), and PMR is a technique that needs to be practised at home after instruction (King *et al.*, 1998), the question arises whether it will be beneficial if it is practised entirely as a home programme when a child attends direct OT intervention for LDs. Efficacy of and participation in home programmes are discussed in the following section.

2.10. Home programmes

When considering the present economic climate, it is important for intervention programmes for children with LDs to be both cost and time effective (Molineux, 1993; Ozonoff and Cathcart, 1998). A possible solution to this problem would be to introduce less frequent direct intervention sessions and start relying more on the implementation of specific home programmes (Molineux, 1993). Learning and transferring of new skills learnt by means of direct intervention is only meaningful and functional when it is generalized into other settings (Humphry and Case-Smith, 2010). A child's natural environment is also said to be the best place for learning to take place (Humphry and Case-Smith, 2010).

Home programmes for children are defined as sets of therapeutic activities that are introduced by therapists, performed by parents at home, as assistance to reaching health goals and outcomes (Segal and Beyer, 2006). Home programmes can be implemented to form part of an intervention programme, instead of an intervention programme or at the end of an intervention programme (Molineux, 1993; Donoso Brown and Fichter, 2017). Parents are integral to aiding the transfer of skills learnt from a programme into the home as they are natural reinforcing agents (Schreiber, Effgen and Palisano, 1995). Studies of home programmes revolve around three main concepts: firstly, evaluating their efficacy, secondly, examining parental collaboration and adherence, and thirdly, attempts to improve adherence (Molineux, 1993; Schreiber, Effgen and Palisano, 1995; Ozonoff and Cathcart, 1998; Rone-Adams, Stern and Walker, 2004; Segal and Beyer, 2006; Novak, Cusick and Lowe, 2007).

2.10.1. Efficacy of home programmes

Three benefits of home programmes are described (Ozonoff and Cathcart, 1998). It is an economical means of increasing the amount of intervention time, parents can be educated and empowered to provide a continuity of services, as the therapist's time with a client is limited. And lastly, after a diagnosis, parents can feel depressed and stressed, whereas after home programmes they report feeling confident and successful (Ozonoff and Cathcart, 1998). Parents agree that home programmes are time efficient and experience implementation as a means to maximize their child's progress (Novak, 2011).

When questioning whether a home programme will work or not, the effectiveness depends on 'what' is done and on 'how' it is done (Novak and Berry, 2014). The 'what' refers to the proven effectiveness of specific interventions (Novak and Berry, 2014). It is thus important to examine evidence-based home programme interventions which are effective. 'How' the home programme is implemented also affects the efficacy. Evidence-based programmes set up in accordance to parent preferences result in parents implementing the home programmes at a higher 'dose', which lead to improved efficacy (Novak and Berry, 2014).

Studies examining home programmes as an adjunct to intervention and also post-intervention or instead of intervention all indicate that home programmes are more effective than no home programme/ intervention (Molineux, 1993; Ozonoff and Cathcart, 1998; Novak, Cusick and Lowe, 2007; Gupta, Desai and Rastogi, 2019). Parents described home programmes as 'a way of life' for children with long-term disabilities (Novak, 2011).

Many effectiveness studies are somewhat flawed due to the use of small sample sizes (Novak, Cusick and Lowe, 2007; Gupta, Desai and Rastogi, 2019). Further investigation is recommended into the efficacy of home programmes, also considering four suggestions from parents (Novak, Cusick and Lowe, 2007; Novak, 2011):

1. Parents want support and request that support appointments be scheduled in advance.

2. Coordinated interdisciplinary home programmes are preferred to multiple home programmes from different therapists.

3. Parents express that compliance pressure is counterproductive. They suggest to rather attempt to understand parental goals and provide positive support.

4. Parents need prognostic information and are more willing to perform home programmes when they better understand their child's diagnosis and prognosis.

Effectiveness is also influenced by the type of home programme; therapist-directed- versus partnership-based home programmes (Novak, 2011). In partnership home programmes, families and therapists collaborate to set goals together, which is a more flexible process (Novak, 2011). As effectiveness of a programme is influenced by how it is implemented, parental collaboration and adherence will be discussed in the next section.

2.10.2. Parental collaboration and adherence

When examining adherence to home programmes, seven components influencing adherence are highlighted in the examined literature (Schreiber, Effgen and Palisano, 1995; Segal and Beyer, 2006). Factors that promote home programme adherenceinclude: i) The child's response to the intervention, ii) the perceived efficacy of the intervention by the parents, iii) the integration of the programme into the family's daily routine, iv) a positive attitude from the mother, v) parental agreement with the child's diagnosis, vi) being supervised from time to time and vii) a good relationship between therapist and parents (Schreiber, Effgen and Palisano, 1995; Segal and Beyer, 2006). When parents see that their child enjoys home programme activities and does not find it threatening or unpleasant, they are more motivated to adhere to the home programme (Segal and Beyer, 2006). If home programme activities yield positive results, as noticed by parents, and activities can be embedded within naturally occurring activities and occupations at home, adherence is also improved (Segal and Beyer, 2006). It is evident that parents gain intrinsic motivation and become committed to completing home programme activities as they experience success with the activities and as they witness progress in their children (Schreiber, Effgen and Palisano, 1995; Segal and Beyer, 2006).

The following factors lead to non-adherence: a lengthy and complex home programme, severity of the diagnosis, parents perceiving a poor relationship with the therapist, a lack of confidence in the efficacy of the home programme (Schreiber, Effgen and Palisano, 1995). Findings that suggest that caregivers of children with disabilities experience stress and caregiver- and family problems, negatively impacted on their adherence to suggested home programmes (Rone-Adams, Stern and Walker, 2004). Non-adherence does provoke a sense of guilt in mothers (Schreiber, Effgen and Palisano, 1995). Mothers did however gain insight

from observing the therapist's interaction with their children and did adopt, to some extent, activities into their daily routines (Schreiber, Effgen and Palisano, 1995).

When considering a family's daily routines in more detail, it is evident that each family's routines are influenced by their specific social-, physical- and cultural environments (Segal and Beyer, 2006; Humphry and Case-Smith, 2010). These environments influence family sustenance, availability of services and resources (physical and financial) to them, safety in homes and community, convenience of services, parental workload, support to the family, parental roles and childcare tasks (Segal and Beyer, 2006). Family routines are a result of how they navigate through their unique environmental influences (Segal and Beyer, 2006). Family routines help to organize our daily lives. Families have rituals for dinner, bedtimes, birthdays and anniversaries in accordance with their family routines (Segal and Beyer, 2006). If a home programme activity is new to a family, it then requires significant adaptation to their already established daily routines and rituals (Segal and Beyer, 2006). When considering the availability of resources in the home environment (financial, physical, support, time and, energy) appropriate and meaningful suggestions can be made. It thus makes sense that parents are more likely than therapists to identify feasible home programme activities that do not increase stress at home (Schreiber, Effgen and Palisano, 1995), linking to more recent research that parents prefer partnership-based home programmes (Novak, 2011). A family-centred service is thus key (Law *et al.*, 2010).

In conclusion, parents' organizational skills are a more accurate predictor of adherence than the availability of time (Segal and Beyer, 2006). An occupational therapist who wants to suggest a home programme thus needs to focus more on collaborating with parents and incorporating the home programme into the family's daily routine when working with the family, taking into consideration the family's available resources (Segal and Beyer, 2006).

2.10.3. From an Occupational Therapist's point of view

When suggesting home programmes to children with LDs, there are three factors that need to be considered. These factors include the readiness of parents to accept their child's diagnosis, their involvement in planning the home programme and the effect that the programme has on the parent-child relationship (Molineux, 1993). Some strategies used by OTs to improve adherence, and supported by earlier research, include (Molineux, 1993):

1. Thorough explanation of intervention goals, combined with parent/child goals, and the importance of the home programme for achieving the goals.

2. Home programme activities should be explained and demonstrated, accompanied by a hand-out.

3. Questioning adherence should be done in a friendly manner.

4. Rewards/ token economy and contracts are employed when home programme activities are completed.

5. Suggestions are made for incorporating home programme activities into existing routines. (Molineux, 1993)

Some of the above-listed strategies are also supported by findings in more recent research that suggested that OTs incorporated clients' goals and interests, parental education and suggesting specific times and activities during which the home programme exercises can be incorporated in order to create meaningful home programmes (Segal and Beyer, 2006; Donoso Brown and Fichter, 2017). It is noted that personal motivation is a key mediator (Donoso Brown and Fichter, 2017). Although earlier studies recommended contracts and rewards for adherence, more recent studies conclude that parents experience adherence pressure as counter-productive and rather seek support and guidance (Molineux, 1993; Novak, 2011). More recent studies also found that home programmes facilitated parent-child bonding, which was not the case in earlier home programmes where parents were trained to be 'therapists' with negative impacts on relationships (Novak, 2011).

To conclude, it is thus evident that parents need to see a positive response in their child to a home programme, it needs to be an effective (evidence-based) parent-therapist collaboration and the programme should have the potential of being integrated into already existing daily routines. Managing parent stress level, together with continued support and motivation of adherence, from the therapist, seems to indicate positive responses to home programmes.

2.11. Conclusion

Children with LD, experiencing secondary anxiety are referred to OTs for assessment and intervention to improve functional activity participation and quality of life. As seen in the FOR and in the evidence-based practice, anxiety is usually not directly addressed when LD are treated. There are secondary effects of intervention on anxiety, but no complete alleviation (Pfeiffer and Kinnealey, 2003; Storch *et al.*, 2013) and there is a lack of reported studies on children with LD that measure anxiety as an intervention outcome.

Anxiety intervention for specific anxiety disorders is described in the literature. In OT this entails relaxation techniques such as PMR, incorporated into stress management programmes (Davidson, 2010; Crouch and Alers, 2014). From the literature examining PMR and its effect of influencing anxiety, it is evident that this technique does reduce anxiety experienced by children, adolescents and adults when it is instructed directly by a trained professional (Wachelka and Katz, 1999; Heffner, Greco and Eifert, 2003; Lopata, 2003; Nickel *et al.*, 2005; Srilekha, Soumendra and Chattopadhyay, 2013; Ashton, 2015). This technique has also been applied in school settings, with varying results; usually influenced by the level of anxiety on pre- and post-intervention measures. The number of PMR sessions is another area to be further explored in terms of PMR efficacy. This current study will add to the literature the effect of individual intervention where LD and anxiety are both specifically addressed by means of OT FOR in combination with PMR as a home programme. The length of the study period and number of PMR sessions could also provide useful information.

Home programmes can be effective tools for intervention when activities are evidence-based, partnership programmes as opposed to therapist-directed (Segal and Beyer, 2006; Novak, 2011). Embedding activities in familial routines with support and guidance along the way further contributes to success (Molineux, 1993; Segal and Beyer, 2006). In this study, PMR is an evidence-based programme. This study will also add to existing literature whether PMR can be used as a stand-alone home programme, when intervention is aimed at LD directly.

The next chapter describes the method that was followed to gather and interpret data in this study.

CHAPTER 3 : METHODOLOGY

3.1. Introduction

In this chapter the methodology of this study will be described. The chapter starts by describing the research design, sample selection, measurement tools that were used before turning to the research procedure. Data analysis and rigor are described, and lastly ethical considerations applied to the study.

3.2. Research design

An exploratory, multiple case study method of research was employed. Case study research allows a researcher to focus on a "case" to be able to gain a holistic, real-life viewpoint in order to better understand a phenomenon (Yin, 2014). More compelling evidence can be gathered from using multiple cases, leading to a more robust study (Yin, 2014).

In OT, case study research provides opportunities to investigate interventions and what they mean to clients, families and therapists (Salminen, Harra and Lautamo, 2006). Through this research method, the researcher was able to investigate the phenomenon of PMR as a home programme, from more than one view point and in a real life context (Salminen, Harra and Lautamo, 2006). This method also allowed the researcher to re-conceptualize a practical problem of implementing a home programme to influence participants' anxiety and functional activity participation and related theory and practise (Salminen, Harra and Lautamo, 2006).

This case study explored the effect of PMR as a home programme on anxiety and functional activity participation of the participants with LD who attend OT intervention. Through this method, not only baseline-, mid-study and post- intervention outcomes were measured, but it also looked in-depth into the context and provided a rich and complete understanding of the phenomenon.

Multiple sources of evidence and data gathering methods were used and included only quantitative data collection methods (Yin, 2014). Yin proposes six sources of evidence in data collection which includes documents, interviews, direct observation, archive records, participant observation and physical artefacts (Yin, 2014).

In this study, two of Yin's sources of evidence were used, namely documents and artefacts:

Documents:

a) Pre-and post- intervention assessment by means of two questionnaires completed by parents,

b) Pre-, mid- and post-intervention completion of International Classification of Functioning, Disability and Health (ICF) core sets questionnaires and Conners CBRS- Teacher questionnaire completed by teachers and/ or the researcher,

c) Parent final experience questionnaires post-intervention.

The Artefacts comprised of intervention diaries kept by participants' parents.

3.3. Gathering data

Yin proposes four principles of data collection, which includes: Using multiple sources of evidence, creating a case study data base, maintaining a chain of evidence and exercising care when using data from electronic sources (Yin, 2014). These principles influence the construct validity and reliability of research evidence and will be discussed under controlling variables.

In this section on how data were collected, the participant selection, measurement tools, process of the study and the data collection procedure are described. Please refer to the chart of the study process in Section 3.3.3.

3.3.1. Selecting participants- replication for a multiple-case study

When using a multiple-case study design, cases must be carefully selected to either predict similar results or to predict contrasting results, but for reasons which were anticipated (Yin, 2014). This refers to a replication logic as opposed to a sampling logic in other research designs.

The following inclusion- and exclusion criteria applied:

Inclusion criteria:

- Children aged from five years to 13 years.
- Children with identified LD symptoms:
    - A z-score on standardised visual perceptual assessments of -1 or below will indicate LD.
- Accompanying the LD, anxiety symptoms need to be present:
    - In order to identify the presence of anxiety, the t-score for the total score on the Spence Children's Anxiety Scale Parent Version and for sub-categories was calculated. A t-score of at least 50 on either the full scale or subscales identified anxiety. This is the mean, indicating mild, sub-clinical anxiety (Spence, 1997).
- Comprehension of either English or Afrikaans. This was an informal observation made by the researcher during the initial evaluation. The child's response to instructions of evaluation material, following a conversation and responding to questions were aspects that were taken into consideration.
- Participants should have been able to attend OT for at least six months following their referral to participate in the study. This was necessary because participants in this study would have been receiving their usual OT intervention in order to determine the impact of the PMR combined with usual intervention.

Specific exclusion criteria:

- Children with hearing loss, because the protocol is an auditory-based programme. Progressive muscle relaxation is usually implemented through real-time verbal instructions and in the case of this study, it was through an audio recording. Having to read the instructions may affect how the child participates in the home programme. Including children with hearing loss could create additional diversity in the study sample, which would impede the replicability of the study.
- Children with intellectual disability. The ability to learn PMR as a coping strategy and be able to understand the instructions of the tension- relaxation exercises and specific

movements is crucial in participating in PMR exercises (Yuen Fung and Chan, 2000). Children with intellectual disability struggle with learning and understanding concepts (Yuen Fung and Chan, 2000). To follow a replication logic in this study, including children with intellectual disability would thus not result in a homogenous sample.

- Children using anxiolytics, as anxiolytics would be an interfering variable that would make it difficult to distinguish between the impact of a home programme aimed at addressing anxiety. Additionally, the aim of this study was not to address clinically significant anxiety.

- Children attending special/ remedial/ LSEN schools, since they would likely also be receiving another intervention that would create an interfering variable.

The inclusion and exclusion criteria serve the purpose of ensuring similar cases to be able to predict similar results and to control the variables in the study.

The participants who were to be included in this study were children aged five to 13 years, attending OT intervention at the researcher's private practise in Pretoria. In practice, LD are identified by a comprehensive OT evaluation which includes, but is not limited to, detailed background information obtained from a parent and teacher interview, standardised assessments, clinical observations adapted from A.J. Ayres as well as general/ informal observations. Children are also observed while participating in activities in class, ADL and on the playground in order to gain information with regards to functional activity participation and contextual influences.

Parents of eight children attending OT intervention at the researcher's practice, who met the inclusion (except for anxiety which was to be determined at a later stage) and exclusion criteria and replication logic, were invited to participate in the study. Of the eight children, three parents, children and teachers gave their consent and assent to participate in the study and were included.

The age band of participants initially was narrower but was increased at the recommendation of the School of Therapeutic Sciences' Graduate Studies Committee, as it was believed that this would increase the likelihood of obtaining participants for the study. The age band was not increased beyond primary school children, as in South Africa the bulk of practitioners in the private sector provides intervention at pre- and primary school level. Thus, the

participants in this study fall in that group of children most likely to attend occupational therapy.

While it was envisaged at the start of the study that fellow practitioners in the Pretoria area would refer children who met the inclusion criteria to participate in the study, and at least two occupational therapists had provided a written intention to do so, no children were referred from other practices to participate in the study. It was then decided to only include participants from the researcher's private practice in Pretoria. This resulted in a very small study sample. Although participants were recruited for three years, only 4 participants were successfully recruited. One participant's mother gave consent for participation, met inclusion criteria and attended the PMR training session. Before questionnaires could be provided to the participant's teacher, the mother requested to terminate OT intervention sessions, for personal reasons, and therefore also terminated their participation in the study. The other three participants completed the PMR home programme.

3.3.2. Measurement tools

Measurement tools used in this study were a demographic questionnaire (Appendix A), Conners CBRS- parent short form (Conners CBRS-P) (Appendix B), SCAS- parent questionnaire (SCAS-P) (Appendix C), Conners CBRS teacher short form (Conners CBRS-T) (Appendix D), intervention diaries by parents (Appendix E), an ICF)core set questionnaire completed by the researcher and teachers (Appendix F) and final experience questionnaire (Appendix G) completed by parents. Reliability and validity of the tools will be discussed under their descriptions.

3.3.2.1. Demographic questionnaire

Parents were required to complete a short demographic questionnaire (age, gender, date of initial OT evaluation, number of OT sessions attended, diagnosis, medication) (Appendix A), with the initiation of the study. The purpose of this questionnaire was to enable the researcher to describe the case and to ensure that participants were eligible for inclusion (having regard for the inclusion and exclusion criteria). The information about diagnoses and medication was obtained to be able to take into account the internal factors when comparing medical and academic details in the research data.

3.3.2.2. Assessment of client factors and functional activity participation: Conners Comprehensive Behavior Rating Scales (Conners CBRS-Parent form and Conners CBRS-Teacher form), Conners

The Conners CBRS is an instrument that assesses behaviour, emotions, social performance, academic concerns and disorders in children and adolescents aged six through eighteen years (Conners, 2008) (Appendices B & D). These rating scales are available in parent, teacher and self-report versions. The different versions provide information about the parent's and teacher's assessment of a child and how a child compares to other children his/ her age. Initially, only a Conners CBRS-P was used. After the pilot study was conducted (also refer to section 3.3.4.1), additional data points were needed, and the Conners CBRS-T was included to be completed by participants' teachers. Both questionnaires consist of a one-page parent or teacher response sheet with an estimated completion time of 20 minutes. Scores are reported as t- scores (Conners, 2008).

The Cronbach's alpha value for internal consistency range from 0.69 to 0.97, which is very good. Test- retest reliability ranges from 0.56 to 0.96; also significant. In terms of convergent and divergent validity, the relationship between the Conners CBRS scores and other related measures were examined. There was a strong correlation with scales that measured similar constructs (Conners, 2008). The Conners CBRS was also developed as a monitoring instrument to measure the effectiveness of intervention and is therefore sensitive to detect change (Conners, 2008). The components of the Conners CBRS inlcude some client factors which reflect behaviour and academic performance of children. Peer relations are also included. The Conners CBRS thus contains elements to measure a child's client factors and functional activity participation. Parents completed it when they entered the study and, if inclusion criteria were met and they participated in the study, again after 16 weeks. Teachers completed the included participants' Conners CBRS- Teacher forms initially, after eight weeks and finally after the 16-week period.

3.3.2.3. Assessment of anxiety: Spence Children's Anxiety Scale (SCAS) and Preschool Anxiety Scale (PAS), Spence

The SCAS (Appendix C) and PAS were developed to assess the anxiety symptoms reported by children. Six domains are assessed in the SCAS, including: generalized anxiety disorder, panic/ agoraphobia, social phobia, separation anxiety, obsessive compulsive disorder and physical injury fears (Anderson and Catroppa, 2012). There are two versions of the SCAS; one scale is completed by a child and a parent version is also available. For this study, the parent version was preferred, SCAS-P. Due to the age of the children participating in the study, a parent report questionnaire was thought to be more accurate. It consists of 38 items and takes approximately 30 minutes to complete (Anderson and Catroppa, 2012). The PAS assesses five domains that include generalized anxiety, social anxiety, obsessive compulsive disorder, physical injury fears and separation anxiety (Spence *et al.*, 2001). A parent- and teacher version is available for the PAS. Depending on who were able and willing to complete, and timeously return, questionnaires during the study period, the PAS-T was included as a measure of anxiety to be completed instead of the SCAS-P. This was decided so that participants could still be included when the researcher observed anxiety symptoms and parents gave consent, but then did not return a completed SCAS-P in time.

Internal consistency for the SCAS-P total parent scale is acceptable, with the Cronbach alpha value ranging from 0.63 to 0.91 (Wang *et al.*, 2015). The PAS also shows strong internal consistency with alpha values ranging between 0.72 and 0.92 (Spence *et al.*, 2001). Test- retest reliability was averaged at 0.47 to 0.72 for the total SCAS-P score (Wang et al., 2015) and 0.74 for the PAS (Spence *et al.*, 2001). The SCAS-P and PAS can reveal differences in anxiety levels after anxiety is successfully treated (Anderson and Catroppa, 2012). The questionnaires are available to the public from www. scaswebsite.com.

Parents completed the SCAS-P when they entered the study and, if inclusion criteria were met and they participated in the study, again after 16 weeks. The PAS-T was completed by the researcher for one participant at the beginning and end of the study, after his mother completed consent forms, but misplaced and failed to return the completed questionnaires.

3.3.2.4. Assessment of client factors and functional activity participation: International Classification of Functioning, Disability and Health core set questionnaire

International Classification of Functioning, Disability and Health is a framework, developed by the World Health Organization (WHO), to understand and describe functioning and disability (Bickenbach *et al.*, 2012). The complete ICF classification consists of 1424 categories divided into 4 components namely body functions, body structures, activities and participation, environmental factors (Kurtais *et al.*, 2011). This is a very comprehensive classification and thus difficult to implement in clinical practice and research. Core sets for ICF categories were developed by the WHO in conjunction with the ICF Research Branch in order to make the ICF more applicable for everyday use. A multidisciplinary group of experts were involved in the selection of lists of ICF categories that are relevant to specific health conditions. ICF core sets facilitate the description of function in clinical practice (Kurtais *et al.*, 2011).

Describing function with ICF involves the rating of ICF categories. Numeric codes, called ICF qualifiers, are used to describe the extent of functioning in each category. Ratings across ICF categories result in an ordinal/ functioning profile being created; this is thus a useful tool in evaluating intervention (Kurtais *et al.*, 2011).

The ICF core set questionnaire (Appendix F) was compiled for this study after a pilot study indicated the need for more data points (also refer to section 3.3.4.1). Specific core sets for LD and anxiety are not available from https://www.icf-core-sets.org/en/page1.php. The researcher thus only selected components from the additional ICF categories to include body functions similar to that of the components on the Conners CBRS and SCAS questionnaires. Activities and participation categories were added to include the areas of functional activity participation of school, play, social and following a routine. These components were selected in order to compare the results of the different questionnaires when analysing and interpreting the gathered data. It was thus another measure of anxiety, client factors and functional activity participation.

Table 3.1 explains items and where in the ICF they were sourced. Additionally, definitions for items can be found on the ICF core set questionnaire, Appendix F.

Table 3.1 Core set categories and sources

Item	ICF source
Body functions	
Attention functions b140	Specific mental functions (b140-b189)
Memory functions b144	Specific mental functions (b140-b189)
Emotional functions b152	Specific mental functions (b140-b189)
Regulation of emotion b1521	Specific mental functions (b140-b189)
Visuospatial perception b1565	Specific mental functions (b140-b189)
Higher-level cognitive functions b164	Specific mental functions (b140-b189)
Organization and planning b1641	Specific mental functions (b140-b189)
Time management b1642	Specific mental functions (b140-b189)
Problem-solving b1646	Specific mental functions (b140-b189)
Activities and participation	
Learning to read d140	Basic learning (d130- d159)
Learning to write d145	Basic learning (d130- d159)
Learning to calculate d150	Basic learning (d130- d159)
Applying knowledge d160	Applying knowledge (d160-d179)
Carrying out daily routine d230	Carrying out daily routine d230
Handling stress and other psychological demands d240	Handling stress and other psychological demands d240
Preschool education d815	Preschool education d815
School education d820	School education d820
Play d9200	Recreation and leisure
Socializing d9205	Recreation and leisure

Teachers and the researcher completed the questionnaire, consisting of 19 questions, initially, after an eight-week period and again after the 16-week period. The researcher then re-entered the values onto the online ICF documentation form in order to create the functioning profiles. To account for accuracy when transferring the information, a colleague was asked to re-check the values each time after they had been entered, before creating the functioning profiles.

3.3.2.5. Intervention diary

Parents of the participants were asked to complete an intervention diary (Appendix E) after three of the suggested PMR home programme sessions each week. The intervention diary included the following categories: the date, signature of parent, child's response to 'How do you feel' and quality of sleep after PMR technique. Categories for the intervention diary were chosen in an attempt to aid adherence (date and signature), valuate emotion ('how do you

feel?') and the effect on functioning (quality of sleep). To ask parents about the participant's quality of sleep after doing PMR exercises was more practical than asking about different aspects of their daily activity participation, for example personal care activities or playing, as the quality of their sleep could easily be observed and reported on the following morning. Whereas reporting on other aspects of functional activity participation would have been more time consuming. This provided valuable information with regards to adherence and the effect on intervention. Parents were asked to perform the PMR home programme at least three times a week, not less, and complete the intervention diary after three of the sessions.

3.3.2.6. Experience questionnaire

After completion of the 16-week PMR programme, parents were asked to complete a questionnaire (Appendix G) relating to their experience of PMR as a home programme. This is a two-page questionnaire, developed by the researcher from the literature (Koeppen, 1974; Ozonoff and Cathcart, 1998; Segal and Beyer, 2006), as well as incorporating clinical experience. The ultimate goal of PMR as a home programme is for a child to apply this technique independently, when they experience tension or stress (Koeppen, 1974). In OT, the goal is to assist clients to gain functional skills and abilities. Therefore, the questionnaire was developed in order to determine parents' perception of PMR as an intervention technique as well as to gain information whether participants were applying the technique outside of the suggested times. Answers were given according to a rating scale and also included three open-ended questions.

3.3.2.7. Contextual information

From the participants' initial OT evaluations (before the start of the study), the following contextual information was gathered by means of interviews with parents, participants and teachers:

- Relationship between participants and parents.
- Relationship between participants and siblings.
- Relationship between participants and teachers and peers.
- Living arrangements at home.

- Physical resources (space and equipment/ materials) at home which will influence type of home programme activities.

- Information with regards to daily schedules and at what time participants are fetched from school/ aftercare.

Further contextual information that was gathered for the purpose of the study included:

- Availability of media to play the audio CD.

- Daily schedules in order to determine the best fit for performing the PMR home programme.

The following figure summarizes the research procedure that was followed. The research procedure is explained in more detail in section 3.3.4.

3.3.3. Study process chart

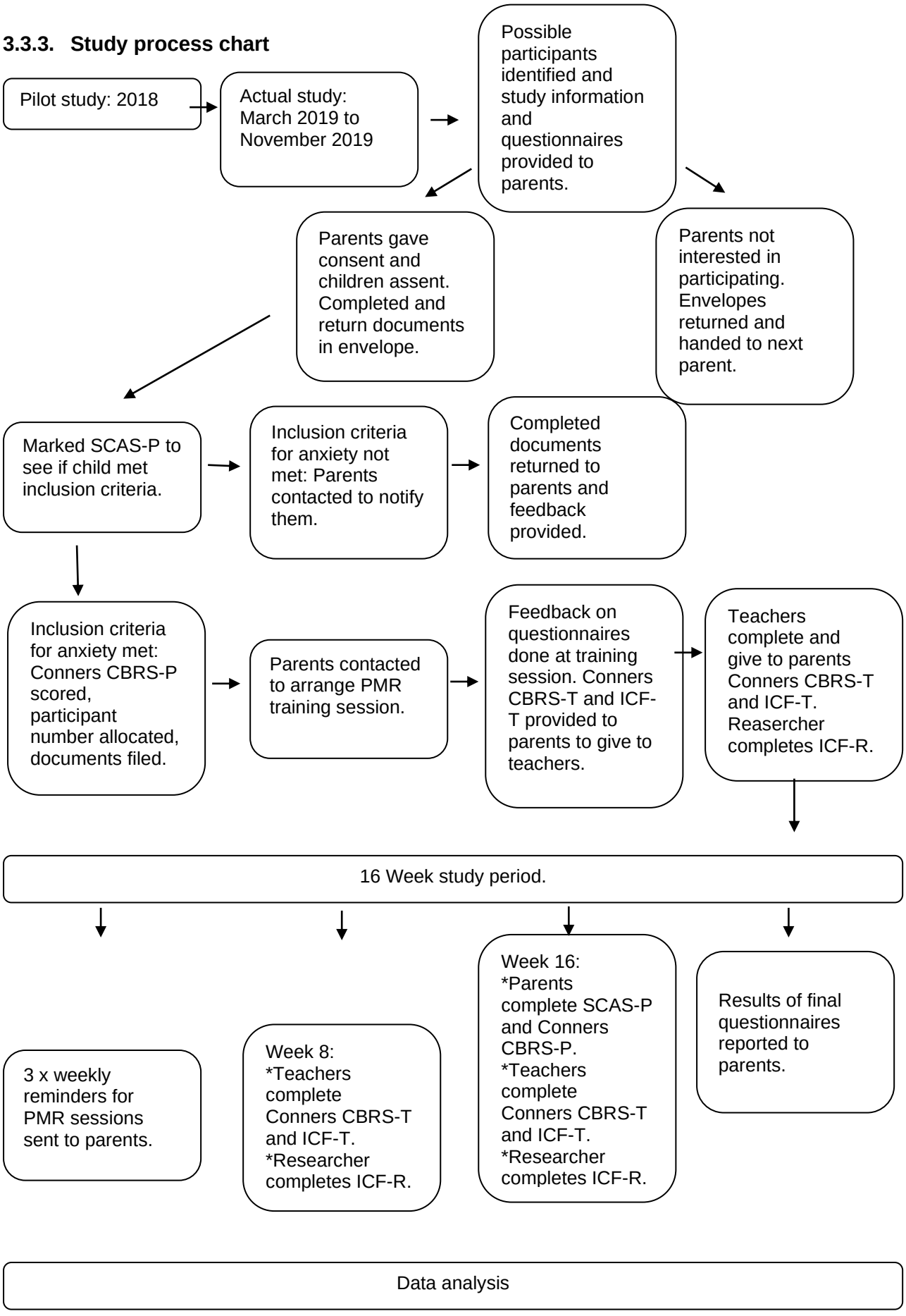


Figure 3.1 Chart of the study process

3.3.4. Research procedure

This study was conducted during the period from March 2019 to November 2019, after ethical clearance and permission to do the study was received. A phased approach was followed, which will be described below.

3.3.4.1. Pilot study

In 2018, the researcher conducted a pilot study with three participants. The purpose of the study was to examine:

- The effectiveness of the training- script and session with participants and parents,
- The ease of understanding, completion and returning of questionnaires,
- The adherence to the home programme and completion of intervention diaries,
- Whether the intervention diaries provided sufficient information in relation to the study objectives,
- The efficiency of the running of the whole process.

After the completion of the 16-week PMR home programme, the following information was gathered and could be used to make adjustments to the research procedure. All adjustments were included in an ethics amendment letter and approved by the Human Research Ethics Committee (Medical) on 27 February 2019, refer to Appendix H for the approval letter. Table 3.2 below explains the different areas that were examined during the pilot study and the necessary adjustments.

Table 3.2 Pilot study information

Area to examine	Strengths/ Weaknesses	Adjustments
Training script and session	Additional information about the intervention diaries was required during the training sessions. Pausing the PMR CD after each instruction negatively influenced the flow of the training session. The rest of the script was sufficient and easy to follow, conveying all necessary information.	The researcher added a section in the training script to stress the importance of the safe keeping of the intervention diaries and their completion. The researcher rather paused the CD after each muscle group.
Questionnaires	Initially, only parents completed two questionnaires to measure anxiety and functional activity participation prior to the study and again after completion of the home programme. This led to insufficient data points. Parents were unable to reflect on the process.	Additional questionnaires were included in the study: ICF core sets and teacher's Conner's CBRS-T. Parents still completed their two questionnaires initially and after 16-weeks (the SCAS-P and Conners CBRS-P). Additionally, the researcher and teachers also completed ICF- and Conners CBRS-T questionnaires initially, mid-study and after 16 weeks. Parents were asked to provide their children's' teachers with the additional questionnaires. An experience questionnaire was developed and completed by parents after completion of the home programme.

Table 3.2 Pilot study information continued

Area to examine	Strengths/ Weaknesses	Adjustments
Adherence	Due to the fact that the participants were all clients in the researcher's private practise, during weekly intervention sessions, the researcher asked the participants about their performing of the PMR home programme. Responses indicated that some participants had not been performing the home programme as suggested.	The researcher changed the one-weekly text message reminder to a text message reminder sent three times a week, on the days scheduled for PMR.
Intervention diaries	Two of the three participants' parents in the pilot study did not return a completed intervention diary but lost it.	In the training session, the researcher mentioned to parents that previous intervention diaries had been lost and asked parents to place them in a safe place, for example pinned on the refrigerator. The importance of returning the completed intervention diary was also highlighted.

In conclusion, alterations were made to the training- script (Appendix I) and session, additional data collection instruments and intervals were added, reminder messages were sent three times a week and the importance of safe keeping the intervention diaries was discussed with the participants' parents.

3.3.4.2. Initial phase

The researcher compiled envelopes containing: an information letter to parents (Appendix J) and children, consent form for parents (Appendix K), assent form for children (Appendix L), a demographic questionnaire (Appendix A), the SCAS-P (Appendix C) and the Conners CBRS-P (Appendix B) and provided it to prospective participants who attended OT intervention with identified LD.

Parents were asked to read, complete and sign the documents and outcome measures if they were interested to participate in the study. If they were not interested, they returned the envelope, which was then presented to a next parent. Completed documentation was returned to the researcher.

3.3.4.3. Obtaining permission

Written consent was obtained from parents (VanNiekerk, 2011). Assent was also obtained from each child (VanNiekerk, 2011). Parents read to their child information relating to the researcher and the study in a way to ensure that they understood the information. The child then had to mark a smiley face for giving assent or a sad face when not giving assent to participate. With all consent and assent forms collected, the researcher could then continue with the next phase of scoring the SCAS-P to determine whether inclusion criteria were met.

3.3.4.4. Meeting inclusion criteria

Upon collection of the envelopes and examining consent forms, the SCAS-P of the returned envelope was scored in order to establish whether the children met the inclusion criteria for anxiety. When inclusion criteria on the SCAS-P were not met, the researcher informed the parents that the child was not included in the study. Documentation was returned to the parents and the results of the two completed questionnaires were discussed with parents. When inclusion criteria for anxiety was met, the Conners CBRS-P was scored and the consent and assent forms and demographic questionnaire were filed and the children then became the participants in the study, receiving a unique participant number, which was used on both outcome measures. Parents then provided to their children's' teachers an information document (Appendix M) and consent form (Appendix N) and collected from their children's teachers the ICF core sets questionnaire and the Conners CBRS-T and presented it to the researcher. The researcher completed an ICF core set questionnaire.

3.3.4.5. Progressive Muscle Relax training

Parents of participants meeting inclusion criteria were contacted telephonically and individual meetings were arranged, at a convenient time and venue for all parties involved. No group sessions were held whereby parents/ participants were exposed to other parents/ participants involved in the study, due to ethical considerations of autonomy, dignity and privacy (OTASA, 2005). At this stage, while the researcher met with each parent and participant, the researcher provided feedback on the completed questionnaires and implemented the training of the PMR technique, which was done according to a training script (Appendix I) developed by the researcher. The training script was necessary in order to aid with uniformity of the study procedures, influencing reliability and validity. A demonstration session with the parent and participant was also done, at this meeting, to further aid understanding and accurate replication of the technique. After demonstration by the researcher, the parents had an opportunity to apply this technique with the participant and ask questions, if they had any. The training was completed at this meeting, but the parents were reassured that they could contact the researcher should any further questions arise. The parents also received an intervention diary and training on how to complete it. Parents were asked to start with the PMR home programme on the first Sunday after training and continued for 16 weeks.

Progressive muscle relaxation technique

The PMR technique for this study was Progressive Muscle Relaxation for Children (Koeppen, 1974) (Appendix O). In the existing and available script, Koeppen first introduces the term ‘relaxation exercises’ and explains what it means in simple terms. Koeppen also defines rules for the technique, from listening carefully to instructions, following them exactly and paying attention to the body (Koeppen, 1974). These principles were also highlighted and taught to the parents and participant during the training.

An audio CD was produced, by the researcher, which included Koeppen’s introduction as well as the full PMR script. The total length of the CD was 12 minutes, from introduction until the CD stopped. The production of the CD aided in the uniformity of the intervention procedure as a method of control over variables. Parents were asked to do the PMR home programme on Sunday, Tuesday and Thursday evenings, just before bedtime.

These specific days were chosen in order to attempt uniformity in intervention. It was included as part of the bedtime routine on these days to attempt achieving better adherence.

Parents were also provided with a diary with the specific time slots for the scheduled intervention and had to sign off each time that the intervention was done. This again aided in the uniformity of the intervention as a reminder to parents and a form of control. Three weekly, text message reminders were sent to all parents by the researcher.

3.3.4.6. Completing programme and second completion of questionnaires

International Classification of Functioning, Disability and Health core set questionnaires were completed by teachers and the researcher after an eight-week period and again after 16-weeks. Teachers also completed a Conners CBRS-T after eight- and 16- weeks. After the 16- weeks, a second envelope containing the SCAS-P, Conners CBRS-P and experience questionnaire were handed to parents for completion and collected and scored by the researcher. The intervention diaries completed by parents were also included in the second envelope.

The second completed questionnaires' results were also communicated to the parents telephonically, after the study was completed. When the calculated SCAS-P scores indicated elevated levels of anxiety which is clinically significant (t-scores of 60 or above), those parents were contacted, and the participants were referred to a clinical psychologist for further evaluation.

3.4. Data analysis

Demographic data were analysed by describing it in the first section on data analysis. Providing frequency distributions of age, gender and medication use seemed meaningless because the study included only three participants.

Due to the fact that there are more data points than cases in case study research, conventional statistical analysis cannot be applied (Kohn, 1997; Yin, 2014). Case-oriented analysis was applied, whereby the interrelationship between the variables in each case was first examined, where after comparisons were made across cases (Kohn, 1997). The results of each participant's outcome measures for anxiety and functional activity participation were discussed and compared throughout the different data collection intervals.

The SCAS-P t-scores were compared between beginning and end of the study and interpreted according to specific t-score interpretation. The t-scores above 60 indicate elevated levels of anxiety or sub-clinical anxiety, used interchangeably.

The Conners CBRS- P and T t-scores were compared over the data collection intervals and interpreted according to a t-score interpretation as seen in Table 3.3 below.

Table 3.3 Understanding Conners Comprehensive Behavior Rating Scales t-scores

T-score	**Guideline**
≥70	Very elevated score (Many more concerns than are typically reported)
65-69	Elevated score (More concerns than are typically reported)
60-64	High average score (Slightly more concerns than are typically reported)
40-59	Average score (Typical levels of concern)
<40	Low score (Fewer concerns than are typically reported)

Adapted from Conners CBRS 3rd edition (C. Conners, 2008, p64)

No t-scores are available for the ICF core set questionnaires. Results were reported for each participant, at the different data collection times, and discussed according to a scale:

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.

Participants were then compared to each other according to their changes in anxiety, client factors and functional activity participation, by comparing the t-scores of their individual Conners CBRS-Ps and Ts, SCAS-Ps and also the ICF core set scales. This allowed the researcher to look for similarities and patterns. Furthermore, data were analysed according to the initial theoretical propositions, developing case descriptions and examining rival explanations (Yin, 2014).

3.5. Rigor of the Study

The quality of a study is determined by rigor relating to a researcher's degree of confidence in the data, interpretation and methodology used. In this section, the various measures used to ensure a reliable and valid quantitative multiple case study will be described. Firstly, the control of variables will be discussed, which influenced the study's reliability, followed by a discussion on validity.

3.5.1. Reliability

In order to address reliability of a study, it is necessary to prove that study procedures can be repeated, rendering the same results (Rowley, 2002). Therefore, the control of variables is summarised below in Table 3.4, as it has also been discussed in the preceding sections.

Table 3.4 Control of variables

Variable	Actions taken
Uniformity in research procedure	PMR Training script. Researcher personally conducting all training sessions. Same person (parent and teacher) asked to complete questionnaires throughout the study. Participants from researcher's private practise to assist with similarity of cases' presenting factors and intervention.
Uniformity of intervention programme (PMR)	Recorded PMR script. Specific days set for performing PMR.
Adherence to intervention program	Reminder messages sent to all participants. Completion of intervention diaries.

When considering Yin's suggestions to enhance reliability of a research study, the multiple sources of evidence included parent-, teacher- and researcher- completed documentation in the form of questionnaires and diaries. The researcher kept a chain of evidence by managing the collected data according to a data management plan (Appendix Q) and by taking notes

when talking to parents, participants and teachers. No data from electronic sources were used in this study, which also enhances its reliability, according to Yin (Yin, 2014).

Confounding variables for the study included medication use as well as intervention session intervals. Although none of the participants used any form of medication when the study commenced, two participants were referred for evaluation by a Paediatric Neurologist for additional intervention with regards to concentration and behaviour. This additional information was included and discussed in those participants' data analysis sections.

Due to differing financial positions, all participants were unable to attend the same amount of intervention sessions on a monthly basis (weekly versus fortnightly). Intervention times also varied between 30- or 45-minute sessions. This too was noted in each participant's data analysis sections and discussed.

Appropriate record keeping is also an integral part of ensuring reliability (Rowley, 2002). Specific procedures and practices were adhered to when data were collected and stored. Please refer to the data management plan, Appendix Q.

3.5.2. Validity

Three types of validity exists (Yin, 2014). In this study, only two apply which includes construct validity and external validity. As this is an explorative multiple case study, internal validity does not apply, as it only applies to causal- and explanatory case studies (Rowley, 2002). In this study, a causal relationship cannot be inferred between the changes in anxiety levels and functional activity participation and the completion of the PMR home programme, due to the fact that there are other factors impacting on these relationships.

3.5.2.1. Construct validity

Construct validity refers to the identification of appropriate measures for the concept that is being studied (Yin, 2014). Case studies have been negatively critiqued for using subjective judgements rather than operational measures to collect data (Yin, 2014). In this study, multiple sources of evidence were used (documents and artefacts), ensuring triangulation of data. It can be argued that completion of the questionnaires relies on subjective judgements.

However, questionnaires included in the study are all reported to be sensitive in detecting change and have good reliability and validity values, as discussed under the section of measurement tools 3.3.2. The questionnaires have very clear instructions and explanations of items and are completed by three of the four different parties involved in the research, namely parents, teachers and the researcher. Information gathered from the completion of the questionnaires also directly links with the research question. A chain of evidence was kept and is discussed in the data management plan, Appendix Q.

3.5.2.2. External validity

This refers to knowing whether one can generalize a study's findings and being able to define the specific domain to which the findings can be generalized (Yin, 2014). Using multiple-cases and the replication logic in this study, external validity was addressed. Findings could potentially be generalised to children (including all of the following):

- Aged between five and 13 years
- With learning problems, experiencing anxiety
- Attending OT intervention
- Attending mainstream schools
- Not using anxiolytic medication

3.5.2.3. Encouraging truthfulness from parents and teachers when completing questionnaires

When meeting with parents and participants at the initial PMR training session, the researcher again reassured them that the purpose of the study is to determine whether a PMR home programme can influence children with LD's anxiety and functional activity participation. It was stressed that it is still uncertain whether PMR will have an effect on anxiety and functional activity participation as little research has been done. Thus whether the results show an improvement or a regression or whether there is no change, the information gained will be very valuable. Parents were therefore asked to be truthful when completing questionnaires, so that accurate information could be gathered in order to direct

future home programmes and intervention. Parents were also asked to convey this message to teachers who completed questionnaires in order to attempt to minimize response bias.

3.6. Ethical considerations

Study procedures were approved by the Post Graduate Studies Committee. Ethical clearance was granted by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand and the study was registered with the Medical Research Council of South Africa, protocol number M161047.

Specific ethical considerations that played a role in this study are discussed below.

3.6.1 Autonomy

Participants' autonomy was respected by adhering to providing informed consent for participation and obtaining the child's assent to participate. All parents and participants received an information letter (Appendix J) covering all aspects of this study. This was done after their weekly OT intervention session where they met with the researcher one-on-one so as to maintain anonymity. Parents were informed that the intervention would be in the form of a home programme aimed at addressing their child's anxiety and would entail them playing a CD to their children, with the children executing the instructions on the CD, three times per week for approximately 20- minutes at a time. Parents consented to participating in the study and children's assent was obtained. Teachers also consented to participate after reading the study information letter (Appendix M). (VanNiekerk, 2011)

3.6.2 Confidentiality

The collected demographic questionnaires (Appendix A), SCAS-P (Appendix C), Conners CBRS P and T (Appendix B & D), ICF questionnaires (Appendix F), intervention diaries (Appendix E) and experience questionnaires (Appendix G) were stored in a locked cabinet to maintain confidentiality. Refer to Appendix Q for the data management plan. Individual meetings, as opposed to a group meeting, were arranged with parents and participants due to ethical considerations of autonomy, dignity and confidentiality of clients in OT intervention

and research. Participant codes were used on all the completed documentation. Where a parent wrote a participant's name, or any identifiable information, it was covered by a sticker with only the participant code written on it. (VanNiekerk, 2011)

3.6.3 Beneficence

Parents and participants were informed explicitly that it is not yet known whether PMR as a home programme could be beneficial or not, but that there is no harm associated with doing the tensing- and- relaxing exercises. (VanNiekerk, 2011)

3.6.4 Justice

Participants were selected in order of referral for OT intervention. All children who were referred for OT intervention and who met the inclusion criteria during the study period were invited to participate in the study. (VanNiekerk, 2011) Additionally, where indicated, participants were either referred for additional treatment.

3.6.5 Conflict of interests

Participants in the study attended paid OT intervention throughout the study period. Initially, participants would have been recruited from other private practices in the Pretoria area. The researcher would have only seen the participants in the light of the study and not in terms of OT intervention. The researcher did not intend to lure participants away from their treating OTs by offering services at no cost when participating in the study. It was thus decided that participants would be paying clients at their treating OTs practices. In the end, no participants were recruited from other practices other than the researcher's practice. All sessions pertaining to the inclusion of the participants in the study and training sessions were done without monetary remuneration. Parents only paid for OT intervention as usual. Aspects of the PMR home programme did not result in additional payments from participants.

The researcher ensured that there was a clear distinction between the research project and the clinical occupational therapy intervention, as well as clarity that participation in the study

was free and would not result in discounted occupational therapy services, so as to eliminate possible perverse incentives to induce participation in the study (HPCSA, 2008).

3.6.6 Therapeutic misconception

Parents were informed that there is no information as to whether PMR as a home programme will assist their children. It was made clear that data were to be gathered for the purpose of contributing to scientific knowledge. However, there is no risk of harm involved in participating in a PMR programme. Thus, the researcher did not convince participants to provide consent or assent to participate on the basis of perceived therapeutic benefit, and therefore the informed consent process was not manipulated. (Dhai, 2019)

3.7. Conclusion

A multiple case study exploratory research design was used with three participants. An initial pilot study identified areas that could be altered for the process to be more meaningful and run more smoothly. During the study, anxiety levels and functional activity participation of the participants were measured and compared at three intervals by quantitative data collection means. The results will be portrayed in the following chapter.

CHAPTER 4 : RESULTS

4.1. Introduction

In this chapter the results of this study, which aimed to explore the effect of a PMR home programme in conjunction with OT intervention on anxiety levels and functional activity participation of three participants with LD, will be discussed.

In section 4.2 the descriptive statistics of the participants' demographic information will be examined. The following three sections will entail the results of the three participants' anxiety and functional activity participation outcome measures, discussed per participant. Section 4.6 will reflect the comparison of anxiety levels and functional activity participation of the three participants. A discussion on whether the null hypothesis is accepted or rejected concludes this chapter.

4.2. Demographic- and contextual information

In Table 4.1, the demographics of the three participants of this study are displayed. Included were two male participants and one female participant, with ages ranging from six- to- 10-years old.

Initial evaluation dates and number of OT sessions already attended varied among the three participants. Participants were referred by their teachers for OT evaluation at different times and therefore there were differences in the number of OT intervention sessions already attended. This was to be expected, as case study entails the examination of phenomena in the natural context (Baxter and Jack, 2008).

None of the participants had any formal diagnosis according to DSM- 5 criteria, at inception. None of the participants were using prescription medication when entering into the study. The participants only attended OT intervention and did not attend any other form of therapy.

Table 4.1 Participant demographic information

	Study start-end dates	Age	Gender	Language	Ethnicity	Grade	#sessions before study	#sessions during study	Intervention interval	Type of family	Siblings	Stressors	Other services	Medication use
P1	19/05/2019 to 05/09/2019	6	Male	Afrikaans	White	R	1	7	Weekly	Nuclear	Younger of two	Strabismus operations; absent for 76 school days throughout 2019.	Ophthalmologist and Pediatrician	Neucon from 21 August 2019
P2	19/05/2019 to 05/09/2020	6	Male	Afrikaans	White	R	6	6	Fortnightly	Nuclear	Older of two	Emigration at end of 2019.	Was referred to Clinical Psychologist	Vitamins and ADDvance
P3	02/06/2019 to 22/09/2019	10	Female	Afrikaans	White	3	3	10	Weekly	Stepfamily	Younger of two	Experiencing problems with bullies at school	Was referred to Clinical Psychologist	None

Participant one (P1) is a six-year-old male, lives with his biological parents and an older brother. His mother reports a good, loving relationship between family members. Participant one has his own room at home, but prefers to sleep in his parents' room at night, because he is too scared to sleep in his own room. He does not have a strict bedtime routine and prefers to watch 'youtube' videos at bedtime, before falling asleep. His mother felt that using the PMR CD before bedtime instead of watching video's might be helpful in establishing a proper routine. His home language is Afrikaans, and he attends Grade R in a public pre-school in Pretoria Gardens. This is his first year in this grade and in this school. His teacher referred him for an OT evaluation in April 2019. There is a good relationship between P1 and his teacher. He has a lot of friends at school. Evaluation results revealed sensory- motor- as well as visual perceptual developmental delays. He thus met inclusion to the study for identified LD. Participant one has a traumatic history leading up to the anxiety that he experiences. At the age of three, he broke his right arm at the elbow joint, repaired by an operation. At the age of five, a truck ran over his right leg, which also led to four operations. Before inclusion in the study, he attended one intervention session. His mother has a laptop computer available for playing the PMR audio CD. She was interested in participating in the study, as she is aware that he experiences anxiety and would want to try any intervention that could possibly help him. She works from home and fetches him directly after school at 12h30. In the study period, he attended seven 30-minute intervention sessions, on a weekly basis (excluding school holidays). Earlier in 2019 and again in the middle of July 2019, P1 underwent eye operations to repair strabismus. Due to the operations, he was absent from school for 76-days, some of which fell within the study period. On 20 August 2019, he was diagnosed with ADHD by a Paediatrician, who prescribed medicinal management with Neucon tablets (Psycho-stimulant drug for managing ADHD (Chigome, Matsangaise and Meyer, 2018)), which was commenced on 21 August 2019.

Participant two (P2) is a six-year-old male and resides with his biological parents and a younger sister. His mother reported that they are a close family with good relationships and discipline. He does quarrel with his younger sister from time to time, but his mother experiences it as 'normal' sibling rivalry. He and his sister have their own rooms at home. His home language is Afrikaans, and he attends Grade R in a public pre-school in Pretoria Gardens. Participant two was referred for OT evaluation in February 2019 by his teacher. Participant two struggles to make new friends at school and rather plays with younger nephews also attending the same pre-school. He trusts his teacher and she acts to protect him when he is vulnerable. Evaluation results indicated LD, as he scored below average on all visual perceptual tests. Anxiety was already identified through various observations and

parent report and confirmed by the SCAS-P results. At home P2 is especially afraid of the dark and loud noises like thunder. He started at a pre-school when he was four months old, after which he became ill regularly, leading to five hospitalizations during his first year of life. Sensory over-responsivity (SOR) was also identified, especially vestibular-, auditory- and oral sensitivity. This led to frequent behavioural outbursts and P2 crying to a point where he could not breathe. He also has general fears such as being afraid of the dark and shows signs of separation anxiety. Before inclusion in the study, he attended six intervention sessions. His mother expressed that she wants to try any intervention that can help P2 to experience less anxiety and be less scared. They have a CD player available in the house, which they moved to P2's room, to be able to play the PMR CD. In the study period, he attended six 45-minute intervention sessions, on a fortnightly basis (excluding school holidays). From inception, he used vitamins and ADDvance Child (Omega- 3 supplement said to improve concentration, memory and learning in children(*Adcock Ingram*, 2019)) for brain health. His mother works full time from Mondays to Fridays and his father works in different shifts. He has a bedtime routine where his mother/ father reads a book while he is in bed, before falling asleep. It was determined that this would be a good time for doing the PMR home programme.

Participant three (P3) is a 10-year-old female, resides with her biological mother, stepfather and older brother. She has her own room at home. Her mother noted that the relationship between mother and daughter has a lot of ups and downs and that they argue frequently. She does have a good relationship with her brother and stepfather. Her home language is Afrikaans, and she attends Grade 3 in a public school in Mountain View, Pretoria. Participant three repeated Grade 1 in 2017. In 2015 and 2016, OT intervention was already suggested by teachers. She was referred for OT evaluation again in May 2019 by her teacher. It seems as if P3 and her teacher does not have a good relationship, as P3 frequently mentions that she dislikes her. Evaluation results indicated visual perceptual difficulties and anxiety, observed when working against time and when she did not know an answer. Anxiety was confirmed by the SCAS-P. Before inclusion in the study, she attended three intervention sessions. Participant three and her mother were both interested in participating in the study to try to find something that can help her relax and be less anxious. They have a laptop computer at home available to use the PMR audio CD. Participant three and her mother did prefer to listen to the PMR CD while driving in the car during the day. As P3's mother is a hairdresser, she works flexible hours to be able to pick P3 up straight after school to go home. Her mother does work late on some afternoons, which makes an afternoon routine difficult to establish and thus they decided to stick to doing the PMR exercises in the car,

rather than at bedtime. In the study period, she attended 10, 45-minute intervention sessions, on a weekly basis (excluding school holidays). She has failed to master the Grade 3 curriculum thus far and an application for a remedial school was done during the study period. After evaluation by an Educational Psychologist, she did not qualify for placement in a remedial school and was placed in the school's LSEN class for learners with mixed learning disabilities.

In the following sections, the results from anxiety- and functional activity participation findings for participants are explained as experienced at home, at school and in OT intervention.

4.3. Participant One

Participant one's parents did not return any completed forms; however, his mother did provide written consent for him to participate in the study. Participant one gave assent to participate. His teacher and the researcher completed other forms, and for this reason he was not excluded from the study.

4.3.1. Participant One: Change in anxiety levels

4.3.1.1. Spence Children's Anxiety Scale- Parent Version for Participant One

Anxiety levels of participants were measured at the beginning and again at the end of the study by means of a parent report measure, the SCAS-P. Participant one's initial SCAS-P was lost at home, according to his mother. After some personal struggles, P1's mother did not return any completed documentation, although she gave consent that P1 could participate in the study, which was filed. The researcher did discover signs of anxiety in P1's initial OT evaluation and completed a PAS-T for P1 at the beginning and again at the end of the study, in order to measure anxiety. These results are summarised in Table 4.2 in the section below.

4.3.1.2. Pre-school Anxiety Scale- Teacher version for Participant One

Table 4.2 Participant one: Preschool Anxiety Scale-Teacher version results

Pre-school Anxiety Scale-teacher		
Sub-categories	**PAS-T-Base**	**PAS-T-After 16 weeks**
Obsessive Compulsive Disorder (OCD)	7	4
Social Phobia (SP)	12	7
Separation Anxiety (SA)	20	12
Physical Injury Fears (PIF)	1	0
Generalised Anxiety (GA)	11	6
PAS-T total score	51	29

Since normative- and t-score information is not yet available for the PAS-T, P1's results were formulated into separate figures, as the sub-categories have different possible total scores. Please refer to the combined figure, Figure 4.1 below.

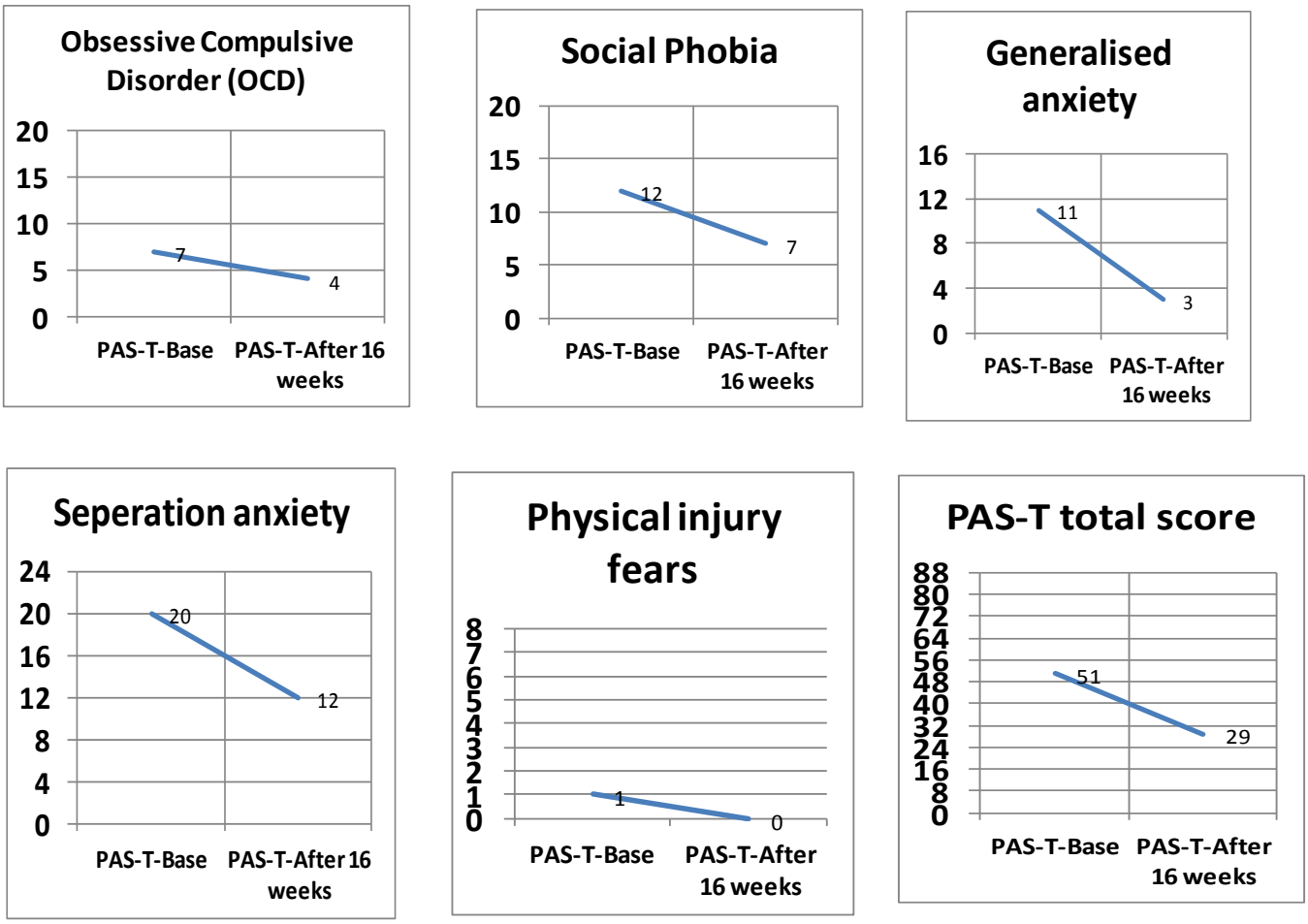


Figure 4.1 Participant one: Preschool Anxiety Scale-Teacher version results

When referring to Figure 4.1, it is evident that the anxiety that P1 experiences did decrease from beginning to the end of the study. Even though normative information and t-scores are not available, a reduction in the raw scores for each sub-category of anxiety is noted as well as for the PAS-T total score. Participant one's anxiety did thus decrease from beginning to end of the study as measured by the researcher on the PAS-T.

4.3.1.3. International Classification of Functioning, Disability, and Health-Teacher and Researcher Versions (Emotive results) for Participant One

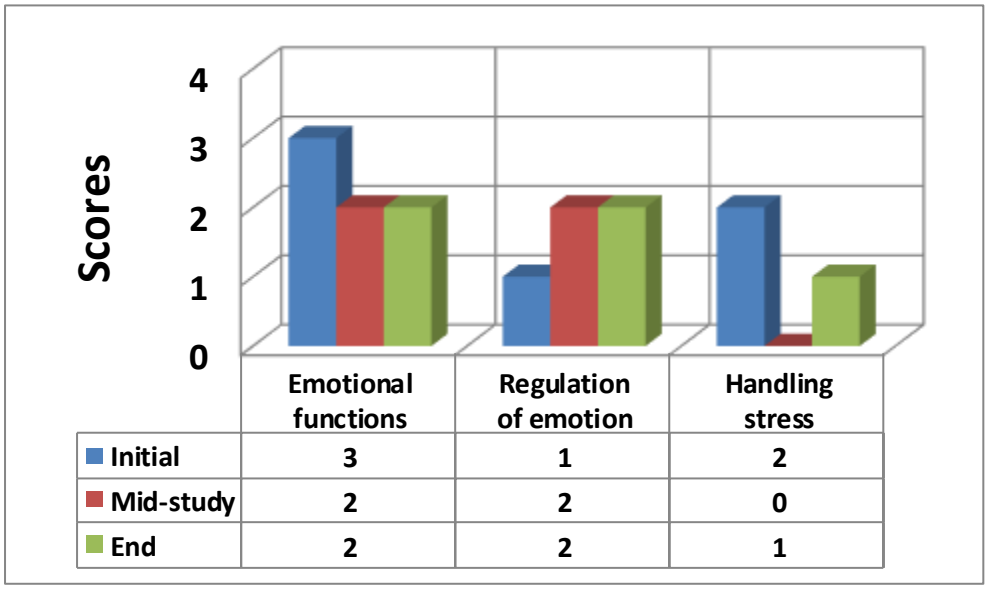
This single questionnaire was completed at the beginning, mid study and again at the end of the study, by participants' teachers and the researcher. Components from the ICF

questionnaire was divided into three categories to reflect the participants' emotive functioning with relation to anxiety, client factors and functional activity participation. In this section, the findings for emotive functioning are presented in the figures below.

No t-scores are available for the ICF core set questionnaires. Results are reported according to a scale:

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.



	Emotional functions	Regulation of emotion	Handling stress
Initial	3	1	2
Mid-study	2	2	0
End	2	2	1

Figure 4.2 Participant one: International Classification of Functioning, Disability and Health-Teacher version, Emotive results

Initially P1's regulation of emotion reflected a mild impairment. Handling stress reflected a moderate impairment with his emotional functions reflecting severe impairment.

At the mid-study point, handling stress improved and reflected no impairment. Emotional functions improved toward moderate impairment, whereas regulation of emotions reverted toward moderate impairment.

By the end of the study, handling stress regressed to reflect a mild impairment. Emotional functions and the regulation of emotion remained the same from mid- to end of the study with moderate impairments remaining.

In figure 4.3 below P1's emotive results from the ICF questionnaire completed by the researcher are displayed.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.

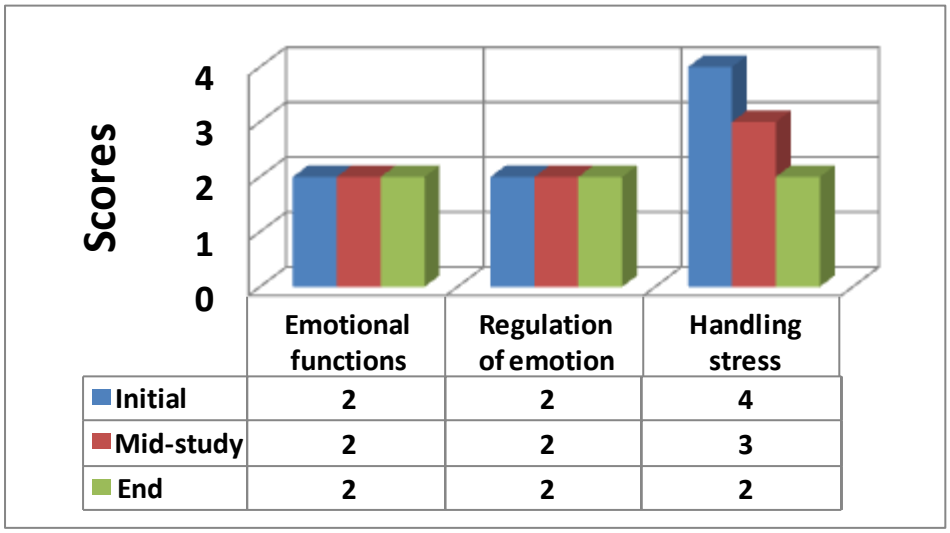


Figure 4.3 Participant one: International Classification of Functioning, Disability and Health-Researcher version, Emotive results

Initially, the researcher reported moderate impairments for P1's emotional functions and regulation of emotion. Handling stress showed a complete impairment.

Mid-study, handling stress improved to reflect severe impairment. Emotional functions and regulation of emotion remained unchanged with moderate impairments.

By the end of the study, handling stress improved again and only reflected moderate impairments. Emotional functions and regulation of emotions still remained unchanged with moderate impairments.

4.3.2. Participant One: Change in client factors

4.3.2.1. Conners Comprehensive Behavior Rating Scales- Parent and Teacher versions for Participant One

Parents completed a Conners CBRS-P questionnaire at the beginning of the study and again after the 16-week study period. Participant one's mother did not return completed Conners CBRS-P questionnaires. His teacher and the researcher did complete measures for his client factors, which will be displayed below.

The Conners CBRS-T questionnaire was completed at the beginning, mid study (after eight weeks) and again at the end of the study (after 16- weeks), by participants' teachers. **Error! Reference source not found.**4 displays the Conners CBRS-T results for P1.

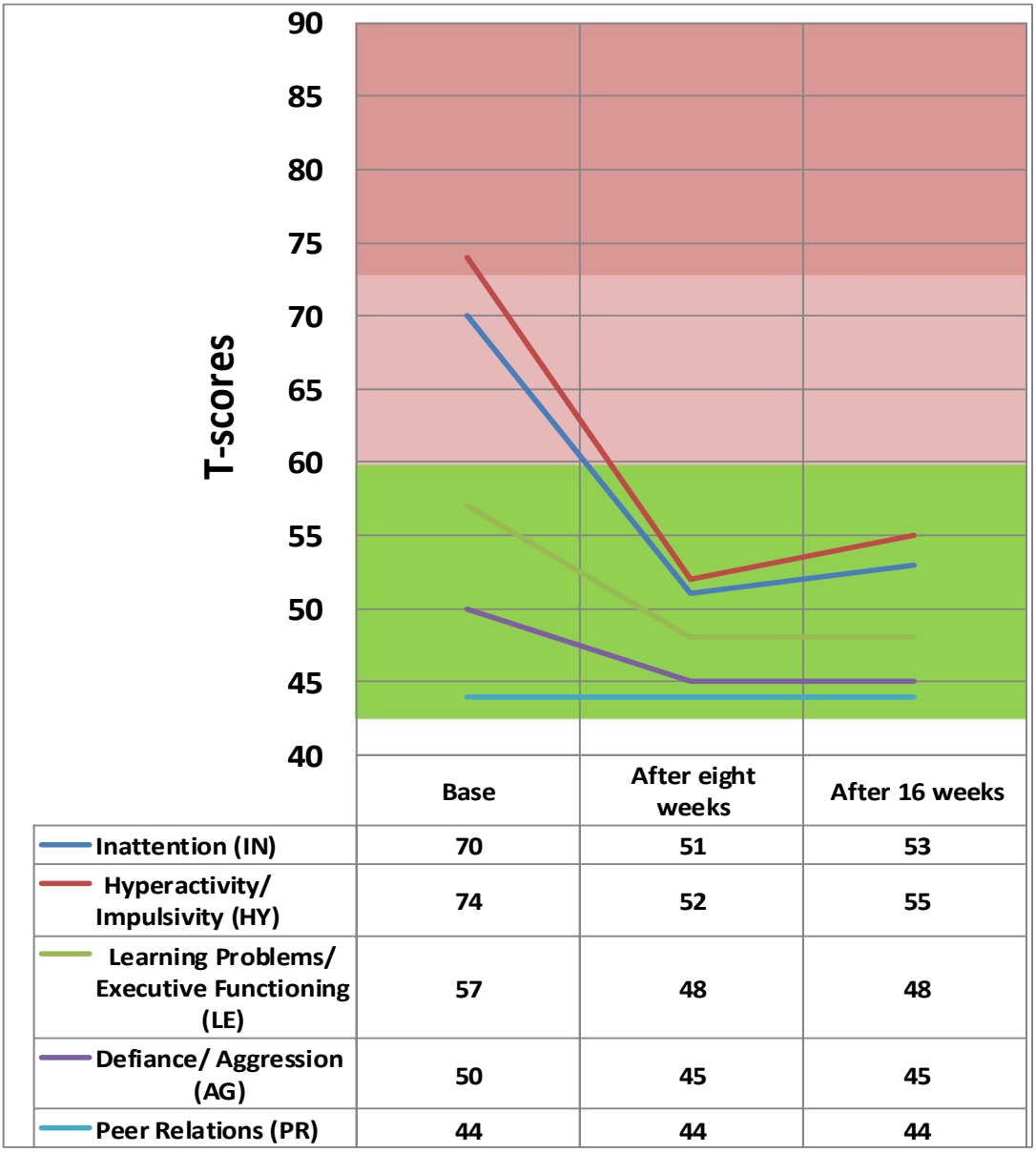


Figure 4.4 Participant one: Conners Comprehensive Behavior Rating Scales-Teacher version results

Table 4.3 Understanding Conners Comprehensive Behavior Rating Scales t-scores

T-score	Guideline
≥70	Very elevated score (Many more concerns than are typically reported)
65-69	Elevated score (More concerns than are typically reported)
60-64	High average score (Slightly more concerns than are typically reported)
40-59	Average score (Typical levels of concern)
<40	Low score (Fewer concerns than are typically reported)

At baseline, P1's t-scores indicating average/ typical performance include: learning problems/ executive function, defiance/ aggression and peer relations. Elevated t-scores are indicated for inattention and hyperactivity/ impulsivity, meaning that there are more concerns in these areas than are typically reported.

After eight weeks, all t-scores indicate average/ typical levels of functioning. An improvement in P1's functional activity participation could thus be noticed at the study's mid-point.

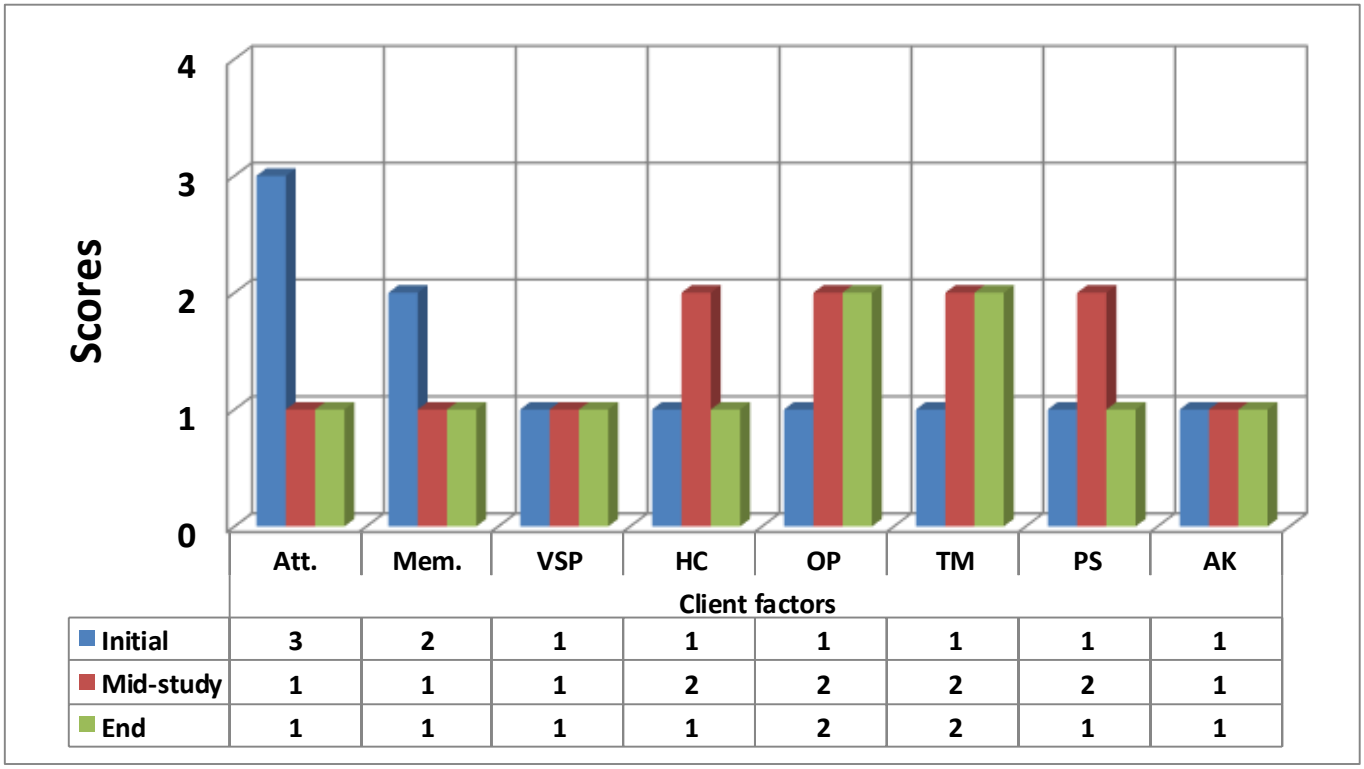
By the end of the study, inattention and hyperactivity's t-scores were slightly higher, but still conveyed typical performance. The remaining t-scores stabilised from mid- to end of study, reflecting an overall improvement in functional activity participation from beginning- to end of study.

4.3.2.2. International Classification of Functioning, Disability and Health core set Questionnaires- Teacher and Researcher Version (client factors) for Participant One

The findings with regards to P1's ICF (teacher and researcher versions) client factors are presented in the figures below.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.



	Att.	Mem.	VSP	HC	OP	TM	PS	AK
Initial	3	2	1	1	1	1	1	1
Mid-study	1	1	1	2	2	2	2	1
End	1	1	1	1	2	2	1	1

Figure 4.5 Participant one: International Classification of Functioning, Disability and Health-Teacher version, Client factors results

Initially, P1's visuo-spatial perception, higher-level cognitive functions, organization and planning, time management, problem solving and applying knowledge only reflected mild impairments. Memory functions reflected moderate impairments. Attention functions reflected severe impairments.

At the mid-study point, the teacher's ICF indicated that P1's attention- and memory-functions, improved, with only mild impairments remaining. Visuo-spatial perception and applying knowledge remained unchanged at the mid-study point, indicating mild impairments. Higher-level cognitive functions, organization and planning, time management and problem-solving showed higher scores at this stage from mild- to moderate impairments.

Higher-level cognitive functions and problem-solving improved from mid- to end of study, with only mild impairments remaining. Aspects that remained the same from the middle- to the

end of the study included attention- and memory functions, visuo-spatial perception, organization and planning, time management and applying knowledge. These aspects still reflected mild- to moderate impairments.

Figure 4.6 displays client factors results from the ICF questionnaire completed by the researcher for P1.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.

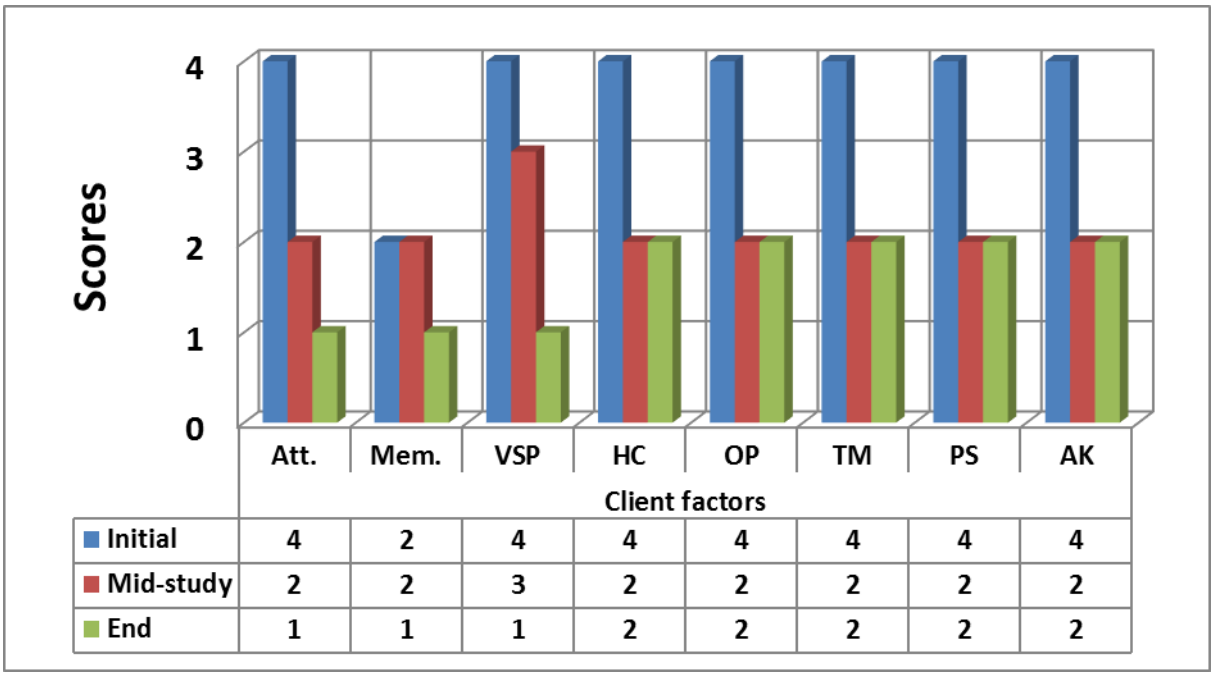


Figure 4.6 Participant one: International Classification of Functioning, Disability and Health-Researcher version, Client factors results

Initially, P1 experienced moderate difficulties relating to memory functions. Attention functions, visuo-spatial perception, higher level cognitive functions, organization and planning, time management, problem solving and applying knowledge were all completely impaired.

By mid-study, memory functions remained unchanged with a moderate impairment. All other aspects showed improvement with moderate to severe impairments remaining.

By the end of the study, attention- and memory functions and visuo-spatial perception showed further improvement and only reflected mild impairments. All other client factors remained unchanged from mid- to end of the study, with moderate impairments.

4.3.3. Participant One: Change in functional activity participation

The ICF-T and ICF-R questionnaires' components of functional activity participation are displayed in the figures below.

No t-scores are available for the ICF core set questionnaires. Results are reported according to a scale:

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.

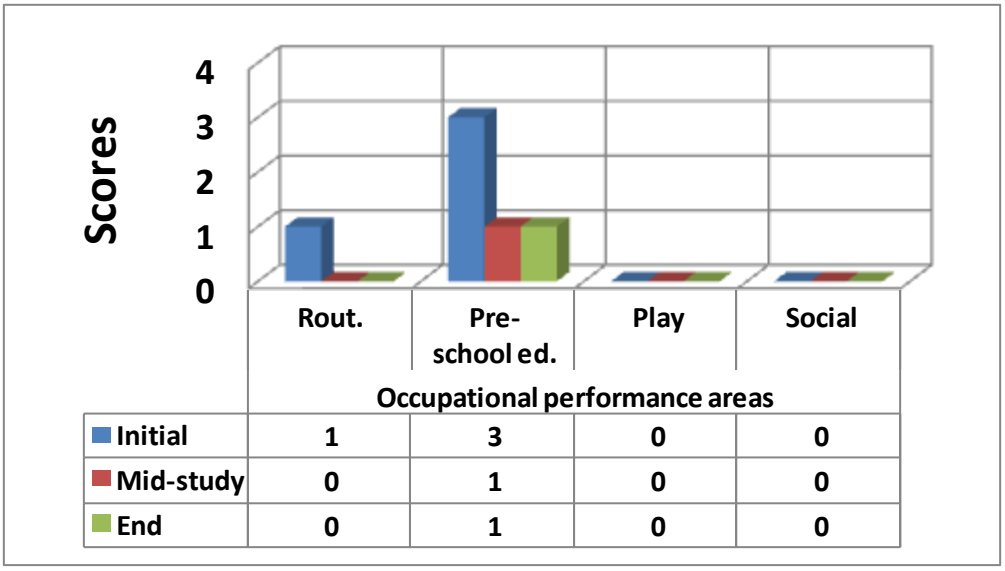


Figure 4.7 Participant one: International Classification of Function, Disability and Health-Teacher version, Functional activity participation results

Initially, P1's play and socializing reflected no impairments, which was also noted at the mid-

and end of the study points. Carrying out the daily routine reflected a mild impairment, whereas preschool education reflected a severe impairment at the beginning of the study.

Carrying out the daily routine improved by mid-study with no impairment remaining and carried over to the end of the study. Pre-school education improved at the mid-study mark from a severe impairment to a mild impairment and still reflected mild impairment at the end of the study.

Figure 4.8 displays ICF-R results for functional activity participation of P1.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.

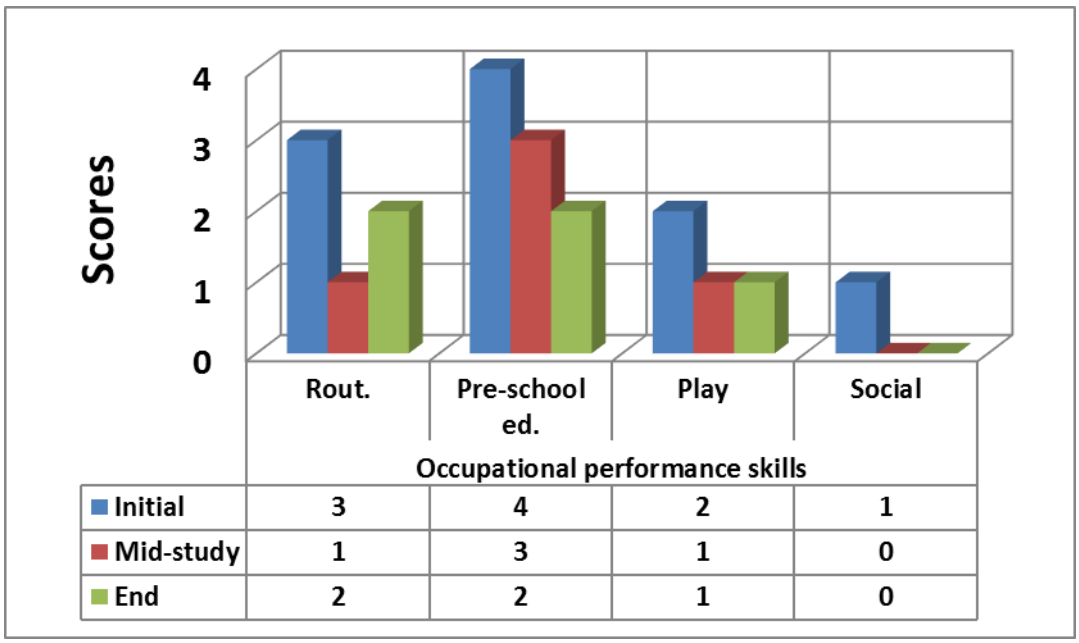


Figure 4.8 Participant one: International Classification of Function, Disability and Health-Researcher version, Functional activity participation results

Initially, P1's social skills reflected a mild impairment. Playing was moderately impaired. Carrying out the daily routine reflected a severe impairment and preschool education was completely impaired.

Participant one's social skills improved and reflected no impairment by mid- and the end of the study. Carrying out the daily routine and playing improved towards mild impairments by mid-study. Pre-school education also improved by the mid-study point from complete- to severe impairment.

By the end of the study, playing reflected mild impairment. Pre-school education further improved towards a moderate impairment. Carrying out the daily routine reverted towards a moderate impairment from mid- to end of the study.

4.3.4. Participant One: Experience of implementing a home programme

At the end of the 16-week study period, parents completed the questionnaire with regards to their experience while implementing the PMR home programme. As stated above, P1's mother did not return any completed documentation other than the consent and assent forms and the demographic questionnaire. Reflections from their experience of PMR as a home programme is thus not available. In a telephone call with P1's mother she provided information that they performed the PMR exercises just before bedtime. She reported that it facilitated P1 to sleep in his own room and that the quality of his sleep was better than before he participated in the PMR exercises.

4.3.5. Summary of Participant One's results for anxiety, client factors and functional activity participation

Participant one achieved an overall improvement of anxiety, client factors and functional activity participation according to teacher- and researcher completed questionnaires.

4.4. Participant Two

4.4.1. Participant Two: Change in anxiety levels

4.4.1.1. Spence Children's Anxiety Scale- Parent version for Participant Two

In Figure 4.9 below, P2's initial and end SCAS-P results are illustrated. The SCAS-P was completed by the parent initially, and after the 16-week period. T-scores of 60 and above indicate elevated levels of anxiety and is indicated by red shading on the figure area.

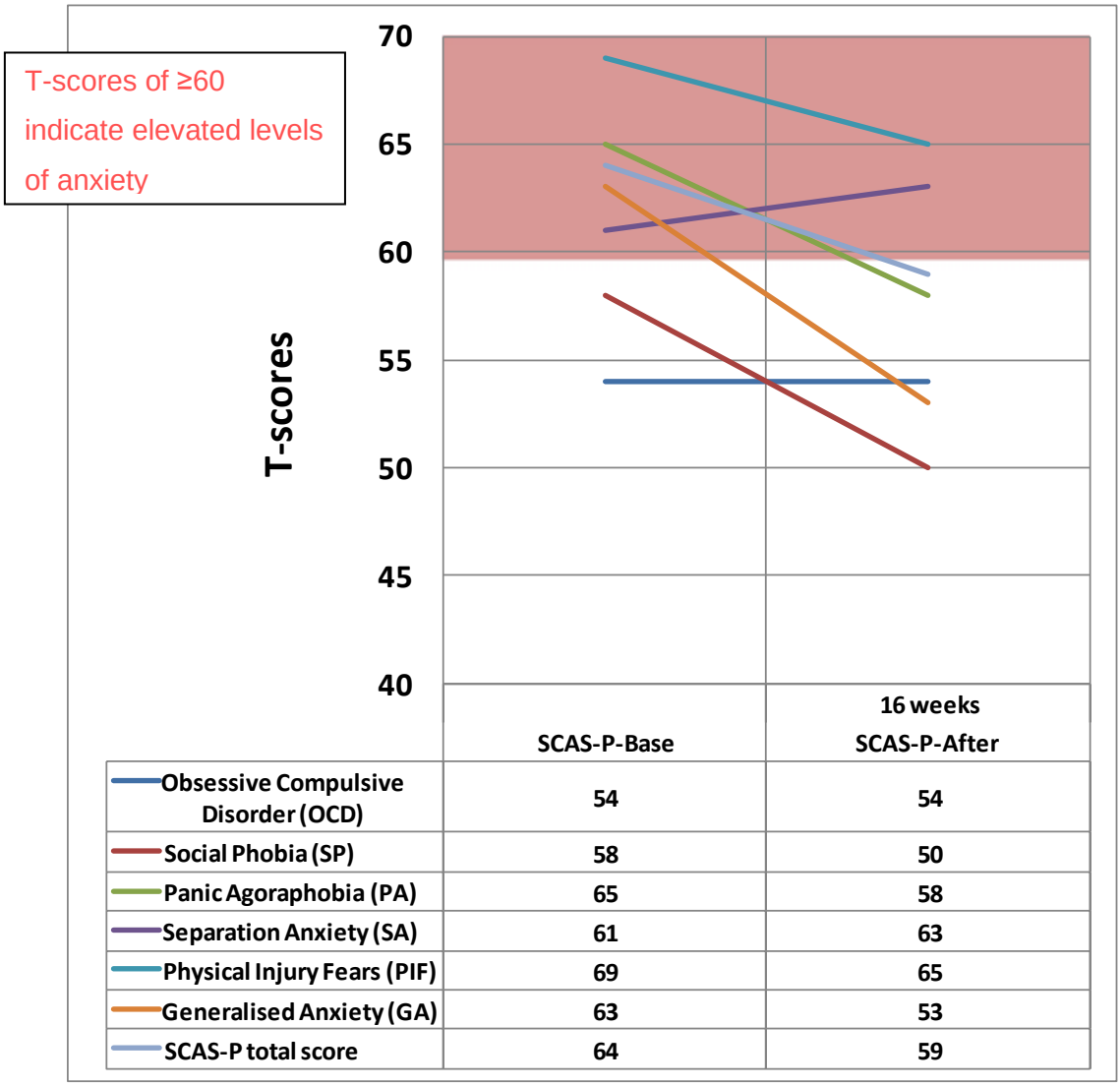


Figure 4.9 Participant two: Spence Children's Anxiety Scale-Parent version results

Participant two's results indicated t-scores within a 'normal' range for Obsessive Compulsive Disorder (OCD) and Social Phobia (SP) at the initial measurement when entering the study. Elevated levels of anxiety were indicated for Panic Agoraphobia (PA), Separation Anxiety (SA), Physical Injury Fears (PIF) and Generalized Anxiety (GA) as well as on the SCAS-P total score, at initial measurement.

After the PMR home program P2's anxiety levels did improve. Separation anxiety however increased after the 16-week period. It is important to note that, even while anxiety improved overall, some of the scores (SA, PIF and total SCAS score) still reflect elevated levels of anxiety. This remains problematic and could require further evaluation and intervention by a clinical psychologist or psychiatrist.

4.4.1.2. International Classification of Functioning, Disability and Health – Teacher and Researcher versions (emotive results) for Participant Two

This single questionnaire was completed at the beginning, mid study and again at the end of the study, by participants' teachers and the researcher. Components from the ICF questionnaire was divided into three categories to reflect the participants' emotive functioning with relation to anxiety, client factors and functional activity participation. In this section, the findings for emotive functioning are presented in the figures below.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment; 4= Complete impairment.

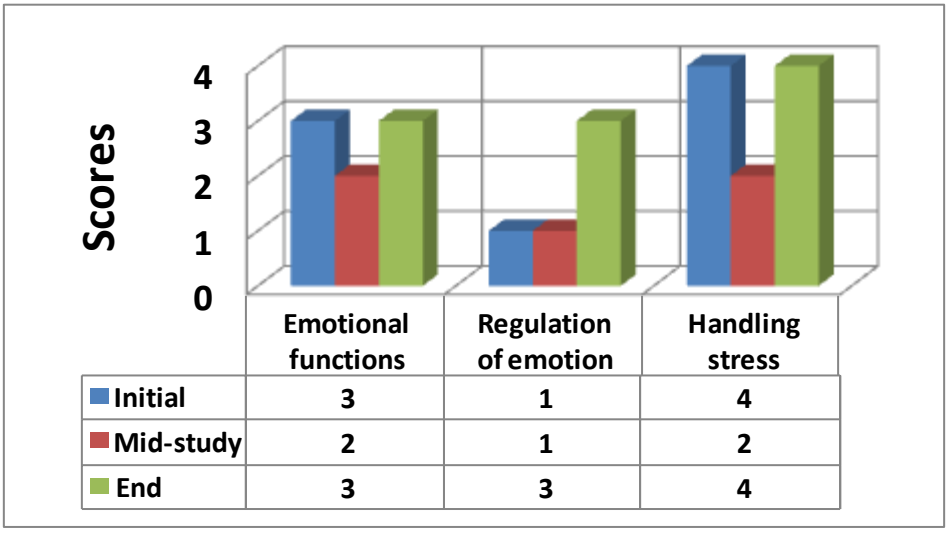


Figure 4.10 Participant two: International Classification of functioning, disability and health-Teacher version: Emotive results

Initially P2's regulation of emotion indicated mild impairment, emotional functions were severely impaired and handling stress showed a complete impairment.

At the mid-study measurement, the regulation of emotion remained unchanged with a mild impairment. Both emotional functions and handling stress improved toward moderate impairments.

By the end of the study all aspects of emotive functions regressed toward severe or complete impairments.

Figure 4.11 shows P2's ICF-R emotive results.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.

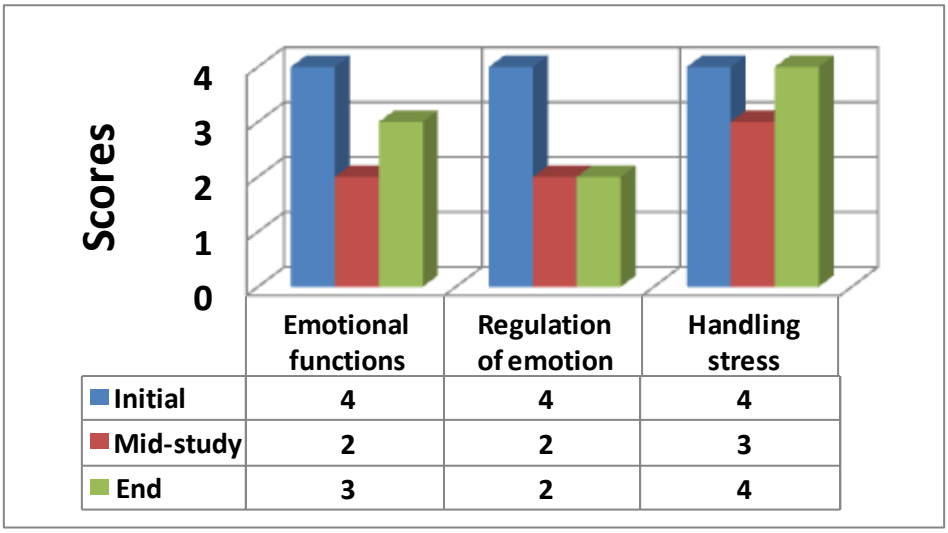


Figure 4.11 Participant two: International Classification of functioning, disability and health-Researcher version: Emotive results

Initial scores on the ICF-R indicated complete impairments for emotive functions. By mid-study, improvements were noted. By the end of the study moderate- to complete impairments for emotive functions were still evident for P2.

4.4.2. Participant Two: Change in client factors

4.4.2.1. Conners Comprehensive Behavior Rating Scales- Parents and Teacher versions for Participant Two

In Figure 4.12 on the following page, P2's initial- and end study Conners CBRS-P results are illustrated.

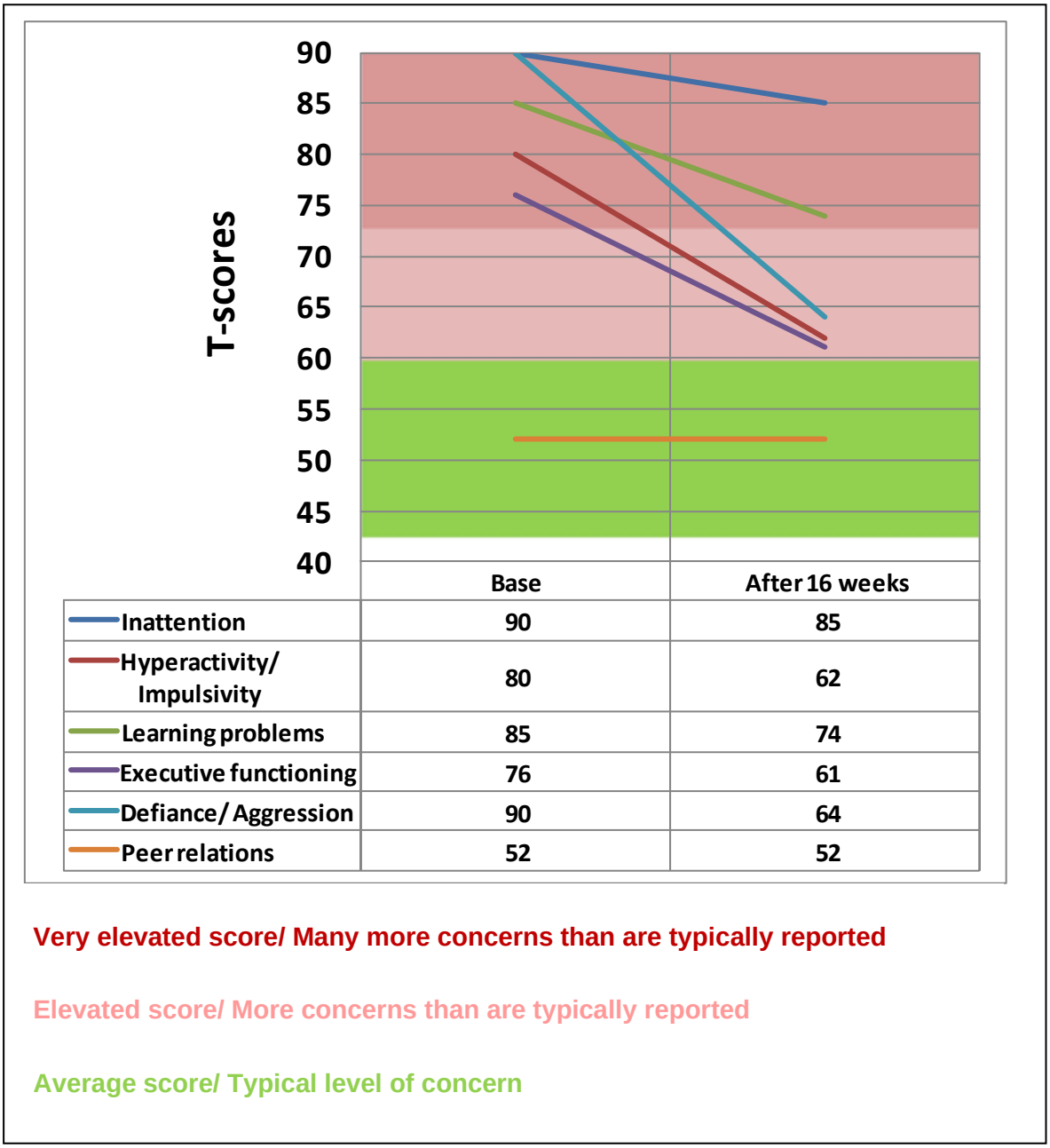


Figure 4.12 Participant two: Conners Comprehensive Behavior rating Scales-Parent version results

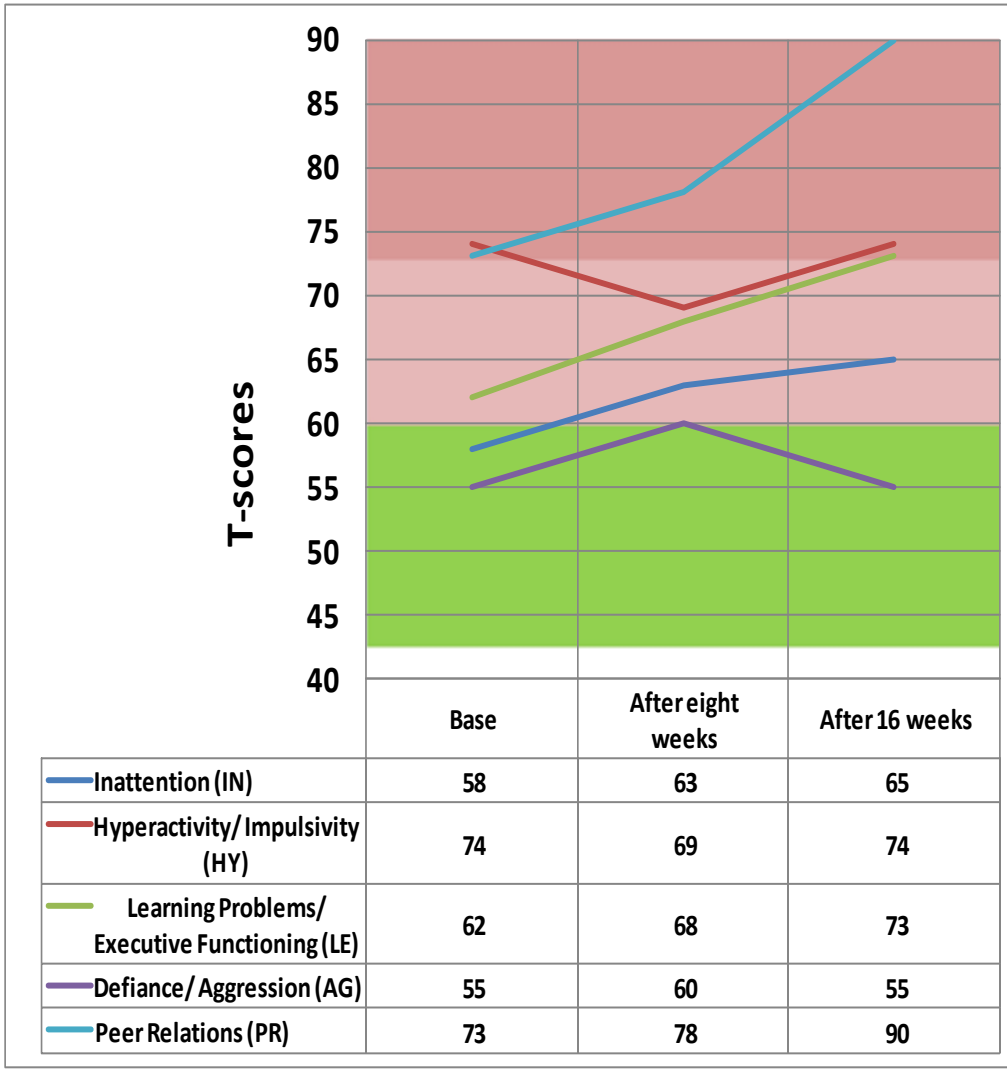
Table 4.4 Understanding Conners Comprehensive Behavior rating Scales t-scores

T-score	Guideline
≥70	Very elevated score (Many more concerns than are typically reported)
65-69	Elevated score (More concerns than are typically reported)
60-64	High average score (Slightly more concerns than are typically reported)
40-59	Average score (Typical levels of concern)
<40	Low score (Fewer concerns than are typically reported)

Participant two's t-score for peer relations reflect an average score. Baseline t-scores of inattention, hyperactivity/ impulsivity, learning problems, executive function and defiance/ aggression, reflect that there are many more concerns than are typically reported.

After 16- weeks, P2's scores indicated improvements. Only inattention and learning problems still reflected many more concerns than are typically reported. Hyperactivity/impulsivity, executive functioning and defiance/ aggression showed only slight concerns remaining. Peer relations remained unchanged at an average score.

In Figure 4.13 below, the Conners CBRS-T results for P2 are illustrated.



	Base	After eight weeks	After 16 weeks
Inattention (IN)	58	63	65
Hyperactivity/ Impulsivity (HY)	74	69	74
Learning Problems/ Executive Functioning (LE)	62	68	73
Defiance/ Aggression (AG)	55	60	55
Peer Relations (PR)	73	78	90

Very elevated score/ Many more concerns than are typically reported

Elevated score/ More concerns than are typically reported

Average score/ Typical level of concern

Figure 4.13 Participant two: Conners Comprehensive Behavior Rating scales-Teacher version: results

At baseline, average/ typical t-scores were indicated for P2 for inattention and defiance/ aggression, reflecting typical levels of concern. High average t-scores were noted for learning problems/ executive functioning, indicating slightly more concerns than are typically reported. Elevated t-scores for hyperactivity/ impulsivity and peer relations were indicated, reflecting more concerns than are typically reported.

After eight weeks, high average t-scores were indicated for defiance/ aggression and inattention; reflecting slightly more concerns than are typically reported. Elevated t-scores were indicated for hyperactivity/ impulsivity and learning problems/ executive functioning. This reflects more concerns than are typically reported. Very elevated t-scores were indicated for peer relations, reflecting many more concerns than are typically reported. Participant 2's teacher thus reported a deterioration in his behaviour.

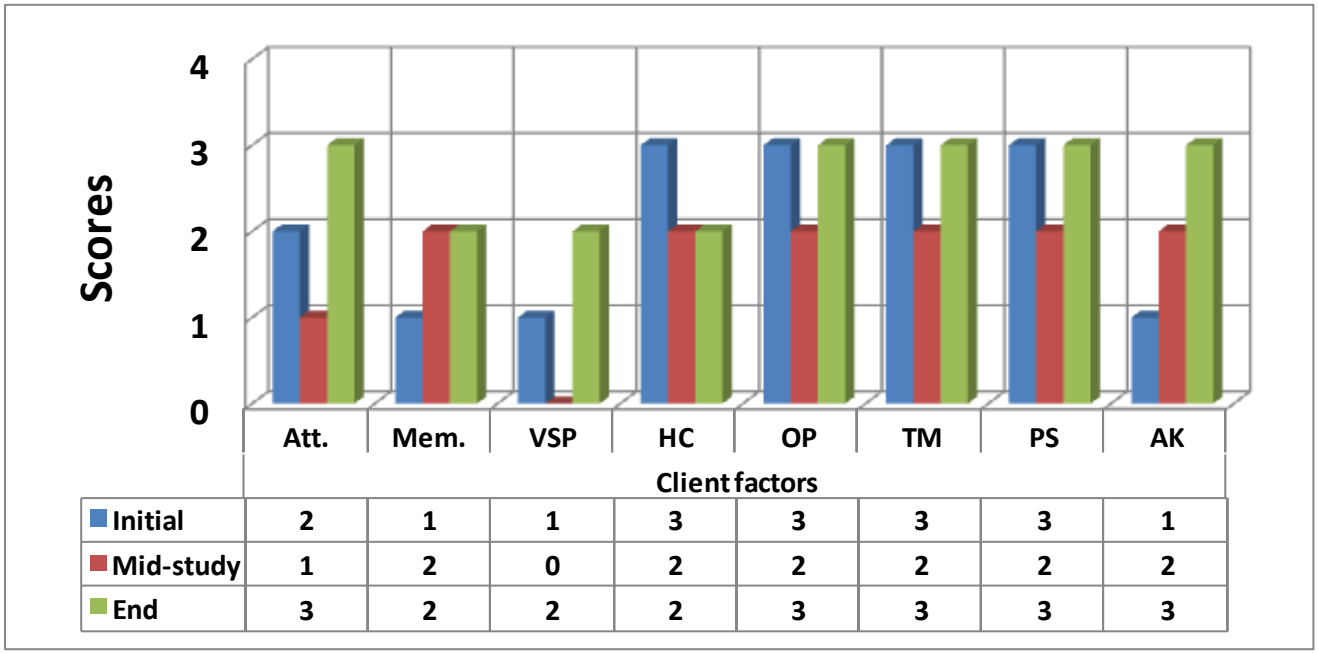
At the end of the study, P2's behaviour further deteriorated, with only defiance/ aggression improving to its initial level of typical performance. Elevated scores (more concerns than are typically reported) were indicated for inattention. Very elevated scores (many more concerns than are typically reported) were indicated for hyperactivity/ impulsivity, learning problems/ executive functioning and peer relations. Last mentioned scores moved from elevated scores to very elevated scores.

4.4.2.2. International Classification of Functioning, Disability and Health- Teacher and Researcher versions (client factors) for Participant Two

The findings with regards to P2's ICF (teacher and researcher versions) client factors are presented in the figures below.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.



	Att.	Mem.	VSP	HC	OP	TM	PS	AK
Initial	2	1	1	3	3	3	3	1
Mid-study	1	2	0	2	2	2	2	2
End	3	2	2	2	3	3	3	3

Figure 4.14 Participant two: International Classification of functioning, disability and health-Teacher version: Client factors results

In terms of client factors, mild impairments for memory functions, visuo-spatial perception and applying knowledge were observed initially. Moderate impairments were present for attention functions. Severe impairments were indicated for higher- level cognitive functions, organization and planning, time management and problem solving.

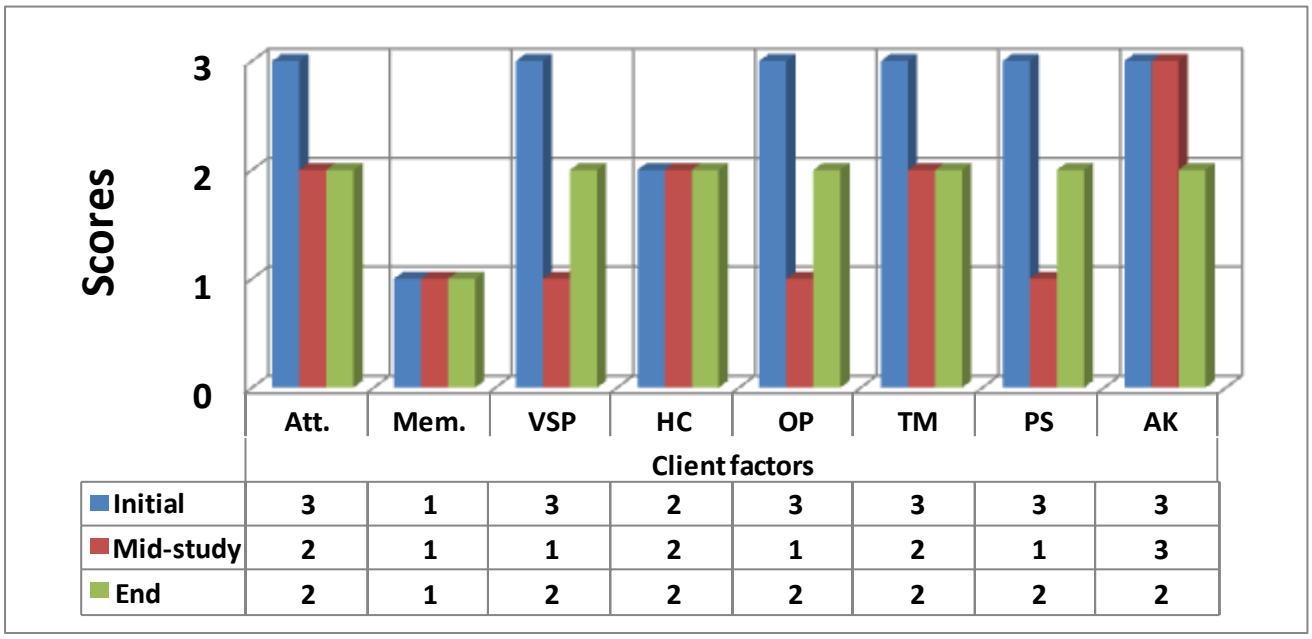
By mid-study visuo-spatial perception indicated no impairment. Attention functions improved toward a mild impairment. Higher-level cognitive functions, organization and planning, time management and problem solving improved from severe- to moderate impairments. Memory functions and applying knowledge lapsed.

At the end of the study, P2's teacher reported a deterioration in his client factors.

Figure 4.15 on the next page displays P2's ICF-R client factors results.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.



	Att.	Mem.	VSP	HC	OP	TM	PS	AK
Initial	3	1	3	2	3	3	3	3
Mid-study	2	1	1	2	1	2	1	3
End	2	1	2	2	2	2	2	2

Figure 4.15 Participant two: International Classification of functioning, disability and health-Researcher version: Client factors results

Participant two's memory functions indicated a mild impairment initially. Other client factors indicated moderate- to severe impairments.

Memory functions and higher-level cognitive functions remained unchanged throughout the study period. Other client factors reflect an overall improvement from the beginning- toward the end of the study.

4.4.3. Participant Two: Change in functional activity participation

4.4.2.3. International Classification of Functioning, Disability and Health-Teacher and Researcher results (functional activity participation) for Participant Two

The findings with regards to P2's ICF (teacher and researcher versions) functional activity participation results are presented in the figures below.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment;

4= Complete impairment.

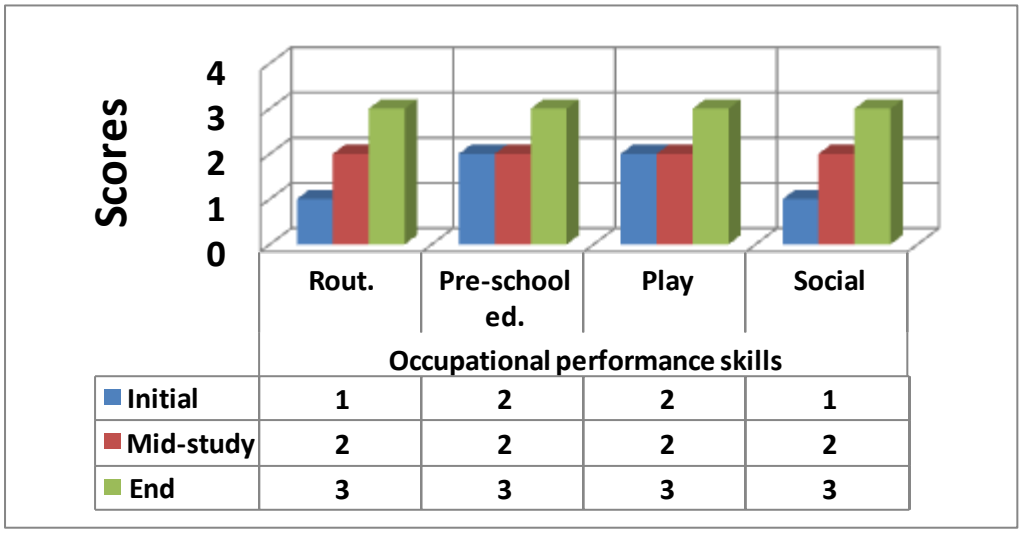


Figure 4.16 Participant two: International Classification of functioning, disability and health-Teacher version: Functional activity participation results

A trend could be observed, whereby deterioration in P2's functional activity participation could be seen from initial- to mid- to the end of the study period. Especially with regards to carrying out the daily routine and socializing.

Figure 4.17 displays P2's ICF-R functional activity participation results.

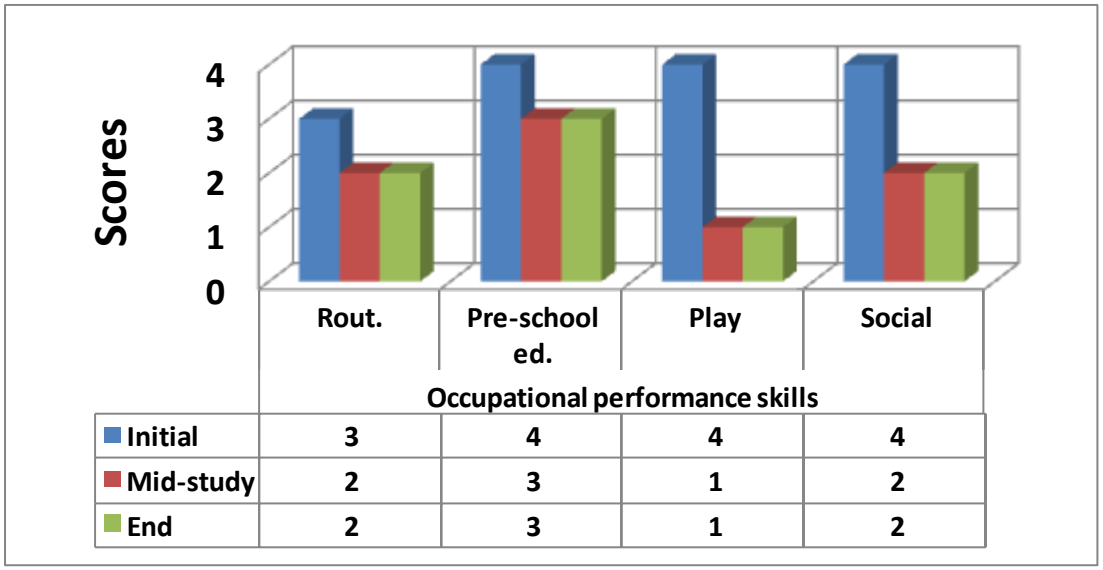


Figure 4.17 Participant two: International Classification of functioning, disability and health-Researcher version: Functional activity participation results

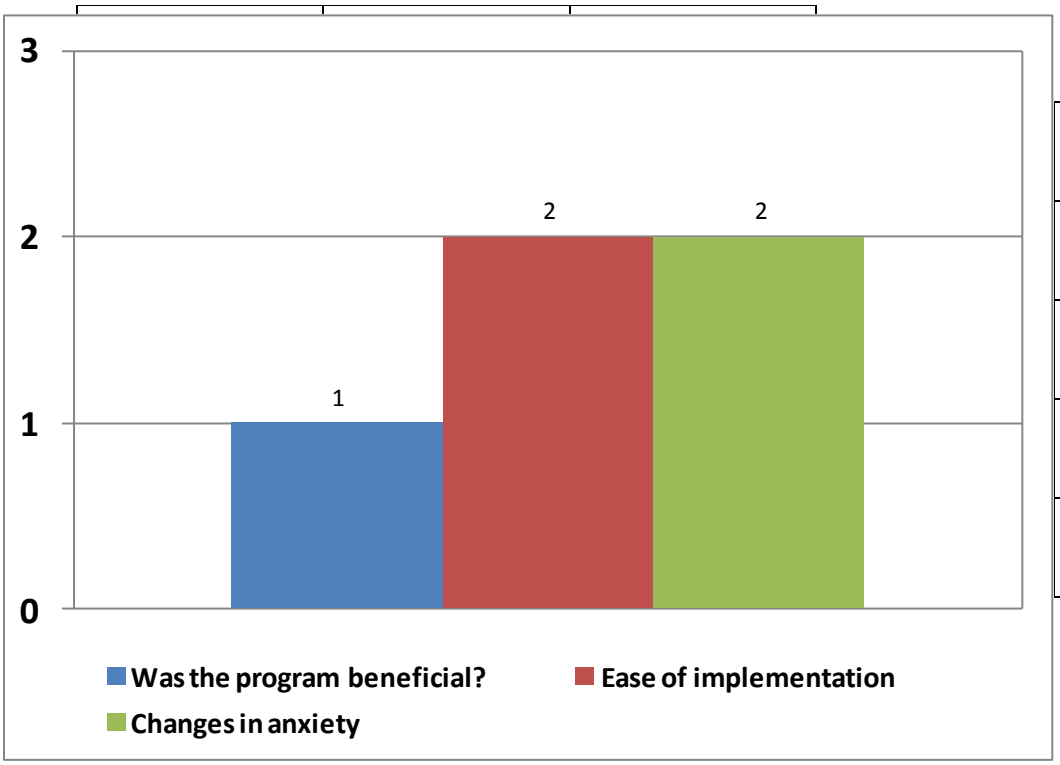
Results from the ICF-R in relation to P2's functional activity participation indicate that the areas improved from beginning- to mid-study and then remained the same from mid- to the end of the study.

4.4.4. Participant Two: Experience of implementing a home programme

At the end of the 16-week study period, parents completed the questionnaire with regards to their experience while implementing the PMR home programme. **Error! Reference source not found.** displays results for P2.

4.4.4.1. Parent experience questionnaire for Participant Two

Table 4.5 Participant two: Parent experience questionnaire



Score	Description
0	Not at all
1	Somewhat
2	Moderate
3	Significant

Table 4.5 Participant two: Parent expreience questionnaire continued

Child does exercises independently		
Would you continue		
Factors that made program implementation difficult	• "not having enough time to sit down" • "school homework needs to be done" • "child too tired some nights to focus and do the programme"	
Significant changes in anxiety	• "some nights sleeping really good, more energy to wake up for school" • "don't struggle so much with tiredness in mornings"	

Participant two's parents reported that it was relatively easy to implement the PMR home programme and indicated that they would continue with it. They noticed moderate changes in P2's anxiety. They noted that he did not apply the technique in any other instances than the scheduled times with his parents. Factors that made it difficult for them to complete the home programme included time constraints of completing school homework and then the PMR home programme as well as P2 being too tired before bedtime, when the programme was scheduled to happen. They noted that, after participating in the PMR home programme, he did sleep better during some evenings and had more energy when waking up the next morning.

4.4.4.2. Reflections from the intervention diary for Participant two

Parents were asked to complete the intervention diary after each of the PMR sessions during the week. As summary of P2's intervention diary is displayed in Table 4.6**Error! Reference source not found.**. Raw data is available in Appendix P.

Table 4.6 Summary of Participant two's intervention diary entries

Aspect of intervention diary	Options	Percentage
Number of sessions done during the week	1	0%
	2	37%
	3	63%
How does the child feel	Positive (comments such as friendly, happy, good, normal, chirpy and okay)	64%
	Negative (comments such as moody, tired, irritated, angry, lazy, off, sick and sad)	36%
Nature of the child's participation	Participated (comments such as participated, participated happily and energetic)	50%
	Distracted (comments such as attention wanders and distracted)	3%
	Not interested/ tired (comments such as not interested, too tired, did some, did one and did not want to)	43%
Quality of sleep	Woke up during the night	7%
	Normal sleep	38%
	Good sleep	53%
	Not good sleep	2%

The returned intervention diary reflected that on most occasions, P2 participated in the PMR home programme and experienced it as positive (feeling happy/ friendly), 64% of the time. A total of 48-time slots were recorded for following the programme three times a week during the 16-weeks. In the intervention diary, Participant 2's mother recorded that on 13 of the occasions; P2 either did not do the exercises at all, or only did one or a few of the exercises. Reasons for not doing it or only doing a few included: "not interested", "too tired", "falling asleep before" or "school concert". On most evenings, P2's sleep was good (53%) or normal (38%). During four of the weeks that the full programme was not completed, it is noticeable that P2 had an evening in those weeks that he woke up once or more and did not sleep well (2% of the time). Overall, from the initial entries in the diary of P2 being "irritated" or "struggling to focus", the entries changed to "participated happily", "energetic" and "good" toward the end of the programme.

4.4.5. Summary of Participant Two's results for anxiety, client factors and functional activity participation

When considering all the results from the various measurement tools relating to P2's experience of anxiety, client factors and his functional activity participation, the following conclusions can be made. Behaviour that improved included inattention, hyperactivity, emotional functions, aggression and handling stress. His ability to play indicated no problems after the 16-weeks. Inconsistent results are indicated for client factors and functional activity participation. Parent- and researcher measures indicated an improvement in these skills. Teacher measures indicated a decline in these skills for P2. Overall anxiety levels improved after the period of 16-weeks attending OT intervention and following the PMR home programme.

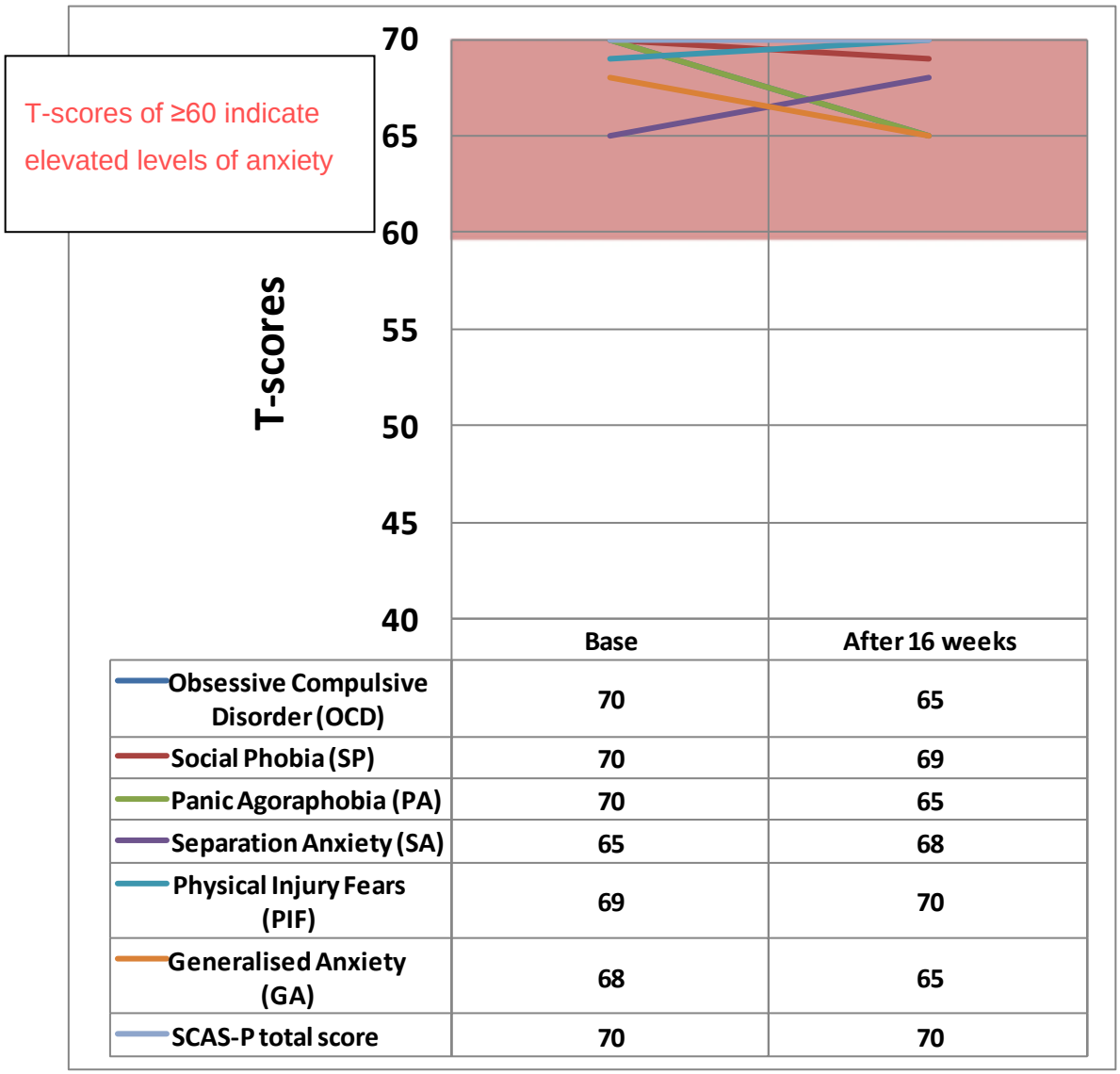
4.5. Participant Three

Participant three's teacher did not consent to participating in the study. Results of parent- and researcher completed measures are available for P3.

4.5.1. Participant Three: Change in anxiety

4.5.1.1. Spence Children's Anxiety Scale- Parent version for Participant Three

Below in Figure 4.18 P3's SCAS-P results are indicated. The SCAS-P was completed at the beginning- and again at the end of the 16-week period. T-scores of 60 and above reflect elevated levels of anxiety as is indicated by red shading on the figure below.



	Base	After 16 weeks
Obsessive Compulsive Disorder (OCD)	70	65
Social Phobia (SP)	70	69
Panic Agoraphobia (PA)	70	65
Separation Anxiety (SA)	65	68
Physical Injury Fears (PIF)	69	70
Generalised Anxiety (GA)	68	65
SCAS-P total score	70	70

Figure 4.18 Participant three: Spence Children's Anxiety Scale-Parent version results

Participant three's results at initial measurement for anxiety indicated that all t-scores were elevated. At the end of the study, improvements in anxiety could be noted for OCD, SP, PA and GA. Separation anxiety and PIF scores were elevated by the end of the study. The t-

score for the total SCAS-P score remained the same. All the t-scores were still elevated by the end of the study, thus indicating that further intervention by a clinical psychologist or psychiatrist may be necessary.

4.5.1.2. International Classification of Functioning, Disability and Health-Researcher version (emotive results) for Participant Three

This single questionnaire was completed at the beginning, mid study and again at the end of the study, by the researcher. Components from the ICF questionnaire was divided into three categories to reflect the participants' emotive functioning with relation to anxiety, client factors and functional activity participation. In this section, the findings for emotive functioning are presented in the figure below.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment; 4= Complete impairment.

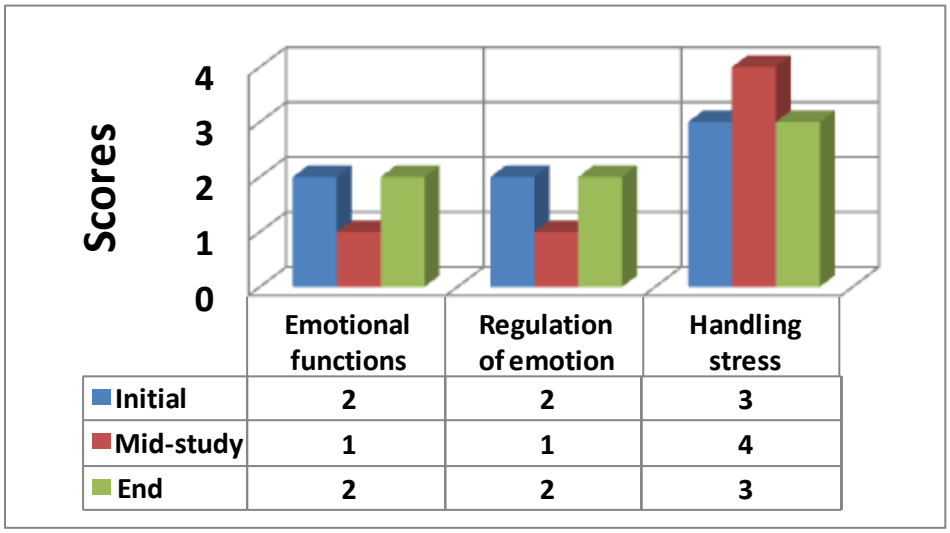


Figure 4.19 Participant three: International classification of functioning, disability and health questionnaire- Researcher version: Emotive results

Moderate impairments were noted for emotional functions and regulation of emotion at the beginning of the study, with severe impairments for handling stress.

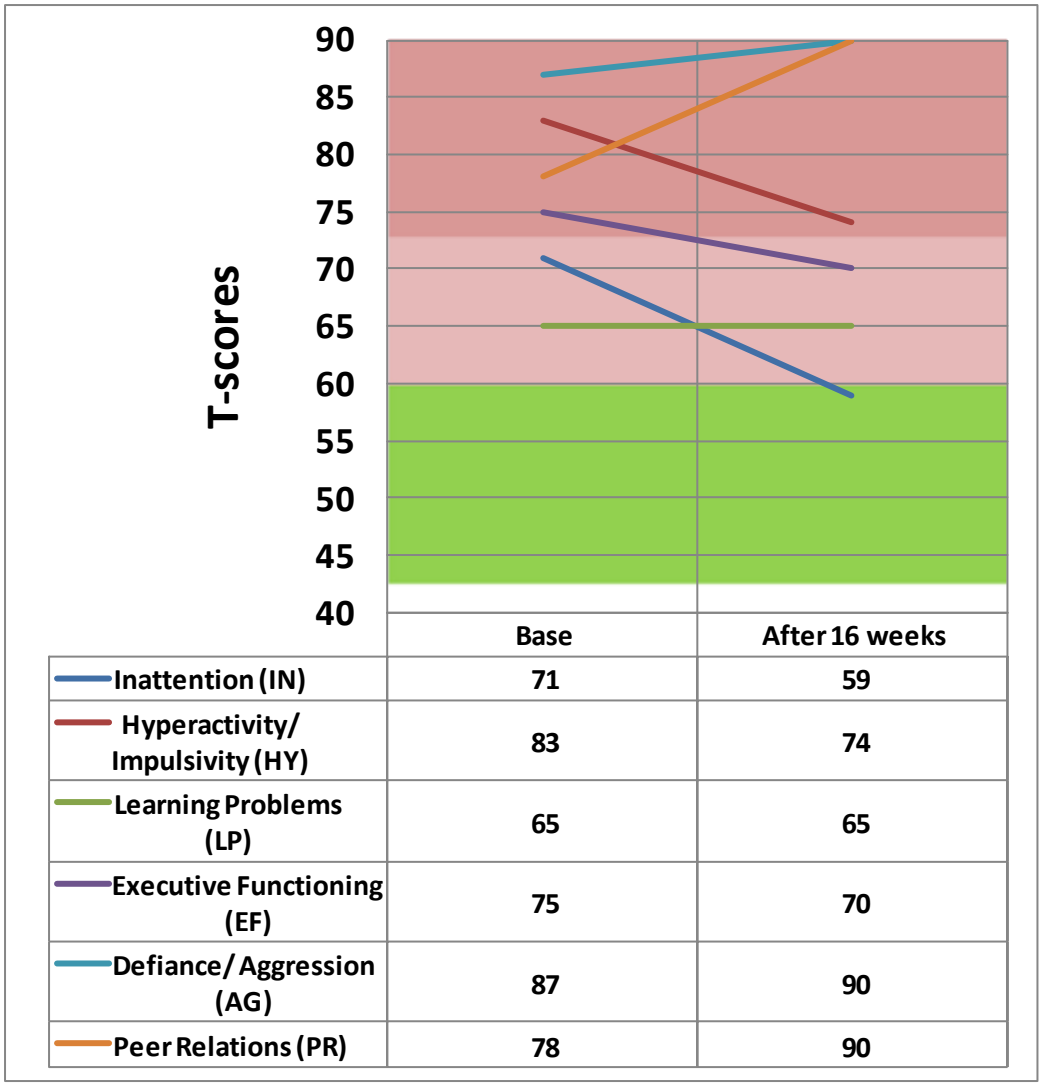
Emotional functions and the regulation of emotion did improve toward the mid-study mark, with a deterioration in handling stress.

By the end of the study, emotive functions all reflected no change from initial scores.

4.5.2. Participant Three: Change in client factors

4.5.2.1. Conners Comprehensive Behavior Rating Scales- Parent version for Participant Three

In Figure 4.20 on the following page, P2's initial- and end study Conners CBRS-P results are illustrated.



	Base	After 16 weeks
Inattention (IN)	71	59
Hyperactivity/ Impulsivity (HY)	83	74
Learning Problems (LP)	65	65
Executive Functioning (EF)	75	70
Defiance/ Aggression (AG)	87	90
Peer Relations (PR)	78	90

Very elevated score/ Many more concerns than are typically reported

Elevated score/ More concerns than are typically reported

Average score/ Typical level of concern

Figure 4.20 Participant three: Conners Comprehensive Behavior Rating Scales-Parent version results

Table 4.7 Understanding Conners Comprehensive Behavior Rating Scales t-scores

T-score	Guideline
≥70	Very elevated score (Many more concerns than are typically reported)
65-69	Elevated score (More concerns than are typically reported)
60-64	High average score (Slightly more concerns than are typically reported)
40-59	Average score (Typical levels of concern)
<40	Low score (Fewer concerns than are typically reported)

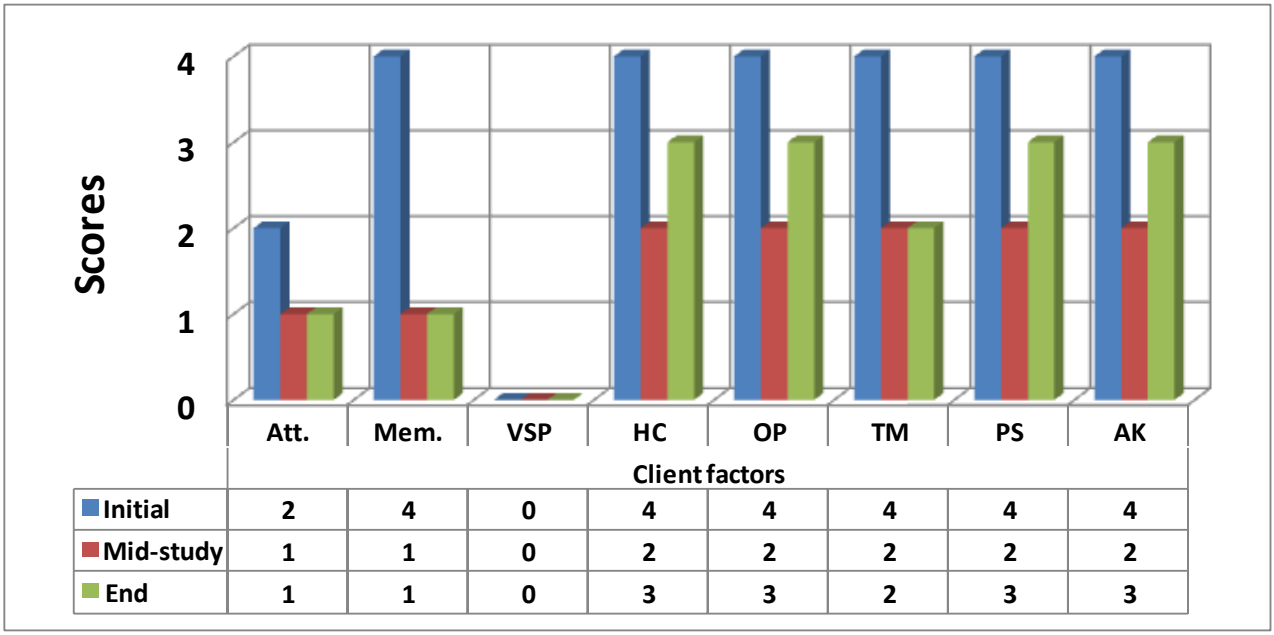
Participant three's t-scores at the beginning of the study indicate that inattention, learning problems and executive function's baseline t-scores reflect elevated scores. This indicates more concerns than are typically reported. Hyperactivity, defiance/ aggression and peer relations have very elevated t-scores. There are many more concerns than are typically reported.

After 16- weeks at the end of the study, inattention showed an improvement from being very elevated towards an average score; i.e. typical level of concern. Further improvements were noted for hyperactivity/ impulsivity and executive functioning; although the results continue to indicate very elevated scores (many more concerns than are typically reported). Decline in scores were indicated for defiance/ aggression and peer relations; remaining within the very elevated range.

4.5.2.2. International Classification of Functioning, Disability and Health-Researcher version (client factors) for Participant Two

Figure 4.21 below illustrates ICF-R client factors results for P3.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment; 4= Complete impairment.



	Att.	Mem.	VSP	HC	OP	TM	PS	AK
Initial	2	4	0	4	4	4	4	4
Mid-study	1	1	0	2	2	2	2	2
End	1	1	0	3	3	2	3	3

Figure 4.21 Participant three: International classification of functioning, disability and health questionnaire- Researcher version: Client factors results

No impairment was noted for visuo-spatial perception from beginning to the end of the study. Participant three's attention functions indicated moderate impairment. All other client factors indicated complete impairments initially.

By mid-study all of P3's client factors reflected improvements, with mild- to moderate impairments remaining.

From mid- to the end of the study, attention- and memory functions and time management stabilized. A deterioration was seen in higher-level cognitive functions, organization and planning, problem solving and applying knowledge.

4.5.3. Participant Three: Change in functional activity participation

Functional activity participation was measured by using two different questionnaires for this participant. Participant three's teacher did not give consent to participating in the study and therefore the Conners CBRS-T and ICF-T are not included in the results. Only the Conners CBRS-P and ICF-R could be included for this participant. Below in Figure 4.22 ICF-R functional activity participation results are displayed for P3.

0= No impairment; 1= Mild impairment; 2= Moderate impairment; 3= Severe impairment; 4= Complete impairment.

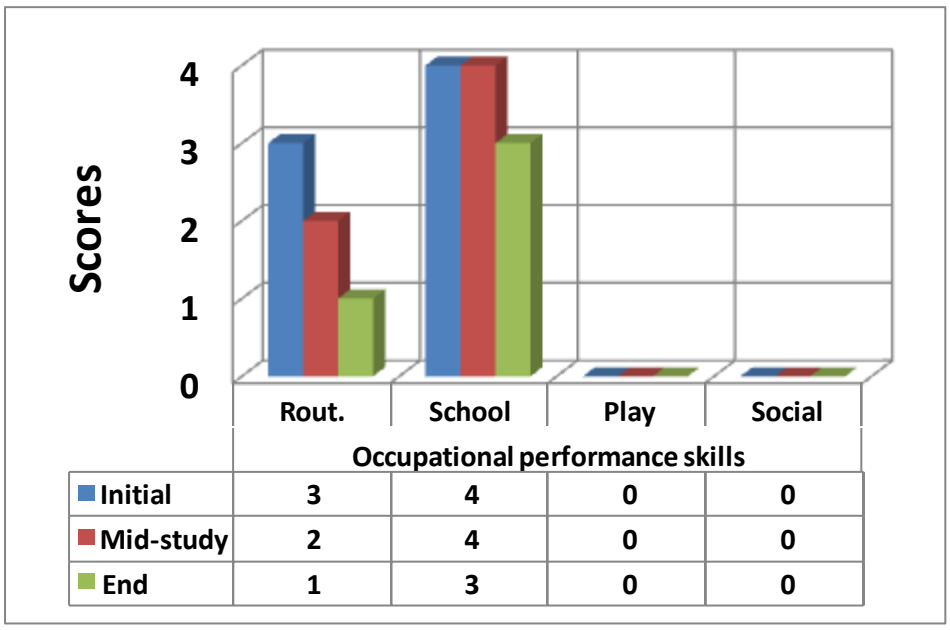


Figure 4.22 Participant three: International classification of functioning, disability and health questionnaire- Researcher version: Functional activity participation results

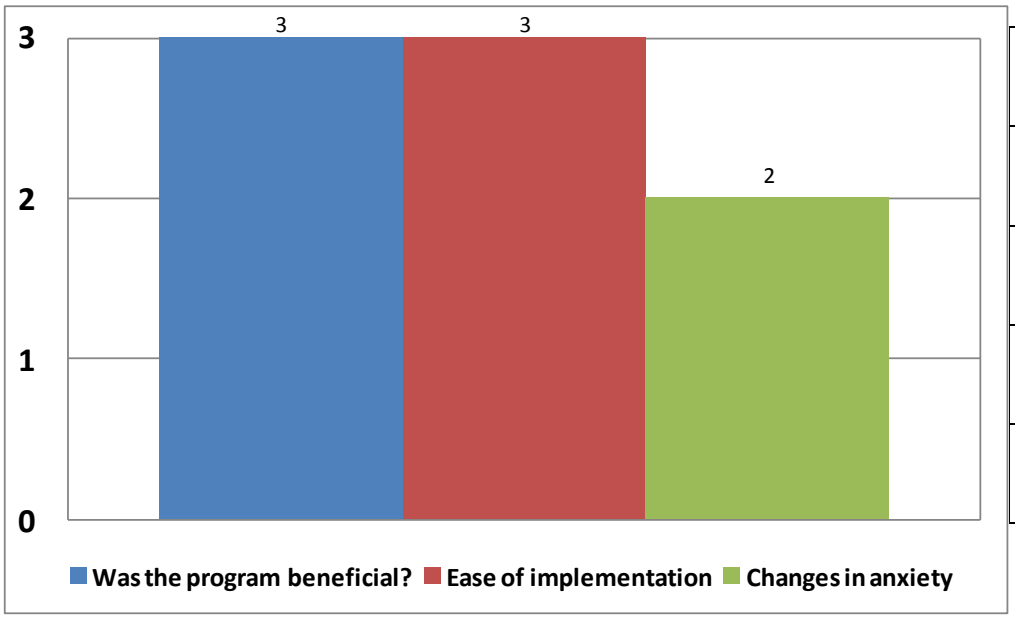
According to the researcher ICF, P3 did not experience problems in terms of playing and socializing, which reflected no impairments throughout the study period. Carrying out the daily routine and school performance did indicate severe and complete impairments. By the

end of the study these areas did improve, although school performance still indicated severe impairment.

4.5.4. Participant Three: Experience of implementing a home programme

This questionnaire was completed at the end of the study, by participants' parents. Results are indicated in Table 4.8 below. Participant three's mother reported that the PMR home programme was significantly beneficial and easy to implement, with moderate changes in anxiety noted. Although P3's mother reported that the programme was beneficial to them, there was little change in P3's anxiety levels ,still reflecting elevated levels of anxiety which is clinically significant with regards to anxiety disorders and therefore may require further investigation.

Table 4.8 Participant three: Parent experience questionnaire



Score	Description
0	Not at all
1	Somewhat
2	Moderate
3	Significant

	Yes	No
Child does exercises independently		
Would you continue		

Table 4.8 Participant three: Parent experience questionnaire continued

Factors that made program implementation difficult	Section on questionnaire not completed.
Significant changes in anxiety	Section on questionnaire not completed.

Participant three's mother indicated that P3 did not implement the PMR exercises independently from the scheduled times. She did indicate that they would continue with the home programme after the study is completed. The sections on the questionnaire reflecting factors that influenced implementation and the changes that they noticed in P3's anxiety were not completed.

4.5.5. Summary of Participant Three's results for anxiety, client factors and functional activity participation

When considering all the results from the various measurement tools relating to P3's experience of anxiety, client factors and her functional activity participation, the following conclusions can be made. Participant three's mother observed that her anxiety improved over the study period, although only slightly . The researcher however, observed that emotional- regulation and functions and the handling of stress remained unchanged when comparing initial- and end scores of researcher-completed questionnaires. Client factors, as reported on by the researcher, showed an overall improvement. Her mother also noticed improvements in P3's client factors. Functional activity participation in terms of school-related skills demonstrated an overall improvement on parent- and researcher-completed report measures. Playing remained with no impairment from initial to end study results. Socializing and peer relations did reflect a deterioration on the parent report measure.

4.6. Comparing anxiety and functional activity participation for participants

4.6.1. Anxiety comparison

Participants were selected and included in the study following the replication logic. Some similar results were displayed across the sample of participants. Anxiety levels did decrease for P2 and P3, displayed in Figure 4.23. On the PAS-T P1's anxiety also decreased, but the results cannot be compared to the other two participants because no t-scores are available. Participant two and P3's level of separation anxiety increased over the study period. Elevated levels of anxiety are indicated on the figure by red shading.

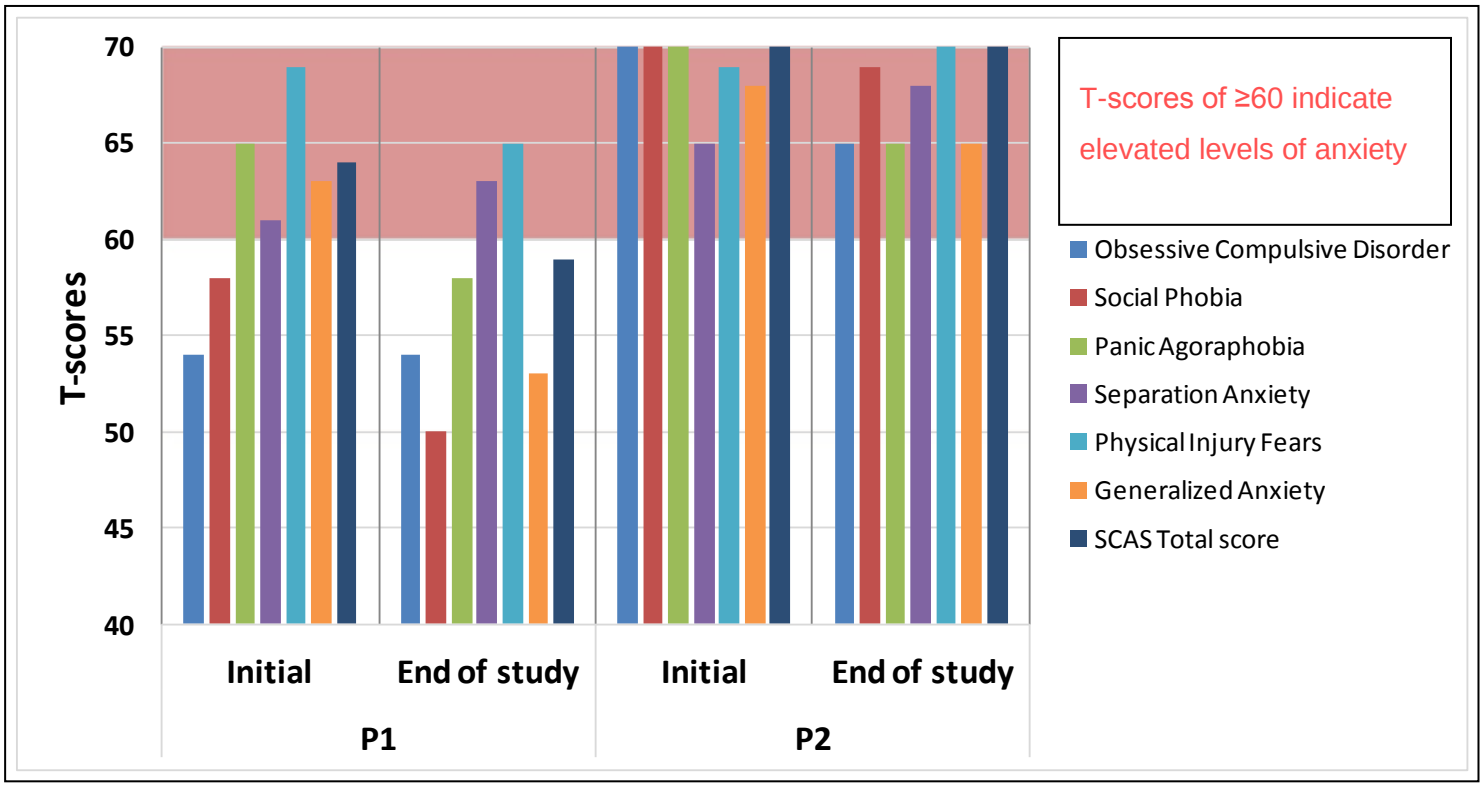


Figure 4.23 Comparison of SCAS-P results for P2 and P3

4.6.2. Functional activity participation comparison

School- related functional activity participation improved for P1 and P3 from beginning- to mid- study and then stabilised for P1 and regressed for P3, still reflecting an overall improvement in the full study period. Participant two showed a regression in functional activity participation over the study period at school. Even though P3's teacher did not complete questionnaires, P3 was placed in the LSEN class at school just after the study period ended. This could be seen as a regression in her functional activity participation at school, as she was unable to keep up with the demands in mainstream education. Participants two and three both had improved functional activity participation at home, reported by parents. These results could not be compared by means of figures, due to missing data.

4.7 Conclusion

The sample size in this study was limited, due to the case study design method of research that was employed. The nature of the study does not call for statistical analysis of data, but rather case-oriented analysis (Yin, 2014).

When comparing the participants, an overall decrease in participant level of anxiety was found, however, the change in anxiety was marginal on the measurement scales. Although P1 showed a decrease in anxiety, his results could not be compared to a normative sample in order to decide whether a significant decrease in anxiety was achieved. For P2 and P3, some elevated levels of anxiety were still evident, as seen on their SCAS-P total scores.

Mixed results were found regarding functional activity participation. Participant one's functional activity participation improved at school as well as in the one-on one context of intervention sessions. Participant two and P3's results indicate a similar pattern whereby improvements in functional activity participation were noted in smaller settings. Regressions in their functional activity participation were noted at school for participants two and three, with peer relations and social skills also regressing in group settings. When comparing participants, moderate to severe impairments remained in the end, especially with regards to school participation. Further intervention is indicated for all three participants.

In the following chapter, these results will be discussed in relation to the literature.

CHAPTER 5 : DISCUSSION

5.1. Introduction

The findings of this study as well as the interpretation of the results will be discussed in this chapter, in relation to existing literature. The demographic data and the prevalence of LD and anxiety in the sample will be explored first. In the subsequent sections the results will be discussed in relation to the two study objectives also addressing rival explanations, per participant. Finally, strengths and study limitations are discussed.

The purpose of the study was to explore the effect of a PMR home programme on the anxiety and functional participation in activities of children with LD who attend OT intervention. The results of this study indicated that some of the participants' anxiety decreased, although only marginal changes on anxiety measurement scales were found. Mixed results were found on measures of functional activity participation. Parent and researcher scales indicated improved functional participation in activities, whereas teacher scales indicated a regression in functional activity participation.

5.2. Demographic data and identification of children with learning disability

Although the sample size of this case study was small, two male participants and one female participant were identified experiencing LD and anxiety. This correlates with literature in a South African context identifying that, among children with LD as well as emotional/ behavioural difficulties, more boys than girls are involved (Nel and Grosser, 2016). From data collected from the 2001 Census, 2007 Community Survey and 2009 Annual General Household Survey, it is reported that LD comprises 0.4% of children, whereas behavioural/ emotional difficulties comprise 0.2% of children (Nel and Grosser, 2016).

The 10-year-old female participant's LD was formally diagnosed by an Educational Psychologist, after the study ended in September 2019. The two, six-year-old male participants are almost entering Grade one, with their LD identified by teachers within their current grade at the time of participating in the study in 2019. The timeframe of identifying LD is in line with previous research which illustrated that the identification of children with LD reached a peak in the first grade, declined through grades two and three, with an incline

again in grades six and seven. The mean age of LD identification being 10-years-old (Mcleskey, 1992; Tannock, 2018).

The participants included in this sample all attended mainstream schools at the beginning of the study. No formal diagnoses were present for any of the participants at the initiation of the study. Participant two did however display signs of SOR in his initial OT evaluation. The presence of SI difficulties in children with LD is estimated at 70% (Schaffer *et al.*, 1989). His increased level of anxiety could likely be a combination of the LD that he experiences as well as his SOR. This coincides with previous literature examining the co-morbidity of SOR and anxiety in children, which found that LD is among the co-morbidities that these children experience (Miller *et al.*, 2007; Reynolds and Lane, 2009). By mid-study, P1 was diagnosed with ADHD (a LD-related disorder (ldaamerica.org, 2012)) by his paediatrician. His elevated level of anxiety could thus be linked to the diagnosis of ADHD, which is said to be seen in 25% of children, among other factors, which is also supported by previous research (Reynolds and Lane, 2009). Participant three struggled to cope with the demands in the mainstream school and, after evaluation by an Educational Psychologist, was placed in the school's LSEN class for learners with mixed LD. The co-occurrence of her LD and anxiety is also supported by previous research (Yu *et al.*, 2006; Beauchemin, Hutchins and Patterson, 2008; Thakkar *et al.*, 2016).

5.3. Progressive muscle relaxation home programme to impact anxiety and functional activity participation

Since there is a strong link between anxiety and a child's functional activity participation, the findings with regards to the objectives will be discussed simultaneously for each participant.

Objective one:

To determine whether implementing a PMR home programme in conjunction with OT intervention after a period of 16- weeks affects the anxiety levels of children with LD.

Objective two:

To determine whether implementing a PMR home programme in conjunction with OT intervention after a period of 16- weeks affects the client factors and functional activity participation of children with LD.

5.3.1. Participant one

Participant one attended the PMR training session with his mother. He was eager to perform the exercises, but distractible behaviour was observed throughout the training session. He would want to get up in-between each of the sections on the CD and required encouragement from the researcher and his mother to complete the training session and perform all the exercises. It is possible that he did not understand the goal of the PMR exercises and could have possibly experienced it as a fun activity. In the following sections, the effect of the PMR home programme will be discussed in relation to P1's anxiety and functional activity participation.

5.3.1.1. Objective one: Assessment of, and change in anxiety for Participant One

Participant one's teacher reported an improvement in emotional functions and handling stress. Handling stress also improved from the researcher's perspective. A reduction in levels of anxiety was also noted on the other researcher-completed measure, as parent measures were not returned. The regulation of his emotions showed a regression. This could be due to the medication that he started to use for ADHD at the mid-study point. Research indicates that emotional outbursts and irritability are some of the adverse effects when starting on medication for ADHD, but that it could stabilize as soon as medication stabilizes (Schellack and Meyer, 2012). This could be seen in P1; from mid- to end of the study his emotional regulation stabilized again.

5.3.1.2. Objective two: Assessment of, and change in client factors and functional activity participation for Participant One

Change in Participant One's client factors

Participant one, a male, was diagnosed with ADHD at the mid-study point. It is estimated that four to five percent of children in South Africa present with ADHD, with a higher incidence reported for boys (Schellack and Meyer, 2012).

An improvement in P1's attention functions was noted on teacher- and researcher-completed measures by mid- and toward the end of the study. Hyperactive and impulsive behaviour also improved. His executive functioning and other client factors included in higher- level cognitive functioning scores regressed on the teacher completed measure, but

showed a slight improvement on the researcher-completed measure. Organisation and planning as well as time management still reflected moderate impairments at the end of the study according to the teacher and researcher. Participant one started to use prescription medication to improve his ability to concentrate as well as to address impulsivity and hyperactivity. Neucon tablets are psycho-stimulant drugs, with a controlled, slow release which increases the drug's elimination half-life (Chigome, Matsangaise and Meyer, 2018). The improvements found in P1's performance has also been noted in research showing that pharmacological management enhances cognition. While, research recommends that children could still benefit from further strategies to improve task planning (Chigome, Matsangaise and Meyer, 2018), it is difficult to determine the extent to which P1's improvements are related to the OT intervention.

Change in Participant One's functional activity participation

From the beginning of the study, the teacher and researcher did not report any problems in terms of P1's ability to play. No problems with P1's social skills were indicated by teacher or researcher. Playing and socializing were thus not areas of concern for P1.

In terms of P1's pre-school education, teacher and researcher report measures indicated severe to complete difficulties initially. Participant one's performance at school improved throughout the study period as reported by his teacher and the researcher.

Participant one's teacher did not experience any problems with him following a daily routine at school. The researcher experienced an improvement in P1's ability to carry out a daily routine, but still reported moderate problems by the end of the study period.

Information gained from the intervention diary reflects the parent's experience of the participant's quality of sleep after doing the PMR exercises. An intervention diary was not returned for P1.. Following a telephone conversation with P1's mother, she reported that she could notice a difference in his sleep habits after they started with the PMR home programme. She would do the PMR home programme with him in bed, just before time to sleep, and said that he had less night awakenings on those nights when they did the PMR home programme. She also reported that this change in his sleep could be observed before he was diagnosed with ADHD and started on medication. This information could however not be confirmed, as P1's mother did not return the completed intervention diary.

5.3.1.3. Participation in the progressive muscle relaxation home programme and other factors to consider for Participant One

Participant one's mother did not return an intervention diary, and it is thus unclear whether and how PMR home programme exercises were executed, if at all. Throughout the study period P1 did not speak about the PMR CD during weekly intervention sessions. The researcher did not observe P1 apply any of the PMR exercises during intervention sessions. During one telephone conversation with P1's mother, she talked about how they incorporated the PMR CD into P1's bedtime routine every night and that the CD facilitated P1 to sleep in his own room where he was not able to sleep in his own room before. Three weekly text message reminders were sent out throughout the study period, to enhance participation, with no reply from P1's mother, other than the aforementioned telephone conversation.

From mid- to end of the study, P1's functional activity participation stabilised (for teacher and researcher) and did not change much, as can be observed in the completed measures. This could be explained since P1 was absent from school for most of this last eight-weeks of the study. As his intervention was done at his school, he consequently attended no intervention sessions while being absent from school. Even though he might have continued with the PMR home programme during the absence, he did not participate in the school curriculum or in OT intervention sessions and thus little progress could be made, which is reflected in the similarities of teacher- and researcher-completed ICF questionnaires, especially with regards to his client factors.

One should also consider the accident in which P1 was involved when a truck drove over his right leg when he was five years old in 2018. Several surgical procedures were necessary to repair fractured bones and torn ligaments. In an initial interview with P1's mother, she expressed that he started to chew through the collars his shirts just after the accident and she noticed that he had more nightmares. Being involved in an accident is reportedly a significant life event and could possibly lead to post-traumatic stress or residual anxiety (Taylor and Koch, 1995; Keppel-Benson, Ollendick and Benson, 2002). In previous research of children who were involved in motor vehicle accidents, residual anxiety remained four to 12-months after the accident (Keppel-Benson, Ollendick and Benson, 2002). Highly anxious symptoms and PTSD diagnoses or phobias are reported to worsen over time (Taylor and Koch, 1995; Keppel-Benson, Ollendick and Benson, 2002). With a greater degree of physical injuries, as in P1's case, more PTSD symptoms are reported (Keppel-Benson, Ollendick and Benson, 2002). The three operations that he underwent to repair strabismus in his eyes were

also events that could have provoked stress and anxiety. Research suggests that anxiety is common in the preoperative period and also predicts negative post-operative behaviours, such as separation anxiety (Golden *et al.*, 2006; Cagiran *et al.*, 2014). Participant one thus has multiple potential precipitators of the anxiety that he experiences, and the anxiety may not only be linked to his LD. A multi-disciplinary team approach might be beneficial for addressing total anxiety.

5.3.1.4. Conclusion for Participant One

Participant one's anxiety did improve when comparing initial- and end of study results, although residual anxiety remained, with other factors also influencing the anxiety that he experiences, i.e. a traumatic motor vehicle accident and multiple subsequent surgeries. The reduction of his anxiety may be in line with research suggesting that PMR has a positive effect of reducing stress (Pawlow and Jones, 2005; McCallie, Blum and Hood, 2015; Tsitsi, Charalambous and Papastavrou, 2017). However, since it is unclear whether P1 participated in the PMR home programme as suggested, other factors should be considered. Research also suggests that children who use psychostimulant medication experience an improvement in anxiety symptoms as a result of the improvement of their ADHD symptoms (Coughlin *et al.*, 2015). Participation in pre-school education and carrying out the daily routine improved based on researcher and teacher observations. Reportedly, his sleep also improved. Adult research on PMR indicate that when anxiety is reduced, working memory is freed up which leads to an improvement in academic performance (Hubbard and Blyler, 2016). Improved sleep after PMR is in line with research (Varvogli and Darviri, 2011), but could not be confirmed with P1's intervention diary. Improved client factors and school performance is also associated with pharmacotherapy in children with ADHD (Schellack and Meyer, 2012). In conclusion, because there is no clarity whether P1 followed the PMR home programme as described, his improved client factors, activity participation and anxiety could rather be as a result of receiving pharmacological intervention for ADHD, combined with OT intervention.

5.3.2. Participant two

In the initial PMR training session, P2 was very shy and did not cooperate when the audio CD was explored. Regardless, the researcher continued to explore the CD with his mother and demonstrated the exercises to provide her an opportunity to ask questions and gain an understanding of the exercises related to the PMR home programme. Participant two

listened to parts of the conversation with his mother, but also focussed his attention on other activities during the training session. It is possible that P2 did not understand the goal of the PMR exercises after the training session. In the following sections, the effect of the PMR home programme will be discussed in relation to P2's anxiety and functional activity participation.

5.3.2.1. Objective one: Assessment of, and change in anxiety for Participant Two

When comparing initial and final scores on the SCAS-P for P2, OCD remained the same and a higher score for separation anxiety was seen after completion of the PMR home programme. This is important, because children in a normative sample tended to show substantial decreases in the SA category after a six-month test-retest period and overall, there is a general tendency for scores to be reducing with age (Anderson and Catroppa, 2012). All other scores on the SCAS-P showed a decline in the anxiety P2 experienced. This included scores for social phobia, panic agoraphobia, physical injury fears and generalised anxiety. Participant two also demonstrated an improvement in the total SCAS-P score, which indicates that anxiety levels did decrease over the study period.

Participant two's teacher's perception of emotional- functions and regulation as well as handling stress indicated severe impairments and regression by the end of the study. The change that his parents noticed at home was not translated into his school environment. This is similar to the researcher's findings; even though the researcher indicated a slight improvement, it is marginal on the scales and still falls within severe- to complete impairment categories.

In the end, the anxiety levels for SA and PIF were still clinically significant and elevated, and P2 was referred for further evaluation by a Clinical Psychologist.

5.3.2.2. Objective two: Assessment of, and change in client factors and functional activity participation for Participant Two

Change in Participant Two's client factors

Participant two's attention functions improved on parent- and researcher- completed measures. On both of the teacher- completed measures P2's attention functions regressed from beginning toward the end of the study. The same trend is observed with regards to P2's executive functioning and higher-level cognitive skills. The researcher and his parents

observed an improvement in these skills, whereas his teacher observed a slight improvement by the study's mid-point, but a regression by the end of the study, with moderate- to severe impairment remaining.

Participant two's teacher is in agreement with his parents that his behaviour (hyperactivity and aggression) demonstrated an improvement by the end of the study period.

Change in Participant Two's functional activity participation

Teacher and researcher results are in contrast with regards to P2's play performance. The teacher reported that P2's ability to play and participate in play activities regressed by the end of the study period. The researcher observed an improvement in his ability to play within the intervention sessions that he attended.

Results for pre-school education are also in contrast. Participant two's teacher reported a decline in pre-school functioning, whereas the researcher noted a slight improvement by mid-study, with a stabilization of this improvement by the end of the study. Results indicated a severe impairment on both teacher- and researcher- completed documents. In the intervention that he attended, activities were graded and presented according to his level of functioning and progress in order to address learning problems (Kramer and Hinojosa, 2010). The home programme activities were also graded in the same manner. He first had to master certain skills before introducing new, more advanced skills. It could therefore have been easier for the researcher and his parents to notice change and improvement as his skills were not necessarily compared to age-related developmental norms, but rather compared to his own performance during the intervention sessions. This is different from the classroom setting, where the children follow a set curriculum (National Curriculum and Assessment Policy Statement/ CAPS) with defined outcomes. While the CAPS curriculum and the policy on inclusive education make provision for individual learning plans (Department of Basic Education, 2010), this was not implemented for P2. Consequently, his teacher evaluated him and scored the questionnaires according to what is expected of children at a certain stage in a certain grade, which he was unable to meet due to his LD. His performance, as reported by the teacher, declined throughout the 16-weeks, which could be related to the curriculum at school that becomes incrementally more difficult and more complex to prepare students for Grade 1.

Participant two's ability to carry out the daily routine in the classroom regressed at each measurement interval throughout the study period. The researcher noted an improvement in

P2's ability to follow routine within intervention sessions by the mid-study point, but no further change was noted by the end of the study.

Both teacher-completed measures indicated a regression in peer relationships and social participation for P2. His parents did not experience any problems in terms of his social participation. The researcher noted an improvement in his ability to function in the social setting of the intervention sessions. This could be because other children in Grade R did not experience LD and anxiety to the extent that P2 experienced it. They were able to cope with the increasing demands in preparation for Grade 1. He was thus on a different emotional level than his peers in Grade R, which could be the reason for a regression in his social participation. This can be related to previous research which suggests that persistent problems with social participation, peer rejection and strained relationships are evident for children with LD (Harpin, 2005; Loe and Feldman, 2007).

Patterns in P2's intervention diary could be observed where he had a good night's sleep on the occasions when he performed the PMR home programme before bedtime. Research suggests that PMR can energize a person and improve sleep (Varvogli and Darviri, 2011), both instances noted in P2's intervention diary. In the weeks that his parents reported that they did not do any or some of the exercises, P2 had instances when he woke up during the night.

5.3.2.3. Participation in the progressive muscle relaxation home programme and other factors to consider for Participant Two

This participant is the only one whose intervention diary was returned to the researcher. All the sections in the intervention diary were completed and signed. Participant two did not talk about the PMR exercises during weekly intervention sessions and did not attempt to do any of the exercises in intervention. In his experience questionnaire, P2's mother reported that he did not perform the exercises out of the indicated time slots.

During the participation in the programme, the participant's parents decided to emigrate to a different country at the end of the year. According to previous research, moving house is a stressful event (Rumbold *et al.*, 2012; Morris *et al.*, 2017). The participant was informed, and changes started at home. At the end of August 2019, just before P2 completed the 16-weeks on September 6th 2019, they moved to a new house, in preparation for emigration. Participant two's mother noted, in the intervention diary, that she was more stressed and that moving to a new house made him sad. Research also shows that children from 12-months

old and onward appraise situations as being stressful through using social referencing, when they observe their parents (Rumbold *et al.*, 2012). This could have had a big influence on P2's SCAS-P scores, especially separation anxiety, and overall performance.

Most children between the ages of 18-months and six-years-old experience little to moderate separation anxiety (Battaglia *et al.*, 2016). If a trend exists whereby separation anxiety increases at a consistent pace and continues, a child might be a risk of developing separation anxiety disorder (Battaglia *et al.*, 2016). This could also be a valid concern requiring further investigation.

Participant two attended intervention sessions every second week throughout the study period (excluding a three-week school holiday). Intervention aimed to address SOR and LD (sensory-motor- and visual perceptual skills). His participation in the sessions was good as he willingly cooperated and participated in activities. In addition to doing the PMR home programme, his parents also completed regular home programme activities that were supplied by the researcher for addressing other skills related to the SOR and learning problems that were identified and addressed in direct intervention. Sensory integration/ sensory-motor and acquisitional FORs were applied (not at the same time) in P2's intervention programme. These approaches have a positive effect of reducing physiological stress and anxiety in children and adults who experience SOR and anxiety (Pfeiffer and Kinnealey, 2003; Miller *et al.*, 2007).

5.3.2.4. Conclusion for Participant Two

Participant two's level of anxiety did decrease over the study period. This is in line with research suggesting that PMR has a positive effect of reducing anxiety (Pawlow and Jones, 2005; McCallie, Blum and Hood, 2015; Tsitsi, Charalambous and Papastavrou, 2017).

Results pertaining to client factors and functional activity participation reported by his teacher contrast with the improvements noted by the parents and researcher. It is noted that in one-on-one settings with P2's parents and the researcher, more improvements can be seen, as intervention is graded and applied according to his current level of functioning. However, in the class setting P2's performance degenerated as he was unable to keep up with the demands of the set CAPS curriculum. Even though his reduced anxiety could have led to a freeing of working memory and improved academic performance as research suggests, this was not the case for P2 (Hubbard and Blyler, 2016).

5.3.3. Participant three

Participant three had a very positive attitude during the PMR training session and cooperated with enthusiasm. During intervention sessions she mentioned that she enjoyed doing the PMR home programme exercises when they had time for it. She talked about doing the exercises in the car during the day and not before bedtime at night.

5.3.3.1. Objective one: Assessment of, and change in anxiety for Participant Three

After following the PMR home programme and attending once-weekly OT intervention sessions, this participant's total SCAS-P score remained unchanged, with an elevated level of anxiety. This is in contrast to children in a normative sample, where there is a general tendency for scores to be reducing with age (Anderson and Catroppa, 2012), with noteworthy decreases in the SA category after a six-month test-retest period (Anderson and Catroppa, 2012). Decreased anxiety levels were noted for some of the individual SCAS-P categories of OCD, SP, PA and GA, although the scores still indicated elevated/ sub-clinical anxiety. Increased levels of anxiety were noted for SA and PIF after completion of the study. Results of researcher-completed documents also suggest that emotional- functions and regulation and handling stress remained unchanged.

5.3.3.2. Objective two: Assessment of, and change in client factors and functional activity participation for Participant Three

As P3's teacher did not provide consent to participate in the study, only parent- and researcher results are discussed.

Change in Participant Three's client factors

Both the researcher and P3's mother reported an improvement in attention functions. Participant three's mother also noted an improvement in hyperactive behaviour, with aggression worsening over the study period.

Executive functioning and higher-level cognitive skills improved throughout the study and is reported by P3's mother and the researcher.

Change in Participant Three's functional activity participation

Observations with regards to play was only included in the researcher- completed documents and does not form part of the Conners CBRS-P. From the beginning of the study, no problems were observed in terms of P3's ability to play. This was also evident at the end of the study.

The researcher noted an improvement in school performance for P3 from beginning to the end of the study, with severe impairment remaining. Even though P3's teacher did not participate in the study, it can be inferred that participation at school deteriorated. This is evident after being formally diagnosed with a LD and placed in the school's LSEN class.

An improvement in P3's ability to carry out the routine in the intervention sessions was noted by the researcher.

Participant three's social participation and peer relations regressed as reported by her mother. This is consistent with literature that indicate that children with LD experience persistent problems in this regard (Harpin, 2005; Loe and Feldman, 2007). This area of P3's functional activity participation did thus not improve following direct OT intervention, in conjunction with the PMR home programme.

No information regarding P3's sleep was gathered during the study.

5.3.3.3. Participation in the progressive muscle relaxation home programme and other factors to consider for Participant Three

Participant three's mother did not return an intervention diary and reportedly lost it during a house move. There is consequently no clear indication on how many of the PMR home programme exercises this participant completed. However, in the experience questionnaire that was completed for this participant, it is noted that they found the programme very beneficial and easy to implement, with moderate changes in anxiety observed. This is not in line with her results reflecting only slight changes. Participant three's mother could have been subject to response bias, specifically demand characteristics, and answered the questions in relation to what she perceived the researcher's expectations were (Dell *et al.*, 2012). Participant three did talk about listening to the PMR CD in the car when she attended intervention sessions, and she might have done the exercises at times during the study period. In the experience questionnaire her mother noted that she did not apply the exercises outside of the suggested times. She did not apply the exercises while attending intervention sessions. It is thus unclear how P3 participated in the PMR home programme.

Intervention for P3 focussed more on the LD, attempting to remediate some of her difficulties in order to progress in school. An acquisitional frame of reference was used. Although gains in functional activity participation was made, this did not influence her level of anxiety. Two specific factors may have played a role in her continued increased anxiety, i.e. moving to a new house and failing terms at school.

Participant three experienced the process of moving to a new house. This was however just after the PMR training session, in the beginning of the study. Still, the stress that her mother may have experienced at the time and the changing of environments and routines could have influenced the anxiety that she experiences in accordance with previous research (Rumbold *et al.*, 2012; Morris *et al.*, 2017).

The fact that P3 was formally diagnosed with LD just after concluding the study, could indicate why anxiety did not improve meaningfully. Throughout the study period, she remained in mainstream schooling, following the set CAPS curriculum for Grade 3's. Her school did offer an Individual Support Programme (Department of Basic Education, 2010), whereby she was identified as requiring additional support in the form of OT and extra classes related to specific subjects (Afrikaans, English and Mathematics). An Individual Learning Plan with principles of differentiating lesson plans and assessments to meet her specific needs (Department of Basic Education, 2010) was, however, not implemented and she continued to struggle in class, failing each term. Failing a term is associated with an increase in anxiety levels, when unable to meet set demands and failing to comply with grade-specific requirements (Ben-Sasson et al. 2007).

5.3.3.4. Conclusion for Participant Three

Participant three's overall level of anxiety remained unchanged throughout the study period. The results are in contrast to literature that suggest that anxiety decreases after PMR intervention (Pawlow and Jones, 2005; McCallie, Blum and Hood, 2015; Tsitsi, Charalambous and Papastavrou, 2017). It is still unclear how/ if the PMR home programme was followed as suggested.

The change in client factors and functional activity participation could be noticed in one-on-one settings, and by following a graded intervention programme. Intervention for this participant was also conducted and graded in accordance with her current level of functioning. She thus showed progress in foundation skills and not yet in skills required at a Grade 3 level at school. As mentioned earlier, intervention was aimed at addressing her LD

directly by utilising an acquisitional FOR, which is said to improve visual-motor skills (Dankert, Davies and Gavin, 2003), as seen in P3. An overall regression in functional activity participation was observed.

5.4. Contribution of a progressive muscle relaxation home programme to a reduction in anxiety and improved functional activity participation

When the participants' results for anxiety and functional activity participation are compared, no specific conclusion can be reached. Some similarities in results do exist, which will be discussed. Differences were also noted which will be discussed below.

Participant one and P2 both demonstrated improvements in the anxiety that they experience. Both are six-year-old boys attending pre-school. Anxiety levels for P3 did not change from initial- to end of study measurement. She is in Grade 3 in school, with higher demands in terms of the CAPS curriculum.

Similar to P2, P3's level of SA regressed over the study period. Both participants experienced a house move during the study period, said to influence anxiety (Rumbold *et al.*, 2012; Morris *et al.*, 2017). Both P2 and P3's levels of anxiety after the study period still remained elevated and of clinical significance. Further investigation by a Clinical Psychologist was recommended.

School-related functional activity participation and social participation also indicated a similar pattern for P2 and P3. In smaller settings, as with parents and the researcher, school-related activity participation improved. In the school setting, functional activity participation and social skills regressed. This is in contrast to existing literature that suggests that academic performance improves with training in PMR (Hubbard and Blyler, 2016).

5.5. Factors influencing the effect of the progressive muscle relaxation home programme observed in the participants

5.5.1. Participation in the initial progressive muscle relaxation training session

Two of the three participants (P1 and P3) were eager to participate in the initial training session. Neither P1 nor P3 returned a completed intervention diary with unclarity on how/ whether they participated in the PMR home programme during the study period. Participant two was reluctant and shy to participate in the training session. However, P2's mother completed an intervention diary and reported on his participation in the PMR home programme. In this study, the participant's participation in the initial training session did not have an impact on their adherence to the PMR home programme. It is noticed that none of the participants applied PMR as a coping strategy. This was thus not enforced enough during the initial training session, even though it is reinforced on the actual audio CD that was produced, with phrases such as "practise these exercises everyday…", "you can help yourself relax at school…" and "you can do the exercises and nobody will know" (Koeppen, 1974). As literature suggested, more direct training in combination with a home programme lead to more promising results (King *et al.*, 1998).

5.5.2. Adherence to the progressive muscle relaxation home programme

It is stressed in recent literature that home programmes should be partnership-based programmes set up when OTs and parents collaboratively decide on intervention goals (Novak, 2011). The goals for each participants' intervention programme was a collaboration between the researcher and the parents before intervention commenced. Anxiety management was identified by the involved parents as an intervention goal. As participants attended OT intervention throughout the study period, additional home programmes were incorporated into their family-centred, partnership-based goals. However, due to the nature of a multiple case study research design, the PMR home programme could not be individually adjusted and changed to fit each family. This would have gone against the principle of the replication logic in multiple case studies (Yin, 2014). Parents were informed that the PMR home programmes would not be a collaboration similar to the other aspects of their home programmes, only for the purpose of the research study. Attempts were still made by the researcher to apply other factors that promote participation in home programmes. These include:

- Integration of the home programme into the family's daily routine (Schreiber, Effgen and Palisano, 1995; Segal and Beyer, 2006). It was suggested that the PMR home programme be done three times a week, just before bedtime. As it is a 12-minute CD, it was thought that it would not interfere with other family routines.

- Being supervised form time-to-time (Schreiber, Effgen and Palisano, 1995; Segal and Beyer, 2006). The researcher sent three weekly text message reminders to parents to help them remember to do the PMR home programme. No additional pressure was put on parents, as research has showed that adherence-pressure is counter-productive (Novak, Cusick and Lowe, 2007; Novak, 2011).

- A good relationship between parents and therapist (Schreiber, Effgen and Palisano, 1995; Segal and Beyer, 2006; Novak, 2011). The researcher was in contact with parents on a weekly basis, especially for providing feedback on their children's participation in intervention sessions. The researcher experienced all relationships as positive. Specific mention of the PMR home programme was not made by parents during this contact time.

- No lengthy and complex home programmes (Schreiber, Effgen and Palisano, 1995). The PMR home programme is neither lengthy nor complex. The total time of the CD is 12-minutes. The ease of implementation is demonstrated in P2 and P3's completed parent experience questionnaires where they indicated that the programme was moderately easy to implement.

Even though the researcher attempted to ensure ease of participation in the PMR home programme, the only information that reflect parent and participant participation in the PMR home programme, available to the researcher, , was by means of parents completing intervention diaries three times a week, after each PMR session, for the period of 16-weeks. Despite the additional precautions (deducted from findings in the pilot study) that the researcher discussed with participants' parents, in order to carefully store the intervention diary, two out of the three intervention diaries (P1 and P3) were still misplaced. Even though P3's mother completed an experience questionnaire, without a completed intervention diary it is difficult to determine whether or not they participated in the PMR home programme exercises. It can be argued that P2's mother completed the intervention diary without letting P2 do the home programme exercises. When examining the intervention diary though, different pens were used and entries in the diary are not similar, as can be seen in the results

section of P2. While P1 experienced an improvement in his anxiety levels, it is most likely attributable to the commencement of psychostimulant medication for ADHD, as discussed previously. Participant three's level of anxiety did not improve meaningfully as she still presented with elevated levels of anxiety. When considering that no intervention diary was returned and P3's functioning deteriorated, it could be said that she probably did not participate in the home programme exercises as suggested. Participant two did show improvement when the study ended and as there is proof that he completed the home programme exercises, one can assume that he attempted to follow the programme as suggested, which led to an improvement in anxiety.

5.5.3. Effect of usual occupational therapy intervention intervals and number of occupational therapy intervention sessions

During the PMR home programme period of 16-weeks, there was a three-week school holiday in which participants did not attend OT intervention. For participants attending weekly intervention sessions, there was a total of 13 possible sessions scheduled. For P2 who attended intervention on a fortnightly basis, there was six sessions during the study period.

Participant one attended weekly intervention sessions and demonstrated improvements in anxiety and functional activity participation. He started using medication from the mid-study point and was absent from OT intervention for six- out of the 13- sessions during the study period; effectively attending seven intervention sessions. Even though P2 only attended intervention on a fortnightly basis, he was the only participant who demonstrated improvement in anxiety levels after certain following of the PMR home programme exercises. He attended all six of the possible intervention sessions during the study period. Participant three attended more individual weekly intervention sessions than the other two participants (10 out of the possible 13) but did not achieve better results than the other two participants. She was the only participant to receive a formal diagnosis of LD when the study ended. Intervention intervals and number of OT intervention sessions did thus not influence the results.

5.5.4. Familial learning disability

From literature it is evident that LD is hereditary and has genetic components (Kavale and Forness, 1996; Lagae, 2008). Children with LD could possibly also have parents with LD. Strong evidence of a genetic link exists for children diagnosed with ADHD (Schellack and Meyer, 2012). It could thus be argued that some or all of the participants in the study has a parent who could possibly suffer from LD. It is said that adults with LD experience occupational and vocational difficulties and social problems, with continued academic difficulties (Kavale and Forness, 1996).

Two particular problems that have been described in the literature may have influenced adherence to the PMR programme in this study, namely daily time management (Shessel and Reiff, 1999) and problems with emotional health including stress, anxiety, shame, depression and negative self-concept (Shessel and Reiff, 1999). This may have had practical implications for the study, e.g. Setting aside enough time for PMR CD before bedtime, completing the intervention diary after the PMR exercises three times a week and parents' emotional health might have affected their ability to tend to their children's emotional- and physical needs. School work, homework and the PMR home programme might have thus been neglected.

It is possible that a parent with LD could have affected the participation in the study, and consequently influences the results of whether PMR as a home programme is beneficial to reducing anxiety levels and improving functional activity participation.

5.5.5. Progressive muscle relaxation as a stand-alone home programme

In OT, home programmes are usually given as follow-up exercises, between intervention sessions, as a means whereby newly learnt skills are transformed into functional changes within daily routines (Novak, Cusick and Lowe, 2007). In this present study, this was not the case. The PMR home programme exercises were recorded on an audio CD, parents and participants were trained on its use in a single training session and no mention of PMR was done at weekly OT intervention sessions. Other home programme exercises were supplied to parents, relating to skills learnt in direct OT intervention. It is thus evident that while PMR can be beneficial in reducing anxiety and improving functional activity participation, it is not beneficial as a stand-alone home programme where reinforcement and modelling is not

applied. This could be seen, as all three participants did not apply PMR as a coping strategy outside of the suggested time slots. It was thus not incorporated into functional changes in their daily routines, as the definition of home programmes state.

5.5.6. Length of the progressive muscle relaxation home programme and variance in amount of scheduled sessions

In this study, a combination of factors of other studies were considered in order to determine intervention length. A previous study showed a decrease in anxiety levels after school children participated in a stress management programme daily (led by teachers), for 10-minutes each day, for four months (Bothe, Grignon and Olness, 2014). Other studies indicated that PMR over a period of eight weeks, with weekly sessions ranging from 15-minutes three times a week, to 30- minutes twice a week (led by a trained professional), yielded varying results (Wachelka and Katz, 1999; Nickel *et al.*, 2005). As PMR was suggested as a home programme, and training was done in one session, it was decided to continue the programme for four months (16- weeks), with three weekly sessions (overseen by parents at home) of 12- minutes (the length of the PMR audio CD). Still results did not resemble previous studies that achieved greater reductions in anxiety levels. Many other factors influence the study findings and it is therefore not accurate to reach a conclusion with regards to the length of the intervention period and PMR CD.

5.5.7. Cognitive skills of children

The two six-year-old participants in the study were functioning on a preoperational stage according to Piaget's theory on cognitive development (McLeod, 2018). The preoperational stage is evident from ages two-to-seven-years-old in children (McLeod, 2018). It is characterised by symbolic and pretend play and children in this stage do not yet understand concrete logic (McLeod, 2018). The script by Koeppen was thus appropriate due to the elements of fantasy. Participant one and P2 were able to do the different relaxation exercises, but because of the level of their cognitive development, could not comprehend applying the PMR exercises as a coping strategy. This was reported by P2's mother in his experience questionnaire. Neither P1 and P2 attempted to apply the exercises during intervention sessions or in class. The use of modelling and reinforcement is suggested when

teaching very young children how to apply PMR as a coping strategy (King *et al.*, 1998). This was not done in the present study and is a limitation that needs to be addressed in future research.

Participant three, the 10-year-old girl, is in Piaget's concrete operational stage of cognitive development (McLeod, 2018). Ten- and 11-year old children did show less emotional distress after following PMR training for 12 direct sessions (Hashim and Zainol, 2015). Due to the ability to use inductive logic from this stage on, P3 should have been able to implement the PMR exercises as a coping strategy, relating the experience of relaxation while doing the exercises to a general principle of applying the exercises when feeling anxious (McLeod, 2018). However, as the use of PMR as a coping strategy was not specifically reinforced in any of the participants, P3 did not apply it as a coping strategy in stressful situations as noted by her mother in the experience questionnaire.

5.5.8. The influence of context on the effect of progressive muscle relaxation as a home programme

Characteristics of the participants' physical contexts that could have influenced their participation in and the effect of the PMR home programme included the following:

- Time availability for parents. All three of the participants' parents stated that they did have time available for performing the PMR home programme exercises. Participant one's mother indicated in the telephone call that they performed the PMR exercises before bedtime to help P1 sleep in his own room. They thus formed a new bedtime routine for P1 within the time that he would have usually watched 'youtube' videos. Participant two's mother added the PMR CD to their existing bedtime routine, after reading a book. Participant three did talk about performing the PMR exercises in the car, which indicates that her mother did attempt to fit the PMR programme into their daily routine by having the CD available while driving in the car. Even though it seems as if the availability of time was not an issue, in P2's intervention diary it can be seen that activities like the school concert and moving to a new house influenced the amount of time that they had available to perform the PMR home programme as suggested. Unforeseen changes in daily/ weekly routines thus seems to impact time availability for doing home programme exercises and therefore influenced the effect of the PMR exercises in the current study. It is said that parents experience disruptions to their normal routines as unsettling and tiring (Humphry and Case-Smith, 2010). This might ring true in this study.

- Parent interest level. Prior to the study, the parents who were approached for study participation all expressed that their child's anxiety is of concern to them. Parents were thus eager to participate in the study, because it explored an intervention that could influence their child's anxiety, even though they were informed that the intervention effect is still unclear. Parental interest was thus not a problem in the study. Research suggests that parents experience home programmes as a means to maximize their child's progress (Novak, 2011), which is why parent's interest level most likely did not affect adherence to the PMR home programme.

- Home environments. The participants who were included in the study are of middle socio-economic classes and have sufficient resources available at home. Participants live in houses with their parents and siblings or stepfamilies. All three participants have their own rooms. Even though P1 did not sleep in his own room before the study period, it seems as if the PMR home programme facilitated him sleeping in his own room. Parents had laptops or CD players available to be able to use the PMR CD. Home environments were thus stable and resourceful to aid participation in the PMR home programme. Unforeseen circumstances of P2 and P3's house moves during the study period led to stress at home and could have impacted their experience of anxiety and subsequently, the influence of the PMR home programme.

- School environment. Participant two and P3 experienced pressure in their school environments. They struggled to cope with the task demands and could not meet expected educational outcomes. Participant one did not experience pressure at school, but it should also be taken into consideration that P1 was absent from school for much of the study period. Transferring skills learnt into different environments is crucial for generalization of skills (Humphry and Case-Smith, 2010). Practicing PMR exercises in the school environment would thus be necessary for addressing the impact of the school environment on children's anxiety and functional activity participation. This is a limitation to the study.

Characteristics of the participants' social contexts that could have influenced their participation in and the effect of the PMR home programme included:

- Family relationships. As noted in the demographic section in Chapter 4, relationships between family members were reported to be good, stable and supportive. The fact that there are good family relationships could have had a positive influence on

adherence to, and the effect of the PMR home programme. Unfortunately, no information was gathered in terms of parent roles and whether parents assisted each other in following through with the PMR home programme.

- Relationships with teachers and peers. As it was noted, P2 and P3 experienced problems with social participation and making friends. Participant three did not have a good relationship with her teacher (as reported by P3 and her mother). Both participants' functional activity participation at school worsened over the study period. As participants did not learn to perform the PMR exercises in the school environment, it is unlikely that relationships with their teachers and peers influenced their participation in the PMR home programme. The effect of the PMR home programme might have been more extensive if it had been practiced in different contexts, including schools, where support from a teacher and peers could influence participation and effect.

In conclusion, contextual factors that influenced the outcome of this study are most likely unforeseen changes in daily routines impacting on parent time availability and changes to home environments (as seen for P2 and P3). Constantly experiencing failure at school (P2 and P3) could have also negatively influenced their experience of anxiety and functional activity participation, affecting child and parent motivation for continuing with the PMR home programme.

5.6. Limitations

A very small sample of children, only three, participated in this study. No control group was present to compare the effect of PMR as a home programme in conjunction with OT intervention to children only attending OT intervention. Even though a replication logic was followed, several preceding factors resulted in small differences in the sample. Generalisation to a larger group of children with LD and anxiety cannot be done on the basis of this study alone. A randomised controlled (RCT) study could better investigate the effect of PMR in conjunction with OT intervention, as RCTs are the "gold standard" for outcome studies (Miller *et al.*, 2007).

Due to the nature of this stand-alone home programme, it was not possible to consistently stress the importance to participants or parents that PMR should eventually be a coping skill/

strategy. As literature stresses the importance of PMR used in conjunction with other intervention (King *et al.*, 1998; McCallie, Blum and Hood, 2015), it might be worthwhile incorporating it within direct OT intervention programmes. Applying the technique in different environments is also important so that children can generalize PMR to other settings where it could be used as a coping skill (Humphry and Case-Smith, 2010).

Due to the study design, the researcher only had one training session with participants and parents. This may have resulted in limited participation, e.g. with P1. Additionally, P2 did not cooperate during the training session, which might have influenced his experience of the exercises and ultimately affected his overall adherence/ participation. A follow-up training session or including the PMR in actual OT intervention may circumvent this problem.

5.7. Strengths

The audio CD with the PMR home programme exercises that was produced for this research study is very short and not time consuming. It would be easy to use again in future studies that include PMR techniques for children.

The case study research design provided rich contextual information with regards to the participants home environments. The contextual information influenced the study procedures and subsequently also the results, as was discussed for each participant. Rich contextual information would be harder to gather and incorporate in a big RCT type of study.

5.8. Conclusion

The co-morbidity of LD and anxiety in school children, referred for OT intervention, validated the need for exploring additional home programme interventions to apply in conjunction with direct OT intervention. Progressive muscle relaxation is a technique generally used in stress management groups and applied in school settings to target anxiety that children experience (King *et al.*, 1998; Pawlow and Jones, 2005; Conrad and Roth, 2007; McCallie, Blum and Hood, 2015). Home programmes are useful in supporting and complimenting direct intervention (Segal and Beyer, 2006). When home programmes are designed to be incorporated into families' daily routine, adherence is positively influenced.

In this study, PMR as a home programme was structured in such a way as to form part of participants' bedtime routines. A 12- minute audio CD was produced, in which the parents had to supervise participants' execution. It was anticipated to be relatively quick and easy, which coupled with bed-time routines, was hoped to contribute to adherence. However, results suggested that participants did not participate in the programme consistently. Results further indicated that elevated levels of anxiety remained, and functional activity participation regressed for two of the participants. The use of PMR as a coping skill was not reinforced or applied.

Future research should thus stress the importance of PMR as a coping skill, in conjunction with additional intervention. More direct training by an OT should be done, before prescribing it as a home programme. Physiological measures of anxiety could also be beneficial in determining the ultimate effect of PMR in children who experience LD and anxiety.

In the following chapter the conclusion of the study is discussed, with implications for practice and future recommendations suggested.

CHAPTER 6 : CONCLUSION

The aim of this research study was to explore the effect of a PMR home programme on the anxiety levels and functional activity participation of children who experience LD, already attending OT intervention.

From literature it is evident that children with LD experience anxiety (Yu *et al.*, 2006; Beauchemin, Hutchins and Patterson, 2008; Nelson and Harwood, 2011; Mammarella *et al.*, 2016; Thakkar *et al.*, 2016), with both the LD and the anxiety negatively impacting their functional activity participation (Kavale and Forness, 1996; Harpin, 2005; Loe and Feldman, 2007; Case-Smith and O'Brien, 2010; Green and Ben-Sasson, 2010; Fallon and Maccobb, 2013; Storch *et al.*, 2013; Dacey, Mack and Fiore, 2016; Mammarella *et al.*, 2016; Sciberras *et al.*, 2019). As typical OT intervention entail sensory- based strategies as well as perceptual-motor approaches to address LD and developmental delays, direct attention is rarely paid to the anxiety that these children experience.

In the field of stress management, PMR frequently forms part of intervention plans to address anxiety directly (Crouch and Alers, 2014), as PMR is an evidence-based approach to reducing anxiety (Wachelka and Katz, 1999; Heffner, Greco and Eifert, 2003; Lopata, 2003; Nickel *et al.*, 2005; Srilekha, Soumendra and Chattopadhyay, 2013; Ashton, 2015). A script specifically for children was developed (Koeppen, 1974), but not truly utilized in OT practice, or not reported on in research, for children who experience anxiety. As PMR is usually applied directly by a trained professional in regular direct-contact sessions, with additional practice at home, it's use solely as a stand-alone home programme is a field with minimal information.

Home programmes are said to be effective if they are based on practice evidence and if adherence is good (Molineux, 1993; Ozonoff and Cathcart, 1998; Novak, Cusick and Lowe, 2007; Novak, 2011; Gupta, Desai and Rastogi, 2019). It is also a cost-effective way to maximize intervention effect with less direct contact from an OT.

This case study design thus set out to recruit three children already attending OT intervention, who experience LD and anxiety, to examine the case of PMR as a stand-alone home programme.

6.1. Main conclusions

The main conclusions from the study can be summarized as follows:

- Although there was some improvement in anxiety levels, the improvement was only marginal on the measurement scales with no complete alleviation of anxiety.
- The slight improvement in anxiety did not relate to improved functional activity participation at school. In fact, two participants' functional activity participation showed a regression at school.
- The participant diagnosed with ADHD, who started using medication was the only participant to show decreased levels of anxiety and improved functional activity participation at school.
- None of the participants employed the PMR home programme as a coping strategy in stressful situations.
- The PMR home programme did lead to improved sleep for two of the participants on the nights when it was performed.
- PMR as a stand-alone home programme is thus not able to completely alleviate anxiety that children with LD experience and does not translate into improved functional activity participation

An important finding was the substantial role that context played in this study. As seen with P2, after deciding to emigrate and moving to a new house, his anxiety could not be alleviated. His participation at school also deteriorated. This is similar to P3 who experienced continued pressure in her mainstream class, elevated anxiety levels and eventually being placed in the LSEN class at school. It is thus necessary to provide additional support to children when their contexts aggravate the anxiety that they already experience. Empowering parents at home, teachers and other people involved in these children's education, to recognize anxiety and how to provide support or approach professionals who are better able to help is thus crucial.

Another important finding was that the participants did not apply PMR as a coping skill in circumstances other than when their parents played the CD to them, either while driving or at bedtime. The ultimate goal of PMR is to facilitate it's use as a coping skill in multiple setting, which should facilitate a sense of control (King *et al.*, 1998). It is thus necessary to emphasize this to parents and children. Teaching and practising the technique during direct OT intervention with children, using a cognitive frame of reference such as Cognitive

Orientation to Occupational Performance, and helping them to apply it in class may be essential in ensuring carry-over and more frequent use. Parents can still practise PMR at home as an adjunct to direct training.

Only one participant returned an intervention diary. Thus, it was difficult to discern who applied the PMR home programme as suggested and who did not. Even though Molineux suggests token reinforcement and contracts (Molineux, 1993) to aid adherence, more recent literature from parents depict that adherence pressure is counterproductive (Novak, 2011). A follow-up training session and possibly more contact sessions with parents (which was not done in the present study), incorporating parental goals and providing more information with regards to their child's diagnosis and prognosis could result in better adherence to home programmes in general, as seen in literature (Novak, 2011). Weekly follow-ups of home programme progress during OT intervention sessions might also improve adherence.

6.2. Implications for practice

It is evident that children with LD experience anxiety, and that other co-morbidities exist that also influence functional activity participation. It is thus important to develop a comprehensive intervention programme to address all aspects identified as impeding on children's functional activity participation and quality of life.

Progressive muscle relaxation as a home programme used in this study had a positive effect on two (P1 and P2) of the three participants' levels of anxiety. As only P2 returned an intervention diary, it could not be absolute that the other two participants applied the PMR home programme as suggested. Nonetheless, P2 and P3 still demonstrated clinically relevant levels of anxiety after completion of the programme.

Generally, methodology of studies examining PMR intervention included direct instruction of the PMR by the researcher or a trained professional (Pawlow and Jones, 2005; Hashim and Zainol, 2015). Cognitive changes involved in applying PMR include a new way of thinking and an increased sense of control, only seen when instructed by a licenced health care practitioner (Conrad and Roth, 2007). It could be that the way a trained person provides instruction on PMR, differs from the presentation by a lay person, e.g. a parent. More initial training contact from the OT could be beneficial. After an initial training session with parents and children, parents can continue with the home programme. The OT could also then

include direct training of the PMR exercises in initial intervention sessions, stressing the importance of learning it as a coping skill. A possible beneficial FOR could be the Cognitive Orientation to Occupational Performance (CO-OP). This is a problem-solving approach where strategies are identified to help a child reach specific goals (Polatajko *et al.*, 2001). Further research would be necessary in order to investigate the functionality of such an approach to anxiety management in children with LD.

King et al. also suggest a multi- training session approach, which can be followed through with taped instructions and home programme application. Emphasis is again placed on teaching PMR as a coping skill (King *et al.*, 1998). They also suggest using physiological measures to determine and monitor the extent to which a child learns the PMR exercises (King *et al.*, 1998). Although this would probably convey important information as to whether physiological relaxation and reduced anxiety is experienced by the child, it could be a costly procedure. However, it could be beneficial to monitor a child's heart rate, breathing and palpate for muscle tension as part of a CO-OP approach.

Through this study's findings, it is notable that PMR applied only as a stand-alone home programme after one formal training session, is not beneficial in completely alleviating anxiety in children who participated in the study, diagnosed with LD, anxiety and other co-morbidities. Studies on home programmes as a continuation of intervention have mixed results. Few studies examining home programme effectiveness exist as most studies revolve around adherence to and experience of home programmes (Novak, Cusick and Lowe, 2007). Studies that measure effectiveness are usually flawed by not including control groups or using sample sizes that are too small (Novak, Cusick and Lowe, 2007; Donoso Brown and Fichter, 2017). More research is needed in order to determine the functional effects of participation in home programme exercises.

6.3. Future research into progressive muscle relaxation as a home programme

Recommendations for future research include:

- Initial direct training by the OT during intervention sessions, with home practice and thereafter prescription of the home programme,

- Stressing the importance of applying PMR as a coping skill with specific practice in various settings (including home, classroom and during OT intervention),
- The number of initial direct training sessions would depend on how fast a child understands the concept of PMR, which would be different for each child,
- Home programme collaboration of goals and weekly follow-up with support sessions to aid adherence,
- More case study design research studies, which also include context in findings, could be beneficial to determine the effect of PMR as a home programme in conjunction with OT intervention, when children apply it as a coping skill.

This study added to existing literature that PMR cannot just be suggested as a stand-alone home programme after one training session with parents and children. It is not naturally used as a coping skill and thus does not alleviate anxiety and improve functional activity participation in this way.

The length of the study period was long, and data had to be collected at set intervals in order to achieve close to consistent results. This implied that parents, teachers and the researcher had to manage time appropriately when completing questionnaires, while still attending to their own set daily routines and schedules. Conducting case study research over an extended period of time, with several data points and analysing results is thus challenging.

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APPENDIX A

Demographic questionnaire

(Information to be kept separate)

Participant number (office use): _____

Personal details:

Child's name and surname : _____

Date of birth : _____

Parent's contact number : _____

Participant number : _____

Gender : _____

Date of initial evaluation : _____

Number of occupational therapy sessions already attended: _____

Any diagnosis received from a specialist (for example ADHD, Autistic Spectrum Disorder etc), please explain:

_____

_____

_____

Is your child using any prescription medication or natural remedy? Please name them and explain:

_____

_____

_____

Thank you for your time!

APPENDIX B

CONNERS 3™–Parent Short

C. Keith Conners, Ph.D.

Code _____ Gender: M F (Circle One) Age Yesr Months

_____ Age: ____ ____ Grade: ____ Today's Date: ____/____/____ (Month Day Year)

Instructions: Here are some things parents might say about their children. Please tell us about *your* child and what he/she has been like in the ***past month***. Read each item carefully, then mark how well it describes your child or how frequently it has happened in the ***past month***.

0 = In the past month, this was ***not true at all*** about my child. It never (or seldom) happened.
1 = In the past month, this was ***just a little true*** about my child. It happened occasionally.
2 = In the past month, this was ***pretty much true*** about my child. It happened often (or quite a bit).
3 = In the past month, this was ***very much true*** about my child. It happened very often (very frequently).

Please circle only one answer for each item. It is important to respond to every item.
For items that you find difficult to answer, please give your best guess.

Rating: *In the past month, this was...*	0 = Not true at all (Never, Seldom) 1 = Just a little true (Occasionally)	2 = Pretty much true (Often, Quite a bit) 3 = Very much true (Very often, Very frequently)

1.	Forgets to turn in completed work.	0	1	2	3
2.	Is perfect in every way.	0	1	2	3
3.	Fidgets or squirms in seat.	0	1	2	3
4.	Is one of the last to be picked for teams or games.	0	1	2	3
5.	Restless or overactive.	0	1	2	3
6.	Does not know how to make friends.	0	1	2	3
7.	Runs or climbs when he/she is not supposed to.	0	1	2	3
8.	Cannot grasp arithmetic.	0	1	2	3
9.	Is difficult to please or amuse.	0	1	2	3
10.	Needs extra explanation of instructions.	0	1	2	3
11.	Is hard to motivate (even with rewards like candy or money).	0	1	2	3
12.	Makes mistakes.	0	1	2	3
13.	Acts as if driven by a motor.	0	1	2	3
14.	Starts fights with others on purpose.	0	1	2	3
15.	Has trouble getting started on tasks or projects.	0	1	2	3
16.	Is happy, cheerful, and has a positive attitude.	0	1	2	3
17.	Doesn't pay attention to details; makes careless mistakes.	0	1	2	3
18.	Has trouble keeping friends.	0	1	2	3
19.	Bullies, threatens, or scares others.	0	1	2	3
20.	Loses things (for example, schoolwork, pencils, books, tools, or toys).	0	1	2	3
21.	Tells lies to hurt other people.	0	1	2	3
22.	I cannot figure out what makes him/her happy.	0	1	2	3
23.	Threatens to hurt others.	0	1	2	3
24.	Is constantly moving.	0	1	2	3
25.	Has trouble with reading.	0	1	2	3
26.	Is angry and resentful.	0	1	2	3
27.	Has a short attention span.	0	1	2	3
28.	Excitable, impulsive.	0	1	2	3
29.	Cannot do things right.	0	1	2	3
30.	Has trouble concentrating.	0	1	2	3
31.	Tells the truth; doesn't even tell "little white lies."	0	1	2	3
32.	Has trouble organizing tasks or activities.	0	1	2	3
33.	Is fun to be around.	0	1	2	3
34.	Inattentive, easily distracted.	0	1	2	3
35.	Is messy or disorganized.	0	1	2	3
36.	Spelling is poor.	0	1	2	3
37.	Is patient and content, even when waiting in a long line.	0	1	2	3
38.	Has no friends.	0	1	2	3
39.	Does not understand what he/she reads.	0	1	2	3
40.	Behaves like an angel.	0	1	2	3
41.	Has trouble keeping his/her mind on work or on play for long.	0	1	2	3
42.	Has to struggle to complete hard tasks.	0	1	2	3
43.	Does not get invited to play or go out with others.	0	1	2	3

Additional Questions:

44. Do you have any other concerns about your child? _____

45. What strengths or skills does your child have? _____

APPENDIX C

Participant number (To be covered by sticker):

SPENCE CHILDREN'S ANXIETY SCALE
(Parent Report)

Date: _____

BELOW IS A LIST OF ITEMS THAT DESCRIBE CHILDREN. FOR EACH ITEM PLEASE CIRCLE THE RESPONSE THAT BEST DESCRIBES YOUR CHILD. PLEASE ANSWER ALL THE ITEMS.

1.	My child worries about things.....	Never	Sometimes	Often	Always
2.	My child is scared of the dark.....	Never	Sometimes	Often	Always
3.	When my child has a problem, s(he) complains of having a funny feeling in his / her stomach	Never	Sometimes	Often	Always
4.	My child complains of feeling afraid.....	Never	Sometimes	Often	Always
5.	My child would feel afraid of being on his/her own at home.....	Never	Sometimes	Often	Always
6.	My child is scared when s(he) has to take a test.....	Never	Sometimes	Often	Always
7.	My child is afraid when (s)he has to use public toilets or bathrooms.....	Never	Sometimes	Often	Always
8.	My child worries about being away from us / me.....	Never	Sometimes	Often	Always
9.	My child feels afraid that (s)he will make a fool of him/herself in front of people.....	Never	Sometimes	Often	Always
10.	My child worries that (s)he will do badly at school.....	Never	Sometimes	Often	Always
11.	My child worries that something awful will happen to someone in our family.....	Never	Sometimes	Often	Always
12.	My child complains of suddenly feeling as if (s)he can't breathe when there is no reason for this.....	Never	Sometimes	Often	Always
13.	My child has to keep checking that (s)he has done things right (like the switch is off, or the door is locked)..	Never	Sometimes	Often	Always
14.	My child is scared if (s)he has to sleep on his/her own.....	Never	Sometimes	Often	Always
15.	My child has trouble going to school in the mornings because (s)he feels nervous or afraid.....	Never	Sometimes	Often	Always
16.	My child is scared of dogs	Never	Sometimes	Often	Always
17.	My child can't seem to get bad or silly thoughts out of his / her head.....	Never	Sometimes	Often	Always
18.	When my child has a problem, s(he) complains of his/her heart beating really fast.....	Never	Sometimes	Often	Always

19.	My child suddenly starts to tremble or shake when there is no reason for this.....	Never	Sometimes	Often	Always
20.	My child worries that something bad will happen to him/her.....	Never	Sometimes	Often	Always
21.	My child is scared of going to the doctor or dentist	Never	Sometimes	Often	Always
22.	When my child has a problem, (s)he feels shaky.....	Never	Sometimes	Often	Always
23.	My child is scared of heights (eg. being at the top of a cliff).....	Never	Sometimes	Often	Always
24.	My child has to think special thoughts (like numbers or words) to stop bad things from happening.....	Never	Sometimes	Often	Always
25.	My child feels scared if (s)he has to travel in the car, or on a bus or train	Never	Sometimes	Often	Always
26.	My child worries what other people think of him/her.....	Never	Sometimes	Often	Always
27.	My child is afraid of being in crowded places (like shopping centres, the movies, buses, busy playgrounds).....	Never	Sometimes	Often	Always
28	All of a sudden my child feels really scared for no reason at all.....	Never	Sometimes	Often	Always
29.	My child is scared of insects or spiders.....	Never	Sometimes	Often	Always
30.	My child complains of suddenly becoming dizzy or faint when there is no reason for this.....	Never	Sometimes	Often	Always
31.	My child feels afraid when (s)he has to talk in front of the class.....	Never	Sometimes	Often	Always
32.	My child's complains of his / her heart suddenly starting to beat too quickly for no reason	Never	Sometimes	Often	Always
33.	My child worries that (s)he will suddenly get a scared feeling when there is nothing to be afraid of.....	Never	Sometimes	Often	Always
34.	My child is afraid of being in small closed places, like tunnels or small rooms.....	Never	Sometimes	Often	Always
35.	My child has to do some things over and over again (like washing his / her hands, cleaning or putting things in a certain order).....	Never	Sometimes	Often	Always
36.	My child gets bothered by bad or silly thoughts or pictures in his/her head	Never	Sometimes	Often	Always
37.	My child has to do certain things in just the right way to stop bad things from happening	Never	Sometimes	Often	Always
38.	My child would feel scared if (s)he had to stay away from home overnight.....	Never	Sometimes	Often	Always
39.	Is there anything else that your child is really afraid of?	YES	NO		
	Please write down what it is, and fill out how often (s)he is afraid of this thing: _____	Never	Sometimes	Often	Always
	_____	Never	Sometimes	Often	Always
	_____	Never	Sometimes	Often	Always

APPENDIX D

CONNERS 3rd–Teacher Short

C. Keith Conners, Ph.D.

Student's Name/ID: _____ Gender: M F (Circle One) Birth Date: ____/____/____ (Month / Day / Year)

Teacher's Name/ID: _____ Age: ____ (Years) ____ (Months) Grade: _____ Today's Date: ____/____/____ (Month / Day / Year)

Time Known Student: _____ (Months) Class(es) Taught: _____

Instructions: Here are some things teachers might say about their students. Please tell us about *this* student and what he/she has been like in the ***past month***. Read each item carefully, then mark how well it describes this student or how frequently it has happened in the ***past month***.

0 = In the past month, this was ***not true at all*** about this student. It never (or seldom) happened.
1 = In the past month, this was ***just a little true*** about this student. It happened occasionally.
2 = In the past month, this was ***pretty much true*** about this student. It happened often (or quite a bit).
3 = In the past month, this was ***very much true*** about this student. It happened very often (very frequently).

Please circle only one answer for each item. It is important to respond to every item.
For items that you find difficult to answer, please give your best guess.

	Rating: *In the past month, this was...*	0 = Not true at all (Never, Seldom) 1 = Just a little true (Occasionally)		2 = Pretty much true (Often, Quite a bit) 3 = Very much true (Very often, Very frequently)	
1.	Is constantly moving.	0	1	2	3
2.	Has to struggle to complete hard tasks.	0	1	2	3
3.	Inattentive, easily distracted.	0	1	2	3
4.	Makes mistakes.	0	1	2	3
5.	Bullies, threatens, or scares others.	0	1	2	3
6.	Cannot do things right.	0	1	2	3
7.	Is angry and resentful.	0	1	2	3
8.	Excitable, impulsive.	0	1	2	3
9.	Is fun to be around.	0	1	2	3
10.	Has trouble keeping his/her mind on work or play for long.	0	1	2	3
11.	Has poor social skills.	0	1	2	3
12.	Actively refuses to do what adults tell him/her to do.	0	1	2	3
13.	Is happy, cheerful, and has a positive attitude.	0	1	2	3
14.	Cannot grasp arithmetic.	0	1	2	3
15.	Tries to get even with people.	0	1	2	3
16.	Has trouble getting started on tasks or projects.	0	1	2	3
17.	Acts in sneaky or manipulative ways.	0	1	2	3
18.	Does not understand what he/she reads.	0	1	2	3
19.	Tells the truth; does not even tell "little white lies."	0	1	2	3
20.	Appears to be unaccepted by group.	0	1	2	3
21.	Is hard to motivate (even with highly desirable rewards).	0	1	2	3
22.	Restless or overactive.	0	1	2	3
23.	Is good at planning ahead.	0	1	2	3
24.	Fidgets or squirms in seat.	0	1	2	3
25.	Is patient and content, even when waiting in a long line.	0	1	2	3
26.	Doesn't pay attention to details; makes careless mistakes.	0	1	2	3
27.	Is one of the last to be picked for teams or games.	0	1	2	3
28.	Spelling is poor.	0	1	2	3
29.	Has trouble keeping friends.	0	1	2	3
30.	Leaves seat when he/she should stay seated.	0	1	2	3
31.	Behaves like an angel.	0	1	2	3
32.	Talks out of turn.	0	1	2	3
33.	Is difficult to please or amuse.	0	1	2	3
34.	Is perfect in every way.	0	1	2	3
35.	Forgets things already learned.	0	1	2	3
36.	Has a short attention span.	0	1	2	3
37.	Does not know how to make friends.	0	1	2	3
38.	I cannot figure out what makes him/her happy.	0	1	2	3
39.	Is sidetracked easily.	0	1	2	3

Additional Questions:

40. Do you have any other concerns about this student? _____

41. What strengths or skills does this student have? _____

APPENDIX E

Intervention diary

Week 1				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 2				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 3				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 4				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	

How do you feel? (child)			Quality of sleep night after PMR	
Week 5				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 6				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 7				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 8				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 9				

Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 10				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 11				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 12				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 13				
Sunday	Signature		Nature of participation	
How do you			Quality of sleep night	

feel? (child)			after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 14				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 15				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Week 16				
Sunday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Tuesday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	
Thursday	Signature		Nature of participation	
How do you feel? (child)			Quality of sleep night after PMR	

APPENDIX F

ICF-based Documentation Form

PATIENT INFORMATION

Name of child:

Person completing form:

(Indicate: parent, teacher, treating OT)

Date of completion:

BODY FUNCTIONS Physiological functions of body systems (including psychological functions) ***How much impairment does the person have in ...***		**No impairment**	**Mild impairment**	**Moderate impairment**	**Severe impairment**	**Complete impairment**	**Not specified**	**Not applicable**
		0	1	2	3	4	8	9
b140	**Attention functions**							
	Specific mental functions of focusing on an external stimulus or internal experience for the required period of time. Inclusions: functions of sustaining attention, shifting attention, dividing attention, sharing attention; concentration; distractibility Exclusions: consciousness functions (b110); energy and drive functions (b130); sleep functions (b134); memory functions (b144); psychomotor functions (b147); perceptual functions (b156)							
	Sources of information: Case history Patient reported questionnaire Clinical examination Technical investigation							
	Description of the problem:							
		0	1	2	3	4	8	9
b144	**Memory functions**							
	Specific mental functions of registering and storing information and retrieving it as needed. Inclusions: functions of short-term and long-term memory, immediate, recent and remote memory; memory span; retrieval of memory; remembering; functions used in recalling and learning, such as in nominal, selective and dissociative amnesia Exclusions: consciousness functions (b110); orientation functions (b114); intellectual functions (b117); attention functions (b140); perceptual functions (b156); thought functions (b160); higher-level cognitive functions (b164); mental functions of language (b167); calculation functions (b172)							
	Sources of information: Case history Patient reported questionnaire Clinical examination Technical investigation							
	Description of the problem:							
		0	1	2	3	4	8	9
b152	**Emotional functions (G)**							
	Specific mental functions related to the feeling and affective components of the processes of the mind. Inclusions: functions of appropriateness of emotion, regulation and range of emotion; affect; sadness, happiness, love, fear, anger, hate, tension, anxiety, joy, sorrow; lability of emotion; flattening of affect Exclusions: temperament and personality functions (b126); energy and drive functions (b130)							
	Sources of information: Case history Patient reported questionnaire Clinical examination Technical investigation							
	Description of the problem:							
		0	1	2	3	4	8	9
b1521	**Regulation of emotion**							
	Mental functions that control the experience and display of affect.							
	Sources of information: Case history Patient reported questionnaire Clinical examination Technical investigation							
	Description of the problem:							
		0	1	2	3	4	8	9
b1565	**Visuospatial perception**							
	Mental function involved in distinguishing by sight the relative position of objects in the environment or in relation to oneself. Sources of information: Case history Patient reported questionnaire Clinical examination Technical investigation **Description of the problem:**							

BODY FUNCTIONS Physiological functions of body systems (including psychological functions) ***How much impairment does the person have in ...***		**No impairment**	**Mild impairment**	**Moderate impairment**	**Severe impairment**	**Complete impairment**	**Not specified**	**Not applicable**
		0	1	2	3	4	8	9
b140	**Attention functions**							
	Specific mental functions of focusing on an external stimulus or internal experience for the required period of time. Inclusions: functions of sustaining attention, shifting attention, dividing attention, sharing attention; concentration; distractibility Exclusions: consciousness functions (b110); energy and drive functions (b130); sleep functions (b134); memory functions (b144); psychomotor functions (b147); perceptual functions (b156)							
	Sources of information: Case history Patient reported questionnaire Clinical examination Technical investigation							
	Description of the problem:							
		0	1	2	3	4	8	9
b144	**Memory functions**							
	Specific mental functions of registering and storing information and retrieving it as needed. Inclusions: functions of short-term and long-term memory, immediate, recent and remote memory; memory span; retrieval of memory; remembering; functions used in recalling and learning, such as in nominal, selective and dissociative amnesia Exclusions: consciousness functions (b110); orientation functions (b114); intellectual functions (b117); attention functions (b140); perceptual functions (b156); thought functions (b160); higher-level cognitive functions (b164); mental functions of language (b167); calculation functions (b172)							
	Sources of information: Case history Patient reported questionnaire Clinical examination Technical investigation							
	Description of the problem:							
		0	1	2	3	4	8	9
b152	**Emotional functions (G)**							
	Specific mental functions related to the feeling and affective components of the processes of the mind. Inclusions: functions of appropriateness of emotion, regulation and range of emotion; affect; sadness, happiness, love, fear, anger, hate, tension, anxiety, joy, sorrow; lability of emotion; flattening of affect Exclusions: temperament and personality functions (b126); energy and drive functions (b130)							
	Sources of information: Case history Patient reported questionnaire Clinical examination Technical investigation							
	Description of the problem:							
		0	1	2	3	4	8	9
b1521	**Regulation of emotion**							
	Mental functions that control the experience and display of affect.							
	Sources of information: Case history Patient reported questionnaire Clinical examination Technical investigation							

ACTIVITIES AND PARTICIPATION

Execution of a task or action by an individual and involvement in a life situation

How much difficulty does the person have in the ...

P = ***performance of ...***
C = ***capacity in ...***

			No difficulty	Mild difficulty	Moderate difficulty	Severe difficulty	Complete difficulty	Not specified	Not applicable
			0	1	2	3	4	8	9
d140	Learning to read	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Developing the competence to read written material (including Braille) with fluency and accuracy, such as recognizing characters and alphabets, sounding out words with correct pronunciation, and understanding words and phrases.								
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								
			0	1	2	3	4	8	9
d145	Learning to write	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Developing the competence to produce symbols that represent sounds, words or phrases in order to convey meaning (including Braille writing), such as spelling effectively and using correct grammar.								
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								
			0	1	2	3	4	8	9
d150	Learning to calculate	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Developing the competence to manipulate numbers and perform simple and complex mathematical operations, such as using mathematical signs for addition and subtraction and applying the correct mathematical operation to a problem.								
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								
			0	1	2	3	4	8	9
d160-d179	Applying knowledge (d160-d179)	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								
			0	1	2	3	4	8	9
d230	Carrying out daily routine (G)	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Carrying out simple or complex and coordinated actions in order to plan, manage and complete the requirements of day-to-day procedures or duties, such as budgeting time and making plans for separate activities throughout the day. Inclusions: managing and completing the daily routine; managing one's own activity level Exclusion: undertaking multiple tasks (d220)								
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								

			0	1	2	3	4	8	9
d240	Handling stress and other psychological demands	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Carrying out simple or complex and coordinated actions to manage and control the psychological demands required to carry out tasks demanding significant responsibilities and involving stress, distraction or crises, such as driving a vehicle during heavy traffic or taking care of many children. Inclusions: handling responsibilities; handling stress and crisis								
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								

			0	1	2	3	4	8	9
d815	Preschool education	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Learning at an initial level of organized instruction, designed primarily to introduce a child to the school-type environment and prepare it for compulsory education, such as by acquiring skills in a day-care or similar setting as preparation for advancement to school.								
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								

			0	1	2	3	4	8	9
d820	School education	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Gaining admission to school, engaging in all school-related responsibilities and privileges, and learning the course material, subjects and other curriculum requirements in a primary or secondary education programme, including attending school regularly, working cooperatively with other students, taking direction from teachers, organizing, studying and completing assigned tasks and projects, and advancing to other stages of education.								
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								

			0	1	2	3	4	8	9
d9200	Play	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Engaging in games with rules or unstructured or unorganized games and spontaneous recreation, such as playing chess or cards or children's play.								
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								

			0	1	2	3	4	8	9
d9205	Socializing	P	☐	☐	☐	☐	☐	☐	☐
		C	☐	☐	☐	☐	☐	☐	☐
	Engaging in informal or casual gatherings with others, such as visiting friends or relatives or meeting informally in public places.								
	Sources of information: ☐ Case history ☐ Patient reported questionnaire ☐ Clinical examination ☐ Technical investigation								
	Description of the problem:								

APPENDIX G

Parent questionnaire

Please complete the following questions, by selecting the option that best describes your experience.

1. Was the PMR home programme beneficial to your child?

Not at all	Somewhat beneficial	Beneficial	Very beneficial

2. Was the PMR home programme easy to implement?

Extremely difficult	Difficult	Easy	Very easy

3. Have you noticed changes in the level of anxiety that your child experiences?

No changes	Very few changes	Moderate changes	Significant changes

4. Has your child tried to implement exercises from the PMR CD independently, not in scheduled times?

Yes	No

If yes, in what contexts did you observe your child trying to implement PMR exercises?

_____

_____

_____

5. Would you continue with the PMR home programme?

Yes	No

Please describe the factors that enhanced your ability to implement the home programme

Please describe the factors that made it difficult for you to implement the home programme

Please describe the most significant changes in your child's anxiety following the home programme

APPENDIX H

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

27/02/2019

Ms R Diedericks
School of Theurapeutic Sciences
Department of Occupational Therapy
Medical School
University

Sent by e-mail to: ruda.diedericks@gmail.com

Dear Ms Diedericks

Re: **Protocol Ref No: M161047**
Protocol Title: *Progressive muscle relaxation as part of the home programmes for children with learning disabilities and anxiety: a randomised control trial*
Principal Investigator: Ms R Diedericks

Thank you for your letter of 16/02/2019.

Your proposed amendments are noted and approved, subject to the following conditions:

1. please show the study title as a heading on all Information and Consent Sheets
2. please make sure you have any necessary permissions or licenses to use the Conners and ICF tests

For the record, the amendments are the addition of the following data collection tools:

A) ICF questionnaire
B) Conners CBRF teacher form
C) questionnaire for parents
D) Information and Consent Sheets pertaining to the above

Thank you for keeping us informed.

Yours Sincerely

I. Burns
.....
Mr I Burns
For the Human Research Ethics Committee (Medical)

Works2000/Iain0007/Acknowledge.docx

APPENDIX I

Training script for PMR technique training with parents and participants

1. Introductions: Researcher, parents, child

2. Researcher gives research title:

Progressive muscle relaxation (PMR) as part of the home programmes for children with learning disabilities and anxiety.

3. Short explanation of study:

Researcher will say: Basically, I will look at the effect of combining OT intervention and home programme, together with a PMR home programme, on a child with LD anxiety levels and functional activity participation. So I am asking whether the PMR home programme will have an effect or not on anxiety and functional activity participation.

PMR is a stress management technique that is aimed at reducing anxiety. Muscles are tensed and relaxed in a specific sequence. This allows a child to feel the difference between tension and relaxation. They will thus be able to notice when they are feeling tense and will be able to relax and therefore reduce anxiety.

4. Give the PMR script to parents and look through it. Various sections will be explained. For example, participants have to pretend that they have a jawbreaker in their mouths, squeeze a lemon etc. The researcher will take with various objects or pictures of them for the participants to be able to visualise it when they are doing the home program, creating a frame of reference. When fears exist toward these objects/ animals (in one section they pretend that they are a lazy puppy), it will be discussed with the parents and alternative examples will be used.

5. Show the CD and play it for approximately 5 minutes.

6. Researcher will explain that the PMR script is recorded on the CD and that the parents are to use the CD and not read the script to their child. The importance of accurate and manualised intervention in research studies will be explained. At this stage the researcher will ask the parents to do the home programme on Sunday, Tuesday and Thursday evenings. The researcher will suggest that the parents choose a time that fits in with the family schedule, perhaps as part of the bedtime routine, but parents can decide. The researcher will also show the parents the intervention diary and explain how to sign off on each PMR session in order to aim to measure participation in the intervention.

7. The child will sit comfortably on a chair for a demonstration.

8. The researcher will go through the entire PMR script with the CD playing, pausing after each instruction to see that the child understands and performs the contractions and

relaxations accurately. The researcher will help to correct the child, if necessary.

9. One of the parents could sit next to the child and also do the PMR technique to get a feel for it.

10. Once the full CD has been done, the researcher will allow for questions and further demonstration if requested.

11. The researcher will leave her contact details with the parents for additional support or queries.

12. The training session will end at this stage.

APPENDIX J

Progressive muscle relaxation (PMR) as part of the home programmes for children with learning disabilities (LD) and anxiety.

Dear Parents,

I, Ruda Roux, am an occupational therapist in Pretoria and I am currently completing my Master's- degree in occupational therapy at the University of Witwatersrand. This entails me conducting research. My topic includes children who experience learning disabilities and inter-related anxiety. An additional intervention combined with typical occupational therapy intervention strategies is explored.

I would like to invite you and your child to participate in my study.

This will require the following actions from you as parent:

1. Completion of a short demographic questionnaire. This will include your child's name, age, gender, number of OT sessions already attended, diagnosis present and medication used (if any).
2. Completion of two questionnaires at two stages in the process (initially and after 16 weeks); the Spence Children Anxiety Scale (SCAS-P) and the Conners Comprehensive Behavior Rating Scales Parent Short Form (Conners CBRS-P). It will take approximately 50 minutes to complete both questionnaires.
3. Completion of a questionnaire after a 16-week period, relating to your experience of the additional intervention.
4. Providing the ICF questionnaire for completion prior to the study, after an eight-week period and again after the 16- week period your child's teacher and returning it to me after completion.
5. Providing a Conners CBRS Teacher Short Form (Conners CBRS-T) questionnaire for completion prior to the study, after an eight-week period and again after the 16- week period your child's teacher and returning it to me after completion.

Only children from Grade R to Grade 7 who have a LD with symptoms of anxiety can participate in the study. Children must be able to understand Afrikaans or English. Participants must be able to attend their current occupational therapist for at least six months after they started participating in this study. This is necessary because participants in this study will be receiving their usual OT intervention in order to determine the impact of the additional intervention combined with usual intervention.

Children with hearing loss, intellectual disability or who use anti-anxiety medication, or who attend a special/remedial/LSEN school cannot participate in the study.

The information from your child's initial evaluation and the SCAS-P will be used to establish whether your child meets the inclusion criteria for this study. Your child thus may or may not be recruited for this study, according to the information obtained from these documents. Inclusion or exclusion will thus be confirmed once these documents are processed by the researcher. Should your child not meet the inclusion criteria, all completed forms will be returned to you and you will receive feedback on the completed questionnaires.

Should your child meet the inclusion criteria, you will be contacted to arrange a meeting where you will receive feedback on the completed questionnaires and the additional intervention technique will be taught to you and your child. The intervention is in the form of a home programme aimed at addressing your child's anxiety and will entail you playing a CD to your child, with the child following the instructions on the CD, three times per week for approximately 20 minutes at a time, for a period of 16 weeks. You will also receive an intervention diary, to be completed after each session. At the beginning of the study, after eight weeks, and at the end of the study, the teacher and the treating OT will be asked to complete an ICF questionnaire and the teacher will be asked to complete a Conners CBRS-T at the beginning and the end of the study. After the 16 weeks, you will complete another SCAS-P and Conners CBRS-P as well as a short questionnaire on your experience of implementing a home programme and return them to your treating occupational therapist. Altogether, this will take approximately 55 minutes to complete.

The research procedure will incur no cost to you as a parent. Your participation in this study and that of your child are completely voluntary; your consent and your child's assent will first be obtained. You can withdraw from this study at any time without consequences.

Efforts will be made to ensure confidentiality throughout the study and your child's name will not be used in the data collection process. Participant numbers will be assigned to each child and will be used when referring to that child in the entire research procedure. Only the researcher will keep the identifying information for these numbers, separate from the completed questionnaires in a locked cabinet.

I have obtained ethical clearance from the Human Research Ethics Committee (medical) of the University of the Witwatersrand. If you have any concern over the way the study is being conducted, please contact the Chairperson of this Committee who is Professor Clement Penny, who may be contacted on telephone number 011 717 2301, or by e-mail on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/1234 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za and

Rhulani.Mukansi@wits.ac.za

If you have any further questions about the study please feel free to contact me on 072 143 1082 or my supervisor, Mrs Matty van Niekerk at 011 717 3704 or matty.vanniekerk@wits.ac.za.

If you agree to your child's participation in this study please complete the attached consent forms, demographic questionnaire, SCAS-P and Conners CBRS-P. Please also allow your child to complete the attached assent form.

Thank you for your time.

_____

Ruda Diedericks

B Occ. Ther. (UP)

APPENDIX K

Informed consent Parent

Progressive muscle relaxation (PMR) as part of the home programmes for children with learning disabilities (LD) and anxiety.

I _____ agree to take part in the study and to allow my child, _____, to participate in the study. I have read all information concerning this study in the information document. I consent to completing the necessary documentation. I also consent to providing my child's teacher with the necessary forms and to completing the questionnaire at the end of the study. I allow the researcher access to my child's initial occupational therapy report from our treating occupational therapist.

Parent/ guardian signature : _____

Date : _____

APPENDIX L

Progressive muscle relaxation (PMR) as part of the home programmes for children with learning disabilities (LD) and anxiety.

Verbal assent from child

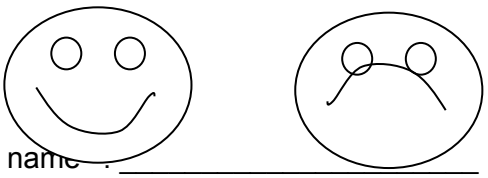
(Parent reads to child)

My name is Ruda, I am an occupational therapist just like (parent names the treating occupational therapist). I want to see how some extra exercises work and want to explain them to you and your parents. In addition to you attending your occupational therapy intervention, you will listen to a CD and do some extra exercises three times a week, just before bedtime to help you relax more.

You will do these extra exercises for 16 weeks.

Remember, you don't have to do the exercises if you don't want to, you can tell your mom/ dad at any time, okay? Do you understand?

Please tick the smiley face if you want to take part or the sad face if you don't want to take part.



Child's name : _____

Date : _____

APPENDIX M

Progressive muscle relaxation (PMR) as part of the home programmes for children with learning disabilities (LD) and anxiety.

Dear Teacher,

I, Ruda Roux, am an occupational therapist in Pretoria and I am currently completing my master's degree in occupational therapy at the University of Witwatersrand. This entails me conducting research. My topic includes children who experience learning disabilities and inter-related anxiety. An additional intervention combined with typical occupational therapy intervention strategies is explored.

Children participating in the study are already included in occupational therapy intervention. They will perform an additional intervention home programme, for 16 weeks, aimed at addressing anxiety. Their anxiety and functional activity participation will be measured initially and after the 16- week period of applying the additional intervention combined with occupational therapy intervention as usual.

I would like to ask for your input in my study. This will entail the following actions from you:

- Completion of an International Classification of Disability (ICF) questionnaire prior to the study, after eight weeks and again after the 16- week period. This will take approximately 20 minutes to complete.
- Completion of a Conners Comprehensive Behavior Rating Scale (Conners CBRS-T) Teacher Short Form prior to the study and after the 16- week period. This will take approximately 10 minutes to complete.

The research procedure will incur no cost to you as a teacher. Your participation in this study is completely voluntary; your consent will first be obtained. You can withdraw from this study at any time without consequences.

Efforts will be made to ensure confidentiality throughout the study and your name will not be used in the data collection process.

I have obtained ethical clearance from the Human Research Ethics Committee (medical) of the University of the Witwatersrand. If you have any concern over the way the study is being conducted, please contact the Chairperson of this Committee who is Professor Clement Penny, who may be contacted on telephone number 011 717 2301, or by e-mail on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011

717 2700/1234 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za and Rhulani.Mukansi@wits.ac.za

If you have any further queries, please feel free to contact me on 072 143 1082 or my supervisor Mrs Matty van Niekerk at 0117173704 or matty.vanniekerk@wits.ac.za.
If you agree to participation in this study, please complete the attached consent form.

Thank you for your time.

_____

Ruda Diedericks
B Occ. Ther. (UP)

APPENDIX N

Progressive muscle relaxation (PMR) as part of the home programmes for children with learning disabilities (LD) and anxiety.

Informed consent Teacher

I_____, teacher of_____ consent to completing the necessary ICF documentation at three stages and the Conners CBRS Teacher Short Form at two stages during the child's participation in the study.

Teacher signature : _____

Date : _____

APPENDIX O

PMR script

Progressive Muscle Relaxation for Children

Author: Koeppen, A.S. (1974). Relaxation training for children. Elementary School Guidance and Counselling, 9, 14-21.

INTRODUCTION

Today we're going to practice some special kinds of exercises called relaxation exercises. These exercises help you to learn how to relax when you're feeling up-tight and help you get rid of those butterflies-in-your-stomach kinds of feelings. They're also kind of neat because you can learn how to do some of them without anyone really noticing.

In order for you to get the best feelings from these exercises, there are some rules you must follow. First, you must do exactly what I say, even if it seems kind of silly. Second, you must try hard to do what I say. Third, you must pay attention to your body. Throughout these exercises, pay attention to how your muscles feel when they are tight and when they are loose and relaxed. And fourth, you must practice. The more you practice, the more relaxed you can get. Do you have any questions?

Are you ready to begin?

Okay, first, get as comfortable as you can, sitting on a chair. That's fine. Now close your eyes and don't open them until I say to. Remember to follow my instructions very carefully, try hard, and pay attention to your body. Here we go!

HANDS AND ARMS

Pretend you have a whole lemon in your left hand. Now squeeze it hard. Try to squeeze all the juice out. Feel the tightness in your hand and arm as you squeeze. Now drop the lemon. Notice how your muscles feel when they are relaxed. Take another lemon and squeeze. Try to squeeze this one harder than you did the first one. That's right. Real hard. Now drop the lemon and relax. See how much better your hand and arm feel when they are relaxed. Once again, take a lemon in your left hand and squeeze all the juice out. Don't leave a single drop. Squeeze hard. Good. Now relax and let the lemon fall from your hand.

(Repeat the process for the right hand and arm.)

ARMS AND SHOULDERS

Pretend you are a lazy puppy. You want to stretch. Stretch your arms out in front of you. Raise them up high over your head. Way back. Feel the pull in your shoulders. Stretch higher. Now just let your arms drop back to your side. Okay, puppy, let's stretch again. Stretch your arms out in front of you. Raise them over your head. Pull them back, way back. Pull hard. Now let them drop quickly. Good. Notice how your shoulders feel more relaxed. This time let's have a great big stretch. Try to touch the ceiling. Stretch your arms way out in

front of you. Raise them way up high over your head. Push them way, way back. Notice the tension and pull in your arms and shoulders. Hold tight, now. Great. Let them drop very quickly and feel how good it is to be relaxed. It feels good and warm and lazy.

JAW

You have a giant jawbreaker bubble gum in your mouth. It's very hard to chew. Bite down on it. Hard! Let your neck muscles help you. Now relax. Just let your jaw hang loose. Notice that how good it feels just to let your jaw drop. Okay, let's tackle that jawbreaker again now. Bite down. Hard! Try to squeeze it out between your teeth. That's good. You're really tearing that gum up. Now relax again. Just let your jaw drop off your face. It feels good just to let go and not have to fight that bubble gum. Okay, one more time. We're really going to tear it up this time. Bite down. Hard as you can. Harder. Oh, you're really working hard. Good. Now relax. Try to relax your whole body. You've beaten that bubble gum. Let yourself go as loose as you can.

FACE AND NOSE

Here comes a pesky old fly. He has landed on your nose. Try to get him off without using your hands. That's right, wrinkle up your nose. Make as many wrinkles in your nose as you can. Scrunch your nose up real hard. Good. You've chased him away. Now you can relax your nose. Oops, here he comes back again. Right back in the middle of your nose. Wrinkle up your nose again. Shoo him off. Wrinkle it up hard. Hold it just as tight as you can. Okay, he flew away. You can relax your face. Notice that when you scrunch up your nose your cheeks and your mouth and your forehead and your eyes all help you, and they get tight too. So when you relax your nose, your whole body relaxes too, and that feels good. Oh-oh. This time that old fly has come back, but this time he's on your forehead. Make lots of wrinkles. Try to catch him between all those wrinkles. Hold it tight, now. Okay, you can let go. He's gone for good. Now you can just relax. Let your face go smooth, no wrinkles anywhere. Your face feels nice and smooth and relaxed.

STOMACH

Hey! Here comes a cute baby elephant. But he's not watching where he's going. He doesn't see you lying in the grass, and he's about to step on your stomach. Don't move. You don't have time to get out of the way. Just get ready for him. Make your stomach very hard. Tighten up your stomach muscles real tight. Hold it. It looks like he is going the other way. You can relax now. Let your stomach go soft. Let it be as relaxed as you can. That feels so much better. Oops, he's coming this way again. Get Ready. Tighten up your stomach. Real hard. If he steps on you when your stomach is hard, it won't hurt. Make your stomach into a rock. Okay, he's moving away again. You can relax now. Kind of settle down, get comfortable, and relax. Notice the difference between a tight stomach and a relaxed one. That's how we want to feel---nice and loose and relaxed. You won't believe this, but this time he's coming your way and no turning around. He's headed straight for you. Tighten up. Tighten hard. Here he comes. This is really it. You've got to hold on tight. He's stepping on you. He's stepped over you. Now he's gone for good. You can relax completely. You're safe. Everything is okay, and you can feel nice and relaxed.

This time imagine that you want to squeeze through a narrow fence and the boards have splinters on them. You'll have to make yourself very skinny if you're going to make it through. Suck your stomach in. Try to squeeze it up against your backbone. Try to be skinny as you can. You've got to be skinny now. Just relax and feel your stomach being warm and loose.

Okay, let's try to get through that fence now. Squeeze up your stomach. Make it touch your backbone. Get it real small and tight. Get it as skinny as you can. Hold tight, now. You've got to squeeze through. You got through that narrow little fence and no splinters! You can relax now. Settle back and let your stomach come back out where it belongs. You can feel really good now. You've done fine.

LEGS AND FEET

Now pretend that you are standing barefoot in a big, fat mud puddle. Squish your toes down deep into the mud. Try to get your feet down to the bottom of the mud puddle. You'll probably need your legs to help you push. Push down, spread your toes apart, feel the mud squish up between your toes. Now step out of the mud puddle. Relax your feet. Let your toes go loose and feel how nice that it feels to be relaxed. Back into the mud puddle. Squish your toes down. Let your leg muscles help push your feet down. Push your feet. Hard. Try to squeeze that puddle dry. Okay. Come back out now. Relax your feet, relax your legs, relax your toes. It feels so good to be relaxed. No tenseness anywhere. You feel kind of warm and tingly.

CONCLUSION

Stay as relaxed as you can. Let your whole body go limp and feel all your muscles relaxed. In a few minutes I will ask you to open your eyes, and that will be the end of this practice session. As you go through the day, remember how good it feels to be relaxed. Sometimes you have to make yourself tighter before you can be relaxed, just as we did in these exercises. Practice these exercises every day to get more and more relaxed. A good time to practice is at night, after you have gone to bed and the lights are out and you won't be disturbed. It will help you get to sleep. Then, when you are really a good relaxer, you can help yourself relax at school. Just remember the elephant, or the jaw breaker, or the mud puddle, and you can do our exercises, and nobody will know.

Today is a good day, and you are ready to feel very relaxed. You've worked hard and it feels good to work hard. Very slowly, now, open your eyes and wiggle your muscles around a little. Very good. You've done a good job. You're going to be a super relaxer.

APPENDIX P

Raw data from P2's intervention diary

Weeks	Number of sessions done	How does child feel	Nature of participation	Quality of sleep
1	3	1. Normal/Okay	1. Attention wandering	• Normal
		2. Normal	2. Thinks it is a game	• Good
		3. Moody	3. Not very interested	• Normal
2	3	1. Tired, not interested	1. Very tired	1. Good
		2. Friendly	2. Participated	2. Good
		3. Normal, happy	3. Participated	3. Good
3	3	1. Friendly	1. Participated	1. Normal, good
		2. Tired	2. Not very interested	2. Normal
		3. Happy	3. Participated, but distracted	3. Good
4	2 (fell asleep before exercises on one evening)	1. Happy/ friendly	1. Participated	1. Good
		2. Little irritated	2. Participated, but not very interested	2. Normal
5	3. Full program was not completed once in this week	1. Angry	1. Did no exercises	1. Woke up twice in the evenings
		2. Tired	2. Did 1 exercise	2. Good

Weeks	Number of sessions done	How does child feel	Nature of participation	Quality of sleep
		3. Little tired	3. Did some exercises	3. Good
6	3	1. Good	1. Not very interested	1. Normal
		2. Chirpy	2. Did all exercises	2. Good
		3. Normal	3. Did all exercises	3. Good
7	2	1. Happy	1. Did all exercises	1. Good
		2. Friendly	2. Did all exercises	2. Normal
8	3	1. Irritated	1. Not focussing	1. Normal
		2. Friendly	2. Did all exercises	2. Normal
		3. Happy	3. Did all exercises	3. Good
9	2. Full program was not completed once this week.	1. Tired	1. Did not want to do the exercises	1. Normal
		2. Normal	2. Did some exercises	2. Woke up once in the evening
10	3	1. Lazy	1. Not interested	1. Normal

Weeks	Number of sessions done	How does child feel	Nature of participation	Quality of sleep
		2. Happy	2. Did all exercises	2. Normal
		3. Friendly	3. Did all exercises	3. Good
11	3. The full program was only completed once this week.	1. Happy	1. Did all exercises	1. Normal
		2. Too tired	2. No exercises	2. Woke up 2-3 times.
		3. Okay	3. Did some exercises	3. Normal
12	Although 3 sessions were attempted, only 2 were completed.	1. Irritated	1. Did not want to do exercises	1. Normal
		2. Tired	2. Did all exercises	2. Good
		3. Okay, happy	3. Did all exercises	3. Good
13	3	1. Okay, friendly	1. Did some exercises, not all	1. Normal
		2. Friendly	2. Did all exercises	2. Good

Weeks	Number of sessions done	How does child feel	Nature of participation	Quality of sleep
		3. Happy	3. Participated happily	3. Good
14	3. The full program was only completed once this week.	1. Normal, friendly	1. Energetic	1. Good
		2. Feeling off	2. Did some exercises, not all	2. Not too good
		3. Little bit sick	3. Did some exercises, not all	3. Normal
15	2 School concert week	1. Normal	1. Participated	1. Good
		2. Normal	2. Did all exercises	2. Normal, good
16	3	1. Sad (moved house)	1. Very tired after moving	1. Good
		2. Happy	2. Participated happily	2. Good
		3. Friendly	3. Participated	3. Good

APPENDIX Q

<table>
<tr><th colspan="2">Data Management Plan</th></tr>
<tr><th>Component of Data Management</th><th>Management Plan for this Study</th></tr>
<tr><td>Types of Data

1. What types of data will you be creating or capturing? (experimental measures, observational or qualitative, model simulation, existing)
2. How will you capture, create, and/or process the data? (Identify instruments, software, imaging, etc. used)</td><td>1. Quantitative data will be gathered throughout the study in the form of different questionnaires completed by three of the four parties involved.

2. Capturing:

<table>
<tr><th>Questionnaire</th><th>Scoring/ processing</th></tr>
<tr><td>Demographic questionnaire</td><td>Data transferred to excel spreadsheet.</td></tr>
<tr><td>SCAS-P</td><td>Scored manually. Data transferred to excel spreadsheet.</td></tr>
<tr><td>Conners CBRS-P</td><td>Scored manually. Data transferred to excel spreadsheet.</td></tr>
<tr><td>Conners CBRS-T</td><td>Scored manually. Data transferred to excel spreadsheet.</td></tr>
<tr><td>ICF core sets</td><td>Data entered into online ICF documentation form to create functioning profiles. Data transferred to excel spreadsheet.</td></tr>
<tr><td>Intervention diary</td><td>Data transferred to excel spreadsheet.</td></tr>
<tr><td>Experience questionnaire</td><td>Data transferred to excel spreadsheet.</td></tr>
</table>
</td></tr>
<tr><td>Contextual Details (Metadata)

1. What file formats and naming conventions will you be using?</td><td><u>Documents</u>

Each participant’s completed documents and questionnaires were filed in individual envelopes. Envelopes were labelled with the acronym PMR (for Progressive Muscle Relaxation), each participant’s code and the start date of their PMR home program, for example PMR_Participant1_20190512. This is stored in a locked cabinet at the researcher’s office. Name-code correlations are stored in a separate locked cabinet at a different location, at the researcher’s house. This is labelled PMR_NamesCodes_2019.</td></tr>
</table>

	<u>Excel spreadsheets</u> Data captured on each participant's excel spreadsheet was saved under the same name as their filed questionnaires.
Storage Backup and Security 1. Where and on what media will you store the data? 2. What is your backup plan for the data? 3. How will you manage data security?	1. The original data (forms and questionnaires) are stored in the locked cabinet at the researcher's office. All completed forms and questionnaires from parents, teachers and the researcher were scanned to PDF files on the researcher's computer and saved with the same file names as the original documents. The computer and files are password protected. 2. The researcher will back up the data on the University of the Witwatersrand Cloud. 3. The keys for the locket cabinet are kept by the researcher. Data will be encrypted and stored on the researcher's password-protected computer to ensure security.
Provisions for Protection/Privacy 1. How are you addressing any ethical or privacy issues (IRB, anonymization of data)? 2. Who will own any copyright or intellectual property rights to the data?	1. Participants received participant codes (numbers starting at one). Name-code correlations are kept in a separate location from the completed questionnaires. When parents wrote participants' names on any of the documentation, it was scratched out by the researcher and replaced by the participant number. 2. Intellectual property rights will belong to the University of the Witwatersrand. All of the original and saved data, questionnaires, name-code correlations and PDF-files will be handed over to the University of the Witwatersrand after completion of the study.
Policies for Re-use 1. What restrictions need to be placed on re-use of your data?	1. To access data, a person will need permission from the researcher and from the Department of Occupational Therapy. This should be in accordance with the university's data access policies. Ethical clearance from HREC-M should also be obtained.
Policies for Access and Sharing 1. What is the process for gaining access to your data?	1. Application needs to be done through the HREC-M of the University of the Witwatersrand.
Plan for archiving and Preservation of Access	1. After completion of the study and submission of the

1. What is your long-term plan for preservation and maintenance of the data?	research report for examining, all data will be handed over to the Department of Occupational Therapy to be stored in its digital research repository. 2. Data will be archived by the University library for two years after the student graduates.