UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

PARENTS' KNOWLEDGE OF THE SENSORY INTEGRATIVE APPROACH WITHIN OCCUPATIONAL THERAPY AT A REMEDIAL SCHOOL

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

Johannesburg
September 2019

Ethics Clearance Certificate Number: M160952

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I declare that this thesis, which I hereby submit for the degree of Master of Science in Occupational Therapy applied to Perceptual Disorders at the University of the Witwatersrand, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

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ACKNOWLEDGEMENTS

I would like to acknowledge the assistance of the following people:

- My research report supervisor, Dr. Janine van der Linde, for her dedication, patience, technical expertise and support while supervising this report and its supporting research proposal.
- Mrs Denise Franzsen, for her assistance with the statistics relating to this research study.
- The parents who completed my questionnaire and aided my understanding of their knowledge of sensory integration within a remedial school setting.
- The parents, teachers and therapists who assisted with my pilot study and formed part of the expert panel who validated the questionnaire to be used.
- Lastly, to my husband and family for supporting me through this process and allowing me the space and time to complete my studies.

ABSTRACT

Sensory integration has been used as an approach to treat children with various learning disabilities. The approach is used by occupational therapists as it follows a developmental sequence to assist children with sensory integrative difficulties to participate in their various occupations (1). Parents' involvement in their children's occupational therapy is seen as a fundamental part of the therapy process as they play a vital role in the carryover of therapy into the home environment. The purpose of the study was thus to describe parents' knowledge of a sensory integrative approach in occupational therapy within a remedial school environment. A quantitative method was used, utilising a descriptive design that included the use of surveys. A specifically designed self-report questionnaire was distributed to parents, both in hard copy and electronic format, whose children receive the sensory integrative approach at a remedial school in Johannesburg. The required sample size that was identified for the research was 152 parents, including both mothers and fathers, however in the six-month data collection period, only 61 parents completed the questionnaire despite the researcher sending out the questionnaire multiple times. One of the parent questionnaires was excluded from the analysis of the results as the parent did not complete all the required demographic information, resulting in a sample size of 60 parents comprised of 53 mothers and 7 fathers.

Six categories emerged out of the analysis on how parents perceive what the sensory integrative approach is. The majority (80%) of the parents had an understanding of what the sensory integrative approach is, however the remaining 20% had no understanding or an incorrect understanding. These results were also analysed using quantitative content analysis where preceptages and freqeucies were calculated to determine whether the findings support those seen in previous research. Parents perceived the approach to be both effective and beneficial to their children, and reported decreases in sensory defensive behaviours, anxiety and aggression, as well as increases in confidence, social skills and concentration. The information gathered in this study will be used to guide future therapy in the remedial school. The findings will also aid in workshop development for parents, as well as to ensure that collaborative goal setting is taking place in the therapy setting.

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NOMENCLATURE/LIST OF ABBREVIATIONS AND SYMBOLS

ADLs: Activities of Daily Living

ASD: Autism Spectrum Disorder

ASI®: Ayres' Sensory Integration

DDDM: Data Driven Decision-Making

SCSIT: Southern California Sensory Integration Tests

SID: Sensory Integrative Dysfunction

SIPT: Sensory Integration and Praxis Tests

OPERATIONAL DEFINITIONS

The key terms used in this research are defined as follows:

Adaptive response: “Appropriate action in which the individual responds successfully to some environmental demand” (1, p.22). It is further explained as the way a child recalls and uses previous successful motor responses to engage in new tasks (2).

Collaboration: “a situation of two or more people working together to create or achieve the same thing” (3).

Defensiveness: an excessive emotional response to a certain sensation (2).

Difficult behaviour: behaviours that are difficult to manage where the child struggles with the ability to self soothe or be soothed by their primary care giver using various techniques (4).

Engagement: “diversion from the stressful situation while providing an opportunity to exercise mastery over an aspect of life” (5, p.305).

Family centred therapy: “a systematic way of creating a partnership with families that (a) treats them with dignity and respect, (b) honours their values and choices, and (c) provides supports that strengthen and enhance their functioning as a family” (6, p.136).

Functional goals: Outcomes set together with family, child and therapist that will increase the child’s engagement in their various occupations (7, 8).

Home routine adherence: the specific routine or sequence of events a child is required to perform, in the home environment, in order to complete their ADLs (8).

Independence: the ability to carry out certain tasks without the need to receive help from someone else (8).

Knowledge: “understanding of or information about a subject that you get by experience or study, either known by one person or by people generally” (9)

Meltdown: “an occasion when a person becomes extremely upset and is not able to deal with a problem or situation” (10)

Motor accuracy: the way groups of muscles work together in order to perform a required action effectively taking into account one's body awareness and how it relates to the environment (5).

Motor planning: the way a child plans, sequences and performs a motor action in response to a stimulus (7).

Occupation: "Daily life activities in which people engage. Occupations occur in context and are influenced by the interplay among client factors, performance skills, and performance patterns. Occupations occur over time; have purpose, meaning, and perceived utility to the client; and can be observed by others or be known only to the person involved" (11, p.6).

Perception: "a belief or opinion, often held by many people and based on how things seem" (12)

Remedial education: "a course consisting in extra-class time offered to low-achieving students in order to improve their performance in one or more subjects" (13, p.73).

Sensory processing: "an umbrella term to describe dysfunction in the sensory integrative process' (5, p.438).

Sensory Integration: "Neurological process that organises sensations from one's body and from the environment and make it possible to use the body effectively in the environment" (14, p.9).

Speech and language abilities: the abilities a child has that allow him/her to engage with or speak to other people in an age appropriate manner (8).

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CHAPTER 1: INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

Parents play an important role in the occupational therapy process as they are actively involved in carrying over the therapy into the home environment (15,16). Occupational therapists involved in treating children value the input that both the family and child have to the therapy process (4). This valuable input is gained by interviewing the family as well as the child and determining what the areas of difficulty are, how these difficulties can be addressed as well as ways to support them through the therapy process (4). An important aspect of family centred therapy is setting realistic functional goals and determining which of the interventions available would best address the areas of concern (4). One of the approaches used by occupational therapists working in the remedial school context in South Africa is the sensory integrative approach. Occupational therapist that use this approach for intervention and work in close contact with the parents. Cohn (17) explained that understanding a parent's knowledge and perception of therapy is vital in understanding how sensory integration intervention has changed the specific child's life and functioning.

The accurate processing and integration of sensory input from the environment has been found to result in the development of academic performance, concentration, socialisation and praxis (1). Difficulties in sensory integration lead to difficulties in the participation of occupations, such as picky eaters who have over responsivity to oral sensory inputs, children who cannot engage with others on the playground as they are unable to plan and adapt their movements, or children who will not allow their parents to wash their hair or cut their nails due to tactile sensitivities. These participation difficulties are frequently addressed by occupational therapists within the home and school using a sensory integrative approach. The sensory integrative approach is used by occupational therapists to assist the individual child's needs to ensure effective participation and engagement with their environment through various occupations (7).

Parents have expressed better success in intervention programmes where they have been actively involved. This was specifically related to interventions were parents either sat in on the therapy or demonstrated prescribed home programmes to the therapist (18). Parents have given enthusiastic accounts of how occupational therapy using the sensory integrative approach improved their child's motor skills, body image, engagement, personal management, play, socialisation and self-image, as well as an improved understanding of their children for themselves (17). Parents have also noticed the following in their children: fine motor skills had definite improvements; increases in balance and coordination resulting in better gross motor skills; an improvement in understanding of the body for climbing on and under playground equipment; and the ability to engage in sports better (15,17,19). Research within the field highlighted that parents perceived that positive changes in one area led to changes in another area of functioning (15). A study conducted in the Western Cape by Geral (20), found that parents within this study described an improved understanding of occupational therapy, an improved understanding of their child's difficulties, as well as increases in social participation, self-worth and the child's potential.

The researcher wanted to investigate whether the parents within a remedial school context had similar views to the parents in both Cohn's (17), and Geral's (20) studies. In order to ensure their involvement within the remedial school context, parents are provided with feedback on their child's progress when they attend meetings with the therapists once a term. At these meetings parents and therapists discuss the child's progress and home programme options and decide on the best interventions available for their children at the school.

1.2 PROBLEM STATEMENT

Parents' involvement in their children's occupational therapy using a sensory integrative approach is seen as a fundamental part of the therapy process, as they play a vital role in the carryover of therapy into the home environment. This is done by home programmes, sensory diets or any other activities of a therapeutic nature based on the child's needs.

These home programmes are necessary to ensure that the goals and aims of therapy are achieved in a timeous manner. Understanding what knowledge, the parents have of the sensory integrative approach will allow for better collaboration between the occupational therapist at the remedial school and the parents. In the remedial school context, parents and therapists meet to discuss therapy goals for the child, available interventions as well as how each can contribute to the child's development. The meetings take place at the beginning of the year as well as at the end of every term. Working together to achieve treatment aims results in a positive parent-therapist collaboration which results in shorter therapy duration and greater benefit for the child. Only once the collaboration is established and both parties commit to the family-centred practice can the child's specific intervention be successful. As the sensory integrative approach is one of the more common occupational therapy treatment practices within remedial schools in South Africa, examining parents' knowledge of this approach can be deemed valuable.

1.3 RESEARCH QUESTION

This leads to the following question: What knowledge do parents of children from a remedial school context in South Africa, have regarding sensory integration as an approach in occupational therapy intervention and what are their perceptions about the influence on the child's function?

1.4 PURPOSE OF THE STUDY

The study therefore aimed to describe parents' knowledge of a sensory integrative approach in occupational therapy within a remedial school environment. The researcher wanted to determine what parents know about the sensory integration approach that their children have either received in the past or are currently receiving at the remedial school. The study will assist the researcher, as well as other occupational therapists working at the remedial school, to ensure that an effective, quality service is provided to the children. This will be done by providing parents various opportunities to expand their current level of knowledge of the approach.

Ensuring parents have the correct information about the sensory integrative approach will assist them in understanding the effect of the sensory integration approach and the therapist to deliver effective family centred therapy.

Any information gathered during data collection that is found to be lacking or inaccurate will assist the researcher and other therapists working at the remedial school to understand what other services should be provided to the parents to expand their knowledge. The services could include, but are not limited to, workshops, parent seminars, research articles and/or blogs.

1.5 AIM OF THE RESEARCH

The aim of the study is to describe parents' knowledge of the sensory integrative approach and their perception of changes to performance due to occupational therapy within a remedial school environment.

1.6 RESEARCH OBJECTIVES

1.6.1 To describe parents' knowledge of the sensory integrative approach within occupational therapy at remedial schools.

1.6.2. To describe parents' perceptions of changes in their children's function due to the use of the sensory integrative approach.

1.6.3. To establish the functional goals that parents attributed to the sensory integrative approach and whether or not these goals were achieved in various occupations.

1.6.4. To establish which resources are used by parents to gain knowledge on sensory integration.

1.7 JUSTIFICATION OF THE STUDY

The researcher works within the remedial school environment with children who have sensory integrative dysfunction. Meetings frequently occur between the parents and

the therapists involved in their therapy to establish the aims and goals of therapy. In order for these therapeutic aims and goals to be implemented at home, the parents need to understand the sensory integrative approach that is used by the occupational therapists at the school, however limited research has been conducted into parents' knowledge of the sensory integrative approach in remedial schools and in the South African context. One study was undertaken in the Western Cape by Geral (20), who identified four concepts during her three phases of intervention. These included before, during and after sensory integration intervention. The parents identified that prior to the intervention, their knowledge of the approach was lacking. During and after the intervention, the parents expressed their ability to find ways to support their children better in the home and greater family context, and the children were found to show improvements in self-worth, self-regulation and social participation. Geral (20) recommended that further studies be conducted to improve parents' knowledge of the sensory integrative approach by improving health professionals' and educators' awareness of sensory integration, improving awareness of parents in the general population, as well as ensuring that occupational therapists deliver a service that is deeply rooted in family-centred life. By conducting this study, the researcher gained knowledge on how parents define the sensory integrative approach, how they perceive the changes it made to their children occupations, what resources might be useful to expand their knowledge as well as how they perceive the sensory integrative approach led to improved functional goals in their children. The knowledge gained from this study will guide occupational therapy service delivery at the school, as the researcher will know what information needs to be provided both in meetings as well as workshops with these parents.

1.8 ORGANISATION OF THE RESEARCH REPORT

The research report is organised into chapters as described below:

Chapter 1: Introduction to the study

In this chapter, the background and purpose of the study were discussed so that readers understand the reasons behind the decision to conduct this research.

The introduction chapter also places the study within the remedial school environment and introduces what literature will be explored as well as how the study will impact the researcher's therapy. The purpose aims and objectives of the study are also explained in this chapter.

Chapter 2: Literature review

In this chapter, the theoretical background, current knowledge base and general overview of parents' knowledge regarding the sensory integrative approach will be discussed and explored. Other research that have been undertaken, along with their findings, will be explained, as will their similarities and differences with this study, which are explored further in later chapters.

Chapter 3: Methodology

In this chapter, the research methodology will be explained. This includes the type and design of the study, the population selected, the sample size used, the procedure undertaken, the data collection and instrument used, the data analysis and the ethical considerations for this study.

Chapter 4: Results of the study

The findings of this study are presented in the fourth chapter, which are grouped according to the three objectives of the study. These include what perceptions the parents have of the sensory integrative approach in terms of their knowledge, what changes can be attributed to this approach, and finally, what resources the parents feel would be beneficial to expand and increase their knowledge.

Chapter 5: Discussion

In this chapter, the results of the study are discussed with respect to the current literature and how the findings of this study can benefit future occupational therapy within a remedial school.

The discussion will be set out according to the three objectives of the study. The findings will also be compared to the original study published by Cohn in 2001 (17), as well as to a more recent South African study done by Geral in 2014 (20).

Chapter 6: Conclusion

In this chapter, the study will be summarised in order to provide conclusions regarding parents' knowledge of the sensory integrative approach. This will allow the researcher to identify if the study has answered the research question. The conclusion will describe both the strengths and limitations of the study, as well as provide possible recommendations for future research studies based on the same topic.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will outline and critically evaluate the literature relating to parents' knowledge of Ayres' Sensory Integration (ASI)® as a treatment approach in occupational therapy. This study was based within the paediatric population of occupational therapy, therefore only parents' knowledge of ASI® in this population was explored. Firstly, the literature review focuses on the underlying theory of sensory integration, the components of sensory integration, as well as what constitutes sensory integration dysfunction (SID). Secondly, the meaning of true sensory integration, as defined by Dr Ayres herself, with the use of the Fidelity measure will be discussed. Thirdly, the researcher will explore what is understood by remedial education and what the components of a remedial education are in order to better understand parents' knowledge within this school environment. Fourthly, the researcher will discuss other studies which have explored parents' perceptions or knowledge of sensory integration both in the South African context and in other countries, and explore parents' knowledge of other occupational interventions, before finally evaluating parents' involvement in goal setting and family-centred therapy. Figure 1 below depicts how the literature were collated and organised for this review.

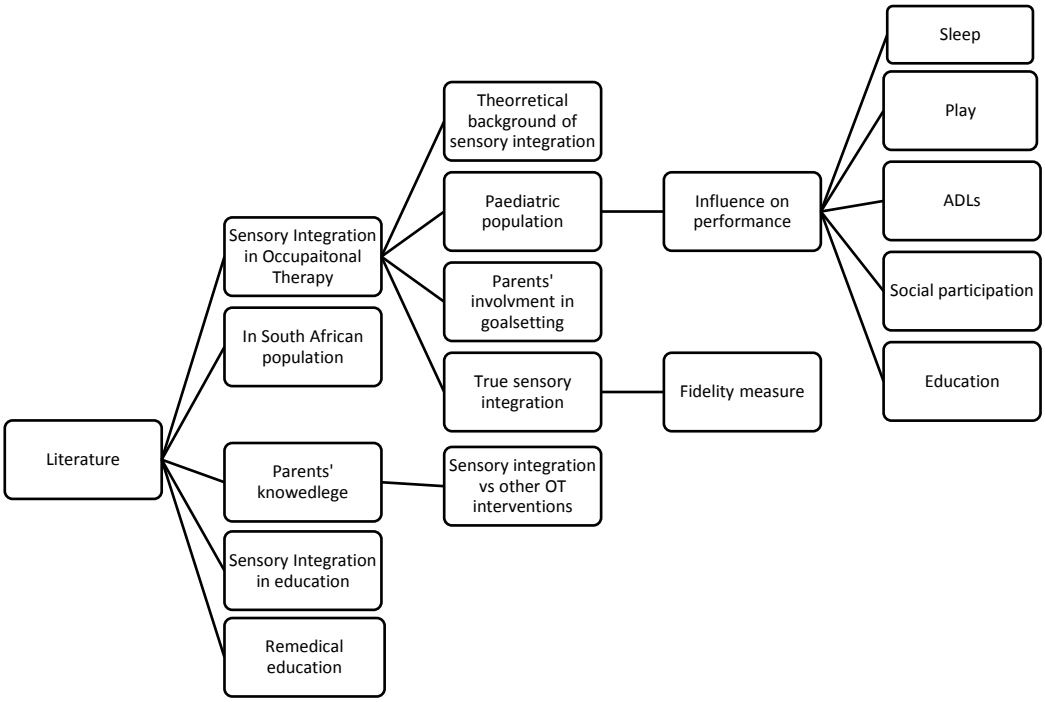


Figure 1: Guideline for literature review

2.2 PURPOSE OF THE LITERATURE REVIEW

The purpose of this literature review was to frame the theoretical underpinnings regarding ASI® for discussion in order for the findings of this study to be presented later. The theoretical information regarding the sensory integrative approach is necessary to understand the approach and to allow the researcher to be able to determine whether parents can define the approach effectively. The literature review will provide a complete picture of the latest and most pertinent research related to ASI® and its effectiveness as an approach in paediatric occupational therapy. The literature will also discuss other studies that have researched parents' knowledge and understanding of ASI®. To date very little research has been undertaken on this topic, however Cohn has performed various studies in the United States and Geral has conducted one in the South African context (4, 15,17, 18, 20, 21). The above studies made use of qualitative research methods to examine parents' knowledge, whereas this study made use of a quantitative research method, which allowed the researcher to make use of statistics to corroborate the data collected with the views and opinions found in the two previous studies on parents' perceptions of the sensory integrative approach. The reason this topic was chosen was to allow the researcher to understand what knowledge the parents at the remedial school have regarding ASI®. This current knowledge base, together with an understanding of what further information may be needed, will be combined in order to enhance parents' knowledge to allow better carryover of therapy, resulting in improved effectiveness.

2.3 SENSORY INTEGRATION IN OCCUPATIONAL THERAPY

2.3.1 Theoretical background of sensory integration

Sensory integration has been used as an approach to treat children with various learning disabilities. The approach is used by occupational therapists as it follows a developmental sequence to assist children with sensory integrative difficulties to participate in their various occupations (22). A systematic review was conducted by Arbesman and Lieberman (23) on the advantages of using sensory integration in school-based occupational therapy, which found that sensory integration therapy was useful in treating children with occupational performance difficulties such as difficulty

with socialising, difficulty engaging in classroom activities, or difficulty communicating with family at home resulting from their poor sensory processing and integration.

Sensory integration theory was first developed by Dr Jean Ayres in the 1970s. Much of Ayres' research was done alongside colleagues who were studying psychology or neurophysiology (24). Ayres began working with adults who had suffered various neurological disorders; her understanding of how the brain developed showed that any part of the brain can improve post injury due to the plasticity of the brain. She went on to explain that changes in the nervous system resulting in improved performance could be applied to all the sensory systems (25). Ayres theorised that sensory integration explains the relationship between sensory inputs and motor outputs by observing how an individual takes in various sensory inputs to allow for adequate participation and engagement within their environments (26). Ayres defined sensory integration as the "neurological process that organises sensations from one's body and from the environment and makes it possible to use the body effectively in the environment" (2, p. 9). Ayres further described sensory integration as the basis for adaptive responses that are required when a person is challenged by the environment around them, resulting in learning, i.e. it describes the relationship that occurs between the body and the environment. The basic constituents of sensory integration theory include four aspects. The first is the ability for sensations to be integrated; the second is the need for adaptive responses to occur alongside self-directed action; the third is the dynamic interaction; and the fourth is how sensory integration occurs in normal development (27).

The nervous system's ability to integrate sensations looks at the person's ability to register and process information regarding a sensory stimulus. This includes the type, quantity and intensity of the stimulus that the environment provides to the person, which results in behaviours that are either adaptive or maladaptive in nature. The adaptive response requires the person to engage in self-directed action, i.e. the person must be motivated to engage in actions that are purposeful. Ayres called this the 'innate drive' to engage with the environment. She explained that this drive provides the nervous system with the opportunity to improve and increase in activity and growth through these adaptive responses.

This self-directed action was further described as the person's active participation in their own ability to interact with their environment; the dynamic interaction is how the person interacts with their environment using their sensory systems (27). Ayres added that "sensory integration sorts, orders and eventually puts all the individual's sensory inputs together into whole brain function" (28). When this happens, improvements in behaviour, adaptive responses and performance in occupations can be observed. Ayres' unique idea and understanding of this dynamic interaction occurred before research was conducted by any other professionals. This approach only began to be used in the 1980s and described how systems may influence each other to affect a person's behaviour, learning and engagement. The final concept explains that sensory integration occurs during normal development when a person engages actively in their environment using the sensory inputs they receive effectively (27).

Sensory integration is based on seven theoretical principles. The first principle explains that sensory integration lays the foundation for learning and behaviour. This means that it considers all the sensory systems but focuses on three - vestibular, tactile and proprioceptive - which are known as the body senses. These three systems provide the necessary information regarding interactions with the environment and develop a 'map' of the body for future reference for planning and executing motor movements. The second principle explains that sensory integration follows a development sequence shaped by our interactions with others and the environment around us (2). This means that the nervous system is assumed to be immature when a baby is born. When the baby interacts adequately and effectively with the world, their brain develops and matures, allowing for more complex interactions to occur (29). The third principle explains that adaptive responses are developed through our successful integration and organisation of sensory inputs. This means that with every interaction a baby has with the environment, it will result in him recognising previous attempts made through the use of motor engrams and with the engram and the feedback he received in the previous attempt to plan and execute a novel motor movement. The fourth principle explains that sensory integration occurs when the person experiences the 'just right challenge' (2). This means that a child learns through successful engagement with the environment, resulting in more complex processes developing for future interactions (29). The fifth principle explains that people have an innate drive to seek, explore and engage in the environment in a purposeful way (2).

This means that children explore their environment through the use of an internal motivational system, resulting in improved self-confidence and feelings about their own potential (26). The sixth principle describes the brain's ability to adapt to changes in the environment through neuroplasticity (2). This means that the brain has the ability to adapt or change as a result of environmental interactions, which with adequate and effective experiences delivered through sensory integration the child is able to increase their brain's volume, density and connectivity. The seventh and final theoretical principle describes sensory integration as the basis for engaging successfully and purposefully in occupations. This means that sensory integration allows the child to make use of the various interactions and processes that occur in the nervous system so that they can meet the demands set by the environment, resulting in successful participation and engagement in their everyday lives (2).

Sensory integration is a two-part process. Both parts - sensory modulation and sensory discrimination - are needed for effective sensory integration to take place. Within the sensory integration literature, the terms have been changed to sensory reactivity and sensory perception (30). The newer terms are used in this review. The first part of sensory integration is sensory reactivity, which is the ability of the brain to respond and adapt to different sensory inputs in an efficient and productive way (26, 27, 31). Sensory reactivity requires a person to register, orientate and attend to a sensory input (26). A person's sensory reactivity is considered adequate when they can maintain their level of arousal in the optimal band to meet the environmental demands placed on them (2) (22). The optimal band of arousal is defined as "the level of neuron excitability needed to remain focused on the task at hand" (27, p. 93).

As occupational therapists dealing with children with sensory integrative difficulties, it is important to be aware of how a child's sensory reactivity can affect occupational performance. According to Bundy and Lane et al (26) and Smith-Roley and Mailloux et al (31), reactivity is dependent on arousal levels, which explains why having high or low arousal levels will affect our ability to attend to sensory inputs. Reactivity occurs at a cellular and behavioural level. At a cellular level, reactivity relies on changes in the sensitivity of the neurons, which occurs through habituation or sensitisation (26,31). Habituation is the way the brain decreases a response to a stimulus that is ongoing or irrelevant, therefore requiring no interpretation at the higher-level centres of the brain (27).

Habituation is required to block out irrelevant information to avoid our systems going into overstimulation. If this process is ineffective, too many stimuli are processed, resulting in sensory overload and possible sensory shut down (32).

The opposite of habituation is sensitisation. Sensitisation occurs when the response elicited, following stimulation, is larger than expected to stimuli that provided a normal response previously (27, 32)**.** This process is necessary for dangerous stimuli as ineffective sensitisation causes everyday non-threatening stimuli to appear as threatening, resulting in defensive and avoidant behaviours (27). A balance is required between these two for effective reactivity to occur. Difficulties in sensory reactivity are reflected by a mismatch between the child's performance or behaviour and the demands set, on the child, by the environment (2). These difficulties are described as over responsive, under responsive, or a fluctuating response. Dunn (33) proposed a model explaining how the behavioural responses observed are linked to the neurological thresholds we have. Over-responsiveness occurs when a child responds in a stronger, more negative way to a certain stimulus (26,33). In Dunn's (33) model, this child presents with a low neurological threshold. This means they need less sensory stimulation to achieve their optimal arousal level. If the stimulation is above the required amount, the child reacts negatively, and this is displayed in their behavioural choices such as avoiding a task (covering the ears to decrease sound of a teacher's voice) or withdrawing from a task (running outside the classroom) (26).

Under-responsiveness occurs when a child does not react at all or at the expected level (26). In Dunn's (33) model, this child presents with a high neurological threshold, meaning they need more stimulation to achieve their optimal arousal level. If the required amount of sensory input is less than the expected amount, the child appears tired, lethargic (day dreams) or even seeks out the input themselves (running around the classroom) to achieve their 'just right' level of arousal. A fluctuating response refers to a child who reacts to sensory stimuli differently depending on the time of day or environment they are in (26).

The second part of sensory integration is that of sensory perception, which is the ability to distinguish and discriminate between the different qualities of objects both spatially and temporally (2,30). Sensory perception allows a person to develop concepts and perceptions about an experience they have had in order to develop skills in occupations, behaviour and learning.

This process occurs when a person takes in the sensory qualities of an experience, integrates them with previous experiences and memories, and comes up with different views on the sensory event (2). Sensory perception is best seen in a child's perceptual skills, postural ocular control, motor planning, and their ability to adapt a motor engram in relation to the environmental demands. Children with dysfunctions in sensory perception have difficulties when engaging in their occupations. Ayres explained that planning and executing movements effectively is dependent on sensory information received from the body-related systems which develop our body scheme. Body scheme is defined as "an unconscious mechanism underlying spatial motor coordination that provides the central nervous system with information about the relationship of the body and its parts to environmental space" (26, p. 477). When this 'internal map' provides us with inaccurate information, our ability to plan and execute motor movements is impaired. This affects our ability to engage in our occupations, for example if our vestibular perception is impaired, we will not be able to maintain a sitting posture at a table due to inadequate muscle tone, affecting our ability to attend to a lesson in class or complete an assignment at work (2).

Ayres began developing various assessments during the 1960s and 1970s that could be used to determine sensory integrative difficulties in children. She developed her first test, the Ayres Space Test, in 1962, followed by the South California Kinesthesia and Tactile Perception Test in 1966, and finally published her first assessment as the Southern California Sensory Integration Tests (SCSIT) in 1979. The SCSIT was later updated as the Sensory Integration and Praxis Tests in 1989 (SIPT), which has become the 'gold standard' for the assessment of sensory integrative dysfunctions and difficulties (2,24,27). Through her factor analyses on her assessments, Ayres identified six patterns of dysfunction which involved various sensory systems (34). Over the years, much research has been done to validate these patterns of dysfunction, which have been found to include somatodyspraxia, visuodyspraxia, vestibular bilateral integration and sequencing deficits (VBIS), as well as sensory over and under responsiveness (35,36). A more recent study examined the patterns of dysfunction in the South African context and found that there were consistencies in the patterns seen between the American and South African populations (37).

Ayres (1) explained that the difficulties with taking in sensory information from the environment and the body can lead to problems in motor output, behaviour and learning (2,14,22,26). Children with sensory integrative dysfunction may have difficulties in any part of the sensory integration process (38). Seeing as sensory integration follows a developmental sequence, any difficulty in the process affects the parts that proceed the difficulty in the hierarchical sequence (2). These difficulties can also affect the child as a whole (1,38). Sensory integration has its roots deep in human development, allowing occupational therapists to address a child's sensory problems that underlie their functional difficulties. Understanding this allows occupational therapists to use this approach within a paediatric population to influence the child's difficulties in their occupational performance areas.

2.3.2 The use of sensory integration in a paediatric population and its influence on performance

May-Benson (39) explained that 90% of occupational therapists working in the school system within the United States make use of the sensory integrative approach. In a more recent study by Roach (40) on what the most utilised school-based sensory interventions are, the author explained that 73.68% of occupational therapists working in the school system in the United States use ASI® as their intervention of choice (40). In South Africa, occupational therapists attend training and certification in sensory integration through the South African Institute for Sensory Integration (SAISI). With an increase in the popularity of ASI®, it will be helpful to understand parents' knowledge of it as their child will be exposed to it during therapy.

As discussed above, sensory integration is the basis for engaging successfully and purposefully in occupations. This means that there is a dynamic process that occurs between sensory integration and occupational performance. Ayres explained that effective and efficient sensory integration is required for us, as individuals, to engage and function within our everyday environments (2). Studies have been performed to determine whether difficulty or dysfunction in sensory integration affects the individual performance in a certain area of occupation (41-44-, 46-48). These studies will be described below regarding the specific performance areas affected.

According to the OT practice framework 3rd edition (11), a person engages in several various occupations during their lifetime. These are described as ADLs, instrumental ADLs, rest and sleep, education, work, play, leisure and social participation.

Good sleep is necessary for all individuals. Studies have been carried out that estimate that 30% of children have poor sleep health, which has been linked to poor functioning at school, poor emotional regulation and a poor ability to memorise and attend during activities (41,42). A study conducted by Foitzik and Brown (42) on the effect of sensory integration on sleep, found positive correlations between a child's poor sensory integration and their sleep habits and patterns. They explained that children with sensory modulation difficulties, specifically tactile and oral sensitivities, presented with a higher need for daytime naps. Vestibular sensitivity was found to correlate with waking up at night and sleep anxiety was found in children with visual and auditory sensitivities. The study also identified that the children who were over responsive had a poorer ability to socialise with others. They concluded that more research is necessary to validate their findings, however it is important for occupational therapists to consider the effects that poor sensory integration may have on a child's ability to sleep (42).

Play is described by the American Occupational Therapy Association (AOTA) as a child's primary area of occupation (43,44). It is defined as "any spontaneous or organised activity that provides enjoyment, entertainment, amusement or diversion" (45, p.448). Play occurs in the child's everyday environment and is affected by internal and external factors such as motivation, resources, the physical play area and the child's ability (44). A systematic review carried out by Watts, Stagnitti and Brown (44) on the relationship between play and sensory integration found that children with difficulties in sensory integration had poorer play levels compared to their typically developing peers. They further found that these children's play was less imaginative and spontaneous, and that the children had limited involvement in play compared to typically developing children. Another finding was that children with oral and tactile sensitivities displayed poorer functional play or poorer variety in their play skills. They expanded on this by explaining that the type of play children engage in is determined by their preferences in sensory inputs, for example, children who were found to need more sensory input engaged with objects in their play that provided it, such as building blocks or creative arts. The final finding was that parents' sensory preferences influence the type of play they engage their children in.

They concluded that even though more research is needed in the area, occupational therapists need to be aware of how sensory integration can affect a child's occupation of play (44).

Another study was carried out by Roberts, Stagnitti and Brown et al (43) on the relationship between sensory integration and pretend play in the five to seven-year-old population, which found a positive correlation between the scores on body awareness, balance and social skills on the sensory processing measure, and a child's ability to engage in dramatic play. They concluded that play requires the child to adapt their bodies, balance in different positions, engage and touch objects, and interact with other children and adults. Occupational therapists thus need to be aware of how these factors in sensory interaction affect the child's ability to play (43).

Activities of daily living (ADLs) or self-care activities are necessary for developing children. Studies undertaken by Zobel-Lachiusa, Andrianopoulos Mailloux Z, et al (46) and Bellefeuille, Schaaf and Polo (47) on children with autism found that these children have difficulty with self-care tasks because of the sensory difficulties they experience. Zobel-Lachiusa, Andrianopoulos Mailloux Z, et al's (46) research on typically developing children and children with autism found that the children with autism had sensory difficulties and differences in behaviour during meals when measured by three different measures. They also found that the children with autism displayed changes in mealtime behaviours following interventions using the sensory integrative approach (47). Bellefeuille, Schaaf and Polo's (47) study on a child with toileting difficulties found that sensory over responsiveness contributed to the child's difficulty with defecation. The child was found to have sensitivities to tactile, auditory and oral input. After a seven-month period of sensory integration intervention, along with a sensory diet for home, a toileting routine and environmental modification at school, the child was found to have decreased sensory sensitivity and improved toileting both at home and school (47). Both studies indicate how a child's sensory integration may affect their ADLs, thus occupational therapists working with children need to be aware of how sensory integration may influence the child's ADLs.

Social participation was defined in the third edition of the Occupational Therapy Practice Framework (11) as "the interweaving of occupations to support desired engagement in community and family activities as well as those involving peers and friends.

Social participation can occur in person or through remote technologies such as telephone calls, computer interaction, and video conferencing" (11, p.21). Participating in these social activities allows children to develop the necessary skills needed to understand social rules, learn turn taking and help others, and also assists with developing skills for resolving conflict (48).

A study conducted by Cosbey, Johnston and Dunn (48) on sensory integration difficulties and social participation in typically developing children and children with sensory integration difficulties found that both groups displayed the same response in social situations. These responses looked at the children's type of social activities, with whom they engaged, the intensity of participation, the enjoyment derived, and the environment in which the activities were carried out in. The researchers found that the children with sensory integration difficulties struggled to socialise with people outside of their own families. Differences in the intensity of their participation was also found. Occupational therapists working with children who have sensory difficulties need to consider the effect the difficulty may have on their social participation (48). Another study (31) on the patterns of sensory integration dysfunctions in children with autism looked at whether the patterns affected social participation. The researchers found that children with difficulties in imitation praxis, VBIS, somatosensory perception and responsiveness to sensory input had difficulties with social participation. Another score that was found to correlate with difficulties in social participation was praxis on verbal command, however this had a very mild correlation. The researchers commented that this finding was surprising because as children with autism struggle with socialisation, one would expect their language skills to have a more significant correlation (31).

The Occupational Therapy Practice Framework (11) defined education as "activities needed for learning and participating in the educational environment" (11, p.20), which includes both formal and informal educational activities. A study undertaken by Bonggat and Hall (49) on the effects of sensory integration as described by a teacher recruited three children, two with developmental difficulties and one on the autism spectrum. The study found that the intervention had no added benefit to the children's ability to stay in the classroom, however they also concluded that if they had measured the children at the beginning of the school year and not only in the second part of the year, the results may have been different.

A study by Chien, Rodgers and Copley et el (50) investigated if different sensory dysfunctions or difficulties, as identified by the Sensory Profile, would have a higher correlation with children's difficulties in occupational performance areas.

They found that children whose profiles fell in the definite or probable ranges for sensory processing difficulties had poorer engagement and less satisfaction in their occupational performance areas. Even though they examined all areas of occupational performance, their finding regarding the educational areas was interesting, i.e. children who had higher neurological thresholds for sensory input as well as sensitivities to auditory and visual sensory inputs had difficulties in performance and satisfaction in the educational area (50). Another study (51) on the effects of different treatment options for children with mid cognitive delays found that sensory integration therapy resulted in greater increases in fine motor skills and sensory integrative functions (51).

The above studies indicate that when occupational therapists work with children with various sensory difficulties, they must not assume what other strengths or challenges the child may have without completing a full comprehensive assessment that looks at the performance within the occupational performance areas.

2.3.3 Sensory integration intervention and goal setting

Researchers have considered goals within occupational therapy to be family- and child-centred (17,26). Studies have been completed where parents explained that occupational therapy using a sensory integrative approach improved the quality of their family lives, with specific gains including trying new play activities, improved socialisation and enhanced emotional expression (17,19). A study by Cohn (17) on parents' perspectives of occupational therapy using a sensory integrative approach found that the parents had a shift in their understanding of their children's sensory behaviours, resulting in more realistic goals or outcomes for therapy being set. When parents understand what the approach being used in therapy with their child is and what it entails, they are more likely to buy into the therapy process. This process starts at the assessment, goal setting and intervention planning as well as the carryover of therapy in the home environment.

Parents play an integral part in their children's education; the more involved the parent, the more beneficial the educational process is for the child. Occupational therapists use family centred intervention and therefor value the involvement of parents and families when working with a child in therapy. Traditionally, this involvement took more of a child focused approach and the family were just passive beings, but this has changed to include the family as equal stakeholders in their child's treatment (52). Parents feel that if a collaboration between the school and the home environment exists, their children will achieve more academically and have better attitudes and behaviour towards school, which will lead to a better education for children with disabilities (53,54). Another study found that parents' perceptions of family-centred therapy decreased due to poor awareness, poor planning and the limited inclusion of parents on the therapy programme, leading to poorer outcomes as well as a poor exchange of information with parents (17).

Research by Hanna and Rodger (52) that investigated the collaboration that occurs between the parent and the therapist found many challenges and benefits, however the researchers explained that even though occupational therapists value parents' input into goal setting, they do not involve the parent thereafter in the actual intervention. By gaining a better understanding of the parents' knowledge of sensory integration, therapists will be able to ensure that their therapy is carried over into the home environment. This carry over requires occupational therapists, in consultation with parents, to set goals that are family-centred and affect the family's function and routine. Within this focus, the occupational therapist brings developmental knowledge and the family bring their knowledge of their specific child as well as their strengths, expectations and needs as a family. Parents offer a unique understanding of their own parenting style, level of involvement in the therapy process, emotionality, flexibility, and structure of the family unit. Understanding these specific unique qualities is critical if the occupational therapist reports to be using a family-centred approach in her intervention. If a therapist understands the challenges that a family has at home, they can include strategies to decrease the difficulties in the home environment by involving all the different members of the family. The researchers found that even though challenges may arise, the parent plays an important part in the intervention with their children and should thus be consulted at all phases of the therapy process (52,55).

Research done by Miller-Kuhaneck and Watling (55), found that parents of children with sensory integrative difficulties wanted to know more about their children's behaviours and various ways that they could help at home. The specific knowledge that parents mentioned in the study related to four areas. Firstly, a description of the difficulty their children had, secondly what options were available to improve their child's functioning in their occupations, thirdly how parents could improve upon their child's area of strengths and finally how parents could ensure their own health was maintained during the process of intervention (55). These findings highlighted the need for using a family-centred approach with the sensory integrative intervention.

Family-centred therapy has been defined as the facilities given to families of children with special needs. As an occupational therapist working with these children, it is important to understand that each family brings their own individualised life story which places them at the centre of their child's unique characteristics and performances (17). Even though occupational therapists have always valued the need for family involvement in intervention, the research shows that parents are not always included in the actual therapy process. The most important way of including the parents has been found to involve them in the planning and evaluation of the intervention provided. The reason for this is that by listening to the concerns of the family or parent, the occupational therapist makes the intervention more of a shared decision-making process. The occupational therapist thereby addresses, supports and values the families' expectations and goals for therapy. This allows the process to be more meaningful and will assist with carryover into the home environment, as the family feels their goals are also being addressed. Parents often request that occupational therapists determine what sensori-motor components are affecting participation and that the identified difficulties be targeted in therapy (2,22,52,56).

Many of the ways occupational therapists or other therapists make use of a family-centred approach is through the use of an individualised education plan (IEP), which takes the views of both the occupational therapist and the parent into consideration, allowing for unique educational goals to be developed for the specific child (52).

The ability to include parents in therapy and ensure they feel valued and part of their children's intervention can be done using outcome measures and data driven decision making.

The data driven decision making (DDDM) process in sensory integration is defined as a “framework for using data to guide professional reasoning and decision making when using ASI® theory for assessment and intervention” (57, p.2). The information the occupational therapist gathers through using all forms of assessment, including interviews, assessments and observations, is used to gain an understanding of how the sensori-motor components affect and contribute to difficulties in occupational performance.

Eight steps are included in the process, namely identifying the strengths and weaknesses a child has in regard to their engagement in occupational performance areas, performing a complete assessment, generating a hypothesis of what the problem is, developing and setting goals, identifying outcomes measures, planning the intervention, conducting the treatment, and finally measuring the outcomes to determine the effectiveness of the therapy performed (7).

A study by Faller, Hunt, van Hooydonk et al (58) made use of the DDDM process using sensory integration with a child with autism. The researcher identified difficulties in the child’s engagement in areas of socialisation, play, sleep and dressing. The therapist performed a full assessment on all the child’s sensori-motor components using the Sensory Profile, SIPT and the Pediatric Evaluation of Disabilities (PEDI). After this a hypothesis was generated that supported the notion that the child’s sensori-motor difficulties were affecting his participation. Goals were then developed between the therapist and the child’s mother regarding each of the affected areas of performance. Outcome measures were developed using the Goal Attainment Scale (GAS) and changes in test scores. The sensory integration treatment was planned to use the manualised protocol for three days a week for 10 weeks. The treatment was conducted for the specified amount of time and finally the outcomes were measured. The child showed improvements in the goals set and had changes in their test scores (58).

Parents play an important role in the collaborative team that assists with placing and evaluating children in the education system (54). Within the South African system, parents are seen to play a vital role in ensuring their children’s education is more inclusive. This collaborative approach allows the parents to assist with goal development and planning regarding service delivery. Parents of children in South African schools, expressed their need to be involved and argued that schools that adopt an open-door policy have their and their children’s best interests at heart (54).

Yssel, Engelbrecht and Oswald et al.'s (54) study on parents' perceptions of inclusive education compared the United States to South Africa and found that the stronger the parent–school partnership, the more successful the inclusive education is. This can be done through parent-professional empowerment strategies, which highlight the importance of mutual trust and respect between the parties. They further explained the need for ongoing parent-professional collaboration in order to improve the success of inclusive education (54). Parents in both the United States and South Africa emphasise the need for the children to be in inclusive education, which will be discussed later in this review.

The above studies all speak to the need for family-centred therapy, as well as the inclusion of parents within the goal setting process. Making use of ways to measure identified goals ensures that occupational therapists carry out treatment that is effective, efficient and relevant to the families who come for services (57).

2.3.4 Measurement of the effectiveness of sensory integration intervention

The need to understand sensory integration and the effect it has on all areas of performance has remained a topic of research for many years. In fact, sensory integration has grown to become one of the most researched and utilised frames of reference (59, 60). However, although sensory integration is one of the most researched intervention approaches, the evidence on its efficacy remains poor. This is because there is confusion regarding the terminology used by occupational therapists, poor methodology described in each study, as well as few guidelines as to how the therapists carried out their interventions, resulting in a limited ability to replicate previous studies. Ayres' original work is based on her years of research into sensory integration theory, developing materials and tests to assess difficulties in children, generating various hypotheses, and either accepting or rejecting them based on her results for use in practice with children (22,61). As a result, sensory integration based on Ayres' original workings and principles was renamed Ayres' Sensory Integration (ASI®), allowing it to be differentiated from other sensory-based interventions (61-63), thereby protecting the work that Ayres published so that its effectiveness in occupational therapy can be easily identified (22).

Other interventions that have been termed ‘sensory integration’ but do not follow the guidelines set out by Ayres herself include sitting on a ball chair in class through consultation with a teacher, applying passive stimulation to the child through a brushing programme, vestibular-based protocols, or changing the environment the child engages in through adaptations of lighting, sounds or classroom materials, such as heavier pencils (61,64).

To be termed ASI® and to improve the evidence on sensory integration intervention, the sensory integration intervention must meet certain measures according to a fidelity measure, as well as follow the guidelines set out in a step-by-step instruction format. These guidelines allow the researcher or occupational therapist to be sure they are using ‘true’ ASI® and not just a sensory-based intervention. A fidelity regarding a treatment approach is necessary to ensure that the treatment delivers the best possible outcome for a client based on the latest research on the selected intervention (61, 63). Fidelity in this context is described as the way a treatment adheres to the specific guidelines set out to ensure efficient delivery of the approach based on the framework theory (63). The researcher then needs to describe all the aspects of the intervention, including the theory behind the intervention, the therapeutic principles, and what steps other professionals need to follow to provide the intervention correctly. The fidelity measure assists future researchers to carry out the same research to find the same result, thereby improving the evidence for efficacy in sensory integration (59). The poor replicable research may cause novice level occupational therapists to not be able to critically evaluate the research before carrying out an intervention, resulting in poor and unreliable evidence-based practice (39, 61). Studies by Vargas and Camilli (65), Baranek (66) and Polatajko, Kaplan and Wilson (67) were conducted on the efficacy of sensory integration with children, however these studies neglected to look at the principles set out to determine the ‘true sensory integration’ based on Ayres’ original work (39,61,65-67).

2.4 PARENTS’ KNOWLEDGE OF SENSORY INTEGRATION COMPARED TO OTHER INTERVENTIONS

Studies performed by researchers such as Vasak, Williamson and Garden et al. (41), Foitzik and Brown (42) and Roberts, Stagnitti and Brown (43) have been conducted to measure the effect that ASI® has on children with regard to their occupational

performance areas, however very few have examined the knowledge of this approach amongst parents whose children receive it in therapy (4,17,68). As previously discussed, parents play an integral part in their children's education; the more involved the parent, the more beneficial the overall educational process for the child will be.

Cohn (17) looked into parents' perceptions of occupational therapy using a sensory integrative approach and found that parents feel that sensory integration benefits fall into three categories: "abilities, activities and reconstruction of self-worth" (17, p.291).

To date, only one study has been conducted on parents' perceptions of sensory integration in occupational therapy within the South African context (20). In this research, the researcher found that the parents perceived three phases - before, during and after intervention - each of which had their own barriers and facilitators. She further explained that the parents had limited knowledge as to what sensory integration was and how it affected their children across various contexts and areas of difficulty. Geral (20) further found that the parents' perceptions highlighted four specific themes, i.e. a lack of understanding, newfound understanding, changes within the child, and intervention facilitators, concluding that there is a lack of understanding of sensory integration within occupational therapy as a whole. Finally, she discussed the need to work together with the family to achieve therapy goals (20). Yet despite the limited research, more and more therapists are training in sensory integration. This growth in the number of occupational therapists using the sensory integrative approach thus demonstrates the value of this approach, even if its effectiveness has not been completely documented thus far.

Reynolds, Glennon and Ausderau et al. (69) undertook a study which aimed to develop a structural framework that described all the possible occupational therapy interventions that are used when working with children with sensory integration difficulties. The study described three types of intervention based on environmental modifications or supports; parent-focused interventions including teacher-facilitated intervention, and child-directed, therapist-facilitated interventions. The environmental interventions included those where therapists focused on changes either to the classroom or home physical environment by either adapting the seating or providing passive sensory inputs to the child in the form of a fidget or weighted blanket. The researchers explained that many of the studies they examined did not have enough evidence to support their use, therefore further research was required in these areas.

The parent-focused interventions included interventions that assisted children with their difficulties in school-related tasks using mediation and coaching. These interventions were found to have a positive influence on the children's play area or social participation, as well as on their communication with others and their ability to share their attention with other people (69).

Other changes found with these interventions were decreased stress in caregivers, increased feelings of competence within the mothers, enhanced family relations and improved efficacy in the ability to parent. The last type of intervention the study looked at was child-directed, therapist-facilitated interventions, which included ASI® as well as therapist-directed manualised interventions. ASI® research continues to grow, which looks at the efficacy of the intervention when treating children with sensory integrative dysfunction. Therapist-directed intervention includes therapies such as Therapeutic Listening or other auditory-related therapy, Astronaut Training and other vestibular-related interventions, or any other sensory-based therapy where the therapist provides directed sensory input to the child. This is as opposed to child-directed therapy such as ASI®, where the child is in control of the sensory inputs they require (69).

2.5 SENSORY INTEGRATION IN THE EDUCATIONAL SETTING

Ayres started her research on sensory integration by arguing that motor pattern stimulation would result in reinforcing the need for learning (70). She hypothesised that body scheme in children would become an important base for academics and performance of motor skills. She furthered her hypothesis by stating that sensory inputs from the body senses relayed information that is essential for the development of the academic skills of reading and writing (22). Since the development of her theory 48 years ago, many researchers have explored the efficacy of sensory integration within the field of occupational therapy (39). Dr Ayres' initial research on sensory integration indicated that occupational therapists using the sensory integrative approach in a specialised education system could lead to increased scores in academics, with some subsequent studies validating this theory and others finding inconclusive evidence (65, 71).

A systematic review by May-Benson and Koomar (39) on studies conducted on the effectiveness of sensory integration with children found 27 studies that researched this topic. In regard to behavioural outcomes and improvements at school, the researchers found that interventions which made use of the sensory integrative approach resulted in improved concentration and participation in four different studies when compared to other occupational therapy interventions.

In regard to educational outcomes, the researchers found that six studies described improvements in academic skills, specifically reading, however all of them recommended further research into these improvements (40). A further systematic review was done by Watling and Hauer (61) on the effectiveness of ASI® and sensory-based interventions with children on the autism spectrum. They found 22 studies, however only 8 scored as reliable as many of the other studies lacked specific details regarding the methodology and intervention used, resulting in poor reproducibility. The studies that used ASI® found positive results in terms of individualised goals as measured by the GAS system, as well as reduced autistic features, whereas the sensory-based interventions did not find any specific effects with the use of weighted vests or sound therapy (61). A study done on three boys with developmental delays and/or autism to determine what the effects of ASI® would be on the children's educational performance found that the children had no visible difference in terms of their ability to attend in class and no visible improvement in their ability to initiate their school day, however their ability to attend in one-on-one sessions did improve (49). The above study's results were, however, evaluated by the teacher in the class, which could have affected the children's ability to determine changes in the behaviours or performances of the children.

2.6 REMEDIAL SCHOOL SETTING

2.6.1 Legislation

To best understand what a remedial school is, it is important to understand how the school system in South Africa was developed. Originally schools were developed according to the medical model, meaning that the child's diagnosis and treatment determined how the child could and should learn (72).

When using this idea, the child becomes separated from their diagnosis as the professional seeks to find how to change or 'fix' what is wrong with the child. This view requires a comprehensive work-up of the child's abilities, as well as the strengths and weaknesses that he possesses, so that the child can be placed into a specific category such as learning difficulty, attention deficit disorder, autistic spectrum disorders or cerebral palsy. This places a child into a specific school or educational system according to their disability (72). Remedial education adheres to the medical view of the child where treatment and diagnosis are the focus.

Remedial education is viewed as a school where the child's needs and difficulties are at the forefront of their learning. Remedial education can be seen as the need to change and correct the child's difficulties; it measures change and progress through test specific quantitative assessments in order to determine the child's score against a set of norms. This view of education is now seeing a shift, however, where the focus is moving to the integration rather than the separation of the child (72).

In the early years of the South African democracy, the government established various education committees to review and report on the education system in South Africa, which found five main concepts. Firstly, specialised education was limited to small numbers of learners within a special class or school system. Secondly, where specialised education existed, it was reserved for those seen as previously superior with the greatest availability to resources in the form of teachers, schools or education materials. Thirdly, those learners who required specialised education had either been moved back into mainstream education or had 'dropped out' of education all together. Fourthly, the educational syllabus which was in place could not be adapted to meet the various needs of the learners in the educational system, which resulted in further learners dropping out of school, being removed or failing grades continuously. Lastly, they found that certain levels of education had been favoured over others (73).

Considering these findings, the South African government identified the importance of creating an inclusive education system as opposed to the exclusive medical system that was prevalent during the apartheid years, which separated learners base on race and disability. In 2001, the White Paper 6 policy on inclusive education in South Africa was developed. This policy defines inclusive education as "acknowledging that all children and youth can learn and that all children and youth need support... maximising the participation of all learners in the culture and the curriculum of educational

institutions and uncovering and minimising barriers to learning" (73, p.6-7). According to the White Paper, inclusive education understands that all children have the ability to learn, however for effective learning and support to take place, the learners require certain resources, skills and supports to be put into place. These include, but are not limited to, educators with adequate training who can assist learners to achieve their potential at school. These educators also need to understand that learning is diverse between learners when it comes to age, gender, race, language, difficulties, illness and socio-economic class, and that these differences need to be accommodated and celebrated in the classroom environment. The educators need to further understand that learning occurs outside the school context as well. Modifying the curriculum, environment or the ways learners are taught will ensure that they can all access the required knowledge effectively, leading to their increased engagement in the school system by limiting the effect that any barriers to learning may have on them (73).

The aim of White Paper 6 was to promote an inclusive educational view, whereby inclusion is seen to incorporate concepts such as ensuring that all children receive an education that is fair and valuable and accommodates all of their varying needs to ensure they become equal members of society. Inclusion is developed in the belief that all types of diversity are important; it speaks toward a feeling of belonging rather than the feeling of segregation of people with disabilities (72).

2.6.2 Remedial schools and special needs education

Remedial education is defined as an educational system where the focus is on "improving students' cognitive outcomes by extending instruction time, coaching literacy and numeracy skills, and revising material in small classes" (74, p.127). According to the White Paper 6 of 2001, a special needs school is defined as a school that is comprised of staff with specialised training and skills who can assist learners with difficulties to learn. These learners are defined as having various difficulties, however the White Paper describes visual impairments in particular and explains that special needs schools need to have resources such as Braille for their leaners to use (73).

Remedial schools and special needs education are therefore seen as being part of the medical model, which favours the view of the exclusion of learners with barriers to learning. Within these specialised environments these learners are placed in schools that focus specifically on the disability or diagnosis the learner has, rather than on ways to include them into the mainstream education. Within the new inclusive education system, special needs schools will be restructured as resource centres, meaning they will provide specialised support and assistance to include children with barriers into inclusive education successfully. These centres will make up support teams at a district level, which will be expected to assess and support learners with placement into an inclusive education system with the necessary modifications to allow for successful integration.

2.7 PROFESSIONALS PROVIDING SERVICES IN A REMEDIAL SCHOOL SETTING

According to the White Paper 6 of 2001, professionals who provide services in the 'inclusive' education system are therapists, psychologists, remedial educators and health professionals (73). The new school legislation moves from a more individual child-focused intervention to teacher support and integration of the child with difficulties into the 'inclusive' educational system. The professionals, who prior to the White Paper 6 were focused on assisting children on their case load with speech problems, feeding problems and hearing difficulties, will have to shift their focus to more of a 'hands off' therapy approach, where the teacher is empowered to carry out strategies to assist these children in the classroom environment in order to achieve to their maximum potential (75). So, 18 years later, how has education changed to include this idealistic inclusive education view?

An article written by Martinez (76) described the failure of the South African educational system to include children with disabilities. The researcher explained that her key findings for the failure was discrimination against access, a lack of reasonable accommodations, high fee and expense costs, neglect and violence towards students, a lack of trained teachers and staff resulting in poor educational quality, and a lack of skill-based training for future life. Discrimination against access is explained as schools deciding whether they will accept a certain child based on the disability or difficulty that the child presents with.

The children who were found to have the highest level of discrimination were children with ASD, intellectual disabilities, more than one disability, or foetal alcohol syndrome. A lack of reasonable accommodations are explained as children not having the same opportunities in subject choice due to the various difficulties they experience. High fees and expenses require parents of children with disabilities to pay for additional items such as transport, nappies, special food or hostel costs. Neglect and violence are higher in special need environments. Poor teaching and education quality are caused by the limited knowledge and skills of teachers when it comes to special needs education and the diversity of students. Finally, a lack of life skills-based education results in students not progressing onto higher education, vocational training or work (76).

Unfortunately, according to Martinez's (76) study, the White Paper policy of 2001, which was intended to promote inclusive education, is not being implemented to its original objectives, thus a lack of inclusive education remains an issue in the South African context. Even though special need schools or 'inclusive' education has higher support from the professionals who work in these situations, many difficulties and challenges limit the amount of services that can be provided to the children who need them most. A study by Engelbrecht, Savolainen, Nel, Koskela and Okkolin, (77) compared the abilities of Finland and South Africa to implement inclusive education into the classroom setting. They interviewed the educators in the schools and found that even though the educational system has increased the number of admissions of learners into inclusive schools, the limited access to human and material resources and cost implications affected the ability to teach learners with various disabilities within these inclusive classrooms. The learners with disabilities were also found to be in separate classrooms and not in the mainstream classes, resulting in their exclusion.

2.8 CONCLUSION

The above literature review highlighted the improvements that researchers in the field of occupational therapy have made in identifying the critical factors required to produce reliable, valid research. The need for a specific understanding of what Ayres' Sensory Integration includes and how this can be evaluated using the Fidelity Measure was explained to ensure that occupational therapists are using the truest form of this approach in their service delivery.

The literature available regarding parents' knowledge of the sensory integrative approach, as well as other occupational therapy interventions, assisted with the development of the instrument for this study to better understand what parents know about this treatment approach and what still needs to be explained and made clearer to them. The literature regarding parents' involvement in therapy highlights the parents need to know more about what sensory integrative difficulties their children are facing. This study adds to the value of understanding what the current knowledge is that parents have of the sensory integrative approach and what knowledge is missing, incorrect or misunderstood. It also adds to the value of understanding what parents' perceptions are of the outcome of sensory integrative intervention.

This will assist occupational therapists to understand what knowledge needs to be imparted as part of the goal setting process, as well as why family-centred therapy is the most beneficial way to achieve the goals set for each specific child in our care.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

The research design that was selected for this study was considered best suited to the research question. Current literature, other research study findings, as well as the researcher's work within the remedial school environment informed all the decisions made regarding this research study. As the sensory integrative approach forms a large part of how the occupational therapy intervention is provided at the remedial school under study, understanding what knowledge the parents have of the approach was deemed a valuable question.

As discussed in the introductory chapter, the parents at the remedial school attend termly meetings with the therapists to receive feedback on what progress has been made in therapy. In these meetings alternative options for interventions are also discussed if required. These may include using different approaches to target certain skills or adapting the outcomes and goals of therapy for the child. The aim of this study was to describe parents' knowledge of the sensory integrative approach within occupational therapy within a remedial school environment. The aim was broken down into three separate objectives to allow for easier data analysis. The first objective was to find out what perceptions the parents have of the sensory integrative approach, which was measured by asking the parents to define the concept of sensory integration. These definitions were then categorised according to similar responses. The second objective was for the parents to describe what changes they perceived had occurred in their children's functioning due to the sensory integrative approach. This objective was measured by asking the parents to rate the changes on a Likert scale. The responses for each observed change were then totalled and plotted in tables or graphs for ease of interpretation. The third and final objective was to establish what resources the parents use to expand their knowledge on the sensory integrative approach, what resources they felt they could benefit from in the future, as well as what further knowledge they required. This was measured by asking the parents to choose one or more of the options provided. These responses were then totalled and tabled for ease of analysis.

In the paragraphs that follow, the research study will be explained with regards to the:

- type of research design used;
- population and sample selection and size;
- data collection procedure;
- data collection instruments;
- data analysis; and
- ethical considerations.

3.2 TYPE OF RESEARCH DESIGN

The researcher made use of a quantitative method using a descriptive design that included the use of questionnaires. Quantitative research makes use of both experimental and non-experimental methods to test and develop hypotheses, in order to develop new theories and models that explain the relationship between two or more variables (78). The quantitative design was chosen as it allowed the researcher to look at what evidence exists with regard to parents' knowledge of the sensory integrative approach. Using the findings from previous studies, the researcher developed a questionnaire so that the research question posed, could be answered. After this, the researcher could decide whether to support or refute previous findings based on the results found in this study.

The design utilised was a descriptive, non-experimental, cross-sectional design, which aimed to examine the parents' knowledge of sensory integration without the introduction of any in-services or workshops which may have influenced their existing knowledge. For convenience, the data was collected at one point in time, therefore the study was cross-sectional. A survey design was used as it has a rapid turnaround time and is cost effective (79). The measurement tool (see Appendix A) was a questionnaire which was designed with the intention to elicit information from the parents regarding their perceptions of sensory integration - both negative and positive. The questionnaire also set out to determine the parents' perceptions of any changes in their children's functioning due to the use of the sensory integrative approach. The final part of the questionnaire asked the parents to select which of the resources listed they had used to expand their knowledge of the sensory integrative approach.

This section of the questionnaire also asked parents what information they felt they would like more of, as well as what resources they felt would be most beneficial.

3.3 POPULATION

A population is defined as “the group to which the researcher would like the results of a study to be generalisable; it includes all individuals with certain specified characteristics” (80, p.92). The researcher works within the remedial school context. As a result, she wanted to conduct her research within the specific context in order to describe what knowledge and perception these parents have of the sensory integrative approach. A private remedial school in Johannesburg was identified as the study site for this study. Approximately 250 children attend this remedial school. The parents of these children were approached to participate in the study and were thus considered the population for study.

3.3.1 Sample selection and size

A sample is defined as “the group on which information is obtained” (80, p.91). A convenience sample was used, which is defined as “a group of individuals who (conveniently) are available for study” (80, p.99). The parents of the children who attend this remedial school and receive occupational therapy using the sensory integrative approach as intervention, were selected as a convenience sample. According to literature, convenience sampling is effective as it is inexpensive, therefore obtaining the required number of participants is easier than if using randomised sampling. Convenience sampling forms the foundation in a homogenous group, i.e. where the participants have something in common (79). The researcher anticipated a total sample of 152, as the researcher requested both the mother and father of each of the 76 children who receive the sensory integrative approach as their intervention to fill out the questionnaire where possible (79). The researcher made use of Raosoft® (81) to calculate the minimum sample size needed. The minimum size needed was 98 questionnaires at a 90% confidence interval. The group was defined as homogenous, as all the parents who participated had children at the selected remedial school, i.e. they had a child with a learning difficulty.

Inclusion criterion: Parents of children who attended the selected remedial school in Johannesburg and who received therapy using the sensory integrative approach between June and November 2017.

3.4 DATA COLLECTION PROCEDURES

The researcher approached the principal of the remedial school and gained consent to use the school as the study site, as well as to review the therapy files to select participants. The selected parents were invited to participate in the study and received an information sheet which explained the objectives and purposes of the study, their right to request a copy of the results, and confirmation that they had the freedom to withdraw from the study if they wanted. Two options were provided to the parents to fill out the questionnaire - a hard copy or an electronic copy. The latter was sent out in the school's weekly e-newsletter. To ensure that only the targeted population was studied, i.e. parents whose children received occupational therapy using a sensory integrative approach, the researcher included information in the newsletter explaining the purpose of the study as well as the inclusion criteria. If they chose the hard copy format, the parents were requested to fill out the questionnaire when they attended their termly meeting with their therapists. The parents filled out their questionnaires anonymously after their meetings and were asked to place them in a marked box when their meetings had ended. The researcher explained in the information sheet provided to the parents that their consent to participate was assumed when the questionnaires were returned or submitted online.

One of the difficulties with using a survey-based study is the potential low return rate. To decrease the possibility of a low response rate, the researcher requested teachers to remind parents of children whose kids were receiving sensory integration therapy to complete the questionnaire if they had not done so electronically. To further decrease the possibility of a low response rate, the researcher kept the questionnaire brief and easy to answer using a Likert scale.

3.5 DATA COLLECTION INSTRUMENTS

No existing instruments could be found to collect the required data, therefore a questionnaire was developed by the researcher. The questions in the questionnaire were based on information from literature related to sensory integration. Previous research performed on parents' perceptions of sensory integration by Cohn (17) and Geral (20), as well as the goals and aims the parents set with their occupational therapist for their children, were considered. This helped to derive appropriate questions to explore the parents' knowledge and perceptions of the sensory integrative approach.

Statements 1 to 8 were set to determine the demographic information of the parents, while statement 9 was set to determine the parents' knowledge of the sensory integrative approach. A Likert scale was used, and participants were asked to indicate if they strongly disagreed, disagreed, were neutral, agreed or strongly agreed with each statement made in the questionnaire. Statements 10 to 29 aimed to determine the parents' perceptions of the functional changes in their children due to sensory integration. Statements 30 to 34 aimed to determine what resources the parents use to expand their knowledge of the sensory integrative approach, as well as what other resources or information they felt they still required. Finally, open-ended questions (35 to 42) were used to determine what functional goals had been set for occupational therapy, what goals had been achieved thus far, and what goals still needed to be achieved regarding the sensory integrative approach.

To ensure the validity and reliability of the newly developed questionnaire, it was validated by a review of the statements and questions by twenty-five occupational therapists who are experts in sensory integration. These experts were identified from the South African Institute of Sensory Integration (SAISI) database. An expert in sensory integration is someone who has completed their qualification through the SAISI and has five or more years' experience working with children with sensory integration difficulties. This review was done to ensure the statements and questions were clear, understandable, unambiguous as well as structured correctly. In the demographic section, an option for other was added for statement 2. On statement 22, motor coordination was added alongside motor accuracy. The experts suggested adding in definitions for sensory defensiveness, motor planning, motor accuracy,

Statement 10 was included, to determine where the specific knowledge the parent had, came from. Finally statement 31 was included to examine how sensory integration had affected the child's functional performance. After the questionnaire had been validated it was piloted on a group of ten parents who were not participating in the study. These parents were close friends of the researcher and volunteered to pilot the questionnaire. This was done to ensure that the questionnaire was user friendly and would elicit the information required. After the pilot, the definition of sensory integration was simplified, and the word meltdown was changed to difficult behaviour.

REDCap® was used as the online data collection application; parents were provided with a link in the school's newsletter which they could select or copy into their chosen internet browser to open the REDCap® system. REDCap® is "a mature, secure web application for building and managing online surveys and databases. Using REDCap®'s stream-lined process for rapidly developing projects, you may create and design projects using 1) the online method from your web browser using the Online Designer; and/or 2) the offline method by constructing a 'data dictionary' template file in Microsoft Excel, which can be later uploaded into REDCap®. Both surveys and databases (or a mixture of the two) can be built using these methods. REDCap® provides automated export procedures for seamless data downloads to Excel" (82). REDCap® was chosen as it has had positive results in various research studies and departments. One of its key features is its ability to have the researcher control and manage their own data, with various options for storing and moving data between researchers or between various devices and research sites (82). One of the main concerns that arose within the research field regarding online data capturing and handling was confidentiality. Harris, Taylor, Payne, Gonzalez, and Conde. (83) explained that strict protocols have been adhered to ensure the safety of data inserted and stored on the server, making REDCap® one of the safest data handling tools for research.

3.6 DATA ANALYSIS

3.6.1 Preparation of data and software used

Sixty-one questionnaires were returned either in hard copy format (21) or in electronic format (40) through the REDCap® software, resulting in a response rate of 40%. The 21 hard copy responses were manually captured by the researcher on the REDCap® software to allow for one single data source (82). The data was cleaned up by removing the one questionnaire that had incomplete answers.

3.6.2 Types of analysis

- Demographic: Descriptive analysis was used to reflect the demographic information that was included in the questionnaire. A Microsoft Excel spreadsheet was used to analyse the percentage/number of parents according to gender, age, child's gender, child's age as well as grade at school. The results were compiled into graphs to visualise the information.
- Analysis of the questionnaire: All the data stored on REDCap® was exported to Microsoft Excel, which allowed the researcher to analyse the data with ease as all the responses for each question could be seen on one worksheet. Again, a descriptive analysis of the data was done, with percentages being calculated for each of the statements within the questionnaire (see Appendix A). As an example, for each specific statement the researcher calculated the number of responses for strongly disagree, disagree, neutral, agree and strongly agree, and divided each answer by the total number of respondents in order to calculate the percentage. The same approach was used for the analysis of the second part of the questionnaire when looking at an increase or decrease in a specific response. The same approach was used again for the questions relating to the types of information parents would like to receive, as well as for the suggestions for future training.
- Analysis of the open-ended questions: The open-ended questions gathered data by looking at what information the experts as well as the pilot parents had on sensory integration, and the parents' knowledge of this. All the responses from the open-ended questionnaires were collected in Microsoft Excel.

The researcher then read through all the responses and highlighted responses that were similar or different in specific colours making use of thematic analysis. The researcher made use of the colours light blue, red, green, dark blue, turquoise and orange. Light blue was used to group together statements that could fit with the theme intake, processing and use in function. Red was used to group statements that could fit with the theme sensory modulation and over responses. Green was used to group together statements that could fit with basic understanding of using the senses. Dark blue for those with incorrect statements, turquoise for those that did not know what it was and orange for those that did not included a response. The researcher then analysed how many of the responses were similar and calculated how many of the parents gave these answers as a percentage of total responses. After this analysis was done, the researcher conducted a content analysis. Content analysis is a document analysis where the researcher examined both the Microsoft Excel spreadsheet as well as Cohn (17) and Geral's (20) articles to determine what new information was provided by these parents compared to the previous two research studies.

3.7 ETHICAL CONSIDERATIONS

As this research report involved human subjects, the Human Research Ethics Committee (HREC) at the University of the Witwatersrand was required to give approval before the study could begin. Unconditional approval was granted by the committee, approval number M160952 (see Appendix E). The principal of the remedial school was approached to use the school as the study site and was given an information sheet detailing the purpose of the study and the inclusion criteria (see Appendix B). A letter of written approval was obtained from her (see Appendix C). Once the school had given its approval, the researcher requested the relevant parents to fill in the questionnaire, either in a hard copy format or electronically using a link supplied in the school's e-newsletter. Both the mother and father of the child were provided with an information sheet (see Appendix D), which explained the objectives and purposes of the study, their right to request a copy of the results, and confirming that they had the freedom to withdraw from the study if they wanted. They were informed that consent was to be assumed when the questionnaire was returned.

The parents' identities are protected as they completed the questionnaire anonymously and placed them into a marked box if they made use of the hard copy, or anonymously online using the REDCap® system.

CHAPTER 4: RESULTS OF THE STUDY

4.1 INTRODUCTION

The results of this research study were analysed using descriptive statistics and will be discussed in detail in this chapter. Objective 1 set out to describe parents' knowledge of the sensory integrative approach within occupational therapy, whereas objective 2 aimed to assess parents' perceptions of change in their children's occupational function due to sensory integration. This included what knowledge the parents have of the sensory integrative approach, how effective the parents perceive the approach to be, and what changes they feel could be attributed to the approach. Objective 3 set out to establish what functional goals parents attributed to the sensory integrative approach and whether or not these goals were achieved in various occupations. Objective 4 set out to establish which resources are used by parents to gain knowledge on sensory integration. The required sample size that was identified for the research was 152 parents, including both mothers and fathers, however in the six-month data collection period, only 61 parents completed the questionnaire. This was despite the researcher sending out the questionnaire in hard copy format as well as sending out a notification in the school's e-newsletter three times. One of the parent questionnaires was excluded from the analysis of the results as the parent did not complete all the required demographic information.

As discussed in the previous chapter, the response rate was 40%. The response rate was calculated by dividing the number of useable surveys by the number of people in the sample and multiplying the answer by 100, which was 60/152 x100. The 40% response rate was half the expected 80%. As discussed in the previous chapter, a response rate of less than 80% results in nonresponse bias. With a 40% response rate, the nonresponse bias was 60%, which suggests limited representation of the targeted population (84).

Previous research has eluded to reasons for not participating in surveys as limited interest in the topic, not having enough time to complete it, invasion of privacy and previously bad experiences, not having enough knowledge on the topics and too many surveys being sent (85). The reasons that have been provided for poor response rates in surveys include the use of a non-randomised sample, having incorrect contact information for potential participants, and an unwillingness to participate. A reason for the latter is over-surveying (86), which occurs when potential participants are inundated with multiple questionnaires to complete, and as a result, they only complete the questionnaires they deem important. In this study, the reasons for the 60% nonresponse bias may have been that the parents did not understand the questions posed, they did not believe that the survey was important to them or their children, or they thought the questionnaire was too long.

Results have been displayed as tables and graphs. In the case where lots of data was available tables were chosen as the representation. Where the data had less information but was more appropriate in a visual format, graphs were chosen as the representation.

4.2 DEMOGRAPHICS OF THE SAMPLE

The parents' data was divided into two genders: mothers and fathers. Table 1 below shows that 53 of the 60 participants (88%) were mothers and seven (12%) were fathers. The parents' ages are also included in Table 4.1 below, according to age group, i.e. 30-35 (3%), 35-40 (18%), 40-45 (47%), 45-50 (23%) and 50 and above (8%).

Table 1: Demographics of parents (n=60)

Age in years	Mother (n = 53)	Father (n= 7)
30-35	2	0
35-40	11	0
40-45	27	1
45-50	9	5
50 and above	4	1

The children's demographics (see Table 2) show that of the 60 children, 36 (60%) were boys and 24 (40%) were girls. The children's data were further analysed by looking at the children's grades, which included Grade R (5%), Grade 1 (7%), Grade 2 (23%), Grade 3 (32%), Grade 4 (8%) and Grade 5 and above (25%).

Table 2: Demographics of children (n=60)

Grade	Boys (n=36)	Girls (n= 24)
R	2	1
1	3	1
2	7	7
3	14	5
4	1	4
5 and above	9	6

4.3 OBJECTIVE 1: TO DESCRIBE PARENTS' KNOWLEDGE OF THE SENSORY INTEGRATIVE APPROACH WITHIN OCCUPATIONAL THERAPY AT REMEDIAL SCHOOLS

Open-ended questions were used to ask the parents about their knowledge of the sensory integrative approach. All of their responses were then categorised according to similarities into six categories. Figure 2 shows the categories that were used to analyse the data as well as the percentage of parents who explained their knowledge according to the specific category. A pie chart was used to represent the information as it provides the best visual representation of the data being discussed.

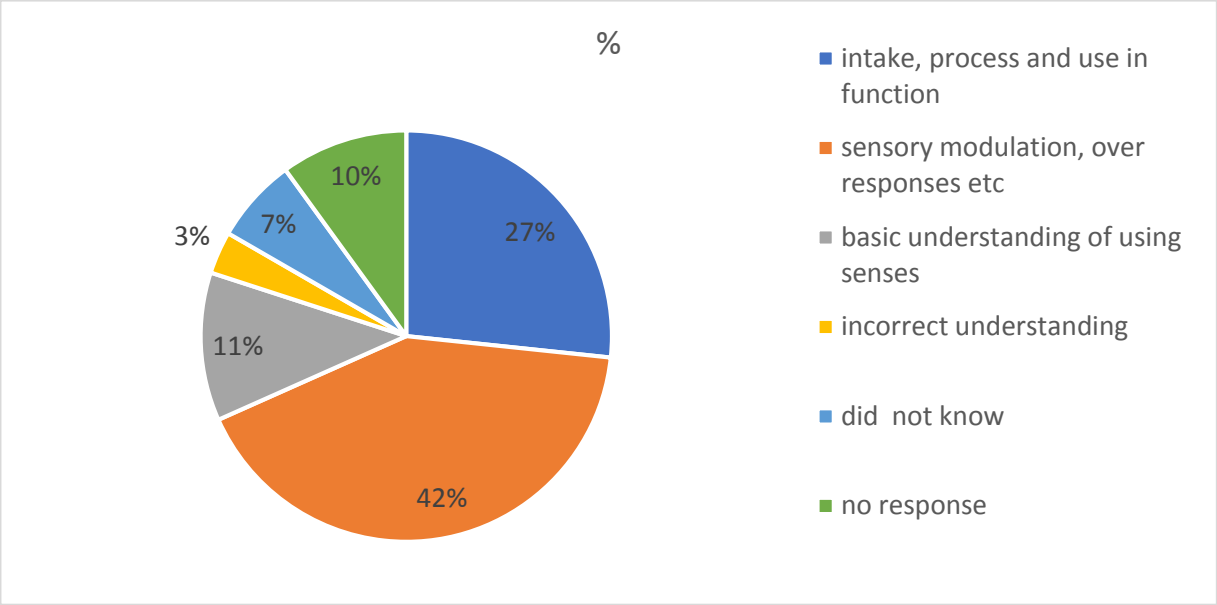


Figure 2: Parents' understanding of sensory integration (n=60)

Under half (42%) of the parents' responses fell into the category of sensory modulation or over responses, whilst 27% of the parents' responses fell into the category of intake, processing and use in function.

Just 11% of the parents had responses that fell into the basic understanding of using the senses, whereas the last 20% fell into responses including no response, did not know or incorrect understanding.

Within each category, the parents also commented on what their specific understanding included. One parent, whose definition fell into the intake category, defined sensory integration as:

> *"the way the information is taken in through our five senses and helps us carry out our daily activities".*

Another parent's chosen definition fell into the sensory modulation category; they defined sensory integration as:

> "*therapy aimed to help the child learn how to modulate their sensory input in order to put them in a place for optimal performance and learning".*

A parent whose sensory integration definition fell into the basic understanding category, defined sensory integration as:

> *"interacting with the child using all senses if possible, to communicate in the most understandable way with the child".*

The other categories were made up of parents who had an incorrect understanding of what sensory integration is (3%). An example of an incorrect definition was:

> *"Therapy that helps the child with crossing the midline, their pencil grip and upper body strength, helping the child with posture."*

Another category was that of did not know (7%). One of the responses that was categorised under this category was:

> *"my limited knowledge of sensory integration therapy is from Google, which provides links to a number of useful websites".*

The last category was made up of parents who did not provide any response (10%) when asked to provide a definition for sensory integration.

4.4 OBJECTIVE 2: TO DESCRIBE PARENTS' PERCEPTIONS OF CHANGES IN THEIR CHILD'S FUNCTION DUE TO SENSORY INTEGRATION

To understand parents' perceptions of the changes in their child's functioning as a result of sensory integration, a Likert scale was used. The parents were asked to rate whether they felt sensory integration had led to changes in their child's specific behaviours, motor planning or motor skills, coordination, anxiety or home routines. Table 3 highlights the parents' perceptions regarding how effective sensory integration is for their child, whether they feel their child benefits from the therapy, and if they feel there has been an overall change in their child's sensory processing as a result of sensory integration.

Table 3: Parents' perceptions of the effectiveness of sensory integration for their child, expressed as a percentage (n=60)

Effectiveness	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Effective	0	2	11	53	34
Benefit child	4	0	23	46	27
Changed processing	0	4	23	50	23
Mean % score	1	2	19	50	28

Of the sample, 34% of the parents strongly agreed that sensory integration is effective for their children, 53% agreed, 11% were neutral and 2% disagreed. No parents strongly disagreed that sensory integration is effective for their children.

When asked how beneficial sensory integration is to their children, 27% of parents strongly agreed their children benefitted from sensory integration therapy, 46% agreed, 23% were neutral and 4% strongly disagreed.

None of the parents disagreed that sensory integration is beneficial to their children. When asked whether sensory integration had led to changes in their child's sensory processing, 23% strongly agreed, 50% agreed, 23% were neutral, 4% disagreed and none strongly disagreed. The mean scores for each of the categories are displayed above, which indicate that the majority of the parents agreed that sensory integration had a positive influence on their child in some way. The benefits or changes that parents felt could be attributed to sensory integration are described below.

Table 4: Parents' perceptions of whether sensory integration increased or decreased their child's functioning, expressed as a percentage

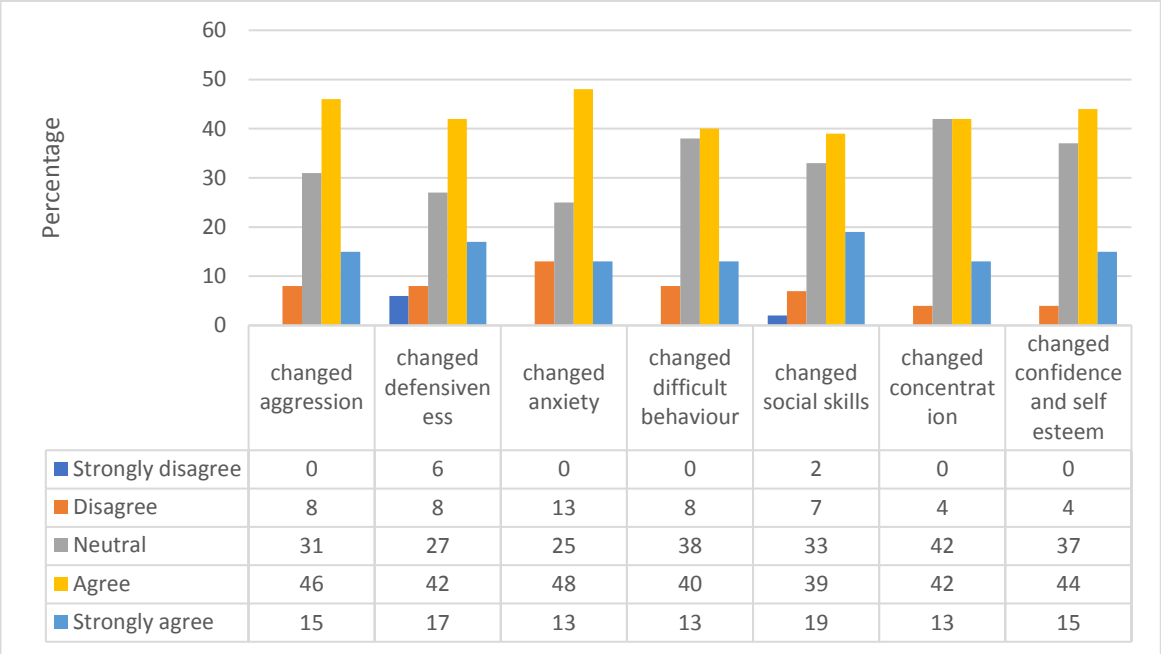
Effectiveness SI	Increased	Decreased
SI is effective n = 11	75	25
SI benefitted the child n = 9	89	11

Table 4 above shows the parents' perceptions regarding whether sensory integration increased or decreased their child's functioning. Of the 11 parents who answered the question regarding whether sensory integration had increased or decreased their child's functioning, 75% felt that it had increased and 25% felt it had decreased their child's functioning.

Of the nine parents who answered the question regarding whether sensory integration benefited their child, 89% felt it benefitted their child and increased their functioning, and 11% felt it did not benefit them or decreased their functioning.

Again, a Likert scale was used to ask the parents to rate what behaviours had changed in their children. These behaviours were categorised into behaviours that should decrease with sensory integration and those that should increase with sensory integration.

The behaviours that should decrease were categorised first, such as aggression, sensory defensiveness, anxiety or difficult behaviour, and behaviours that should increase with sensory integration therapy were categorised second, such as self-esteem, concentration and social skills. Figure 3 shows how the parents perceived functional changes in each of the behaviours in their children concerning sensory integration.



	changed aggression	changed defensiveness	changed anxiety	changed difficult behaviour	changed social skills	changed concentration	changed confidence and self esteem
Strongly disagree	0	6	0	0	2	0	0
Disagree	8	8	13	8	7	4	4
Neutral	31	27	25	38	33	42	37
Agree	46	42	48	40	39	42	44
Strongly agree	15	17	13	13	19	13	15

Figure 3: Parents' perceptions of functional changes in their child's behaviour function in regard to sensory integration (n=60)

When asked whether sensory integration had led to changes in their child's aggression, 15% strongly agreed, 46% agreed, 31% were neutral, 8% disagreed and none strongly disagreed. This indicates that most parents agreed that sensory integration had led to decreases in their child's aggression.

When asked whether sensory integration had led to changes in their child's sensory defensiveness, 17% strongly agreed, 42% agreed, 27% were neutral, 8% disagreed and 6% strongly disagreed. This indicates that most parents agreed that sensory integration had led to decreases in their child's sensory defensiveness.

Thirteen percent of the parents strongly agreed that sensory integration had led to changes in their child's anxiety, 48% agreed, 25% were neutral, 13% disagreed and none strongly disagreed. This indicates that most parents agreed that sensory integration had led to decreases in their child's anxiety. When asked as to whether or not sensory integration had led to changes in their child's difficult behaviour, 13% of the parents strongly agreed, 40% agreed, 38% were neutral, 8% disagreed and none strongly disagreed. This indicates that most parents agreed that sensory integration had led to decreases in their child's difficult behaviours.

While 19% of the parents felt strongly that sensory integration had led to changes in their child's social skills, 39% agreed, 33% were neutral, 7% disagreed and 2% strongly disagreed. This indicates that most parents agreed that sensory integration had led to increases in their child's social skills. When asked whether sensory integration had led to changes in their child's concentration, 13% of the parents strongly agreed, 42% agreed, 42% were neutral, 4% disagreed and none strongly disagreed. This indicates that most parents agreed that sensory integration had led to increases in their child's concentration.

When queried about whether or not sensory integration had led to changes in their child's confidence and self-esteem, 15% of the parents strongly agreed, 44% agreed, 37% were neutral, 4% disagreed and none strongly disagreed.

This indicates that most parents agreed that sensory integration had led to increases in their child's self-esteem and confidence.

Sensory integration aims to decrease behaviours such as aggression, sensory defensiveness and difficult behaviour (86, 87). The results in Table 5 show the parents' perceptions regarding how certain of their children's behaviours decreased with the use of the sensory integrative approach. Of the 13 parents who answered the question, 85% felt sensory integration decreased their child's aggression and 15% felt it increased their child's aggression. Of the 12 parents who answered the question, 92% of them believed sensory integration decreased their child's sensory defensiveness and their difficult behaviour and 8% felt it increased their defensiveness or difficult behaviour. Of the eight parents who answered the question, 75% felt sensory integration decreased their child's anxiety and 25% of them felt it increased their child's anxiety.

Table 5: Parents' perceptions of how certain behaviours decrease with the use of the sensory integrative approach

Decrease in behaviours	Increased	Decreased
SI changed aggression n = 13	2 (15%)	11 (85%)
SI changed defensiveness n = 12	1 (8%)	11 (92%)
SI changed difficult behaviour n = 12	1 (8%)	11 (92%)
SI changed anxiety n = 8	2 (25%)	6 (75%)

Similarly, sensory integration aims to increase behaviours such as social skills, concentration and the child's confidence and self-esteem (17, 21). Table 6 shows the parents' perceptions on how certain behaviours increase with the use of the sensory integrative approach in occupational therapy.

Table 6: Parents' perceptions of how certain behaviours increase with the use of the sensory integrative approach

Increase in behaviours	Increased	Decreased
SI changed social skills n = 10	7 (70%)	3 (30%)
SI changed concentration n = 10	9 (90%)	1 (10%)
SI changed child's confidence and self-esteem n = 9	8 (89%)	1 (11%)

Table 6 shows that of the 10 parents who answered the question, 70% felt that sensory integration increased their child's social skills and 30% felt it decreased their child's social skills. Of the 10 parents who answered the question, 90% believed sensory integration increased their child's concentration and 10% felt it decreased their concentration. Of the nine parents that answered the question, 89% of the parents felt sensory integration increased their child's confidence and self-esteem and 11% of them felt it decreased their child's confidence and self-esteem.

Table 7: Parents' perception of how their child's motor skills changed because of sensory integration, expressed as a percentage

Change in motor skills	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Changed motor planning n =52	0 (0%)	3 (6%)	21 (40%)	22 (42%)	6 (12%)
Changed motor accuracy/coordination n=52	0 (0%)	4 (8%)	20 (38%)	17 (33%)	11 (21%)
Changed gross and fine motor skills n=53	0 (0%)	2 (4%)	16 (30%)	27 (51%)	8 (15%)
Mean % score	0 (0%)	6	36	42	16

Table 7 shows how parents perceived the changes in their child's motor skills with regards to sensory integration. Of the sample, 12% of parents strongly agreed that sensory integration changed their child's motor planning ability, 42% agreed, 40% were neutral and 6% disagreed. No parents strongly disagreed that sensory integration changed their child's motor planning. This indicates that most parents agreed that sensory integration led to changes in their children's motor planning. When asked whether sensory integration had led to changes in their child's motor accuracy or coordination, 21% of the parents strongly agreed, 33% agreed, 38% were neutral, 8% disagreed and none strongly disagreed. This indicates that most parents agreed that sensory integration led to changes in their children's motor coordination or accuracy. Of the sample, 15% of parents strongly agreed that sensory integration changed their child's gross and fine motor skills, 51% agreed, 30% were neutral and 4% disagreed. No parents strongly disagreed. This indicates that most parents agreed that sensory integration led to changes in their children's gross and fine motor skills.

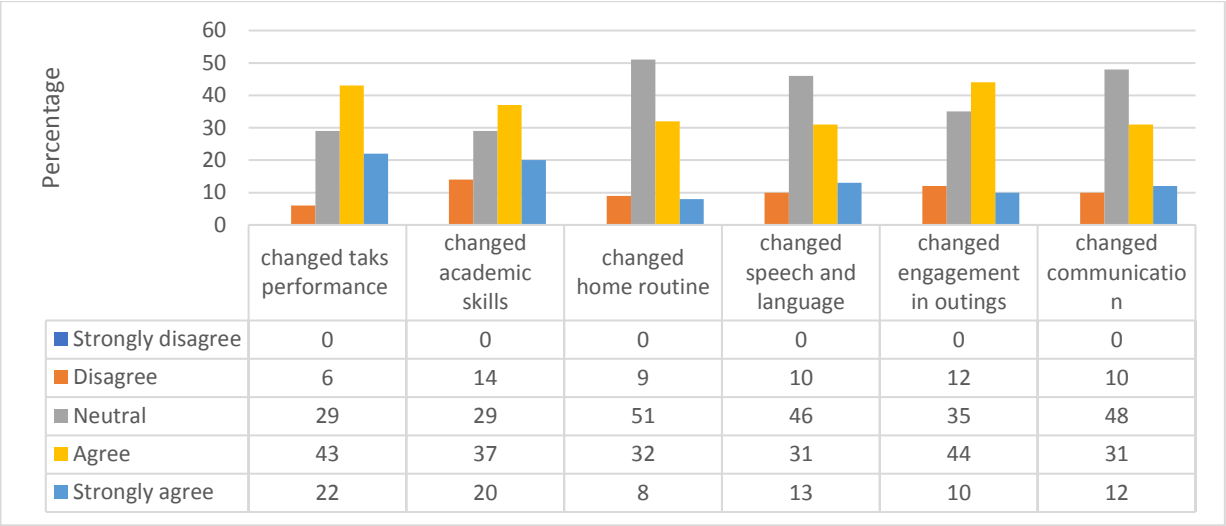
Table 8: Parents' perceptions of whether sensory integration increased or decreased their child's motor skill abilities, expressed as a percentage

Change in motor skills	Increased	Decreased
SI changed motor planning n = 9	5 (56%)	4 (44%)
Si changed motor accuracy/coordination n = 8	7 (88%)	1 (13%)
SI changed gross and fine motor skills n = 10	10 (100%)	0 (0%)

Sensory integration intervention aims to increase performance in motor skills such as motor planning, motor accuracy and coordination (1,27,28,66). Table 8 shows that of the nine parents who answered the question, 56% felt that sensory integration had increased their child's motor planning and 44% felt it had decreased their motor planning.

Of the eight parents who answered the question, 88% believed that sensory integration had increased their child's motor coordination and 13% felt it had decreased their motor coordination. Of the 10 parents who answered the question, 100% felt that sensory integration had increased their child's gross and fine motor skills.

The parents were then asked to rate if they observed changes in their children's occupational performance skills - see Figure 4.



	changed taks performance	changed academic skills	changed home routine	changed speech and language	changed engagement in outings	changed communication
Strongly disagree	0	0	0	0	0	0
Disagree	6	14	9	10	12	10
Neutral	29	29	51	46	35	48
Agree	43	37	32	31	44	31
Strongly agree	22	20	8	13	10	12

Figure 4: Parents' perceptions on changes in their child's occupational performance skills with regards to sensory integration (n=60)

When the parents were questioned as to whether or not sensory integration had led to changes in their child's task performance, 22% strongly agreed, 43% agreed, 29% were neutral, 6% disagreed and none strongly disagreed.

This indicates that most parents agreed that sensory integration has led to a change in their child's task performance. When asked whether sensory integration had led to changes in their child's academic skills, 20% strongly agreed, 37% agreed, 29% were neutral, 14% disagreed and none strongly disagreed. This indicates that most parents agreed that sensory integration had led to a change in their child's academic skills.

Just 8% of the parents strongly agreed that sensory integration had led to changes in their child's home routine adherence, whist 32% agreed, 51% were neutral, 9% disagreed and none strongly disagreed.

This indicates that many of the parents were uncertain as to whether or not sensory integration had led to changes in their child's home routine adherence. When the parents were asked whether sensory integration had led to changes in their child's speech and language, 13% strongly agreed, 31% agreed, 46% were neutral, 10% disagreed and none strongly disagreed. This indicates that many of the parents were uncertain as to whether or not sensory integration had led to changes in their child's speech and language skills.

Amongst the parents, 10% strongly agreed that sensory integration had led to changes in their child's engagement in family outings, 44% agreed, 35% were neutral, 12% disagreed and none strongly disagreed. This indicates that 54% of the parents felt that sensory integration had led to changes in their child's engagement in family outings. When asked whether sensory integration had led to changes in their child's communication at home, 12% strongly agreed, 31% agreed, 48% were neutral, 10% disagreed and none strongly disagreed. This indicates the parents were unsure whether sensory integration had led to changes in their child's communication at home.

The parents were also asked to indicate whether sensory integration intervention led to an increase or decrease in their children's occupational performance skills. Table 9 provides a visual representation of their perceptions.

Table 9: Parents' perceptions of whether sensory integration increased or decreased their children's occupational performance skills, expressed as a percentage

Change in performance skills	Increased	Decreased
SI changed task performance n = 11	10 (91%)	1 (9%)
SI changed academic skills n = 9	8 (89%)	1 (11%)
SI changed home routine n = 7	7 (100%)	0 (0%)
SI changed speech and language n = 7	6 (86%)	1 (14%)
SI changed engagement in outings n = 9	8 (89%)	1 (11%)
SI changed communication skills n = 8	7 (88%)	1 (13%)

Table 9 shows that of the 11 parents who answered the question, 91% felt that sensory integration increased their child's task performance and 9% felt it decreased their child's task performance. Of the nine parents who answered the question, 89% believed sensory integration increased their child's academic skills and 11% felt it decreased their academic skills. Of the seven parents who answered the question, 100% felt that sensory integration increased their child's home routine adherence. Of the seven parents who answered the question, 86% believed that sensory integration increased their speech and language skills and 14% believed it decreased their speech and language skills. Of the nine parents who answered the question, 89% believed that sensory integration increased their child's engagement in outings and 11% felt it decreased their engagement. Of the eight parents, 88% believed sensory integration increased their child's communication skills and 13% believed it decreased their communication skills.

4.5 OBJECTIVE 3: TO ESTABLISH THE FUNCTIONAL GOALS PARENTS ATTRIBUTED TO THE SENSORY INTEGRATIVE APPROACH AND WHETHER OR NOT THESE GOALS WERE ACHIEVED IN VARIOUS OCCUPATIONS.

Results taken from the open-ended question (Statements 35-42) provided more information on the goals and outcomes set by the therapists and parents. This information included what functional goals or outcomes were set with the occupational therapist, which goals had been achieved, what still needed to be achieved, and the child's biggest achievement with regards to the sensory integrative approach thus far. For example, one parent commented that the goal set for her child was:

> *"to assist with trying new foods as my child is still a picky eater".*

Another parent commented that she and the therapist had set five goals for her child, which included:

> *"(1) improved sensory modulation to maintain an optimal level of arousal during daily activities, (2) improved self-regulation to match attention/concentration level to task at hand, (3) improved impulse control to enable him to participate in group games and wait his turn, (4) improved core stability (desk-related tasks), and (5) improved vestibular and proprioceptive processing (balance during gross motor activities)".*

While this parent had set goals with the therapist, some did not have a functional aspect as they were more generalised and focused on the child's specific client factors and performance skills, rather than on the occupation. Many parents did not complete the section (28%), commented that they did not know (17%), or included incorrect answers such as:

> *"wobbling on a wobble chair when working"* (46%).

When asked about what they felt were their child's biggest achievements thus far, parents commented that their children's sensory modulation had improved or that their children were not as sensitive to certain stimuli. For example, one parent commented that her child:

> *"is learning strategies to modulate sensory input. The therapist has given him a 'language' he can relate to in terms of identifying sensory input e.g. how is your engine? This leads to greater self-awareness".*

Another parent commented that his child has the:

> *"ability to understand what is making her not want to wear clothes and shoes and the implications of being a child with a sensitive skin".*

Many of the parents did not complete the section (37%), commented that they did not know (9.8%), or included incorrect answers such as *"improved core strength"*.

Other findings in the school and home achievements, as well as what goals still needed to be achieved, found very similar results with those above, where many of the parents did not complete the section, commented that they did not know, or included incorrect answers.

4.6 OBJECTIVE 4: TO ESTABLISH WHICH RESOURCES ARE USED BY PARENTS TO GAIN KNOWLEDGE ON SENSORY INTEGRATION

The researcher wanted to establish what resources are used by parents to gain more knowledge on sensory integration. Table 10 provides a visual representation of the resources that parents have used to learn about sensory integration. Parents were able to choose more than one option for statement 34.

Table 10: Resources parents used to learn about sensory integration

Where did you learn	Number	Percentage
Therapists	44	73%
Books	13	22%
Internet	19	32%
Other parents	10	17%

Table 10 illustrates which resources are used by the parents to gain information on sensory integration. A total of 73% of the parents reported gaining their knowledge directly from the therapists their children see; 22% reported using and reading books to gain information; 32% reported using the internet; and 17% get information from other parents. Parents were also asked to indicate what information would be useful to learn more about sensory integration - see Table 11.

Table 11: Information parents felt would be useful to learn more about sensory integration

What type of information do you need	Number	Percentage
None	0	0
Different sensory systems	14	23%
Functional implications	18	30%
Home programme ideas	17	28%
Effects of poor sensory integration on child as a whole	15	25%
All of the above	39	65%

Of the sample, 23% of the parents felt that information on the different sensory systems would be useful; 30% felt that information on the functional implications of sensory integration would be most useful; 28% felt that home programme ideas would be most useful, whilst 25% felt that the effects of poor sensory integration on their child as a whole would be useful information. Almost two-thirds (65%) of the parents felt that all of the above information would be useful for them to gain a better understanding of sensory integration.

Table 12: Suggested resources parents felt would be useful to access to learn more about sensory integration

Suggestions for accessing information	Number	Percentage
Reading materials	19	32%
Workshops	20	33%
Discussions with therapists	22	37%
Parent discussion groups	12	20%
Blogs	7	12%
All of the above	25	42%

Table 12 illustrates which resources the parents felt would be useful for them to access to learn more about sensory integration. Of the sample, 32% felt that reading materials would be most beneficial; 33% felt that workshops would be most beneficial; 37% felt that discussions groups with therapists would be a useful way to receive further information; 20% felt that parent discussion groups would be beneficial for them; and 12% felt that blogs on sensory integration would be most beneficial for learning more information on sensory integration. Finally, 42% of the parents felt that all of the above information would be useful as resources.

4.6 CONCLUSION

This section summarised all the results of the quantitative analysis according to the objectives of this study.

Objective 1

Six categories were identified to describe parents' knowledge of the sensory integrative approach. The results showed that 80% of the parents understood what sensory integration was and 20% either did not have a good idea of what sensory integration was or had an incorrect understanding. Of those who understand what sensory integration was, 27% fell in the intake category, 42% fell in the sensory modulation category, and 11% fell in the basic understanding category.

Objective 2

Overall, the parents felt that the sensory integrative approach was an effective intervention for decreasing aggression, sensory defensiveness, anxiety and difficult behaviour. They felt that the approach improved their children's ability to socialise and concentrate and had increased their children's self-esteem and confidence. Other aspects that the parents felt improved as a result of the sensory integrative approach were their children's task performance, academic skills, home routine adherence, speech and language, communication and engagement in outings.

Objective 3

Results taken from the open questions provided information on what goals parents set with their respective occupational therapists, what goals had been achieved, as well as what the biggest achievements to date had been with regards to school and home lives.

Many of the parents did not complete this section or provided responses that displayed a poor lack of awareness when answering these questions. This will be explored further in the discussion in Chapter 5.

Objective 4

Overall, the parents gained most of their information on the sensory integrative approach from the therapists themselves. Parents would like more information on all of the aspects of the sensory integrative approach and felt that they would like it provided through a wide variety of resource options.

The results showed that a substantial proportion of the parent sample had a good understanding of sensory integration and its influence on occupational performance. The results further indicated that parents obtained information from a variety of sources and identified resources for gaining further information. These findings will be discussed in more depth in Chapter 5.

CHAPTER 5: DISCUSSION

5.1 INTRODUCTION

This chapter discusses and interprets the results reported in Chapter 4 with respect to the current literature, as well as the implications of the findings for future occupational therapy practice. The study set out to describe parents' knowledge of the sensory integrative approach within occupational therapy in a remedial school environment. The discussion will be presented by critically reviewing the results in relation to the study demographics, the knowledge the parents have of the sensory integrative approach, the changes in their children's function, the goals set for therapy as well as those that have been achieved as well as what resources parents use to expand their knowledge of the sensory integrative approach. As mentioned in the literature review, parents in Cohn's (17) study were more realistic,than the parents in other studies, when setting goals and outcomes for occupational therapy, which was due to their enhanced understanding of their children's sensory behaviours. Parents in another study by Alsem *et al*, (16) had a poorer understanding of the influence of the sensory integrative approach as they were not included in the goal setting process. The literature review assisted the researcher to understand that parents need to be involved in the entire occupational therapy process, from the planning to the evaluation of the intervention being used by the therapist with their children.

5.2 SAMPLE DEMOGRAPHICS

There were 61 participants in this study; 54 mothers and 7 fathers. Due to incomplete answers on her questionnaire, the results of one mother had to be excluded from the analysis, resulting in a sample size of 60: 53 (88%) mothers and 7 (12%) fathers.

This study made use of a quantitative research design, which requires larger sample sizes and uses surveys to collect the data compared to the other two studies done by Cohn (17) and Geral (20). According to Fincham (84), a researcher should aim to achieve a response rate of 60%, although he specified that the response rate for surveys conducted in schools should be more than 80%. The reason for this is that the researcher wants to be able to conclude that study is representative of the population being studied. The sample of 60 relates to a return rate of 61%. With a response rate of less than 80%, the study is described as having nonresponse bias, which affects the validity and reliability of the research findings in a study (84). A sample of 60 may be further interpreted as small, which may have resulted in a sampling error. A sampling error is defined as "the difference between a sample statistic and the true population value" (88, p.137). Therefore, the results of this study may not be generalisable to the full parent population of the selected remedial school.

Cohn (17) had 16 participants with 14 (87.5%) mothers and 2 (12.5%) fathers in her study, whereas Geral (20) had 9 participants with 8 (88.9%) mothers and 1 (11.1%) father. When comparing this study to the previous two studies, one can see that the majority of the participants in all three were mothers. This was expected as mothers are more frequently seen as the overall caregiver and is more involved in the child's therapy. The exclusion of the one mother's information in this study could suggest a potential bias as the information excluded may have had alternative views or knowledge with regards to the approach. Neither of the previous studies excluded any of the parents' information when analysing their data, however both of these studies made use of a qualitative research design which required smaller sample sizes, and used either interviews or observations for the data collection (79). Bias is defined as "an inclination or prejudice for or against one person or group, especially in a way considered to be unfair (89, p.100)" Identifying possible bias in research is important as it can arise during any of the steps. Smith and Noble identified five different types of bias which occur at the various stages during the research procedure (89).

In this study inclusion bias, measurement bias as well as analysis bias have been identified. Inclusion bias occurs when the researcher selects the sample to be representative of the population (89).

In this study, the parents who participated are comprised of parents who have children with sensory integrative difficulties and attend the remedial school where the researcher is employed. Measurement bias occurs when the survey or measurement tool has not been designed effectively (89). In this study, overlapping criteria was identified regarding parents' ages. For example, a 35-year-old fills in the questionnaire, must he/she mark the 30-35 or 35-40 age band. Analysis bias occurs when the researcher analyses the data and uses data that will support the hypothesis being generated (89).

In order to determine what demographic factors may affect the parents' knowledge in this study, the factors will be discussed separately. Firstly, the discussion will focus on the ages of the parents as well as any effects parental age may have on their knowledge of the sensory integrative approach. Secondly, the discussion will focus on what grades the children receiving therapy are in. Finally, the discussion will focus on gender differences both in the children and in the parents.

Of the 60 parents, 88% were mothers whose average age fell between 40 and 45 years old. Many of the parents fell in the older age range, which may have had an impact on their understanding of what sensory integration is and how it could benefit their children. In the previous two studies, Cohn (17) did not report on the parents' ages, however most (67.7%) of Geral's (20) parents fell between the ages of 35 and 40 years old, with the remaining 33.3% falling in the 40 to 45-year-old range. Little research has been conducted on whether parental age affects parents' understanding or knowledge of sensory integration. This could be a possible limitation to this study. A systematic review done by Jin, Sklar, Oh and li (90), on factors affecting therapy compliance found mixed results with regards to age.

In the older age ranges (over 55 years old), the compliance was better, whereas in the middle (40 to 54 years) and younger (under 40 years) ranges, compliance was reduced as a result of poor understanding and knowledge of the treatment (90). As discussed above, the majority of parents in this study where in the 40 to 45-year-old range, which would suggest that they would be compliant with carryover of therapy into the home environment. This may indicate why 80% of the parents in this study had an understanding of what the sensory integrative approach is.

Of the 60 children whose parents were included in the study, 32% were in Grade 3 (approximately nine years old). Cohn (17) did not report on the individual children's grades and ages in her study but included 16 children between the ages of 4 and 10 years old. Geral (20) reported her children's demographics in ages not grades. The children, were mostly (62.5%) between the ages of four and five years old, indicating that her participants were younger than the majority of the children in this study. This may indicate that the children in this study have either been in therapy for longer as they are older than the children in Geral's study or may have only started therapy at a later stage in life.

As explained, only two fathers completed the survey, which may have influenced the results and could pose as a limitation as it is difficult to generalise the findings to the parent population if there was not an even distribution of fathers and mothers in the sample. The previous two studies' participants were also comprised of mostly mothers of children who receive the sensory integrative approach (17,20). Another study done by Bagby, Dickie and Baranek (91), wanted to investigate how sensory experiences in children with autism influence family life. They interviewed 12 parents in their study and similarly only two of the participants were fathers (91). The results from these three studies indicated that more mothers take part in studies than father do which supports the finding in this study. Of the 60 children whose parents were included in the study, 60% of the children were boys.

Cohn (17) did not report on the individual children's gender in her study but included 16 children. Geral (20) reported her children were 50% boys and 50% girls. A study by Mazzocco and Thompson (92) on predictors of learning disabilities in Kindergarten children found no statistical difference between the girls and boys over a four-year period.

Other studies done by Cohn (12) and Schaaf (56), had majority (74% and 81%) of boys as participants. These two studies show that more boys present to clinics with sensory integrative difficulty and are therefore the higher percentage of participants in the studies undertaken at these clinics. Although research continues to be performed on sensory integration and its use in paediatrics, to date the research has lacked consistency in reporting demographic information therefore resulting in poor reproducibility of these studies (59, 61, 86). Little research has been done on the parents' knowledge of the sensory integrative approach in a remedial school. Within the current study, the majority of the children were boys in grade 3. As mentioned above, boys have a higher rate of sensory integrative difficulties. These parents returned the greatest number of surveys in a single grade. This could have resulted in a potential bias.

5.3 OBJECTIVE 1: TO DESCRIBE PARENTS' KNOWLEDGE OF THE SENSORY INTEGRATIVE APPROACH WITHIN OCCUPATIONAL THERAPY AT REMEDIAL SCHOOLS

By determining what knowledge, the parents have of the sensory integrative approach, the researcher could identify whether or not the parents understood what the approach entails. As discussed in the preceding chapters, parents play a vitally important role in the carryover of the therapy into the home environment (17). A key aspect of understanding what knowledge the parents at the selected remedial school have is that it will allow the researcher to make certain that parents are actively involved in the

therapy ensuring the service delivered is family centred. The need for therapist-parent collaboration is a key component to determining whether or not the sensory integrative approach is a beneficial occupational therapy intervention. This valuable information will allow the researcher to understand whether the sensory integrative approach allows the children treated to reach their full potential in the therapy environment.

Although previous qualitative studies have been conducted on parents' perceptions of the sensory integrative approach (17,20), there has been little quantitative analysis of what parents' knowledge is. The results of this study indicate that almost half of the parents (42%) defined sensory integration as their children's overresponsiveness to sensory input, whereas less than a third (27%) defined it as the way children take in and process sensory inputs for use in their everyday lives. A small percentage (11%) of the parents defined sensory integration in terms of basic ways their children use their senses, whereas a fiifth (20%) of the parents either did not provide a definition or provided an incorrect definition of what sensory integration is. Thematic analysis indicated that parents in this study defined sensory integration as understanding how their child's world fits into and relates within their sensory world. Parents commented that sensory integration is comprised of an intake of information from the senses, which allows us as individuals to carry out our activities in our daily lives. When comparing this to the theoretical concepts that Ayres described, the parents had an understanding that the child takes in sensory information and uses it to engage effectively in their environment. This finding supported those in Geral's (20) study and seemed to fit into the researcher's theme of 'everything just made sense'. A parent in this study explained their understanding of sensory integration as *"configuring and assisting in integrating the sensory world to the child's relationship to that world"*. This fits within the first category of intake, processing and use in function. This shows that the parent was able to understand how her child and his sensory world related to one another.

The second parents in this study defined sensory integration as being connected to sensory reactivity. This fits within the second category of sensory modulation and over responses. It is encouraging to compare this category to that of Geral's (20) theme of 'mobilized my child into the world', where the parent described how her improved understanding of sensory integration allowed her to advocate for her child's needs in various settings. Parents in this study had similar responses, for example one described sensory integration in this study as *"helping my child to focus on the particular sense required at the time so that not everything is overwhelming at the same time - which is displayed as extreme distractibility",* while another explained that it is about *"teaching a child to self-regulate and have coping mechanisms to deal with sensory integration difficulties".* Both of these parents' responses fit into the category of sensory modulation and over responses.

Some of the parents in this study had more of a basic understanding of sensory integration which fitted into the category of basic understanding using the senses, which compared to the Stellenbosch study (20) theme of 'it was tough because we didn't understand', fitting specifically under the subtheme of 'I realized there was something different.' One of the parents in the Stellenbosch study reported that she was able to see her child's full potential but could not understand what was affecting her ability to reach that potential (20). A parent in this study explained her knowledge of sensory integration as *"an amazing way for children and parents to understand how their body works".*

All the other categories were made up of parents who had an incorrect understanding of what sensory integration is, of parents who did not know what sensory integration is, and parents who did not provide any response when asked to provide a definition for sensory integration. These findings are similar to the those expressed by parents in Cohn (17) and Geral (20).

When comparing the parents' poor knowledge to Geral (20), the limited knowledge of the parents in this study fits with her themes of 'it was tough because we didn't understand', falling into the subtheme of 'the elusive thing was missing' where a parent reported she was unable to understand what her child's actual problem was or another parent who reported feeling frustrated with her child's inability to achieve the tasks resulting in even further difficulties (20).

In summary, when compared to the definitions of other parents in previous research studies, the majority (80%) of parents in this study had an understanding of what the sensory integrative approach was, even if all the responses did not have the same amount of detail or specifics. One of the issues that emerged from these findings is that some of the parents (20%) did not have any understanding of what the sensory integrative approach is. This means that further workshops or inservices are needed at the remedial school to develop parents' understanding of the approach.

5.4 OBJECTIVE 2: TO DESCRIBE PARENTS' PERCEPTION OF CHANGES IN THEIR CHILD'S FUNCTION DUE TO SENSORY INTEGRATION

This study set out to describe whether or not parents perceive that sensory integration has changed their children's occupational function. The majority (87%) of the parents in the current study found the sensory integrative approach to be effective in changing their children's function, whereas just under three quarters of the parents (73%) felt that it benefitted their children in some way.

This study selected behaviours that either increased or decreased as a result of the sensory integrative approach based on previous research studies (17,20,23,86,87). When analysing the data, the researcher further categorised the behaviours into those that should increase with sensory integration and behaviours that should decrease.

As mentioned in the literature review and results chapters, sensory integration aims to decrease behaviours such as aggression, sensory defensiveness and difficult behaviour, and aims to increase behaviours such as social skills, concentration, confidence and self-esteem (17, 21, 86, 87). Three quarters of the parents in this study felt that sensory integration had increased their child's functioning. Just under two thirds of the parents in this study reported decreases in their children's aggression (61%), sensory defensiveness (59%) and anxiety (61%) as a result of the sensory integrative approach.

Just over half of the parents in this study reported increases in their children's social skills (58%), concentration (55%) and confidence and self-esteem (59%) as a result of the sensory integrative approach. This study found that the sensory integration approach improved social skills and self-esteem as well as decreased difficult behaviour. These findings support those of previous research by Arbesman and Lieberman (23), as well as the work done by Cohn (17). The decreased behaviours reported in this study are similar to those found in the Stellenbosch study, where parents reported that their children displayed improvements in self-confidence and self-image, but also found that their children were calmer, less anxious, less frustrated, more engaged with others in social situations, and had improved ability to concentrate (20). These findings are similar to those of Cohn (17), whose parents reported improvements in abilities, activities and self-esteem. Specifically, the above behaviours are the same as her findings on changes in self-confidence and the ability to self-regulate (17).

Other findings for changes in children's functions were classified into motor skills and performance skills. Whilst reviewing the literature, it was found that sensory integration leads to increases in a child's motor skills, where fine motor skills were seen to improve specifically (22,51). Within the current study, just over half of the parents perceived changes in their children's motor planning ability (54%) and motor coordination (54%) as a result of the sensory integrative approach.

Two thirds of the parents in this study felt sensory integration had led to improvements in their child's gross and fine motor skills. Specifically, the majority of the parents not only perceived change but reported improvements in their children's motor planning (56%), motor coordination (88%) and motor skills (100%). These findings match those of Ayres (93), Cohn (17) and (21), Wuang (51) and Geral (20).

Parents were then asked whether they had perceived any changes in their children's occupational performance. As mentioned in the literature review, sensory integration has been found to lead to changes in occupational performance, however due to the inconsistencies in the findings the previous results must be interpreted with caution. Just under two thirds of the parents perceived changes in their children's task performance (65%), whereas just over half of the parents perceived changes in their children's academic skills (57%) and engagement in family outings (54%). Less than half of the parents felt that sensory integration led to improvements in home routine adherence (40%), speech and language skills (44%) and communication skills at home (43%). Specifically, the majority of the parents not only perceived change but reported improvements in their children's task performance (91%), academic skills (89%), home routine adherence (100%), speech and language skills (86%), engagement in outings (89%) and communication skills (88%). The findings in this study therefore support the findings found in the Stellenbosch study, where parents reported improvements in task completion, academic skills, being more empathetic towards family and friends, improvements in speech and language skills, and communication in the home (20).

To understand why parents perceived the sensory integration approach as effective or beneficial, the researcher looked at the open statement number 41 qualitatively as well. Of the 60 responses, 31 parents commented that the approach was effective or beneficial for their child. One parent's response was, "*Yes. He is less jumpy and copes better in crowds and noisy environment. We have noticed a big improvement in his gross and fine motor skills which allows him to participate better in sports."*

Another parent wrote, *"Yes. Although most my child's milestones were age appropriate, he is now able to integrate into peer teams since he is now less aversive to noise and does not still insist on playing the same games on the playground."*

5.5 OBJECTIVE 3: TO ESTABLISH WHAT FUNCTIONAL GOALS PARENTS ATTRIBUTED TO THE SENSORY INTEGRATIVE APPROACH AND WHETHER OR NOT THESE GOALS WERE ACHIEVED IN VARIOUS OCCUPATIONS

Within the remedial school setting, parents and therapists meet once every term to discuss progress in the child's therapy as well as ways forward for intervention. The researcher took the open-ended questions and analysed the data quantitatively, as well as with the use of thematic analysis so that more information could be provided on the goals and outcomes set between the therapists and parents. These included what functional goals or outcomes were set, goals that had been achieved, what goals still needed to be achieved, and the child's biggest achievement with regards to sensory integrative approach thus far.

Looking at the results from this study, parents in the remedial school reported changes in their children's functioning but many of these changes were related to specific sensory systems or behaviours. When they were asked to explain what functional goals they had set with their therapists, many of the parents noted sensory components and only one commented on actual occupational performance. None of the parents had set any family centred goals. According to previous research, the sensory integrative approach improves many of the lower order centres of the nervous system which result in changes in higher order centres (94). As mentioned in the literature review, much research has been performed on the effect sensory integration has on occupational performance and how sensory integrative difficulties can lead to functional problems in children (41-44-, 46-48).

As discussed in the literature review, family centred therapy forms a basis for the effective carryover of therapy into the home environment and the success of an intervention. Working together with the families assists the child's learning and allow them to engage in multiple environments successfully using the sensory integrative strategies they have been taught (69).

Goals and outcomes that focus on what family are struggling with, make the carryover of treatment into the home environment more likely to be successful. Occupational therapists working within a paediatric population need to set goals that are important to the family. As discussed in the literature review, Hanna and Rodgers (52), emphasized the important of collaboration between the parent and therapist. This collaboration speaks to the need for both parties to be equal contributors to the relationships working towards a common goal (52).

Of the parents that answered the questions, many of the goals related to changing or improving the child's sensory reactivity, improved motor planning, concentration, anxiety, coordination, impulsiveness and adherence to the morning routine. What was surprising when analysing the results was that very few of the goals set between the therapist and the parent were functional or related to occupational performance, and of the goals that were functional, only one parent commented that the goals set for therapy were to improve dressing (laces), socialisation, toileting and sleeping. The majority (91%) of the parents did not complete the section entirely or included incorrect information in this section. As a result, the findings of the open-ended questions in this study's survey must be interpreted with caution as they only represent a small number of the sample (9%), and thus cannot be generalised to the whole parent population at the remedial school without further research.

These findings were unexpected and there are several reasons for this. Firstly, the parents may not have understood what was meant by functional goals in the survey. A definition for functional goals should have been included with the questionnaire to ensure all parents understood what the statements were asking of them.

This must be considered as a limitation to this study. Secondly, the occupational therapists at the remedial school are setting goals either without the parents' collaboration or focus their interventions on improving skills rather than on improving performance and function.

Making use of the GAS system may make goals more functional and will be discussed later in the implications for practice. Future research is required to establish what the cause for poor goal setting is at the remedial school.

In summary, the parents in this study perceived that the sensory integrative approach as both effective and beneficial for their children in the selected remedial school. They perceived that their children had less sensory defensive behaviours, less anxiety and aggression, as well as improved confidence, social skills and concentration. Parents also perceived that the sensory integrative approach resulted in various improvements in their children's function and occupational performance, specifically in their motor skills, motor planning and coordination, as well as improvements in task performance, academic performance, engagement in family outings, adherence to the home routine, speech and language skills, and communication skills at home. The largest perceived changes in the children as a result of the sensory integrative approach was in their motor skill ability and adherence to the home routine. In regard to goal setting and improvements in function, the findings of this study are not encouraging and require further investigation.

5.6 OBJECTIVE 4: TO ESTABLISH RESOURCES USED BY PARENTS TO GAIN KNOWLEDGE ON SENSORY INTEGRATION

Parents play a vital role in the carryover of therapy into the home environment Cohn's study found that one of the main reasons' parents brought their children to therapy was that *"their children were not fitting in or keeping up with their peers"* (17, p.287).

The parents expressed wanting their children to develop skills that would help them integrate into their environments better, as they viewed the children's belief in their own ability more important than their ability to develop skills.

The parents reported observing improvements in their children within the three areas of abilities, activities and self-worth, and described these observable changes as developing and improving their knowledge of the sensory integrative approach (17). Within in this study, the researcher wanted to examine which resources parents felt would be the most beneficial to increase their current knowledge and whether or not the findings were similar to those in Cohn's (17) study. Another study conducted on how parents perceive their own influence on their children found that parents believed they exerted the greatest influence on the therapy programme when they were actively involved in the process, such as in a home programme that focused on family goals (95). Cohn's study (15) found that parents learnt about the sensory integrative approach and occupational therapy by talking to other parents in an outpatient therapy environment. The researcher went on to explain that even though occupational therapists may collaborate with the family on their needs and goals and actively involve them in sessions, the social structures and support families have might be more beneficial for parents (15).

A systematic review done by Miller-Kuhaneck and Watling (55) on strategies to improve parent and teacher involvement in therapy programmes found that even though all of the articles reviewed described improvements in the child's function, limited assessments were used resulting in poor efficacy of the intervention. The researchers in the study expressed that the education and training of other stakeholders in the therapy team is of vital importance, however very limited research has been done on this area of occupational therapy (55). Another study done by Case Smith (96), examined the effectiveness of various occupational therapy interventions with children.

The parents in her study felt that they benefited the most when they were involved in the actual intervention and had the time and place to demonstrate what they had learnt (96). The parents in this study were asked where they gained the knowledge they had, which resources would be useful for learning more, as well as in what format they would find the information most useful.

Just under three quarters of the parents (73%) gained their information from the therapists their children see, while additional information was gained by using the internet (32%) and reading books (22%). The minority reported learning from other parents (17%). These findings are interesting as they support much of what the literature speaks about regarding the need to collaborate with parents and educate them on their role in the therapy process so that our interventions can be more family centred. The findings also support the value parents place on the occupational therapist's opinion, even though they are the 'experts' when it comes to understanding what is best for their child (20).

Just under two thirds (65%) of the parents in this study expressed wanting resources and information that covered all aspects of sensory integration. This includes the different sensory systems involved, the functional implications, home programme ideas, and the effects poor sensory integration would have on their child as a whole. Less than one third of the parents wanted information or resources on the individual topics of different sensory systems (23%), functional implications (30%), home programme ideas (28%) and effects on the child as a whole (25%). These findings support those reported by the parents in Geral (20), who said that information given to them on why their children act the way they do or understanding how the different systems affect them allowed the parents to understand their children better. Just under half of the parents (42%) in this study felt that all of the following resources would be useful, whereas fewer parents felt that a single resource would be useful: reading materials (32%), workshops (33%), discussions groups with therapist (37%), parent discussions (20%) and blogs (12%).

Majority of the parents in this study wanted more information on all the topics offered in statement 33. This indicates that even though the majority of the parents in the remedial school had an understanding of the sensory integrative approach, they feel that they would benefit from further information to expand on their knowledge. The parents felt that a variety of resources would be most beneficial to expand their knowledge although discussion groups with therapists was the most selected resource in statement 34.

Cohn (15) also found that occupational therapists should structure their therapy environments to allow for interaction between parents, with comfortable seating options and a variety of resources including a library to lend books from and beverages to create a relaxed interactive environment. The findings in this study further support Geral's (20) findings, who asked parents to recommend ways to improve their knowledge of the sensory integrative approach. The parents in her study suggested targeting not only parents but teachers and other health professionals as well. They felt that health professionals needed to be aware of the approach to decrease the number of incorrect referrals. In terms of teacher education, the parents felt that if the teachers had improved knowledge, they would support the children better in the classroom and educational environment. They suggested that this be done through therapist-teacher collaboration. Finally, parents' knowledge could be improved through the use of workshops where all parents are included, not only parents with children who have sensory integrative difficulties (20).

In summary, the parents in this study felt that they required certain resources to improve their knowledge on the sensory integrative approach. These parents reported that they gained most of their current knowledge through discussions with their child's occupational therapist. They also reported wanting to learn more about all aspects of the sensory integrative approach and not only limited individualised topics. When asked how they would prefer to improve their knowledge, the parents in this study felt that a multimodal approach of dispensing information would be best for them.

5.6 CONCLUSION

Even though the majority of the parents in this study had knowledge of the sensory integrative approach, there were still parents in this study who had incomplete, incorrect or no knowledge of the approach at all. These findings were consistent with those of Cohn (17) and Geral (20). There were consistent behaviours that were found to increase and decrease in this study, as compared to other studies in regard to the sensory integrative approach. It was also found that many of the parents in this study, did not set functional goals with their occupational therapists. Of the parents who reported on goal setting, many of them related to changing or improving the child's sensory reactivity, improved motor planning, concentration, anxiety, coordination, impulsiveness and adherence to the morning routine. Finally, parents in this study asked for further information through various resources to in order to improve their awareness of the sensory integrative approach.

CHAPTER 6: CONCLUSION

6.1 INTRODUCTION

This chapter summarises the main results and findings of this study and provides suggestions and recommendations for future studies. The limitations of the study discussed in Chapter 5 will also be highlighted, as will how this study adds to the current literature on parents' knowledge and perceptions of the sensory integrative approach.

6.2 SUMMARY OF STUDY FINDINGS

The purpose of the study was to describe parents' knowledge of the sensory integrative approach in occupational therapy, and their perception on how it influences the child's occupational performance within a remedial school environment. This study made use of a quantitative research design so that specific statistical analysis could be done on the parents' perceptions. This adds to the current literature as all the studies that have been done previously have made use of a qualitative research design. Although this study was conducted on a relatively small sample, the findings generally prove that the majority of the parents in the remedial school environment had some knowledge of what the sensory integrative approach was. The second finding was that majority of the parents perceived that the sensory integrative approach led to changes, both increases and decreases, in certain behaviours in their children. A small minority of the parents in the study either had no concept or had an incorrrect understanding of what the approach involves. These parents also had limited understanding of how the approach can be used to improve their children's engagement in occupational performance. Many of the parents (37%) in this study did not complete the section on functional goals which could have been for various reasons.

Not setting functional goals with parents may result in therapists only focusing on the underlying sensory motor components in therapy and neglecting the child's overall functionality. This study also provides important information for the current practice in South Africa regarding parent's knowledge of the sensory integrative approach in occupational therapy. This information will aid service delivery at the school, as the therapists will know what information needs to be provided both in meetings as well as in workshops with these parents.

6.3 IMPLICATIONS FOR PRACTICE AND FURTHER RESEARCH

The evidence from this study suggests that the majority of the parents at the remedial school had an understanding of what the sensory integrative approach is and how it can be used in therapy with their children. It is important to note that the majority of participants were mothers and there were only seven fathers in the study. This may be interpreted as the fathers not being as involved in the children's therapy at school or at home. The occupational therapists at the remedial school will need to keep in mind that more of the mothers are involved in the carryover of therapy. As a result, the therapists will need to improve the mothers' understanding of the sensory integrative approach through various resources such as workshops, blogs or discussion groups. The therapists will also need to look at ways of involving more of the fathers in the therapy process so that their understanding is also improved. This can be done by inviting fathers to participate in a research project or having them attend a meeting on the importance of parent involvement in therapy.

The results of this study indicate that the majority of the children whose parents completed the questionnaire were boys and just under one third of the children were in grade 3. Taken together, these results could suggest that the parents who completed the study may have done so as their child was struggling with specific sensory integrative difficulties.

Within the remedial school, a larger portion of the children are boys, which may be a result of higher prevelance of learning difficulties in males than in females. In a national health survey conducted in the United States, it was found that in 61000 children, 8.3 % of the children had a learning disability. Of the 8.3% of the population, 10.6% were boys (96). The occupational therapists will need to be aware of this as gender differences may influence how therapy is carried out or which activities are chosen when treating these specific individuals. Future research could examine whether there are gender specific differences regarding changes in functioning as a result of the sensory integrative approach. Another idea is to make use of randomised sampling as opposed to convenience sampling, which was used in this study so that there was an equal opportunity for all the parents at the remedial school to be included in the study as opposed to those whose children received occupational therapy using a sensory integrative approach.

How can the findings in the study help therapists in schools and practices ensure that they gain adequate buy-in from parents and ensure that the given homework is completed? The therapists at the remedial school can ensure that adequate carry over of therapy into the home environment occurs by ensuring effective goal setting is undertaken in collaboration with the parents. As mentioned above, family centred therapy is the key aspect in ensuring therapy is carried over into the home environment. This not only shows the parents or family that they are valued in the therapy process but ensures that the intervention address their areas of concern as a priority (22). This will be done by parents making sure that the provided homework, which aids the child's learning, is completed. The findings on the parents' knowledge of the approach can also be used to identify what additional information is required by the parents to improve their current level of knowledge and perceptions regarding the sensory integrative approach.

It is therefore recommended that future training be done with the parents at the remedial school through various channels both identified by them as well as by recommendations set out in the Stellenbosch study. Geral (20) recommended that parent education be given in two phases - before and after therapy. The education before should include parents, teachers and all health professionals involved with the child. This calls for closer collaboration between team members, allowing for effective intervention, goal setting and outcome achievement. The education after therapy involves the specific occupational therapist and the parents. Recommendations for this education was suggested through partnerships between SAISI and parents, working within various communities, and ensuring that the parent-therapist partnership and collaboration continues throughout the therapy process (20).

Limitations

A number of important limitations need to be considered. Firstly, the majority of the participants were mothers whose age fell in the older range. Secondly, the majority of the parents who completed the questionnaire had boys in the remedial school. Thirdly, a large portion of the children were in grade 3. Finally, the open-ended questions were not answered well, as many of the parents in this study left out this section of the survey and as a result, the results of this section are limited to only 9% of the parent sample. These findings therefore cannot be generalised to the whole parent population and should be interpreted with caution. Other factors that should have been considered when developing the questionnaire: having overlapping criteria for parental age, not mentioning marital status or parental education level as well as not having a definition for functional goal. As a result, the parents did not understand what the questions were asking them, the questionnaire was too long, or the goals being set for occupational therapy are being set by the therapists and not in collaboration with the parents. If the latter is the case, the focus of therapy is on academic challenges in the school rather than functional difficulties within the home environment.

Another area that the therapists could consider is making use of the GAS system when developing goals with parents in their termly meetings. This may increase the parents who had either no knowledge or an incorrect understanding of the sensory integrative approach. Goal setting within the remedial school environment can thus be further researched in the future.

6.4 CONCLUSION

The information gathered in this study will be used by the researcher and other occupational therapists in the remedial school to guide future therapy. The findings will also aid in selecting which approaches to use with specific children and can help with workshop development to ensure the parents receive up-to-date literature on the approaches that are being used with their children. Ensuring collaborative goal setting will aid the therapists in ensuring the set outcomes are achieved quicker. If the children achieve their goals faster, they will spend less time in occupational therapy, resulting in more remedial classroom interventions so that they can mainstream as soon as possible.

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Appendix 1: Questionnaire

Confidential

My First Instrument

Dear Participant,

Thank you for taking the time to fill in this questionnaire. This questionnaire is part of my Masters degree and is designed to understand what knowledge parents have with regards to sensory integration.

Participation in this study is voluntary and you or your child will not be penalised for not participating in the study. Completion of the questionnaire indicates that you consent to take part in this study.

Some of the terms are defined below for clarification. If you have any questions regarding the following document please be in touch. The more detail and information provided by you will be greatly beneficial to this process. The questionanire should take approximately 10-20 minutes to complete.

For your information:

Sensory Integration is how a person receives information through our senses and responds with an action for example the way a child takes in sound information from the teacher, processes it and is able to use it in orde to undertand the task expected of him.

Please complete the survey below.

Many Thanks.

Danielle Fingleson

0704129w@students.wits.ac.za

1) Is your child currently receiving sensory integration therapy or have they received it previously?

- ○ Yes
- ○ No

2) Are you a mother, father or other (guardian, grandparent, aupair etc)? Please specify.

_____

3) Parent's Age

- ○ Below 25
- ○ 25-30
- ○ 30-35
- ○ 35-40
- ○ 40-45
- ○ 45-50
- ○ 50 and above

4) Child's gender

- ○ Boy
- ○ Girl

5) Have you ever received any information on sensory integration therapy from any source?

- ○ Yes
- ○ No

6) Child's grade

- ○ Grade R
- ○ Grade 1
- ○ Grade 2
- ○ Grade 3
- ○ Grade 4
- ○ Grade 5 and above

7) Is your child in any other therapies (physio, speech, play or remedial)? If so, how long have they been in the specific therapy/therapies?

8) How long has your child been receiving sensory integration therapy /how long did your child receive sensory integration therapy

- ○ 0-1 years
- ○ 1-2 years
- ○ 2-5 years
- ○ 5 or more years
- ○ Never

9) What is your understanding of sensory integration therapy? Please provide a short description below

10) Where did you gain the information above?

- ☐ Therapist
- ☐ Books
- ☐ Internet
- ☐ Other parents

In your opinion is/was sensory integration therapy.....
Please rate each on a scale from strongly disagree to strongly agree as well as either increased or decreased:
(Defensiveness is defined as an excessive emotional response to a certain sensation)

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Increased	Decreased
11)	Effective for your child?	☐	☐	☐	☐	☐	☐	☐
12)	Changed your child's sensory processing?	☐	☐	☐	☐	☐	☐	☐
13)	Changed your child's aggression and/or frustration?	☐	☐	☐	☐	☐	☐	☐
14)	Changed your child's defensiveness/oversensitivity	☐	☐	☐	☐	☐	☐	☐
15)	Changed your child's difficult behaviour	☐	☐	☐	☐	☐	☐	☐
16)	Changed your child's social skills	☐	☐	☐	☐	☐	☐	☐

In your opinion did sensory integration therapy---- Please rate each on a scale from strongly disagree to strongly agree as well as increased and decreased.
(Motor planning is defined as the way a child plans, sequences and performs a motor action in response to a stimulus.
Motor accuracy is defined as the way groups of muscles work together in order to perform a required action effectively.)

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Increased	Decreased
17)	Change your child's motor planning difficulties?	☐	☐	☐	☐	☐	☐	☐
18)	Change your child's performance in tasks?	☐	☐	☐	☐	☐	☐	☐
19)	Benefit your child?	☐	☐	☐	☐	☐	☐	☐
20)	Change your child's academic skills?	☐	☐	☐	☐	☐	☐	☐
21)	Change your child's anxiety?	☐	☐	☐	☐	☐	☐	☐
22)	Change your child's motor accuracy/motor coordination?	☐	☐	☐	☐	☐	☐	☐

Did sensory integration therapy cause:
(Gross motor skills are defined as skills that require the large muscles of the body i.e trunk and limbs
Fine motor skills are defined as skills requiring small muscles of the body i.e. hands)

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Increased	Decreased
23)	Changes in gross and fine motor skills in your child?	☐	☐	☐	☐	☐	☐	☐
24)	Changes in concentration in your child?	☐	☐	☐	☐	☐	☐	☐
25)	Changes in home routine adherence?	☐	☐	☐	☐	☐	☐	☐
26)	Changes in confidence and self-esteem in your child?	☐	☐	☐	☐	☐	☐	☐
27)	Changes in speech and language abilities of your child?	☐	☐	☐	☐	☐	☐	☐
28)	Changes in engagement of your child in family outings and events?	☐	☐	☐	☐	☐	☐	☐
29)	Changes in your child communicating in your home?	☐	☐	☐	☐	☐	☐	☐

30) Do you practice sensory integration tasks with your child such as swinging, provided deep pressure activities etc. Please clarify.
Yes
No

_____

31) Sensory integration therapy has helped me to:

☐ help my child at family outings and events
☐ communicate more effectively with my child
☐ handle meltdowns and tantrums
☐ anticipate difficult environments and situations and help my child to cope with these
☐ help my child to concentrate better?
☐ encourage my child to try a wider selections of foods?
☐ encourage more independence from my child in his dressing skills?
☐ encourage more independence from my child in his grooming skills?

32) How important do you think it is for a parent to understand sensory integration therapy?

○ Very important
○ Important
○ Not very important
○ Not important at all

33) In your view what type of information on sensory integration would be beneficial to parents?

- ☐ None
- ☐ Different sensory systems
- ☐ Functional implications
- ☐ Home programme ideas
- ☐ Effects of poor sensory integration on child as a whole
- ☐ All of the above

34) Do you have any suggestions on how to improve parents' knowledge on sensory integration? Please indicate which of the following may be useful. You can choose more than one option.

- ☐ Reading materials
- ☐ Workshops
- ☐ Discussion with therapists
- ☐ Parent discussion groups
- ☐ Blogs
- ☐ All of the above

35) Please answer the questions below relating to your child's goals

What functional goals, if any, were set for your child by you and the therapist with regard to sensory integration frame of reference?

36) Which of these functional goals do you feel have been/were achieved thus far with regard to sensory integration frame of reference? If achieved, what change in behaviour was evident?

37) Which of these set goals do you feel your child still needs/still needed to achieve with regard to sensory integration frame of reference?

38) What has been/was the biggest achievement or change your child has made thus far which you feel can be attributed to the sensory integration frame of reference? Why do you think this is so?

39) What do you think has been/was your child's most significant achievement in family/home life which you feel can be attributed to the sensory integration frame of reference?

40) What do you think has been/was your child's most significant achievement in school life which you feel can be attributed to the sensory integration frame of reference?

41) Do you feel sensory integration frame of reference is/was beneficial to your child? Please elaborate.

42) Do you think the change in your child's sensory integration is due to occupational therapy only? Why or why not?

Appendix 2: Information letter for principal

Department of Occupational Therapy

7 York Road, Parktown, 2193 South Africa • Telegrams 'Witsmed' • Tel: +27-11-717-3701 • Fax: +27-11-717-3709

e-mail: Leilane.Bogoshi@wits.ac.za

Occupational Therapy Department

7 York Road

Parktown

2192

25 May 2016

Mrs Alison Scott

37 Wingfield Ave

Birdhaven

2196

Dear Mrs Scott,

RE: MSc research study at school

I, Danielle Fingleson, am currently completing a research project in partial fulfilment of a MSc degree in Occupational Therapy, at the University of the Witwatersrand, Johannesburg. The title of the study is "Parents' knowledge of sensory integration in occupational therapy within a remedial school environment." The aim of the study is to describe parents' knowledge of sensory integration with a

remedial school environment as well as find out whether their understanding affects outcomes in therapy. I would be most grateful if you would consider allowing your school to be used as the research site as well as allow me to screen through the therapy files to select parents. Once the parents have been they will be asked to complete a survey about their knowledge of sensory integration.

Why am I doing this?

Sensory integration is defined as "the neurological process that organises sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment" (4 page 11). It starts with the intake of information, adjusting that sensation, organising it and then synthesizing it for use within an individual's daily life. Children with sensory integrative dysfunction may have difficulties in any part of the process which in turn will affect the other parts and as well as the child as a whole (4,29). Over the years since the development of this approach, much research has been done to clarify efficacy within the field of occupational therapy (6, 9, 14, 52).

Many studies have been conducted which measure the effect sensory integration has had in occupational therapy with regards to occupational performance areas however, very few studies have looked at the understandings of the parents whose children receive this approach in therapy (9, 12, 59).

Parents play an important role in the therapy process as they are heavily involved in carrying over the therapy into the home environment (9, 14). Parents have given enthusiastic accounts of how occupational therapy making use of sensory integration has improved motor skills, body image, engagement, personal management, play and socialisation in their children and improved self-image and understating of their children for themselves (6,9,10). Cohn ES (9) explained that understanding a parent's view of therapy is vital in understanding how therapy has changed the specific child's life and functioning. The research also found parents felt that positive changes in one area lead to changes in another area of functioning (6).

This research report will allow therapists to understand the parents' knowledge of sensory integration as an approach in South Africa. The findings will also help therapists to ensure they are providing family centred intervention.

What do I expect from the school in the study?

I would like to request permission from the school for participation in the study as well as to screen the therapy files to select the participants. The school will be requested to assist me to hand out the survey to parents in two formats, hard copy or electronic copy. The hard copy can be handed out at the termly meetings with the therapists and a marked box will be placed in the reception area for collecting the surveys. If the parents prefer an electronic copy, a link along with the information sheet can be sent out in the school's newsletter.

Inclusion Criteria:

Parents of children who attended the selected remedial school in Johannesburg and who received therapy using the sensory integrative approach either previously or currently in the year between June and November 2017.

What do I expect from the participants in the study?

An information letter describing the purpose of the study, that their participation is voluntary and that they will not be penalised for not participating in the study will be given to the parents. They will be provided with either a hard copy or electronic copy of the questionnaire to fill in. The questionnaire is to be completed anonymously and will take approximately 20-30 minutes to complete.

Are there benefits to the school and participants?

Yes, the findings will assist in understanding of the parents' knowledge and allow occupational therapists to ensure they are focusing on family centred goals in therapy.

What about confidentiality?

Confidentiality will be maintained by completing the questionnaire anonymously both in the hard copy and electronic format and so that no survey can be traced to the person who completed it.

Ethical considerations

The proposal for this study went through a rigorous assessment and approval was requested from the postgraduate research committee, as well as the Human Research Ethics committee at the University of Witwatersrand. Unconditional approval was granted by the committee, approval number M160952.

If you have any queries or need more information, please contact me on telephone number 0835651988 or daniellefingleson@gmail.com. If you have any ethical concerns please contact the chairperson of the Wits Human Research Ethics Committee, Prof P Cleaton-Jones on 011 7171234 or at zanele.ndlovu@wits.ac.za.

Please contact me if you would like to have a copy of the research protocol that will provide detailed information on the theoretical background of the study as well as on the statistical information for the study.

Thank you,

Danielle Fingleson

Occupational Therapist

Appendix 3: Principal permission letter

WITS UNIVERSITY

Department of Occupational Therapy

7 York Road, Parktown, 2193 South Africa • Telegrams 'Witsmed' • Tel: +27-11-717-3701 • Fax: +27-11-717-3709
e-mail: Leilane.Bogoshi@wits.ac.za

APPENDIX C: PRINCIPAL PERMISSION LETTER

TO BE RETUNED TO:

Danielle Fingleson

E-mail: daniellefingleson@gmail.com

I hereby **grant** / **do not grant** Danielle Fingleson permission to conduct the study entitled:

Parents' knowledge of sensory integration in occupational therapy at a remedial school

I hereby **grant** / **do not grant** Danielle Fingleson permission to screen therapy files in order to select participant for the above mentioned study.

Name of School: BELLAVISTA SCHOOL

Address of School: 35 WINGFIELD AVENUE BIRDHAVEN, JHB.

Name of Principal: ALISON SCOTT

Signature of Principal:

Date: 2016-08-02

School stamp

ALISON MARY SCOTT
PREPARATORY HEAD
BELLAVISTA SCHOOL
Ex Officio Commissioner of Oaths
CERTIFIED TRUE COPY OF ORIGINAL

BELLAVISTA SCHOOL
P.O. BOX 55017
NORTHLANDS
2116

2/8/2016

Appendix 4: Information letter for parents

Department of Occupational Therapy

7 York Road, Parktown, 2193 South Africa • Telegrams 'Witsmed' • Tel: +27-11-717-3701 • Fax: +27-11-717-3709

e-mail: Leilane.Bogoshi@wits.ac.za

Dear Participant,

Thank you for taking the time to fill in this questionnaire. This questionnaire is part of my Masters degree and is designed to understand what knowledge parents have with regards to sensory integration.

Participation in this study is voluntary and you or your child will not be penalised for not participating in the study Completion of the questionnaire indicates that you consent to take part in this study.

Some of the terms are defined below for clarification. If you have any questions regarding the following document please be in touch. The more detail and information provided by you will be greatly beneficial to this process. The questionnaire should take approximately 10-20 minutes to complete.

For your information: Sensory Integration is how a person receives information through our senses and responds with an action for example the way a child takes in sound information from the teacher, processes it and is able to use it in order to understand the task expected of him.

Please complete the survey below.

Many Thanks.

Danielle Fingleson

0704129w@students

Appendix 5: Ethics approval

R14/49 Miss Danielle Fingleson

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M160952

NAME: (Principal Investigator)	Miss Danielle Fingleson
DEPARTMENT:	Occupational Therapy Bella Vista Remedial School in Johannesburg
PROJECT TITLE:	Parents' Knowledge of Sensory Integration Frame of Reference within Occupational Therapy at a Remedial School
DATE CONSIDERED:	30/09/2016
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Janine Van Der Linde
APPROVED BY:	Prof C Feldman, Co-Chairperson, HREC (Medical)
DATE OF APPROVAL:	20/12/2016

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in September and will therefore be due in the month of September each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES