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EXPLORING THE EFFECT OF A SENSORY-BASED INTERVENTION ON OCCUPATIONAL PARTICIPATION AND ANXIETY IN CHILD VICTIMS OF TRAUMA WITHIN THE SOUTH AFRICAN CONTEXT

Rowena Y Joseph

A thesis submitted to the Faculty of Health Sciences, School of Therapeutic Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy.

Johannesburg

September 2022

Declaration

I, Rowena Y Joseph hereby declare that this thesis is my own work. It is being submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.



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Plagiarism Declaration

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Dedication

“A voice to every child *suffering in silence* as a victim of trauma”

Publications and Presentations Arising from This Study

Publications:

1. Sensory Modulation Dysfunction in Child Victims of Trauma: A Scoping Review

Joseph, R.Y., Casteleijn, D., van der Linde, J. *et al.,* Sensory Modulation Dysfunction in Child Victims of Trauma: a Scoping Review. *Journ Child Adol Trauma* **14,** 455–470 (2021). https://doi.org/10.1007/s40653-020-00333-x (Appendix B)

2. Sensory Modulation Dysfunction in Child Victims of Trauma from four residential care sites in Southern Gauteng, South Africa (Appendix C)

Joseph, R.Y., Van der Linde, J., Franzsen, D. Sensory modulation dysfunction in child victims of trauma from four residential care sites in southern Gauteng, South Africa. *South African Journal of Occupational Therapy*, Vol. 52(2), 2022 ..http:/dx.doi.org/10.17159/2310-3833/2022/vol52n2a2

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To the Rosemary Crouch Fund and SAISI, (South African Institute of Sensory Integration) whose financial support contributed significantly to the continuation of this study.

I pray that my Heavenly Father will direct my path to be that instrument of healing to the child whose innocent joys has been derailed and who has been forced too early in their development to face the harsh realities of life.

Abstract

Within the South African context, sensory-based interventions in Child Victims of Trauma (CVT) could have a positive impact on occupational participation and levels of anxiety in this vulnerable group of our population by addressing emotional and developmental dysregulation which results in dysfunction in many occupations. Research indicates that self-regulation difficulties present as behavioural and emotional dysregulation in CVT. This is synonymous with the diagnosis of a sensory modulation dysfunction i.e. one's inability to respond adaptively to sensation over a broad range of intensity and duration (Kramer and Hinojosa, 2010; Lane, 2002). According to literature talk therapy or top-down approaches, alone, do not address this need. Neuroscience research studies indicate that in CVT, the Broca's area (speech area) becomes disengaged due to the intense and violent impact of trauma on the nervous system, making top-down or talk therapy approaches difficult. The literature reviewed indicated that the behavioural and emotional difficulties experienced by CVT stems from physiological (body functions) responses that are linked to our autonomic nervous system. Therefore, the current study focused on exploring the effectiveness of a sensory-based intervention (bottom-up approach) to address the behavioural and emotional difficulties of CVT. Due to the occupational therapy profession being at the forefront of bottom-up therapy strategies and programmes, it was necessary to provide empirically based research to enhance therapists' expertise in this field of practice.

In Phase 1 a scoping review was applied to map the extent of empirical research available that identified and treated CVT using sensory-based interventions (based on Ayres Sensory Integration ®). In Phase 2, using purposive sampling, CVT from four residential care sites were selected. The Child Sensory Profile™ 2 (CSP™2), was completed by Child and Youth Care Workers (CYCWs). This formed the baseline assessment for 128 child participants. In Phase 3, a RCT was used incorporating two outcome measures for occupational performance and anxiety as the dependent variables, and the Alert Program® (a sensory-based intervention) as the independent variable.

The results of the scoping review in Phase 1 yielded 13 articles, indicating that limited empirical research was available which focused on the identification and

treatment of CVT using sensory-based interventions. The findings advocated for a multidisciplinary approach with sensory-based interventions being an important component in the treatment plan for CVT.

The results of Phase 2 identified 91.4 % (117) child participants with sensory modulation dysfunction, with only 8.6 % (11) participants displaying no symptoms and scoring “just like the majority of others” in all categories of the summary scores on the CSP™ 2. For this sample of CVT, a unique sensory profile that differs from published norms for typical children “just like the majority of others,” indicated a vigilant sensory subtype with increased Sensitivity and Avoidance.

In Phase 3 the RCT results, following nine weekly sessions of the Alert Program®, indicated greater statistically and clinically significant changes in anxiety levels as compared to changes in occupational participation. Various confounding variables impacted on the intervention process and outcome measures. A major limitation to the improvement across these outcome measures was the lack of adult availability to carry over and support self-regulation strategies in the daily lives of child participants.

A pilot study prior to implementation of a sensory-based intervention is strongly recommended to ensure that child participants have consistent adult support to incorporate appropriate self-regulation strategies into their daily activities. This might enable them to manage their behaviours and emotions in appropriate ways which may have a significant impact on their occupational participation and levels of anxiety in their daily lives. Ongoing empirical research is also recommended to add rigour and credibility to this new field of research.

Keywords:

Sensory-based intervention, Alert Program®, Child victims of trauma (CVT), Occupational performance, Anxiety, Self-regulation, Sensory modulation dysfunction (SMD), Ayres Sensory Integration® (ASI®), Child and youth care workers (CYCW)

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Operational Definitions

Ayres Sensory Integration®: In ASI® the focus is on the importance of integration of sensory information for developing and using skills in all areas of participation. It is thus an *art* as the interaction between the child and practitioner is playful in a motivating context and *science* as it is based on concepts of neuroscience (Schaaf and Mailloux, 2015).

Sensory Integration: Ayres defined sensory integration as "The neurological process that organizes sensations from one's body and from the environment and makes it possible to use the body effectively in the environment" (Ayres, 1989; Kramer and Hinojosa, 2010).

Sensory Integration Dysfunction: A disorder in processing and integrating information is specifically referred to as the "inability to process and integrate information from the body and the environment" (Smith-Roley, 2006).

Post-Traumatic Stress Disorder: Trauma-related disorder diagnosed secondary to symptoms that present after one or more traumatic events. Symptoms can be divided into categories including re-experience of the traumatic event, avoidance of situations that are reminders of the event, negative changes in beliefs and feelings, and hyper-arousal (DSM-5™)(American Psychiatric Association, 2013).

Sensory-based Interventions: These interventions typically occur in the child's natural environment and consist of applying adult-directed sensory modalities to the child with the aim of producing an effect on self-regulation, attention, or behavioural organization (Watling *et al*., 2011; Watling and Hauer, 2015) Problems caused by dysfunction in sensory processing can be addressed using discrete sensory experiences or environmental modifications (Ayres, 1989; Case-Smith and Arbesman, 2008). This approach primarily includes tactile, proprioceptive, and/or vestibular stimulations.

Sensory Modulation Dysfunction: Sensory modulation takes place as the central nervous system regulates the neural messages about sensory stimuli. It is defined as one's ability to respond adaptively to sensation over a broad range of intensity and duration (Kramer and Hinojosa, 2010; Lane, 2002). Individuals identified with sensory modulation dysfunction present with sensory modulation disorder (Miller, Anzalone, *et al*., 2007).

"Top-down" approach: This refers to higher cognitive functioning, using the cortex for thinking about self-regulation to help individuals recognize problems with lower level functioning (Bundy and Lane, 2020)

bottom-up approach: Strategies used to change sensorimotor regulation which contributes to improved emotional, social and behavioural regulation by using sensorimotor strategies from the mouth, move, touch, look and listen sensory systems (Bundy and Lane, 2020).

Child Victims of Trauma: Children who have experienced overwhelming traumatic situations causing psychological and biological responses that elicits mental and physical responses which interferes with their ability to function and engage with others (Klain, 2014). Trauma in the context of this study inclusive of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment for commercial or other exploitation and excludes physical trauma resulting from a motor vehicle accident or burn injuries.

Occupational Performance: "The ability to perceive, desire, recall, plan and carryout roles, routines, tasks and sub-tasks for the purpose of self-maintenance, productivity, leisure and rest in response to demands of the internal and/or external environment" (Chapparo and Ranka, 1997, p.1)

Anxiety: Anxiety is associated with muscle tension and vigilance in preparation for future danger as well as cautious or avoidant behaviours. It refers to the anticipation of future threat (DSM-5™) (American Psychiatric Association, 2013).

Under-responsivity: Also known as sensory hypo-responsivity, show less of a response to sensory input than would be expected for the situation, they take longer to respond and require more intense input before they even respond (Miller *et al*., 2001). (Depending on the source being cited also referred to as hypo-reactivity, under-reactivity, sensory avoiding or hypo-arousal)

Over-responsivity: Also known as sensory hyper-responsivity characterised by more exaggerated intense and faster behavioural response to sensory stimuli which is for longer durations (Miller *et al*., 2001). (Depending on the source being cited also referred to as hyper-reactivity, over-reactivity, sensory seeking, or hyper-arousal).

Abbreviations

ADLs: Activities of Daily Living

ASI®: Ayres Sensory Integration®

ASD: Autism Spectrum Disorder

CBCL: Child Behaviour Checklist

CBT: Cognitive Behavioural Therapy

CONSORT: Consolidated Standards of Reporting Trials

CSP™ 2: Child Sensory™ Profile 2

CVT/s: Child Victim/s of Trauma

CYC/s: Child and Youth Centres

CYCW/s: Child and Youth Care Worker/s

DBT: Dialectical Behaviour Therapy

EMDR: Eye Movement Desensitization and Reprocessing

GAS: Goal Attainment Scale

HIV: Human Immunodeficiency Virus

HPA: Hypothalamic–Pituitary–Adrenal

MOHO: Model of Human Occupation

NACCW: National Association of Child Care Workers

OTPF: Occupational Therapy Practice Framework

OT-SI: Occupational Therapy Sensory Integration Approach

PET: Positron Emission Tomography

PTSD: Post-Traumatic Stress Disorder

PTSD- RI: Post-Traumatic Stress Disorder Reaction-Index

RCT: Randomised Control Trial

SCAS: Spence Child Anxiety Scale

SCOPE: Short Child Occupational Profile Evaluation

SID: Sensory Integration Dysfunction

SIGN: Sensory Integration Global Network

SMART: Sensory Motor Arousal Regulation Treatment

SMD: Sensory Modulation Disorder

SOR: Sensory Over-responsivity

SPD: Sensory Processing Disorder

STEP-SI: Sensation, Task, Environment, Predictability - Self-Monitoring and Interaction

TF-CBT: Trauma-Focused Cognitive Behavioural Therapy

TIC: Trauma-Informed Care

WHO: World Health Organisation

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION TO THE PROBLEM

A keynote address at the Africa Regional Child Trauma Conference, in 2019, indicated that more than 20% of children in Africa may be affected by trauma due to exposure to violence and other adverse experiences in their homes, schools, and communities. Interpersonal violence, child abuse, and neglect associated with poverty, high levels of Human Immunodeficiency Virus (HIV), breakdown in family structures, and societal values, are considered endemic in South Africa (Mathews, 2019).

Exposure to trauma and resultant post-traumatic stress disorder (PTSD) has been associated with persistent, abnormal adaptation of neurobiological systems to the stress, particularly in children. Childhood trauma should therefore be viewed from a behavioural and biological perspective (Van der Kolk, 2003). To target the source of dysregulation or the child's physiological stress response, within a safe environment, the priority focus needs to be on body functions and in particular sensory systems, which are the initial areas impacted by the trauma (Van der Kolk, 2003).

Herold *et al*. (2016) indicates that the dysregulatory symptoms seen in complex trauma are similar to the symptoms of sensory integration dysfunction (SID) including hypersensitivity, avoidance, low registration, hypervigilance, increased startled response, attention deficits, irritability, and anxiety. Therefore, sensory approaches and sensory-based interventions have been suggested by (World Health Organisation, 2017) to address regulatory disorders using a sensory integration framework (Fraser, MacKenzie and Versnel, 2017; Dowdy *et al.*, 2020).

Further to this, Alers (2008) indicates a link between sensory integration and trauma. However, she indicates this has not been researched conclusively, and the understanding of how our nervous system functions after traumatic events, is often overlooked. With this as a reference point, based on the sensory integration and sensory modulation theoretical framework of Ayres Sensory Integration®, (ASI®) the current study elucidates the physiological link between sensory modulation and

trauma and investigates the effectiveness of a sensory-based program with child victims of trauma (CVT).

Living and working within a diverse community for over 30 years, the safety and security needs of children has always been of highest priority. Within this community, the principal researcher is aware of extensive and frequent reporting by the media of children who have fallen victims to trauma that have been inflicted upon them. It is more often reported that the perpetrators are adult figures within their communities and families.

The degeneration in our morals and values both locally and globally has resulted in catastrophic numbers of children requiring therapeutic support and assistance. This current reality gave the researcher a platform to explore a therapeutic intervention to assist in alleviating the short and long term effects of trauma inflicted upon children in our society.

As an occupational therapist with postgraduate qualifications in play therapy and sensory integration, it was a solid foundation to explore an occupational therapy programme for child victims of trauma. It was important to the principal researcher to keep the study contextually relevant so that it would provide the necessary insight and knowledge to therapists working within the South African context. Due to the lack of healthcare professionals within the South African context, it has become vital that each professional within the multidisciplinary team of health services collaborate their resources in order to provide effective therapeutic interventions based on their training and skills. The population of child victims of trauma is ever increasing, therefore professional skills and expertise is a constant need in providing effective interventions. The principal researcher sees this research study as a catalyst in exploring various other sensory-based approaches in the treatment of this vulnerable population in our society.

1.2 BACKGROUND AND SETTING OF THE PROBLEM

The Children's Institute at the University of Cape Town report in 2017 indicated that although the exact prevalence of child abuse is not known, results of studies consistently report that children exposed to trauma and abuse are common within the South African context (Jamieson, Sambu and Mathews, 2017). The UBS

Optimus Foundation (2016) explored maltreatment of children including neglect, physical abuse, emotional abuse, and exposure to family violence. The study was specifically designed to provide an annual incidence of child sexual abuse and maltreatment in South Africa. The sample population consisted of 15 -17 year old children, staff, and directors of community organizations. The study estimated that abuse is reported by 12% of children and neglect by 17% of children, while one in three children may be victims of sexual violence and physical abuse. Ward *et al*., (2018) reported that both boys (10-14%) and girls (15-16%) are victims of sexual violence in South Africa. This violence and abuse inflicted on children result in varying degrees of trauma that may present as anxiety and depression and other associated behaviour related symptoms of trauma (UBS Optimus Foundation, 2016).

Alers (2008), an occupational therapist and specialist in the field of trauma, indicated that trauma challenges a person's lifestyle, and this can have long-lasting or permanent emotional effects on a person, especially when experienced during childhood. Trauma in childhood, therefore, underlies most long-term emotional and psychological conditions (Cross *et al*., 2017; Murray *et al*., 2014). Severe trauma can even result in changes to the chemistry and physiology of the brain (Van der Kolk, 2003). Together with the impact of the environment e.g., exposure to substance abuse, unhealthy and unhygienic living conditions, poor parenting, and violence in communities; childhood trauma should be viewed from a behavioural and biological perspective. Behavioural or outward manifestations are visible to others while biological manifestations refer to internal changes that are invisible (Pechtel and Pizzagalli, 2011). In childhood and adolescence brain structures and regions undergo different stages and periods of maturation, and the neurophysiological responses of trauma are often dependent on the developmental stages of the brain at the time of trauma. Therefore, stress due to trauma may have a greater impact in childhood and adolescence as compared to adulthood, due to the critical changes happening on a biological level in the brain (Pechtel and Pizzagalli, 2011).

Exposure to trauma resulting in PTSD has been associated with persistent, abnormal adaptation of neurobiological systems to the stress, particularly in children (Atchison, 2007). Dysfunction in sensory modulation may be observed in CVT as over or under-responsiveness as well as sensory shutdown when experiencing trauma (Atchison, 2007). These responses relate to the neurophysiological processes including those described in the Cascade Model (Teicher *et al*., 2002). The Cascade Model centres on the effects of increased activation of the stress hormone systems in the developing brain as a result of trauma, affecting the integration of the sensory input (Teicher *et al*., 2002), leading to debilitating conditions. This model reveals the connection between trauma and permanent changes in the brain that can have a devastating effect on mental health. Exposure to trauma resulting in over-responsive and under-responsive behaviours in children that impact learning, relationships with their peers in a school environment, as well as engagement and response rate to play activities is evidenced in Teicher et al., 2002 research on the Cascade Model.

Children who develop sensory defensiveness, in particular, may become overwhelmed by daily activities or play experiences (Bhreathnach, 2009). Alers, (2008) explains that the primary outcome of interventions in victims of trauma is to integrate the mind-body-brain function. Without appropriate interventions especially during the childhood phase of development, there is a higher risk of children developing cognitive, behavioural, and emotional difficulties later in their life. This would ultimately affect participation in all activities of daily living (ADLs). Therefore, intervention must be provided early in the case of trauma in children, to prevent lasting neurological and psychological damage (Mathews, 2019).

Literature indicates early treatments used to address traumatic stress disorders are cognitive-behavioural therapy (CBT), pharmacotherapy, psychodynamic therapy, and creative therapies (Foa *et al*., 2010). All of these therapies play a significant role in treating trauma in children. Cognitive-behavioural therapy is the most frequently endorsed and empirically supported treatment in psychological change procedures using a top-down approach (Foa *et al*., 2010). However, according to Piaget, children up to 11 years of age have not developed abstract and hypothetical thinking (Piaget, 1957), therefore CBT cannot be considered as the first line of treatment in

the case of the CVT (Warner *et al*., 2014). Treatment should consider non-verbal or bottom- up approaches that prioritizes the body's responses rather than relying on the verbal responses of CVT (Warner *et al*., 2014).

Van der Kolk (2007) concurs on the need to focus less on cognitive responses about the trauma, and more on the person's sensory experiences so treatment should consider non-verbal approaches for CVT. Van der Kolk (2007) further explains that this higher level integration (cognitive responses) is dependent on the integration of the lower-level structures i.e. on sensorimotor (bottom-up) experiences in addressing the needs of the body in CVT.

Based on ASI® sensory integration and sensory modulation theoretical frameworks (Schoen, Miller and Flanagan, 2018), the current study elucidates the physiological link that sensory modulation has to trauma. Given our understanding thus far of the link between trauma and our sensory systems, occupational therapists are well-positioned to provide sensory-based interventions aimed at the self-regulation (Schoen, Miller and Flanagan, 2018). This is based on the association between the trauma experienced and sensory processing, specifically sensory modulation. In addition, the impact of the environment is integral to ASI® sensory integration and sensory modulation theory and practice. This should also be addressed to enable children to regulate their themselves and enhance participation. In functional and supportive environments children are exposed to age appropriate activities. This allows them to experience and register and adjust their responses to themselves and others in an age appropriate manner.

Sensory modulation was defined as the ability to facilitate neural messages to produce an enhanced response while inhibiting other messages to reduce the activity (Ayres, 1979). Brown *et al*., (2019) in their review indicate that sensory modulation is a neurophysiological process that refers to the ability to regulate, process and respond to sensory stimuli. Thresholds described as sensory over-responsivity and under-responsivity affect visible behavioural responses to sensory stimuli.

Within the framework of this study a significant outcome addressed, is the underlying component of anxiety that results in this state of increased arousal in

victims of trauma. Conelea *et al*., (2014) indicates that anxiety is one of the most frequent problems among children who are sensory over-responsive and present with psychological or behavioural dysfunction. These authors also indicate that research highlighting the relationship between anxiety, and sensory over-responsive or sensory over-arousal is extremely limited. From clinical experience within the field of sensory integration, anxiety is observed to be a major component underlying difficult behaviours, often resulting in an overaroused state in CVT.

Interventions used in occupational therapy to address sensory modulation disorder (SMD) or dysfunction in CVT may include sensory-based interventions, environmental modifications, comfort or sensory rooms (Warner *et al*., 2013) and client-centred sensory diets (LeBel *et al*., 2010). The use of these interventions in occupational therapy which addresses sensory modulation and self-regulation support the more complex functions needed in the nervous system for occupational performance. This fulfils outcomes of intervention underlying the philosophy of occupational therapy, where engagement in meaningful occupations allows integration into society in all aspects of life thus improving health, wellbeing, and quality of life (American Occupational Therapy and Association, 2020). For the child, these daily activities include self-care, play, school tasks, sleep, leisure, and social activities which should all be considered as outcomes to test the effect of the sensory-based intervention.

Previous studies such as Sears *et al*., (2016), addressing sensory integration with regards to CVT, have mainly focused on establishing a correlation between trauma and sensory processing disorders (SPD). Ayres Sensory Integration®, (ASI®) theory and research between 1972 and 2018 provides substantial evidence in terms of behaviour and learning disabilities. There appears to be little empirical data for using sensory-based interventions in the treatment of adaptation to the trauma (Kaiser, Gillette and Spinazzola, 2010). However, research has summarised numerous studies that indicate positive outcomes in using sensory approaches with adolescents and adults to reduce aggression and distress (Dowdy *et al*., 2020). As much as this has yielded positive outcomes there is very limited evidence and empirical data on the effectiveness of these sensory approaches in the CVT (Fraser *et al*., 2017). It is also unclear as to whether occupational therapists trained in

sensory integration have provided the correct combination of excitatory and inhibitory stimuli. Simply providing sensory stimulation, that has not been scientifically developed for specific psychological conditions, may increase arousal and lead to maladaptive behaviour (Bhreathnach, 2009). Kaiser, Gillette and Spinazzola (2010) indicate that the degree of accuracy and exactness in treatment is a serious limitation when evaluating the validity of sensory integration studies. Warner *et al.,* (2014) concur that scientific literature does not adequately address somatically based interventions for children.

Therefore, the priority in this study was to map the extent of research in which sensory modulation dysfunction (SMD) has been identified and treated in CVT. It was important to describe the sensory profile of CVT in the clinical setting within the South African context to identify the extent of sensory modulation dysfunction. A sensory modulation approach within this context is appropriate as most environments in which these children grow up do not provide enough sensory rich experiences to aid in the development of self-regulation. Further limitations such as limited access to professional support, a lack of expertise in the field of child trauma, and sensory integration warrants a multidisciplinary approach to address trauma from more than one perspective and approach. Finally, the effect of a sensory-based intervention on occupational participation and levels of anxiety in CVT was explored within this context. The research design chosen allowed empirical documentation to illustrate the outcome of the intervention.

1.3 PROBLEM STATEMENT

Violence against children is a violation of their rights. The Optimus Foundation (2016) and Ward *et al*., (2018) indicate the high percentages of violence against children in South Africa and the varying degrees of severity of trauma resulting from physical abuse, sexual abuse, family violence, neglect, attempted murder, grievous bodily harm, and trafficking. Within the South African context current approaches mainly start with engaging the child's intellectual capacity to cope with trauma by using cognitive-behavioural therapy or a top-down approach. However, expecting verbal and intellectual responses from the traumatised child may be inappropriate (Warner *et al*., 2014). Most children do not have the linguistic and cognitive maturity to address extreme trauma (Van der Kolk, 2003; Warner *et al*.,

2013). The above mentioned research also indicates that due to short-term or long-term exposure to trauma, the physiology and sensory systems are impacted resulting in a dysregulated state. This implies that trauma intervention, particularly in children, should be sensory-based to address dysregulation since sensory modulation is an internal physiological self-regulation process that determines the intensity and duration of our responses as appropriate to a situation.

Occupational therapists as specialists in the field of sensory integration have the theoretical knowledge but not the empirical and documented evidence for the use of sensory-based interventions (a bottom-up approach that prioritises sensory responses), in the treatment of CVT. The application of such an intervention could form an important component in therapy programmes for CVT. This will ultimately impact the child's occupational participation in their ADL.

Current research does not adequately address the need for establishing the effectiveness of bottom-up sensory-based strategies, in the treatment of CVT. Considering the current state of our society and the high prevalence of CVT, the need for research is required in the treatment of CVT.

1.4 RESEARCH QUESTIONS

1. To what extent has sensory modulation dysfunction been identified and treated in CVT?
2. What is the effect of a sensory-based intervention on occupational participation and anxiety in CVT?

1.5 RESEARCH AIMS AND OBJECTIVES

This study was completed in three phases:

1.5.1 Phase 1

Aim

To describe the current evidence for sensory modulation dysfunction in children who have experienced trauma.

Objective

To map literature on sensory modulation dysfunction in children who have experienced trauma.

1.5.2 Phase 2

Aim

To identify and describe the prevalence of sensory modulation dysfunction in CVT in residential settings.

Objective

To identify and describe sensory modulation dysfunction in CVT in residential settings in Gauteng, South Africa.

1.5.3 Phase 3

Aim

To determine the effectiveness of a sensory-based intervention using the Alert Program® on occupational participation and levels of anxiety in child victims of trauma in a residential setting.

Objectives

1. To determine the effect of a sensory-based intervention using the Alert Program® on occupational performance in CVT in a South African setting.
2. To determine the effect of a sensory-based intervention using the Alert Program® on anxiety levels in CVT in a South African setting.

1.5.3.1 Null Hypotheses

There will be no difference in the occupational performance in a group of CVT living in a residential setting who receive a sensory-based intervention, and a group who do not receive the intervention.

There will be no difference in anxiety in a group of CVT living in a residential setting who receive a sensory-based intervention, and a group who do not receive the intervention.

1.6 SIGNIFICANCE OF THE STUDY

This study aimed to contribute to understanding the behavioural and emotional challenges faced by CVT within the South African context and also the extent of knowledge available in this field of study. More specifically this study hoped to add credibility and contribute towards the expertise of occupational therapy practitioners in evaluating and treating CVT within the contexts of their communities and practices.

To achieve the above purposes, this study expanded on the use of the Child Sensory Profile™ 2 (CSP™ 2) in evaluating CVT for which there has been minimal research internationally but not in South Africa. Considering that we are currently facing a growing pandemic in our nation with regards to crimes against children, the results of this study provide empirical evidence for using a specific treatment approach i.e., a sensory-based intervention in the treatment of CVT. The empirical methodology results from the CSP™ 2, and the randomised control trial using the Alert Program® (Williams and Shellenberger, 1996, 2014) (a sensory-based intervention), may equip occupational therapy practitioners with the necessary tools to evaluate and implement a sensory-based intervention in the treatment of CVT.

1.7 ORGANISATION OF THE THESIS

The general outline of the thesis is summarised as follows:

Chapter 1: Introduction.

Chapter 2: Literature Review.

Chapter 3: Underlying Philosophy and Theoretical frameworks of the study.

Chapter 4: Phase 1: Scoping Review.

Chapter 5: Phase 2: Identifying and Describing Sensory Modulation Dysfunction in CVT.

Chapter 6: Phase 3: Exploring the Effectiveness of a Sensory-Based Intervention Occupational Participation and Anxiety in CVT.

Chapter 7: Summary of main findings, strengths and limitations of the study, conclusion, and recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION TO THE LITERATURE REVIEW

This chapter describes childhood trauma within the context of this research study. The physiological response to the trauma associated with neurobiological changes is reviewed. The changes in emotional and behavioural symptoms observed in CVT that align with sensory modulation dysfunction, are explored based on the evidence in the literature. The review also focuses on the assessment of sensory modulation and the outcomes of occupational performance and anxiety associated with sensory modulation dysfunction. Evidence for the use of sensory-based programmes including the Alert Program® used in this study are also considered.

The search engines and database searches used in this study were: Google Scholar, Pubmed, CINAHL, ProQuest, Scopus, and Cochrane, published articles, research theses and congress proceedings.

2.2 TRAUMA IN CHILDREN

Trauma has been defined as child maltreatment which refers to many types of violent acts that are perpetrated against children. The World Health Organisation (WHO) defines child maltreatment as “All forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment for commercial or other exploitation, resulting in actual or potential harm to the child’s health, survival, development or dignity in the context of a relationship of responsibility, trust or power” (WHO, 2020, p.1).

Trauma is an emotional shock that creates significant and lasting damage to a child’s mental, physical, and emotional growth. It can be related to a specific incident such as the loss of parents or a loved one under traumatic circumstances, such as: suicide, natural causes, an unexpected disaster or incarceration, being involved in a disaster or medical trauma related to illness (Virginia Child Protection Newsletter, 2012). Not all trauma is experienced as an initial shock, but it can also be a combination of emotional, physical and sexual abuse that is continuous over months or years. This is often accompanied by environmental and relational stressors such

as parental substance abuse, witnessing domestic and community violence, parent mental illness, child neglect or being a victim of bullying (Koomar, 2009; Van der Kolk, 2003; Virginia Child Protection Newsletter, 2012).

According to Spinhoven *et al*., (2014) trauma can be categorised into two broad types: abuse (emotional, physical and sexual) and neglect (emotional and physical). However, in most studies no clear distinction has been made between the types of trauma nor has there been a consensus on specific types of trauma having specific symptoms (Van der Kolk and Fisler, 1994). In this regard Fraser, MacKenzie and Versnel, (2017) make a comparison between a single event trauma, and complex trauma, the latter being defined as repeated abuse, the witness of physical abuse or prolonged neglect that would have more lasting effects.

Leading experts in the field of traumatic stress, Bessel Van der Kolk (2009), developed the term: “developmental trauma disorder or complex trauma” to give meaning to maltreatment of children, who experienced multiple or chronic events by significant caregivers in their environment. This occurs directly through abuse and neglect, or indirectly by being a witness to violence and stressful experiences. Shrestha *et al*., (2019), in their study on transcultural differences in traumatised children and adolescents, list the following symptoms: changed mood, cognitive and perceptual disturbance, social withdrawal, sleep problems and behavioural problems.

Fraser, MacKenzie and Versnel (2017) further indicate aggression, self-regulation, emotional regulation, attachment, depression, anxiety and misinterpreting sensory information as to symptoms of complex trauma. Kraybill (2015), a childhood trauma survivor, indicates that these long-lasting effects often lead to emotional disturbances and risky behaviour later in life. She describes her experience of trauma as a silent process of disabling children in their day-to-day functioning, which often appears to the observer as being unrelated to the actual trauma experience.

2.3 TRAUMA IN CHILDREN IN SOUTH AFRICA

In the South African context, child maltreatment refers to acts of violence and trauma experienced by persons under the age of 18 years (Optimus Foundation, 2016). Within the context of the country’s socio-economic and political climate, CVT

features at the top of the agenda of social ills in our society, together with issues associated with gender-based violence. Increasing social, political, and economic instability has led to an upward trajectory of incidents of trauma inflicted on the most vulnerable populations in our society. According to the Optimus Foundation (2016), it is estimated that 42% of children in South Africa have experienced some type of maltreatment and 82% have experienced or witnessed some type of victimisation (Optimus Foundation, 2016). Therefore, currently, South Africa experiences high levels of violence against children (Hsiao *et al*., 2018), with an enormity of the problem not on the decline.

This problem does not exclude children who experience intense trauma as a result of being displaced from their familiar family environment. This is often due to it being an unsafe situation that would prevent a child from having their basic needs met. Furthermore some children are doubly displaced due to being refugees. This complicates the safety and security of their living environments.

The Optimus study of 2016 conducted with 15 to 17-year-olds on their experience of violence and abuse, indicated sexual offences inflicted on children as being the highest form of violence against 19.8% of children in South Africa, compared to the global average of 18% for girls and 8% for boys (UBS Optimus Foundation, 2016). The incidence of sexual abuse reported by Ward *et al.,* (2018) on a similar sample was lower at 10%-15%, but they indicated that this form of abuse may well be underreported, depending on the context in which data were collected. Sexual victimisation is strongly associated with other forms of abuse including physical and emotional abuse, neglect, and family violence. One in three children were found to have experienced physical abuse with some being victims of attempted murder and assault with grievous bodily harm, with one in six children have experienced emotional abuse (Optimus Foundation, 2016). While one in eight children indicated they were neglected, one in six children reported they had witnessed violence (Optimus Foundation, 2016).

Although it is documented by the law in the South African Bill of Rights (1996) (Republic of South Africa, 1996) it should also be a basic human response to ensure that children live free from any form of maltreatment. Maltreatment includes, physical, emotional, and sexual violence, either being inflicted upon them or the

child is a witness to these forms of violence. In both situations, the traumatic incidence or experience leaves long-lasting effects on the child's functioning in their ADLs.

2.4 THE IMPACT OF TRAUMA ON NEUROPHYSIOLOGY

Van der Kolk and Fisler, (1994) indicate that most literature on trauma is concerned about the neurophysiological responses to trauma, which are affected by maturation and the severity of exposure to trauma. Klain (2014) states that trauma threatens the life and physical integrity of the child, causing overwhelming stress, fear, and producing intense physiological effects related to breathing, heart rate, and temperature changes in the body.

Children with early repeated experience of exposure to trauma have been found to have associated neuroanatomical changes in the sensory cortex. This was found to affect visual and auditory cortices and the limbic system (Stein *et al*., 1997). In simple terms, the sensory systems interpreted through the child's brain gives meaning to experiences in their complex world (Robinson and Brown, 2016). Perry (2006) explains that when a child is exposed to a significant threat, their physiological response to trauma or a threat will 'reset' their baseline state of arousal, so that even when there are no external threats, their bodies remain in a physiological state of alarm, i.e., being in a constant state of arousal and emotionally 'on guard'.

Dwyer *et al*., (2010) further describe this cascading process as a complex interaction and integration of physiological, cognitive, emotional, and social development processes. These are directly impacted by complex factors of age, developmental stage of the child, the nature of trauma and the support available from significant adults at the time of the trauma. The aspects above play a significant role in emerging psychiatric disorders during development. Traumatic events are related to many forms of psychopathology with the strongest links being anxiety and depression (Copeland *et al*., 2007). In many communities and environments, trauma impairs a child's perception of hope and security in significant caregivers and magnifies their perception of dangerous situations they may observe or experience (Copeland *et al*., 2007). This perception of danger in itself would create anxiety.

Sarah Nikolovska, who holds a bachelor's and master's degree in Cellular and Molecular Biology, based at Europe's leading centre in Neurorehabilitation, explains the difference between the brain of a healthy child and an abused child using Positron Emission Tomography (PET) scans (Nikolovska, 2018). She indicates that the brain of a child who has not experienced emotional trauma looks different from the brain of a child who has. This explains many of the challenges that child trauma survivor's experience:

1. The brain of someone who has experienced trauma shows reduced activity in Broca's area which illustrates the reason individuals generally struggle to verbalise their trauma. Therefore, the need for bottom-up approaches in therapy to address internal physiological changes during trauma. This needs to be prioritized using self-regulation strategies which is at the core of sensory modulation therapy.
2. Reduced communication between the left and right sides of the brain means less information being shared, making it difficult for the brain to reason and understand the context of continuous and volatile emotions (these emotions could be inclusive of anxiety).
3. With changes in the amygdala function, a person is more likely to react to emotional triggers (this could cause instability in their day-to-day occupations).
4. With reduced activity in the cortex and frontal lobes, a person is more likely to react to triggers in their environment even if they are not in danger (could also be inclusive of emotions related to anxiety).
5. Survivors may experience less pleasure and therefore less motivation to engage in activities that they may have previously enjoyed (a reference to a child's occupational participation).
6. These changes may cause survivors of trauma to have difficulty feeling safe even long after the traumatic incident has happened, and often feel threatened by unrelated experiences (this would inevitably affect their daily ability to function effectively in their occupations).

The neurobiology of trauma in childhood may result in a state different from the typical fear response of "fight or flight" and presents as a pattern of the autonomic

response of “freeze”, resulting in disassociation or detachment (Scaer, 2001). This response may include a possible blunted physiological response to the stress (Zaba *et al*., 2015). When a child has been neglected or in a state of fear, in high or low arousal for some time, they may either miss out on important sensory input or may misinterpret sensory information (Van der Kolk, 2003). This has the potential to result in aggression, arousal dysregulation, shutting down if overwhelmed, sensory defensiveness, affect or behavioural dysregulation or running away (Van der Kolk, 2003).

The two main structures of the limbic system that influences our behavioural and emotional responses are the hippocampus which processes conscious memories, and the amygdala that is involved in responses of fear and aggression. Research by Van der Kolk (2014) on the neurobiology of trauma explains that trauma memories become stuck in the amygdala, thus not being processed through the hippocampus into the cortex, to bring meaning to the extent of the trauma**.** Van der Kolk (2003) explained that continued experience or exposure to trauma affects how a child integrates sensory information. In the physiological stress response system, the hypothalamic-pituitary-adrenal (HPA) axis alters the regulation of glucocorticoids, such as cortisol. Childhood trauma is associated with this dysregulation, with elevated baseline cortisol and is thought to be neurotoxic, particularly early in their development (Lupien *et al*., 2016). During adolescence this may result in a compensatory strategy with increased glucocorticoid receptor sensitivity, leading to blunted stress reactivity. Under these circumstances, dysregulation and associated neurobiological changes are likely to persist in (Slattery *et al*., 2013). This has a direct impact on a child’s emotions, behaviour and ability to regulate their arousal levels (Fraser, MacKenzie and Versnel, 2019). Van der Kolk (2014, p.61), explains the function of the hippocampus and amygdala during times of stress using the following diagram (Figure 2.1).

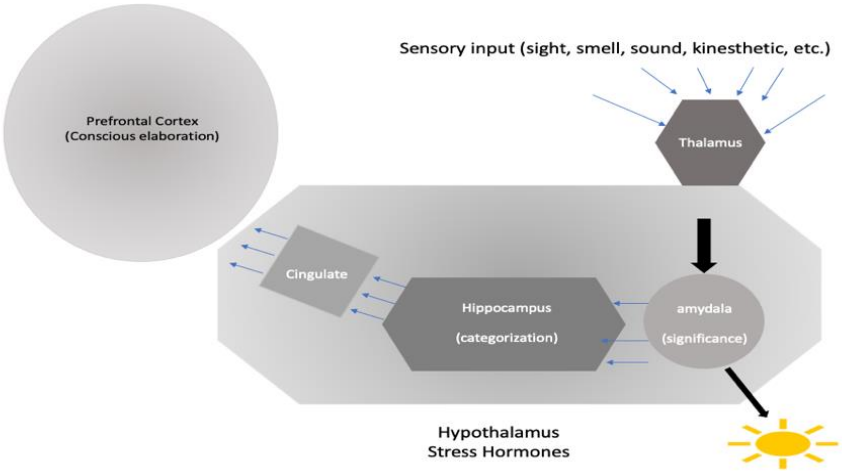


Figure 2.1 The emotional brain interpretation of incoming information
(Van der Kolk, 2014, p. 61)
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Figure 2.1 illustrates how sensory information from the environment is received by the eyes, ears, touch, and kinaesthetic senses. Information received is processed in the thalamus and interpreted by the amygdala to determine the emotional impact of the situation. This process happens with lightning speed and if a threat is detected, secretion of stress hormones by the hypothalamus follows which is the bodies defence against threat. A second pathway makes its way to the prefrontal cortex which is the rational brain that enables a person to become conscious and better able to interpret the details of the situation or incident. If the interpretation of threat by the amygdale is too intense and the filtering system of the brain too weak, a person may lose control over automatic responses such as aggressive outbursts and prolonged startled responses.

Trauma memory symptoms which can be observed in over-arousal, sensory defensiveness and sensory shutdown correlate with symptoms of sensory integration disorder, including SMD which are described in Ayres' Model of Sensory Integration® (ASI®) (Alers, 2008; Parham and Mailloux, 2010).

2.5 SENSORY INTEGRATION AND SENSORY MODULATION

Sensory Integration is a neurophysiological process that integrates sensory input from the external environment and the internal environment in our bodies, with a person's responses and reactions. This theory was developed by (Ayres,1979; 1989; Wellock, 1973) to explain how adequate processing of sensory information is

a foundation for producing an adaptive behavioural response to a task or situation (Kramer and Hinojosa, 2010, p. 99). The neurophysiological processes involve the sensory systems i.e., the auditory, vestibular, proprioceptive, tactile, and visual systems, that receive information from the external environment and internal environment within our bodies. The behavioural responses produced are either seamlessly integrated with the expectations of the task and situation, or these responses are not integrated producing maladaptive behaviours and emotional responses, to the task and situation. As much as all of the above sensory systems contribute to learning, behavioural and emotional responses, the more important contributors are the "body-related" (Kramer and Hinojosa, 2010, p. 101), senses i.e. tactile, vestibular and proprioceptive sensations which are critical contributors to learning and behaviour. Signs and symptoms of maladaptive responses to these sensory systems can be observed in a child's behaviour and emotional response in play, learning, social relationships, and personal care.

The process of sensory integration produces or results in sensory modulation or self-regulation i.e. adjusting your behaviour and emotions to perform a task. This includes paying attention, productively engaging in a task at an age-appropriate level or appropriately self-regulating your emotions to a situation. On a neurological level, sensory modulation or neuromodulation (Bundy, Lane and Murray, 2002) happens within the central nervous system, balancing excitatory and inhibitory inputs to produce an adaptive response to environmental changes. On a behavioural level, sensory modulation indicates responses that are organised and regulated in a graded and adaptive manner, according to the demands and expectations of the environment and is broadly reflected in sensory seeking and sensory avoiding behaviours (Dunn, 1999; Mcintosh *et al*., 1999).

When sensory modulation and self-regulation are dysfunctional, the child may become excessively distracted, excessively passive in an active environment, and excessively emotionally labile. Behaviours reflecting dysfunction present as impulsiveness, distractibility, increased activity level, disorganisation, anxiety, and poor self-regulation (Cohn *et al*., 2000; Wellock, 1973). This has the potential to result in aggression, sensory defensiveness, affect or behavioural dysregulation, avoidance behaviour or arousal dysregulation (May-Benson and Koomar, 2010). All

of the above may produce a maladaptive response and interfere with ADLs. The neurobiology of trauma affects sensory modulation that would usually allow for adaptive responses to the environment when stressors are perceived. All children learn to manage distress, find comfort and regulate or reset their arousal to a state of calm (Perry, 2006) or the "just right" state (Williams and Shellenberger, 1996; 2014). Trauma undermines this fundamental ability of a child's coping system which leads to problems with emotional regulation, sense of self, and interpersonal relations (Dwyer *et al*., 2010).

Wellock (1973) and Ayres (1979, 1989) hypothesised that by stimulating the child with the "just right" (Kramer and Hinojosa, 2010, p.108) sensorimotor opportunities and challenges, change will occur both neurologically and behaviourally enabling the child to make a higher-level adaptive response, with increased motivation to handle their ADLs. The occupational therapy process followed with CVT should therefore include standardised assessments, as well as the implementation of established programmes for children that have shown efficacy for self-regulation of behaviour, even if they have not been trialled with CVT.

2.6 SENSORY MODULATION DYSFUNCTION AND ASSOCIATED OUTCOMES FOR CHILD VICTIMS OF TRAUMA

According to Parham and Mailloux (2010), SMD and related anxiety disrupts the child's daily routines and interfere with their capacity to execute age-appropriate occupations. A case study confirmed positive outcomes for both anxiety and occupational performance when addressing SMD in occupational therapy programmes (Wallis *et al*., 2018).

2.6.1 Occupational Performance

Addressing SMD in trauma victims has gradually started to infiltrate the practice of occupational therapy due to the unique focus of the profession on sensory integration therapy, based on the principles of ASI® (Wellock, 1973; Ayres, 1979; 1989; May-Benson and Koomar, 2010; Petrenchik and Weiss, 2015). This approach allows for volition, habituation, communication, skills, and environment as outlined

in the Model of Human Occupation (MOHO) (Kielhofner, 2008), to be addressed by considering the effect of SMD on occupational performance. Occupational performance refers to “The ability to perceive, desire, recall, plan and carry out roles, routines, tasks and sub-tasks for self-maintenance, productivity, leisure and rest in response to demands of the internal and/or external environment” (Chapparo and Ranka, 1997, p.1)

A study by Fraser, MacKenzie and Versnel (2019), focused on complex trauma and the impact on the developing brain and occupational performance in children and adolescents. Their qualitative study interviewed nine experienced occupational therapists who provided a descriptive analysis of children and adolescents in their practice. They described difficulties in ADLs which included eating, toileting, and sleeping patterns, due to the limited ability of the children to react appropriately to sensory input experienced during these tasks. This occurs as a result of the extent of trauma their bodies and minds have experienced. These children were also described as insatiable, and therefore had much difficulty understanding their own needs. This impacted their occupational performance and participation with family, peers, and other supportive people on a relationship level which leads to maladaptive coping and impacts their overall functioning Fraser, MacKenzie and Versnel (2019).

Baum and Law (1997) reinforce the focus of occupational therapy practitioners on occupational performance, to enable active engagement in life activities by working collaboratively with family, teachers, other professionals, and caregivers in the child’s life. This supports and assists the child’s progress in obtaining skills and strategies to make the necessary adjustments despite their trauma experiences, thus removing barriers that place them in a socially and emotionally disadvantaged position. This focus on occupational performance enables occupational therapists to reframe occupational performance to a socio-medical context i.e., understanding the child’s diagnosis and how trauma has affected their bodies, while simultaneously looking at the external influences that have contributed to the child becoming a victim of trauma. In a recent research study, Harmon (2020), focused on the sensory approach to self-regulation in adolescent survivors of sexual trafficking and highlighted the crucial role that sensory-based programmes have in fostering self-

regulation, which was found to be a necessary skill to address occupational participation.

According to Fraser, MacKenzie and Versnel (2019), trauma impacts the developing brain and occupational performance in children and adolescents, affecting the child's self-awareness in terms of their own self-care needs. Self-regulation using sensory-based interventions improves self-awareness of behaviours and emotions which would in turn contribute to increased awareness of self-care needs and occupational performance.

Addressing the above issues through sensory interventions is indicated as an important component in dealing with complex trauma. Phase 3 of this study focuses on, occupational performance using the Short Child Occupational Performance Evaluation (SCOPE) (Bowyer *et al.*, 2008) and its relation to SMD in CVT

2.6.2 Anxiety

As indicated in the literature review childhood anxiety is one of the most common forms of child psychopathology, particularly related to childhood trauma and dysfunction in the sensory modulation (Copeland *et al.*, 2007; Parham and Mailloux, 2010). Keller *et al*., (1992) suggest that this anxiety is not transient and if left untreated can persist into adolescence and adulthood. It is therefore imperative that anxiety is assessed soon after exposure to trauma, to determine the presence of this often unnoticed behaviour, that has a neurobiological basis with symptoms closely aligned to sensory modulation difficulties (Copeland *et al*., 2007; Spence, 1997). Bundy *et al*., (2002) indicate that according to Ayres, (1972) poor modulation of emotions and behaviour may also manifest as anxiety, which was confirmed by Tauby, (2016) in a sample of South African school-going children with SMD.

Paul, (2019) found that 28.3% of children exposed to trauma had symptoms of subclinical and clinical anxiety. It has been theorised that anxiety may be associated with faulty information processing due to either hyposensitivity or hypersensitivity to sensory input from the environment in children who have SMD (Neal *et a*l., 2002). Over-activation of the amygdala may also lead to encoding and generalisation of the fear response that is greater than usual and may contribute to the development of anxiety disorders particularly sensory over-responsivity (SOR) (Green and Ben-

Sasson, 2010). Symptoms and behaviours such as hypersensitivity to threat, overwhelming physiological arousal, avoidance of feared situations, described in CVT (Bessel and Van der Kolk, 2009), can be exacerbated.

Although behavioural overlap is evident in the assessment of sensory over-responsivity and anxiety, assessments for sensory modulation and anxiety consider different components (Green and Ben-Sasson, 2010). Anxiety assessments would evaluate the intensity of anxiety in relation to life experiences while assessments of sensory modulation would evaluate the intensity of a child's responses to sensory input in relation to daily experiences within the child's environments. Both assessment outcomes describe behavioural responses.

2.7 ASSESSMENT OF SENSORY MODULATION DYSFUNCTION AND ASSOCIATED OUTCOMES

Assessments to determine sensory modulation, levels of anxiety and occupational performance in children used in this study are herein described. These assessment tools were chosen as the most appropriate for the purposes of this research and cost-effective due to the large sample.

2.7.1 Assessment of Sensory Modulation Child Sensory Profile ™2 (CSP™ 2)

There are limited assessments to evaluate sensory modulation. The CSP™ 2 (Dunn, 2014a) (Appendix D) is the assessment commonly referred to in the literature as the gold standard for sensory modulation. The Sensory Integration and Praxis Test (SIPT) (Ayres, 1989), is the most commonly used standardised assessment tool for overall sensory integration and was not solely designed to quantify sensory modulation behavioural difficulties (Schoen, Miller and Sullivan, 2014).

Therefore, Dunn (1999; 2014b) developed the Sensory Profile™2 based on the work on sensory integration by Jean Ayres (1972,1979) to evaluate sensory modulation. As sensory modulation difficulties affect social participation, play and engagement in home and school routines (Cohn *et al.*, 2000; Bundy, Lane and Murray, 2002; Bar-Shalita *et al.*, 2009; Cosbey, Johnston and Dunn, 2010), direct observation to assess these behavioural responses, contributes to the accuracy of diagnosis of

sensory modulation dysfunction. The CSP™ 2 (Dunn, 2014a) therefore relies on the observations of the caregiver of the child. The caregiver reports on the child's sensory behaviours related to tactile, vestibular, and proprioceptive systems, as well as the visual, auditory, olfactory and taste senses.

The assessment of sensory modulation by caregiver observation has often been criticised (Ben-Sasson *et al*., 2009; Woodard *et al*., 2012) because of the potential for bias and a lack of agreement with therapist observations, however, the profile has appropriate validity and reliability. Based on a sample of 1 791 children, the test-retest reliability for the CSP™ 2 (Dunn, 2014a) is 0.83-0.97 and the inter-rater reliability is 0.69-0.89. This indicates good to excellent stability in the test-retest reliability over time, and is mostly acceptable to good inter-rater reliability coefficients.

2.7.2 Short Child Occupational Performance Evaluation (SCOPE)

The uniqueness of occupational therapy as a profession enables clients to achieve their goals by helping them overcome problems that limit their occupational performance (Baum and Law, 1997). Thus, the assessment of participation in occupations as defined by the Occupational Therapy Practice Framework IV (OTPF IV) (American Occupational Therapy Association, 2020), is therefore essential in determining the outcomes of occupational therapy. Occupational performance related to activities, health and well-being, and participation in life through occupational engagement is important for experiencing success. In exploring the meaning of occupations of daily life, components to be included are ADLs, health management, rest and sleep, education, work, play and leisure, and social participation.

The SCOPE (Bowyer *et al.*, 2012; 2008) (Appendix E) is used to assess the occupational performance in children based on Kielhofner's MOHO (Kielhofner, 2008) (see Chapter 3). This model also considers external factors i.e., the socio-cultural and the other environments (Kielhofner, 2008) of the child. When the effect of the environment is considered in CVT, a turbulent political and social-economic environment may profoundly affect the child's occupational performance. The study by Bowyer *et al.,* (2012) reported that the SCOPE was a "top-down" assessment,

that provides a holistic assessment of the child. It also facilitates a family-centred practice thus involving the family members in gathering information about the child.

The SCOPE covers six domains associated with internal components affecting occupational performance namely: volition, habituation, communication and interaction, process skills and motor skills as well as an assessment of the environment. The SCOPE as a caregiver report assessment uses subjective ratings based on the caregiver's judgements and observations, which offers a simple and flexible method of obtaining information about the child's occupational performance.

Although The SCOPE is not a standardised assessment, it is comprehensive enough to provide data on all aspects of a child's participation. The assessment can be conducted formally or informally across practice contexts and settings. Although it may be open to bias due to evaluation by one caregiver, it is an easy tool to administer in a group. It requires the caregiver to read statements based on their observation and decide on a rating. The rating indicates whether the child facilitates, allows, inhibits, or restricts occupational participation. The assessment further allows for the collection of data in larger groups, as instructions and scoring were relatively short and simple (Bowyer *et al.*, 2012).

The SCOPE does not have specific data to reflect reliability and validity scores, however according to (Bowyer *et al*., 2012), their study applied specific processes examining clinical usefulness in the assessment and development of the SCOPE. Psychometric soundness was determined by ensuring the SCOPE delineated its purpose, specified content, and had a data format using Rasch analysis. Clinical usefulness was established by delineating how assessments will be used in a clinical context, cross-referencing with what practitioners need to know, the feasibility of data collection, determining if the format for quantification was relevant and supportive of clinical decisions, and examining who is using the assessment in specific practice contexts.

Over 51% of the practitioners partaking in the study (Bowyer *et al*., 2012), indicated that the qualities of the SCOPE led to their decision to use it in practice. However, a lack of familiarity with the SCOPE, layout of the questions with too much of information, the SCOPE not being widely recognised by other professions and the

fact that there are no standardised administration and scoring methods, were some of the limitations expressed by practitioners. However, the majority of practitioners were willing to work around these barriers in exchange for reported benefits. Despite its limitations, the SCOPE provides occupational therapists with informative and accurate data to choose appropriate interventions to improve occupational participation.

2.7.3 Assessment of Anxiety - Spence Child Anxiety Scale (SCAS)

The Spence Child Anxiety Scale (SCAS) (Spence, 1997) (Appendix F) has been used extensively in international research and assesses symptoms of generalised anxiety disorder, separation anxiety disorder, social phobia, panic disorder and agoraphobia, obsessive-compulsive disorder, and physical injury fears. The results from this scale align well with the DSM-IV™ taxonomy of anxiety disorders. The assessment has previously been used in South Africa by Muris *et al*., (2002) to identify anxiety disorder symptoms in a large sample of children. Their findings indicate relatively high anxiety levels in South African children from lower socio-economic status (with a mean SCAS score of 41.1) compared to a mean score of 20 for children in Western developed countries. In particular, symptoms referring to compulsive behaviours and physical separation were higher. This high level of anxiety may be related to the stressful violent environment in South Africa. However, they conclude that there is evidence, based on a factor analysis, that the SCAS is a reliable and valid assessment to screen anxiety disorders and quantify treatment in South Africa (Muris *et al*., 2002).

Similar to reviews on the CSP™2, the SCAS-Parent/Caregiver questionnaire validity has been questioned, as it is open to bias or inaccurate observation of the caregiver (Nauta *et al*., 2003). A summary of the evidence available on the reliability and validity of the SCAS-Parent/Caregiver questionnaire is given below.

Reliability

Cronbach's alpha coefficients were calculated for each subscale of the SCAS. Since alphas are largely dependent on scale length, corrected reliability coefficients were computed by the Spearman-Brown formula. The internal consistency for the subscales in the two different samples was satisfactory to excellent for most

subscales (Nunnaily, 1978). In the anxiety disorder group, the results were the following: separation anxiety α=0.76 (0.91), social phobia α=0.77 (0.92), generalised anxiety α=0.75 (0.91), panic/agoraphobia α=0.81 (0.92), obsessive-compulsive disorder α=0.78 (0.92), and physical injury fears α=0.61 (0.83). In the normal control group, these figures were: separation anxiety α=0.74 (0.90), social phobia α=0.74 (0.90), generalised anxiety α=0.67 (0.85), panic/agoraphobia α =0.61 (0.80), obsessive–compulsive disorder α=0.74 (0.90), and physical injury fears α=0.58 (0.81). The alpha for the total scale was equally high in both groups (0.89), which indicates high internal homogeneity (Nauta *et al*., 2003).

Validity

In order to determine the convergent and divergent validity of the SCAS-Parent Report, the total score was correlated with other parent and child reports. The total scale on this parent report correlated strongly and significantly with the Child Behaviour Check List (CBCL) internalising subscale (r=0.55 in the anxiety disordered group, r=0.59 in the normal control group). There was also a significant correlation but at a lower level, with the CBCL-externalising subscale (r =0.33 in the anxiety disordered group, r=0.34 in the normal control group). The correlation between the CBCL-internalising subscale was significantly higher than the correlation with the CBCL-externalising subscale in both groups. This provided evidence for convergent and divergent validity respectively (Meng, Rosenthal and Rubin, 1992; Nauta *et al.*, 2003).

In terms of convergence between parent and child self-report on the separate SCAS subscales, inter-correlations ranged from r=0.41 to r=0.66 in the anxiety-disordered group, and from r=0.23 to r=0.60 in the control group. The parent-child agreement was highest for the subscales that consisted of items with observable behaviour (e.g., separation anxiety). Also, as expected, higher concordance was found between corresponding subscales than between non-corresponding subscales (Nauta *et al*., 2003).

2.8 SENSORY- BASED INTERVENTION

An increase in the understanding of how a body experiences trauma on a somatosensory level, and the presentation of behavioural and emotional difficulties

similar to those associated with SMD has resulted in the use of bottom-up sensory-based interventions for CVT. Bottom-up processing refers to how the body processes information through sensorimotor experiences, whereas top-down refers to processing information through our cognitive processes, which is higher up brain functions (Ogden, Pain and Fisher, 2006). Warner *et al*., in 2014 indicated that with the recent advancements in neurophysiology, authors have argued that top-down cognitive strategies which include teaching the child coping skills, problem-solving skills and cognitive restructuring to affect change, have shown limited effectiveness. The physiological response is immediate at the time of trauma and therefore requires sufficient opportunity to process the trauma through sensorimotor experiences before engaging the language centres of our brain.

Self-regulation, the term occupational therapists use when working with children and adolescents with trauma, is described as having two levels (Martini *et al.,* 2016). The first level uses strategies to assist a child or adolescent change an unpleasant negative sensory experience or influence their emotions. The second level assists the child or adolescent to increase awareness of their state of arousal and use strategies to cope with the demands of the situation (Martini *et al.,* 2016). Occupational therapists use a variety of sensory-based approaches and strategies to improve self-regulation, prioritizing bottom-up processes with children and adolescents experiencing complex trauma (Martini *et al.,* 2016).

Children developmentally experience and process trauma on a preverbal sensory level, using less of their cognitive skills to understand the trauma experience (Finn *et al.*, 2018). Children from their early childhood to their teenage phase of development are mostly reluctant to verbalise traumatic events that may occur in their lives. This is especially seen in the case of serious and complex trauma such as sexual abuse and sexual violation. (Dobson and Dozois, 2010). High levels of arousal interfere with frontal lobe function, Broca's area (the brain region necessary to put one's feelings into words) and executive function. These are essentially areas that would elicit a cognitive response to a situation.

Researchers have suggested that bottom-up approaches are needed (Ogden and Fisher, 2015; Van der Kolk, 2014). Warner *et al.,* (2013) concurs that intervention approaches incorporating the regulation of our body's response to a situation,

benefits traumatised children and adolescents as compared to language-based approaches that are difficult to implement at the point of trauma. They also indicate that psychodynamic play therapies with young children have always recognised the linguistic limitations of their treatment approaches. In a later study Warner *et al.*, (2014) also recognised the unique contribution of non-verbal treatments in cases of trauma with adults. Therefore, treatment must consider non-verbal approaches in treating CVT. This implies that it should not be a priority in treatment to focus on a person's psychological needs at the point of trauma i.e., their ability to speak, think, reason, and make judgments.

The impact of trauma often results in the child or adolescent having difficulties with regulating their behaviour, therefore engaging in "top-down" cognitive approaches such as Trauma-Focused Cognitive Behavioural Therapy (Schneider, Grilli and Schneider, 2013), would be difficult.

Therefore, an intervention that is suggested in occupational therapy in addressing these disruptions faced by CVT, requires the inclusion of bottom-up sensory-based approaches to alleviate the neurobiological symptoms of trauma. These interventions are based on the principles of ASI® (Ayres, 1979; 1989; 2018; Wellock, 1973). In her thesis, Taylor (2019) evaluated therapy approaches for the treatment of post-traumatic stress disorder (PTSD) in maltreated children. She suggests the need to build on the relational and self-regulation aspects of well researched approaches, using aspects such as Trauma Focused Cognitive Behavioural Therapy (TF-CBT) with the inclusion of Sensory Integration (SI) intervention. Her study provides a rationale for a combination of sensory integration and the TF-CBT model which is designed to enable children to understand sensory reactions to trauma, provide children with skills for self-regulation and coping while allowing processing of their traumatic experiences in a safe therapeutic environment.

Sensory-based interventions programmes for CVT and SMD have been described in the literature. The SAFE PLACE programme (May-Benson and Teasdale, 2020) is a unique 12-week multi-disciplinary intervention programme that was found to be safe and acceptable, with a high caregiver satisfaction that could be delivered with fidelity. However, the scheduling of multiple professionals into the programme and

the financial constraints were seen as the major limitations in implementing this programme.

Warner *et al.,* (2013) suggests a programme implemented by occupational therapists and psychologists using sensory rooms, a sensory integration approach and trauma psychotherapy based on sensory-motor strategies. Warner *et al.,* (2014) in a quantitative study, provided empirical support for the effectiveness of Sensory Motor Arousal Regulation Treatment (SMART) programme. The SMART programme was used to treat symptoms of dysregulation in child and adolescent victims of trauma in residential programmes for traumatised adolescent girls and boys aged seven-17 years. Results demonstrated the modulating impact of utilising the whole body, demonstrating that sensory inputs mainly from the vestibular, proprioceptive, and tactile systems assist effectively in reducing behaviour problems and symptoms of post-traumatic stress, in children and adolescents. In this comparative group study, the SMART group achieved lower scores on the PTSD Reaction Index subscales (Re-experiencing, Avoidance, Over-arousal) in comparison to the 'treatment as usual' group (Warner, Koomar and Westcott, 2009; Warner *et al.*, 2013; 2014).

Although this study is uniquely focused within the South African context, the cultural influences on the sensory-based intervention utilized for purposes of this research (Alert Program®), was not taken into consideration due to there being no published research on this.

2.8.1 Alert Program® - a sensory-based intervention

For the purposes of this study the Alert Program® was chosen due to it having its theoretical foundation in ASI® which is the gold standard for sensory integration therapeutic approaches. This programme was also chosen as there is no published research on any other structured and cost-effective sensory-based programme (see 6.5.1 for rationale for using a sensory-based intervention).

Although the use of Alert Program® was designed by occupational therapists, Mary Sue Williams and Sherry Shellenberger, there is no research reported with CVT. The programme assists children in recognising their arousal states and sensitivity

to input from their environment, as well as providing strategies for their self-regulation (Barnes *et al*., 2008).

This programme provides cognitive learning that enables children to understand basic sensory integration theory and sensory activities. It is further used to assist children to be aware of the sensory demands of the environment, so they can maintain or change their levels of alertness to match a situation (Barnes *et al*., 2008; MacCobb *et al*., 2014). Sensorimotor activities to the mouth, hands and whole body to manage arousal states, including calming and alerting auditory and visual inputs are included in the programme (Williams and Shellenberger, 1996; 2014).

The Alert Program® covers twelve sessions which are arranged into three stages: identifying engine speeds, experimenting with methods to change engine speeds and regulating engine speeds. Williams and Shellenberger (1996; 2014) use the term “Engine Speed”, as an analogy of the body’s physiological responses. This can be observed in behavioural and emotional responses of a child by the primary caregiver, teacher, and other adults in the child’s life. The child progresses through these stages using a variety of sensorimotor activities which includes auditory, visual, tactile and oral sensory inputs (Williams and Shellenberger, 1996; 2014) (Appendix G). The objectives for the three stages of the programme are presented in Table 2.1.

Table 2.1 Objectives of the three stages of the Alert Program®

(Williams and Shellenberger, 1996; 2014) (Appendix G)

Objectives		
Stage One **Identify Engine Speeds**	**Stage Two** **Experimenting with methods to change engine speeds**	**Stage Three** **Regulating engine speeds**
1.Students learn the engine words	6. Leaders introduce sensorimotor methods to change engine levels	9. Students choose strategies independently
2.Adults label their own engine levels	7. Leaders identify sensory motor preferences and sensory hypersensitivities	10. Students use strategies independently outside therapy session
3.Students develop feel of their own engine speeds, using the adult's labels as guides	8. Students begin experimentation with choosing strategies.	11. Students learn to change their engine levels when options are limited
4. Students learn to identify and label their own engine levels		12. Students continue receiving support
5. Students label their engine speeds outside the therapy session.		

The purpose of this programme as stated by (Williams & Shellenberger, 1996; p1, 2014) is to:

1. provide children, parents, and teachers with the experience on how to recognise arousal states, related to attention, learning and behaviour.
2. help children recognise and expand the number of self-regulation strategies they use in a variety of tasks and settings.
3. give therapists, parents, and teachers a framework (vocabulary, activities, and environments) to help children recognise and regulate their own arousal states.
4. help parents and teachers understand that behaviour may reflect both the current level of organisation of the nervous system and the student's best attempt to respond adaptively and efficiently to the demands of the situation or task.

The sessions in the programme are presented in a sequence as outlined in the leader's guide for the Alert Program® (Williams and Shellenberger, 1996; 2014):

- Chart the level of alertness on High-Low Chart
- Engage in gross motor movement to obtain an optimal arousal state
- Chart the level of alertness following movement
- Introduce Mile Marker activity or discussion selected for the session. Participants are given the opportunity to use previously learned strategies to stay at the "just right" level, with leaders' assistance
- Leader and participants work together to ensure that the participant's engine is at "just the right" level before they close.
- Leader summarises session and the Alert Program® concept introduced
- Only move to another milestone if the student adequately grasps the prior level.

It is important that the children's caregivers are educated about the programme and trained in its use so they can observe and support self-regulation outside of the programme sessions. A summary description of the nine sessions of the Alert Program® is presented in Table 2.2.

Table 2.2 Summary of Nine Sessions of the Alert Program®

Stage One	Stage Two	Stage Three
Session One **Mile Marker 1: Students learn the engine words** Demonstration by therapist of high, low and "just right" engine speed using words, body language and pictures Group Collage of Engine Speeds "Just right" song with Actions (2006) **Mile Marker 2: Adults label their own engine levels** Explain self-regulation using own experience of self-regulation, use body language, use words and pictures. Play Alert: Go Fish! (2008a) Game to identify engine speeds Summarise session with pictures of body engine speeds.	**Session Four** **Mile Marker 6: Leaders introduce sensory motor methods to change engine speeds** Chart engine levels Five Ways Song (2006) Engine Tune-ups: Tools for the **Body** Chart engine levels Engine Tune-ups: Tools for the **Mouth** Chart Engine levels	**Session Eight continued…** **Mile Marker 9: Students choose strategies independently** Chart engine levels "Just Right" Song (2006) Use Mouth, Move, Listen, Touch and Look posters Children make choices in each sensory category to show what they would prefer using to change their engine speeds. Leader and caregivers assist younger children in naming the self-regulation strategy or drawing it on the chart. Chart engine speeds "Just right" song (2006)
Session Two **Mile Marker 3: Students develop awareness of the feel of their own engine speeds, using the adult label as guides** Charting engines levels Gross Motor sequence Charting of engine speeds **Mile Marker 4: Students learn to identify and label levels for themselves** Make a speedometer to chart engine levels "Just right" song with actions (2006) Chart engine levels Summarise session with encouraging children that it is normal for everyone to fluctuate in their levels of alertness.	**Session Five** **Mile Marker 6 continued……..** Chart engine levels Engine Tune-ups for the Body Chart engine levels Engine Tune-ups for the **Hands** Chart engine levels Five Ways Song (2006)	**Session Nine** **Mile Marker 10:** **Students use strategies independently outside therapy sessions** **Mile Marker 11: Students learn engine levels when options are limited** **Mile Marker 12: Students continue receiving support** "Just right" Song (2006) 5 column chart choosing self-regulation activities. Problem solving cards Debriefing and encouraging children to ask for what their bodies need when their engines are too high or too low. "Just Right" song and "Five Ways" song (2006).
Session Three **Mile Marker 5: Students label levels for themselves outside the therapy sessions** Chart engine levels Gross Motor Sequence Chart engine levels Children chart and share about their engine levels "Just right" song with actions (2006) Chart engine levels using speedometers Discuss with caregivers-importance of sharing their engine levels with the participants.	**Session Six** **Mile Marker 6 continued……..** Have oral and tactile input Chart engine levels Engine Tune-up for the body Chart engine levels Engine tune ups for the **Eyes** Chart engine levels Five ways song (2006)	
	Session Seven **Mile Marker 6 continued……** Oral, tactile, and visual input available Chart engine levels Engine Tune-ups: Tools for the Body Chart engine levels Engine Tune ups for **Ears** with percussion instruments Chart engine levels Alert Bingo Game (2008b) **Mile Marker 7: Leaders identify sensory motor preferences and sensory hypersensitivities** 5 Column Activity Caregivers and therapist discuss sensory motor preferences for each child, "brain breaks" or self-regulation activities. The rest of the group are given the engine tune-up activities for experiential purposes.	
	Session Eight **Mile Marker 8: Students begin experimentation with choosing strategies** Oral, tactile, auditory, and visual input activities available. Chart engine levels Engine Tune-ups for the Body Chart engine levels Discuss engine tune-up choices Chart engine levels	
All activities, games, songs indicated in Table 2.2 and Appendix G are included in the Alert Program® (Williams and Shellenberger, 1996; 2006; 2008a; 2008b; 2014)		

To date limited empirical studies have tested the effectiveness of sensory-based interventions in CVT within the field of occupational therapy, and none have considered the use of the Alert Program® (Williams and Shellenberger, 1996, 2014). Therefore, research is needed to add credibility to the implementation of sensory-based interventions which address emotional and behavioural dysregulation evident

in CVT, and the effect of these programmes on occupational performance and anxiety (May-Benson and Koomar, 2010; Bailliard and Whigham, 2017).

Several studies do however highlight the valuable contribution the Alert Program® has made to improving self-regulation in emotionally disturbed children (Barnes *et al*., 2008; MacCobb *et al*., 2014). Barnes *et al.* (2008) evaluated this intervention in an eight week-long exploratory project within a classroom setting. Their results indicated some improvement on all measures for the experimental group while the measures for the control group remained relatively constant or decreased. This further indicated that programmes which target self-regulation skills may be useful in improving self-regulation of children who are emotionally disturbed. A study by MacCobb *et al.,* (2014) confirm the effectiveness of the Alert Program® with students with challenging behaviours, in a school environment. The results of the research indicated that students improved in their self-management within the classroom environment as a result of increased collaboration between therapists, teachers, and the school management in establishing self-regulation strategies. The Alert Program® has also previously been used to improve communication skills (Salls and Bucey, 2003). The results from research by Nash *et al*., (2018) and Soh (2015) suggest that intervention using the Alert Program® led to an increase in cortical grey matter and related improvements in self-regulation skills i.e., behaviour and emotional control.

These studies suggest the positive impact that a sensory-based programme such as the Alert Program® can have in the treatment programme for CVT, since according to Van der Kolk (2003) without intervention for victims of trauma often develop a chronic inability to modulate emotional and behavioural responses.

2.9 CONCLUSION

This chapter defined trauma as child maltreatment, according to WHO. Within the context of this research, maltreatment would refer to physical, emotional, and sexual violence either being inflicted upon the child or the child being a witness to these types of violence.

The neurobiological link between sensory modulation and trauma is clearly illustrated in the literature searched. This evidence provided a foundation for the

rationale in choosing a sensory-based intervention programme to treat CVT. As anxiety is a common pathology directly linked to trauma in children, many authors concur that trauma leaves long lasting effects on a child's ability to participate in ADLs or occupational performance. Specific outcome measures were chosen based on philosophical and theoretical frameworks. This will be discussed next, in Chapter 3.

The literature review provided sufficient evidence for the use of sensory-based interventions in treating CVT. In the literature searched, it was evident that there was limited empirical evidence to establish the effectiveness of such interventions for CVT. Furthermore, the use of a specific intervention programme, the Alert Program® for CVT has not been clearly detailed in the literature for practitioners to replicate. This methodology will form part of the randomised control trial in Chapter 6.

CHAPTER 3: UNDERLYING PHILOSOPHY AND ASSUMPTIONS OF THE STUDY

3.1 INTRODUCTION

To guide the path of research and establish a credible foundation, it is important to outline the theoretical and conceptual frameworks of a study (Adom, Hussain and Joe, 2018). This study was guided by the philosophical view of a post-positivist paradigm (Lincoln and Guba, 1985), which enables the researcher to explore and investigate human behaviour based on scientific methods. Ayres Sensory Integration (ASI ®) (Ayres 1972,1979) was chosen as the primary model and framework for this study. In addition, three sensory-based models and two theoretical models were chosen. The sensory-based models were Sensory Modulation (Dunn, 1997; 2014b), the Ecological Model of Sensory Modulation (Miller *et al*., 2001) and Anxiety-The Primary Sensory Over-Responsivity (SOR) Model (Green and Ben-Sasson, 2010)**.** The two theoretical models were the Sinani Model of Violence and Peace (Khuzwayo, Meintjes and Merk, 2011) and Kielhofner's Model of Human Occupation (MOHO) (Kielhofner, 2008)**.** These models were chosen to encapsulate the theoretical bases for exploring the effectiveness of a sensory-based intervention in the treatment plan for CVT.

Two research questions encompassed these six models or frameworks and provided the guiding principles to this study as well as the situation of the problem that relates to it. Research question one was guided by Ayres Sensory Integration (ASI ®) (Ayres 1972,1979), the Ecological Model of Sensory Modulation (Miller *et al*., 2001) and the Sinani Model of Violence and Peace (Khuzwayo, Meintjes and Merk, 2011)**.** Research question two was guided by Anxiety-The Primary Sensory Over-Responsivity (SOR) Model (Green and Ben-Sasson, 2010)**,** the Sinani Model of Violence and Peace (Khuzwayo, Meintjes and Merk, 2011) and Kielhofner's Model of Human Occupation (MOHO) (Kielhofner, 2008)**.**

1. To what extent has sensory modulation dysfunction been identified and treated in CVT?
2. What is the effect of a sensory-based intervention on occupational performance and anxiety in CVT?

3.2 PHILOSOPHIC VIEW: POST-POSITIVIST PARADIGM

The philosophical approach adopted in this thesis was an important element that was used to guide the assessment of CVT and the implementation of an intervention strategy. To understand the philosophical base, the axiology, ontology, epistemology, and methodology were considered (Table 3.1).

Lincoln and Guba, (1985), indicate that research paradigms can be characterised through their ontology or the single reality or truth. This reality can be explored and constructed through meaningful actions and human interactions. These authors further explain that epistemology refers to obtaining knowledge and measuring the single reality, by evaluating assumptions and determining new approaches. Research paradigms also include methodology or the methods that are used to determine the situation and axiology or the ethical issues that need to be considered to provide the best evidence for practice.

Table 3.1 Philosophical Base of the Study

Axiology	Ontology	Epistemology	Methodology
The values and essential principals of ethics will be considered when involving CVT in a sensory-based intervention. This needs to be justified so the results provide a meaningful outcome by presenting a true reflection of the data, and by taking actions intended to benefit participants who will all be treated fairly.	The single reality or truth in this study refers to sensory modulation dysfunction that can be identified in CVT. Ontology recognises that humans need to transform by adapting their environments. Exploring alternative strategies for the treatment of CVT is in line with ontological assumptions.	This refers to the theory of obtaining knowledge and measuring this single reality. The researcher is an empiricist as it involves testing and generating a hypothesis based on existing objective knowledge about the neurophysiological effects of trauma in childhood and implementation of bottom-up sensory- based interventions	This refers to the methods of finding out. This includes experimental and survey research designs using quantitative methods that would include sampling, measurement of variables in CVT using standardised, valid, and reliable questionnaires which assess the effect of a sensory-based intervention as well as defined statistical analysis from which deductions can be made.

3.2.1. Post-positivist Paradigm

A research paradigm is a set of common beliefs shared between scientists on how problems should be understood and approached (Kuhn, 1962). The post-positivism paradigm utilised in the current study is a worldview, in which reality is accepted as imperfect and can never be fully understood, and the truth is accepted as probable but not absolute. This paradigm is used to investigate human behaviour based on scientific methods (Guba, 1990). The paradigm focuses on a deterministic philosophy in which the cause of a situation determines the effect or outcome of a situation and a reductionist philosophy in which ideas are reduced into variables, built into the hypothesis and research questions (Creswell, 2014).

The post-positivism paradigm is validated by four criteria which are internal validity, external validity, reliability, and objectivity (Burns, 2000). The *internal validity* would be supported by the use of a sensory-based intervention programme. This would be responsible for the variations in the dependent variable of behaviour, indicating engagement in occupational performance and anxiety in CVT. This means understanding and eliminating confounding variables within the study (Behi and Nolan, 1996).

External validity refers to the degree to which the sample used is representative of the population of CVT and if results of the current study can be generalised to other contexts (Ferguson, 2004). *Reliability* depends on a research instrument that produces consistent results; therefore, two out of three standardised research instruments were used to collect data in the current study. One research instrument was not standardised but had a detailed process to ensure reliability and validity. This involved the application of specific processes to examine clinical usefulness and psychometric soundness, in its development.

3.3 THEORETICAL MODELS INFLUECNING THIS STUDY

The current research was based on theoretical models that show the link between concepts when describing specific phenomena addressed in the study. The theoretical models were also used to understand the impact of trauma in children, strategies that can be used to provide intervention, and the outcomes of the

intervention. The theoretical models will be discussed in order of the phases one, two, and three.

3.3.1 Phase 1: Scoping Review

The Scoping Review was conducted to map available research as there is limited research studies linked to the current search undertaken.

3.3.1.1 Sinani Model of Violence and Peace

The injustice in our society is that many CVT have no choice but to return to their volatile contexts thus exacerbating the cycle of trauma as indicated in the Sinani Model of Violence and Peace (Figure 3.1) (Khuzwayo, Meintjes and Merk, 2011). This model supports the need for intervention to effectively break the cycle of violence by addressing the effects of trauma. Alers (2008b) referred to this model when providing effective and meaningful intervention to break the perpetuation of this trauma cycle.

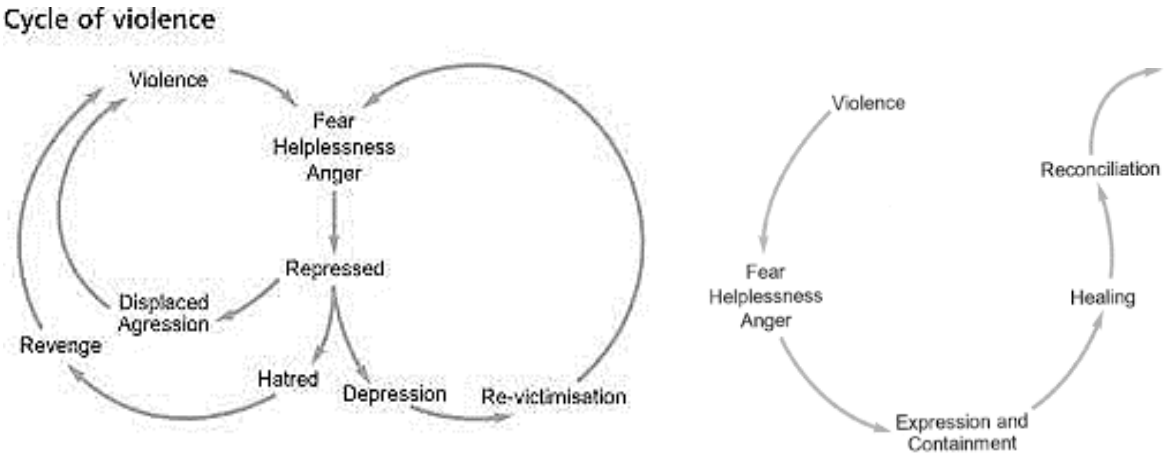


Figure 3.1 Cycle of Violence and Peace Sinani Programme for Survivors of Violence (Alers, 2008b)

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The injustice of our society is that many CVT have no choice but to return to their situation in which they experience violence and are traumatised. This often involves disempowering relationships and oppressive structures which destroys the child's confidence in their own abilities. Providing intervention which allows for participation, affecting their own ability to deal with the effects of trauma, and making choices for themselves without fear, is essential. The model is based on Sinani's theories of change which is influenced by systemic thinking. This provides intervention for the cyclical and repetitive effects of violence. Change needs to occur in CVT and can

only come from the child themselves in an interactive context where they feel acknowledged and safe (Alers, 2008b; Khuzwayo, Meintjes and Merk, 2011).

Sensory-based interventions (bottom-up approaches), directly addresses the body's internal influences of sensory processing, attention, and emotion thus affecting change in the child's sensory modulation, which has been impacted by trauma. With time, skilfully directed intervention, and support, it is hoped that the effects of the cycle of trauma is reduced or does not continue further. Reducing the cycle of trauma by prioritizing the child's physiological or body responses using a sensory-based intervention, can enable the child to function effectively and productively within their families, occupations and into adulthood. The context the child lives in can have a significant impact on their function.

3.3.1.2 Ayres Sensory Integration (ASI®)

Since its inception in 1963, the Ayres framework of Sensory Integration **(**ASI®**)** has evolved in its theory, assessment, intervention techniques and therapeutic equipment used.

As the overarching framework, ASI® explains the ways in which an individual takes in information from the environment and responds in relation to the environment (Ayres, 2005). Ayers' emphasis was on the innate drive of an individual which emerges when the environment is optimal and provides the individual with the opportunity to learn and grow in a fun and playful environment. This presents a "just–right" challenge. The art and science of sensory integration emphasise the importance of adaptive responses and self-direction (Smith-Roley, 2006).

The components of the ASI® framework is detecting (registration), adjusting, and organising reactions (reactivity/modulation), discriminating, or interpreting of sensations from the environment (perception) (Figure 3.2). This enables an individual to interact with the environment and perform his or her occupational

functions. These components are best observed through their effects on behaviour, emotion, motivation and attention (Smith-Roley, 2006).

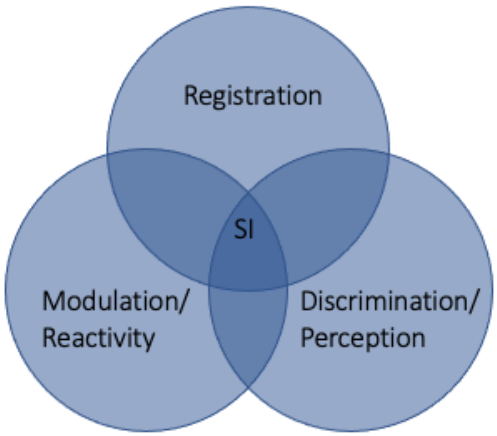


Figure 3.2 Model of Interrelated Sensory Processing
(Smith Roley, 2006)
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ASI® is clearly distinguished from other sensory-based interventions in that the focus is on integrating sensory information to productively participate in everyday activities. It is regarded as an *art* as the child and practitioner interact playfully in a motivating context, and *science* as its foundational principles are based on concepts from the neuroscience (Schaaf and Mailloux, 2015)

Sensory Integration can be understood as a Circular Process (Bundy, Lane and Murray, 2019):

- Sensory intake
- Sensory integration
- Planning and organising behaviour
- Adaptive behaviour and learning;

and also depicts the three elements of practise that is applied by the ASI® trained therapist**:**

- Theory
- Evaluation
- Treatment

Key components of Sensory Integration (Ayres 1972 -1979) that can be observed and measured are:

- Sensory registration
- Arousal
- Sensory reactivity and modulation
- Sensory discrimination and perception
- Motor skills
- Praxis
- Organisation of behaviour

The above components enable an individual to interact and engage with his or her environment. For this research study, the focus was on linking sensory reactivity/modulation in CVT, with the effect it has on their occupational performance and levels of anxiety. The framework of sensory integration theory would be used to explain why individuals would behave in specific ways. It would also be used to plan intervention, improve specific sensory processing difficulties, and finally predict how behaviour will change as a result of the intervention.

According to Ayres (Ayres, 1972), “when the flow of sensation is disorganised, life can be like a rush-hour traffic jam”. Figure 3.3 illustrates the main sensory systems that Ayres (Ayres, 1979) originally emphasised as being foundational to our ability to participate in daily life activities. The integration of these sensory systems determines the quality of the end products indicated below.

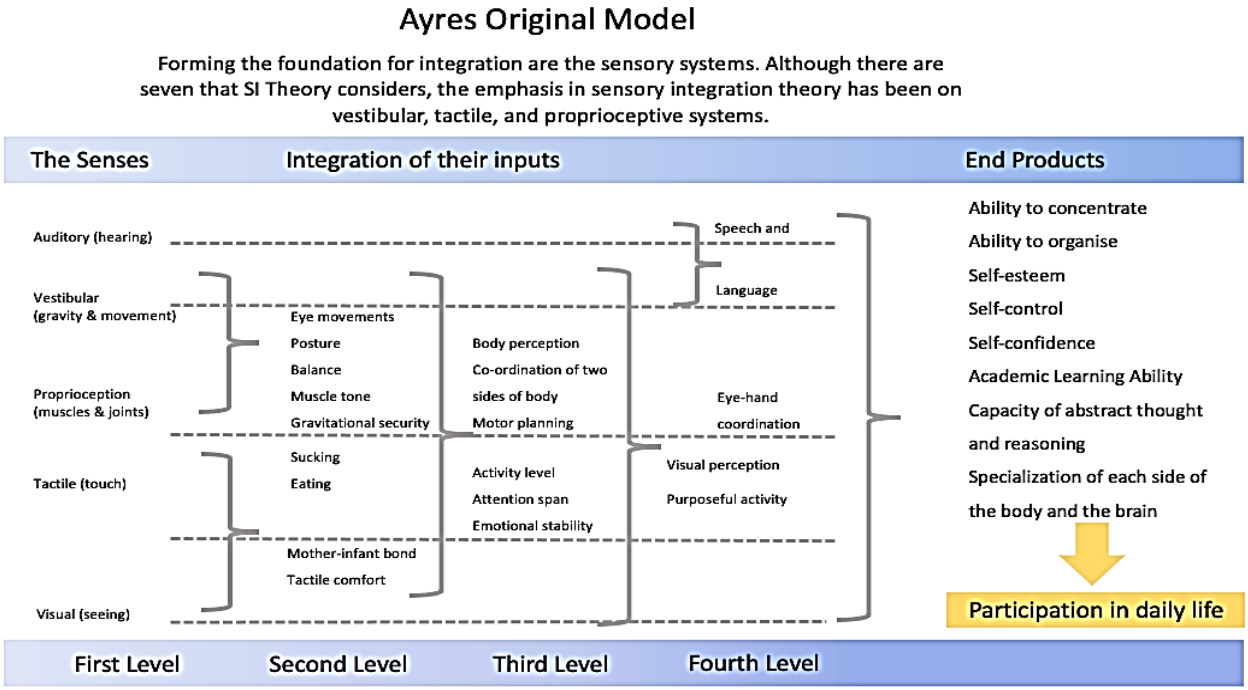


Figure 3.3 Ayres Hypothesised Integration (Ayres 1979)

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3.3.1.3 Ecological Model of Sensory Modulation

Tragically and to a large extent, the external factor that has the most significant influence on CVT, is the adult figures (known and unknown) in a child's life who are often the perpetrators, and the primary cause of the trauma inflicted on a child. According to MacCobb *et al.*, (2014), children and adolescents who experience trauma, which includes abuse and neglect, have also experienced a stressful home environment and community. They are therefore at risk of emotional dysregulation that would impact their behaviour and emotions, disrupting their responses socially, emotionally and intellectually (MacCobb *et al*., 2014).

This ultimately impacts the internal processes in the child. Once in a residential facility as in the current study, the child is influenced by the unique routines of the centre, the cultural values, the environment, relationships with other children in the centre and tasks that form part of their daily routines. This begins to reshape their lives and contributes to recreating a sense of 'normality' with their 'primary caregiver' being the childcare worker.

The Ecological Model of Sensory Modulation highlights the impact of these external influences i.e., culture, environment, relationships, and tasks. The model includes three internal influences impacted by the external factors i.e. sensory processing

(underlying neurophysiologic processes that are not observable), emotions, and attention which affects children with SMD (Miller *et al*., 2001) (Figure 3.4).

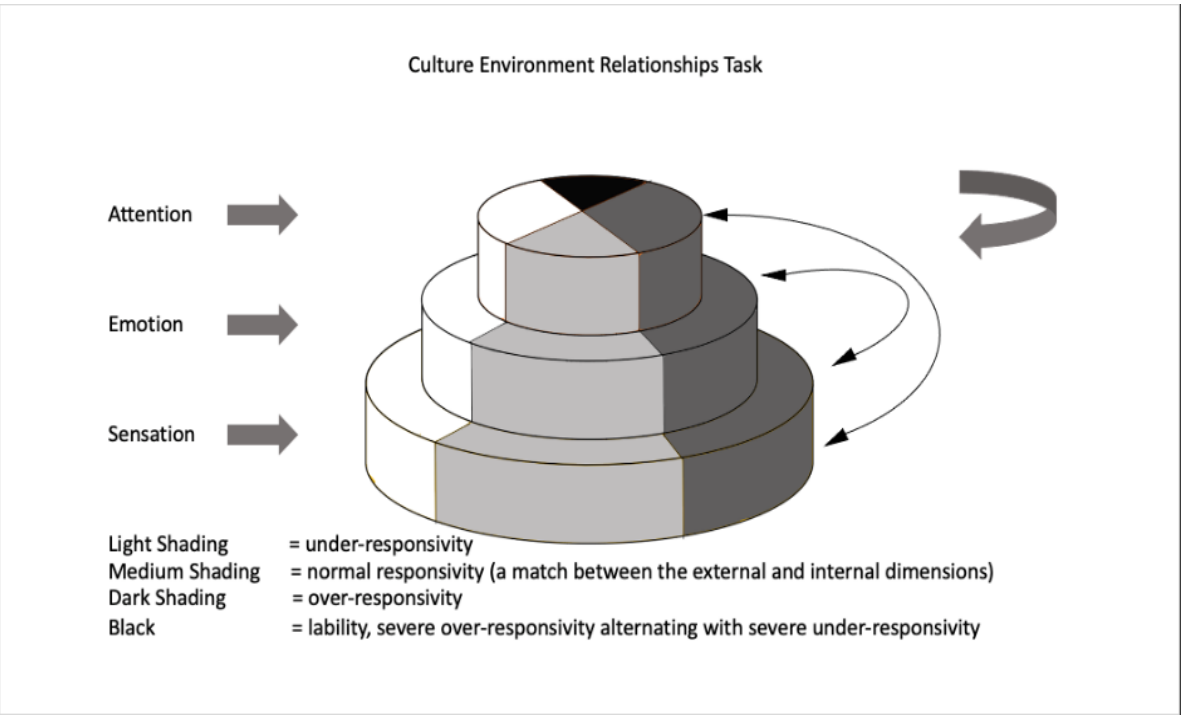


Figure 3.4 Ecological Model of Sensory Modulation (EMSM) (Miller *et al*., 2001) ***Permission granted by: Star.Info@sensoryhealth.org***

An imbalance between the supports and demands of the external factors, and the internal processes of the child, results in maladaptive behaviours and emotional responses. The arrows in the model hypothesise the direction and effects of poor sensory modulation which impacts attention and behaviour. The internal factors are represented using circles rather than a straight line as the child may move from under-responsivity to normal responsivity, to over-responsivity and lability, thus affecting responses to external factors. Varying observable effects to either under-responsiveness or over-responsiveness are indicated in Table 3.2 below.

Table 3.2 Hypothesised effects of internal dimensions of the Ecological Model of Sensory Modulation (EMSM) (Miller *et al*., 2001)

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Internal Dimensions	Under-responsive	Over-responsive
Attention	Unaware Perseveration	Hyperactivity Inattention Impulsivity/Disinhibition
Emotion	Flat affect Lack of empathy	Hostility, Anger Tearfulness Withdrawal
Sensation	Responds slowly Poor discrimination	Responds quickly Fight-fright-flight responses Intense responses Poor habituation

The above model relates how the neurophysiology of a CVT (Chapter 2) i.e., the internal dimensions and processes, interact with external factors i.e., violence and traumatic situations inflicted upon CVT. This results in sensory modulation changes which affect emotional and behavioural regulation. The Ecological Model of Sensory Modulation builds on the work of Royeen and Lane (1991) who suggested a linear continuum of SMD from under-responsivity to over-responsivity. Dunn's (1997) model which includes behavioural and sensory dimensions further evaluates responses by low and high sensory thresholds. These models are based on Ayres' theory of Sensory Integration (ASI®).

3.3.2 Phase 2: Assessment of Sensory Modulation using the Child Sensory Profile™ 2

3.3.2.1 Dunn's Model of Sensory Processing

Sensory modulation reflects behaviours that have been researched and documented broadly as sensory seeking and sensory avoiding behaviours (McIntosh *et al.*, 1999; Dunn, 2001; Parham and Mailloux, 2010; Van der Kolk, 2014). A disorder of the sensory system results in specific behaviours including impulsiveness, distractibility, over-responsivity or under-responsivity, hypersensitivity or hyposensitivity, hypervigilance, irritability, disorganisation, anxiety and poor self-regulation (Van der Kolk, 2003; Pechtel and Pizzagalli, 2011; Grayson *et al.*, 2012; Engel-Yeger, Palgy-Levin and Lev-Wiesel, 2013). Based on

the model of sensory processing and the theoretical foundation of ASI®, Dunn (2014b) proposed a framework for processing sensory information or sensory modulation, illustrating the interaction between the neurological thresholds and the adaptive behavioural response.

According to Dunn (2014b), modulation of sensory information can be placed on a continuum between the child's self-regulation (passive or active) and neurological thresholds (high or low), which results inappropriate responses to stimuli in the environment. The sensory modulation of typical children presents as "*just like the majority of others*" with scores that range from 1 SD below the mean to 1 SD above the mean (Dunn, 2014b).

Fluctuations between habituation (high thresholds when the nervous system responds more slowly) and sensitisation (low thresholds when the nervous system responds quickly to stimulus) permit children to produce functional behaviours (Figure 3.5). Children with high thresholds are not easily activated by sensory stimuli and tend to be under-responsive. They struggle to respond to stimuli around them. Their responses present as "*less than others and much less than others*." Children with a low threshold are easily activated by sensory stimuli and tend to be over-responsive. They are quick to notice and respond or are distracted by every stimulus. Their responses present as "*more than others and much more than others*" (Dunn, 2014b).

At one end of the continuum, a passive strategy towards sensory events is used. Here the child takes no action to change, or the child moves away from the environments when there is discomfort due to sensory events. At the other end of the continuum, an active strategy is used. This results in active control of the type and amount of sensory input, allowing for a manageable amount of sensory input (Duncan, 1996; Dunn, 2014b). Interpretation of the child's sensory modulation behaviours can be classified as illustrated in the bell curve below (Figure 3.5).

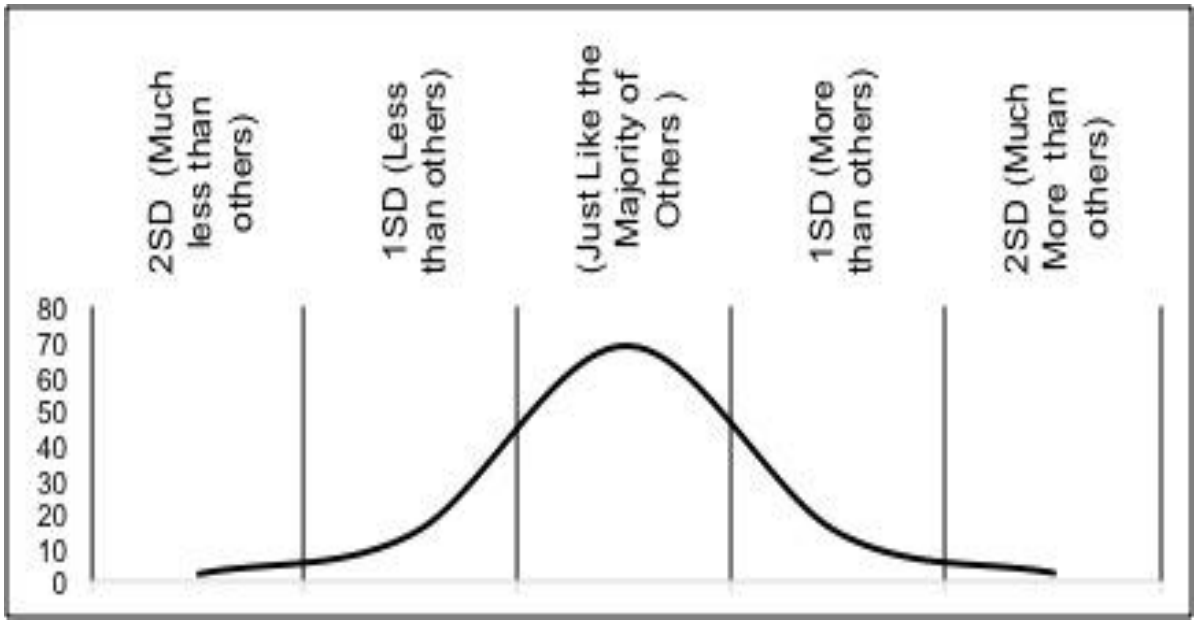


Figure 3.5 The bell curve and Sensory Profile 2 classification system
(Dunn, 2014b)
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According to Dunn (2014b;1997) individuals either use active self-regulating strategies (engage in behaviours to limit exposure to the unpleasant stimuli) or passive self-regulation strategies (disengage from circumstances around them or may withdraw). At both ends of the continuum, these self-regulating behaviours can lead to distress for the child and the caregiver. The quadrant for high neurological thresholds and passive strategies is Low Registration, while Seeking represents active responding strategies within this threshold. The Sensitivity quadrant includes those with low neurological thresholds and passive strategies, while individuals within the active strategies quadrant and a low threshold fall into the Avoiding quadrant (Dunn,2014b) (Figure 3.6).

Four Quadrant Model of Sensory Processing Behaviour (Dunn,2014 a)				
Neurological threshold continuum			Acting according to threshold	Acting to counteract threshold
			Passive behaviour	Active behaviour
	Needs a lot of input before registering	HIGH	LOW/POOR REGISTRATION	SENSATION SEEKING
		(Habituation) Nervous system recognizes that something familiar has occurred	Do not notice sensory events in daily life	Find ways to extend or enhance sensory events in daily life.
	Needs very little input for registration	LOW	SENSITIVE TO STIMULI	SENSATION AVOIDING
		(Sensitization) Nervous system enhances potentially important stimuli	Notices every event in daily life	Find ways to limit sensory input during daily activities

Figure 3.6 Relationships between behavioural responses and neurological thresholds. (Adapted from Dunn W. The Sensory Profile User's manual. First Edition. San Antonio: The Psychological Corporation. 1999)

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This continuum of sensory modulation responses has a direct impact on the child's ability to process sensory information, which enables engagement in meaningful adaptive behaviours and facilitates participation in productive occupations (Dunn, 2001; Yochman, Parush and Ornoy, 2004). For a child and adolescent these occupations are activities specifically related to school and education, personal care, play at school or leisure time out of school, social engagement with their peer group, and family. Early identification and treatment of sensory modulation difficulties contributes to improving the prognosis of children who have difficulties and could subsequently prevent or reduce emotional, behaviour, social and perceptual-motor difficulties in CVT (Yochman and Pat-Horenczyk, 2020). (Howard *et al.*, 2020; Yochman and Pat-Horenczyk, 2020).

3.3.3 Phase 3: Models for Outcomes and Sensory-based Intervention

3.3.3.1 Models for Outcomes

Outcome measures associated with SMD were administered prior to and after the sensory-based intervention in this study. These included assessments for occupational performance in everyday activities, as well as regulation of anxiety levels. The theoretical models used in the research process were secondary to the overarching primary model of ASI®, chosen to demonstrate the effectiveness of the sensory-based intervention.

Occupational Performance- ***Kielhofner's Model of Human Occupation (MOHO)***

The MOHO (Kielhoner, 2008) is the theoretical model on which the Short Child Occupational Profile Evaluation (SCOPE) is based. Occupational performance was conceptualised in the MOHO by Kielhofner in 2008. The Model of Human Occupation (Taylor, 2017) is a person-centred, holistic, open systems model which includes the effect of the environment on occupational performance, while understanding the internal components which affect each individual's participation in occupations. The model considers the individuals mind and body and their thinking, feeling, and doing, with more emphasis being on the 'doing', or the occupational performance of a person (Figure 3.7).

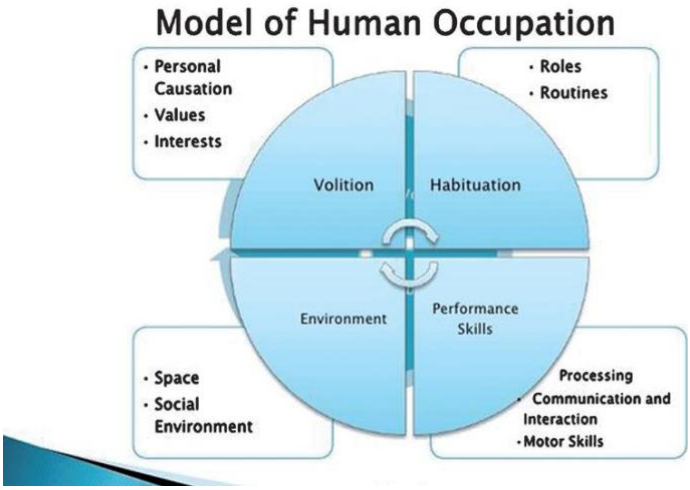


Figure 3.7 Model of Human Occupation (Kielhofner, 2008)

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The Model of Human Occupation emphasises the interaction between the human being, the task, and the environment which plays a key role in providing opportunities for a child to engage in their occupation (Kielhofner, 2008). This model aligns with the Ecological Model of Sensory Modulation, which indicates the effect that the environment has on the ability to regulate emotions and behaviour.

Internal factors are considered under the subsystem of volition or personal causation and awareness. This drives the desire to participate in activities. Secondly, habituation which considers habits and roles allows the performance of an adequate routine and role balance in order to manage activities and tasks associated with life roles. The third subsystem focuses on performance capacity and considers communication, motor and cognitive processes of the individual (Kielhofner, 2008). This subsystem aligns with theories and models of sensory integration and sensory modulation which indicates how internal processes interferes with the ability to participate in occupations. Finally, the external component of space, environment and social interactions also form an integral part of our daily occupations.

In MOHO the environment is made up of physical, social, cultural, economic, and political aspects that impact how occupations are performed. Within the milieu of the South African context, each aspect of the MOHO contributes more often than not, in detrimental ways, to the occupational performance of children.

Within our South African context, providing a child with opportunities to engage in their occupations at play or school is a crucial building block in early childhood development. We can therefore deduce that trauma either inflicted directly on a child or indirectly through exposure to unstable or violent environments, would have a detrimental impact on a child's volition, habits, performance skills and interaction with the environment. This in turn would have a negative influence on their freedom to play in a relaxed and developmentally stimulating environment, attendance, and performance at school, and social engagements with their peer group.

Anxiety – *The Primary Sensory Over-Responsivity (SOR) Model*

The Primary Sensory Over-Responsivity (SOR) Model Green and Ben-Sasson (2010)is a theoretical model which supports the assessment of anxiety in children with over-responsivity which was assessed using the SCAS (Spence Child Anxiety Scale) – Parent Version.

Lane (2002) indicated that high arousal levels or hyper-responsivity are associated with anxiety affective disorders. Green and Ben-Sasson (2010) in their work with children with Autism Spectrum Disorder (ASD) agree that over-activation of the amygdala may contribute to sensory over-responsivity and anxiety disorders. They presented the Primary Sensory Over-Responsivity Model portraying the theoretical pathway linking symptoms of sensory over-responsivity to anxiety disorders (Figure 3.8).

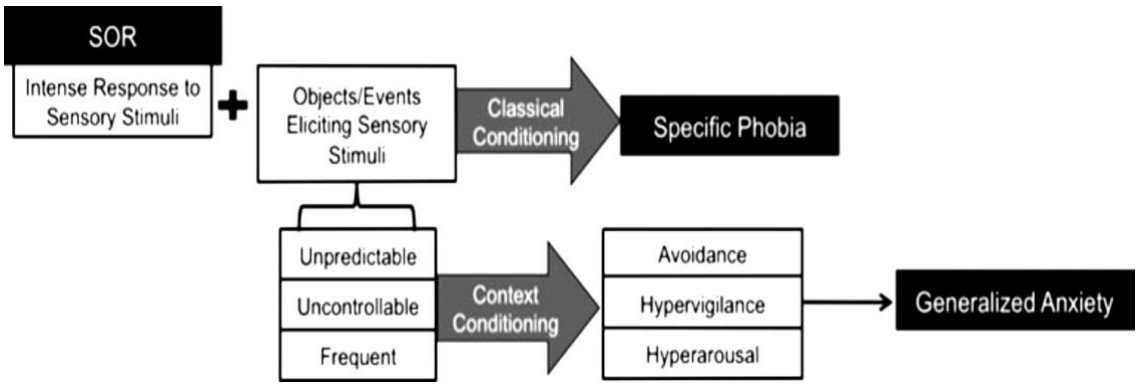


Figure 3.8 Primary SOR model portraying the theoretical pathway from sensory over-responsivity (SOR) to generalised anxiety disorder
(Green and Ben-Sasson, 2010)
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The frequency of sensory stimuli in the environment eliciting sensory over-responsivity may lead to the development of negative behaviours through conditioning, resulting in phobias or generalised anxiety (Green and Ben-Sasson, 2010). Similar pathways may exist in CVT.

3.3.3.1 Sensory-based interventions

Based on the Ayres theory of sensory integration (ASI®) a number of sensory-based interventions have been developed for children with sensory modulation dysfunction. The focus of these interventions is on enhancing sensation to improve behaviour. In these interventions an individual's behaviour and emotional responses

to sensory input (modulation) is observed (Ayres, 1979; Case-Smith and Arbesman, 2008).

Case-Smith *et al*., (2015) suggest that sensory-based interventions can either be single domain sensory-based interventions or multi-domain sensory-based interventions. The former refers to interventions such as swinging, deep pressure using a beanbag, rocking, jumping, crawling, and brushing which may have potential benefits to a child with sensory difficulties. However, further research is required to confirm the significant effects of these interventions. The latter refers to multisensory sensory behaviour interventions, some of which has demonstrated significant improvements with children (Watling and Hauer, 2015). Sensory-based interventions also include modifications to the environment to improve attention, emotional control and group participation (Watling and Hauer, 2015).

However, Wan Yunus *et al*., (2015) and Schmidt *et al*., (2020), indicate that although sensory-based interventions do show promising results, these interventions require data to be collected to ensure that the intervention is effective. Sensory-based interventions may include the following (Sensory Integration Global Network (SIGN), 2021):

- **Remedial Intervention** involves the use of sensory and motor treatment activities and equipment, which provides tactile, proprioceptive, movement and praxis opportunities, with activities that involve the experience of spatial awareness, bilateral integration, ocular motor, and postural skills.
- **Accommodations and Adaptations** include reduction of noise, using reduced sensory input to manage hypersensitivities and using equipment to improve attention, self-regulation, or organisational difficulties.
- **Sensory Diet Programmes** which involve a daily routine with a specific individual menu of supportive sensory input. This may include sensory strategies or physical activities. This type of intervention can be used throughout the day to manage sensory modulation and related emotions and behaviours, minimise escalation to a crisis and promote calming (Champagne, 2010).

- **Environmental Modifications** or adaptations to lighting, noise, murals, furnishings, and equipment can increase or decrease sensory stimulation. Sensory rooms may be used.
- **Education** of individuals, families, caregivers, and teachers about the effect of sensory functions in the performance of daily occupations, and how to provide intervention to decrease the negative impact. This allows for proactive management which may reduce maladaptive behaviours**.**

The Alert Program® would incorporate remedial, accommodation and adaptations, sensory diet activities, environmental modifications, and education. Educational input for caregivers is important to carry over self-regulation activities into the daily routines of the child participants, to prevent maladaptive behaviours.

3.4 CONCLUSION

This research study adopted a positivist paradigm, with the cause of the situation being the trauma inflicted on child participants, which influenced the outcome of the study. The hypothesis and research questions formed a foundation upon which variables were established. Ayres Sensory Integration® formed the main theoretical framework for this study, being complemented by other theories and frameworks that were relevant to trauma and sensory modulation difficulties. The theoretical frameworks provided significant insight into the emotional and behavioural patterns of CVT.

The theoretical frameworks discussed in this chapter link to the topic of this research study and the research questions being addressed. Together they focus on a sensory-based intervention, the Alert Program®, child victims of trauma (CVT), occupational performance, anxiety, self-regulation, sensory modulation dysfunction (SMD) and Ayres Sensory Integration® (ASI®).

The following chapters focus on the methodology used in the three phases of the study, the results, and the discussion of the results of each phase.

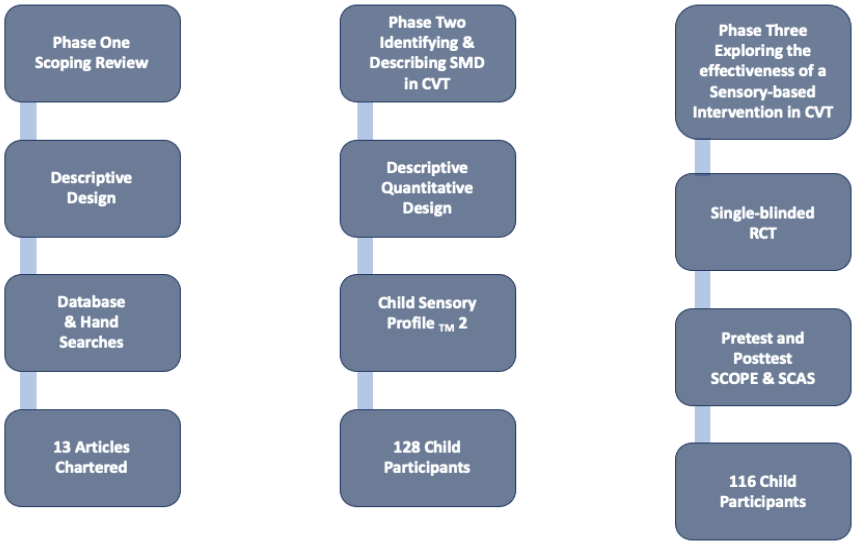


Figure 3.9 Flow Diagram illustrating the three phases of the research study, the research design for each phase, data collection methods, and participants for each phase of the research study.

CHAPTER 4: PHASE 1 SCOPING REVIEW
SENSORY MODULATION DISORDER IN AND SENSORY-BASED INTERVENTIONS FOR CHILD VICTIMS OF TRAUMA

4.1. RATIONALE FOR CONDUCTING THIS SCOPING REVIEW

According to Warner *et al.*, (2014) the majority of studies that report on intervention for children who are victims of trauma, in particular, randomised controlled trials, focus on Cognitive Behavioural Therapies (CBT) as a treatment outcome. This therapy approach focuses on teaching the child coping skills, problem solving skills and cognitive restructuring to affect change (Dobson and Dozois, 2010). While the extent of this research may demonstrate the efficiency of CBT in the treatment of CVT, there is empirical and researched evidence which indicates that during times of stress and dysregulation, individuals are less likely to benefit from cognitive approaches ("top-down" approaches) to regulate their stress (Warner *et al*., 2014).

A pioneering researcher, Van der Kolk, (2014), psychiatrist and author in the field of trauma, concurs that language-based approaches (such as CBT) during times of stress are difficult to implement, since the impact of trauma is primarily directed to the autonomic nervous system. He further explains that approaches incorporating somatic forms of therapy ("bottom–up" approaches) that are body centred, should be the treatment of choice for trauma survivors. A bottom-up approach focuses predominantly on body responses to sensory input rather than on verbal and thought process when providing intervention for emotional difficulties (Miller *et al.*, 2017; Van der Kolk, 2014). This approach postulates an important foundation for adaptive and emotional responses, is the ability to adequately process and integrate sensory information i.e., auditory, visual, touch, movement, body positioning and oral sensation. Occupational therapists use this sensory-based bottom-up approach based on their unique understanding of SMD and the effect it may have on everyday function (Petrenchik and Weiss, 2015).

According to Scanlan and Novak (2015), the current range of research in using the sensory modulation approach in occupational therapy has not yet been fully mapped

or summarised. Bailliard and Whigham (2017), concurred that there is an absence of rigorous research that supports the use of sensory approaches in the many fields of occupational therapy, even though sensory approaches are being used in the treatment of mental health, in adults. There are few published studies evaluating the effectiveness of these approaches (Scanlan and Novak, 2015).

Research to evaluate the effectiveness of a sensory modulation approach based on ASI®, highlights weaknesses in the methodology, study designs and fidelity to sensory integration principles. Miller *et al.,* (2007b), Pollock, (2009) as well as May-Benson and Koomar (2010), proponents of sensory integration and sensory modulation therapy, in reviews of sensory integration studies, found that many studies produced no or minimal effect. They also indicated that there was no significant difference in children who received these interventions compared to those who did not.

In theory and practice sensory-based interventions is predominantly focused on children with learning disabilities and developmental difficulties, with less focus on emotional challenges in children. However, in other studies using an Occupational Therapy Sensory Integrative approach (OT-SI), Miller *et al*., (2007a) showed improvements in self-regulation in the experimental group of children with emotional disturbances who received sensory-based interventions when compared to a control group who did not show improvement. These children experienced problems in regulating their behaviour in school, dealing with frustration related to learning tasks, and getting along with peers. Similar results were found in a study by Barnes *et al*., (2008) using the Alert Program®.

Research studies using the Alert Program® has predominantly focused on children with emotional disturbances and Foetal Alcohol Syndrome Disorder (Williams and Shellenberger, 1996; 2014), but there has been no specific research evidence incorporating CVT. Bailliard and Whigham, (2017) and May-Benson and Koomar (2010), concurred that although there is a positive trend towards supporting the effectiveness of sensory integration for emotion disorders, further evidence based outcomes are required especially for the child who is a victim of trauma, in terms of both emotional and behavioural changes.

Due to the high level of violence globally, intervention for CVT has become a priority in many government departments and amongst many health professionals, including occupational therapists who may use sensory-based interventions. Literature (refer to Chapter 2) suggests that sensory-based interventions is an appropriate treatment approach for CVT since the initial experience of trauma occurs on a somatosensory level. Advances in trauma care indicates that the effects of trauma in children are experienced and observed as an inability to appropriately regulate and organise sensory responses. This results in dysregulation in their emotional state and behavioural challenges. The scoping review provides an overview of the extent to which SMD has been identified and treated in CVT.

4.2 METHODOLOGY

4.2.1 Aims and Objectives for Phase 1

Aim: To describe the current evidence for sensory modulation dysfunction in children who have experienced trauma.

Objective: To map literature on sensory modulation dysfunction in children who have experienced trauma.

This review was guided by a methodological framework for conducting scoping reviews as proposed by Arksey and O'Malley (2005). This scoping review addressed a new research area by including studies where minimal or no formal attempt to provide an overview has previously been made. Currently, limited research is available that considers sensory integration in combination with paediatric trauma within the field of occupational therapy. Therefore, there was a need to map and summarize the extent of research in this area.

4.2.2 Stage 1: Identifying the research question

According to the guidelines for a scoping review by Arksey and O'Malley (2005), the research question that guided this study is "To what extent has sensory modulation dysfunction/disorder been identified and treated in CVT" was broad. This enabled all possible literature to be identified, so that all perspectives and facets of the research study could be reviewed.

4.2.3 Stage 2: Identifying relevant studies

Five databases were chosen for ease of access and on recommendation from a qualified librarian (Appendix H) at the University of Witwatersrand who also assisted with the searches. The databases searched were PubMed, CINAHL, ProQuest, Scopus, and Cochrane. These included published articles, research theses and congress proceedings. Due to the paucity of sources date range for the searches was over 12 years from January 2007 to July 2019. The keywords tabulated in Table 4.1 were initially searched in categories and then in combination with each other. Due to the fact that this area of study is relatively new, a limited number of publications were expected, therefore broad search terms were used to avoid missing any relevant study. The keywords were categorised according to diagnosis, symptoms, assessment tools, intervention, theoretical frameworks, and trauma.

Table 4.1 Keywords used in Search Strategy

Category	Keywords
Diagnostic keywords	sensory modulation OR sensory modulation dysfunction OR sensory modulation disorder
Symptom keywords	Arousal AND self-regulation AND emotional regulation AND sensory defensiveness AND sensory reactivity AND sensory sensitivity AND sensory avoiding AND sensory seeking AND sensory registration AND attention AND hyper-arousal OR over reactivity AND hypo-arousal OR under-reactivity.
Assessment tool keywords	sensory profiles AND sensory histories AND Child Sensory Profile 2 OR Child Sensory Profile AND sensory processing measure
Intervention keywords	Alert Program OR sensory modulation intervention
Theoretical framework keywords	Jean Ayres Sensory Integration AND the Neurobiology of Sensory Integration
Trauma keywords	Trauma OR Child Trauma

The sequential order of the search strategy throughout the databases was maintained. A few adjustments were made to the search strategy when a database did not have sufficient filters, or if a more in-depth search in a particular category was required.

Filters were applied using inclusion and exclusion criteria, as detailed in Stage 3. The following manual searches were conducted: South African Journal of Occupational Therapy, Occupational Therapy Focus Newsletter, and the South African Institute for Sensory Integration (SAISI) Newsletter. The electronic searches included Google Scholar and research studies from the online Alert Program® Course (Therapy Works Inc, 2021; Williams and Shellenberger, 1996; 2014).

The search strategy as illustrated in Figure 4.1, returned 202 studies from database searches and 33 articles from the hand searches during the period January 2007 to July 2019. The reference lists for the articles were also searched.

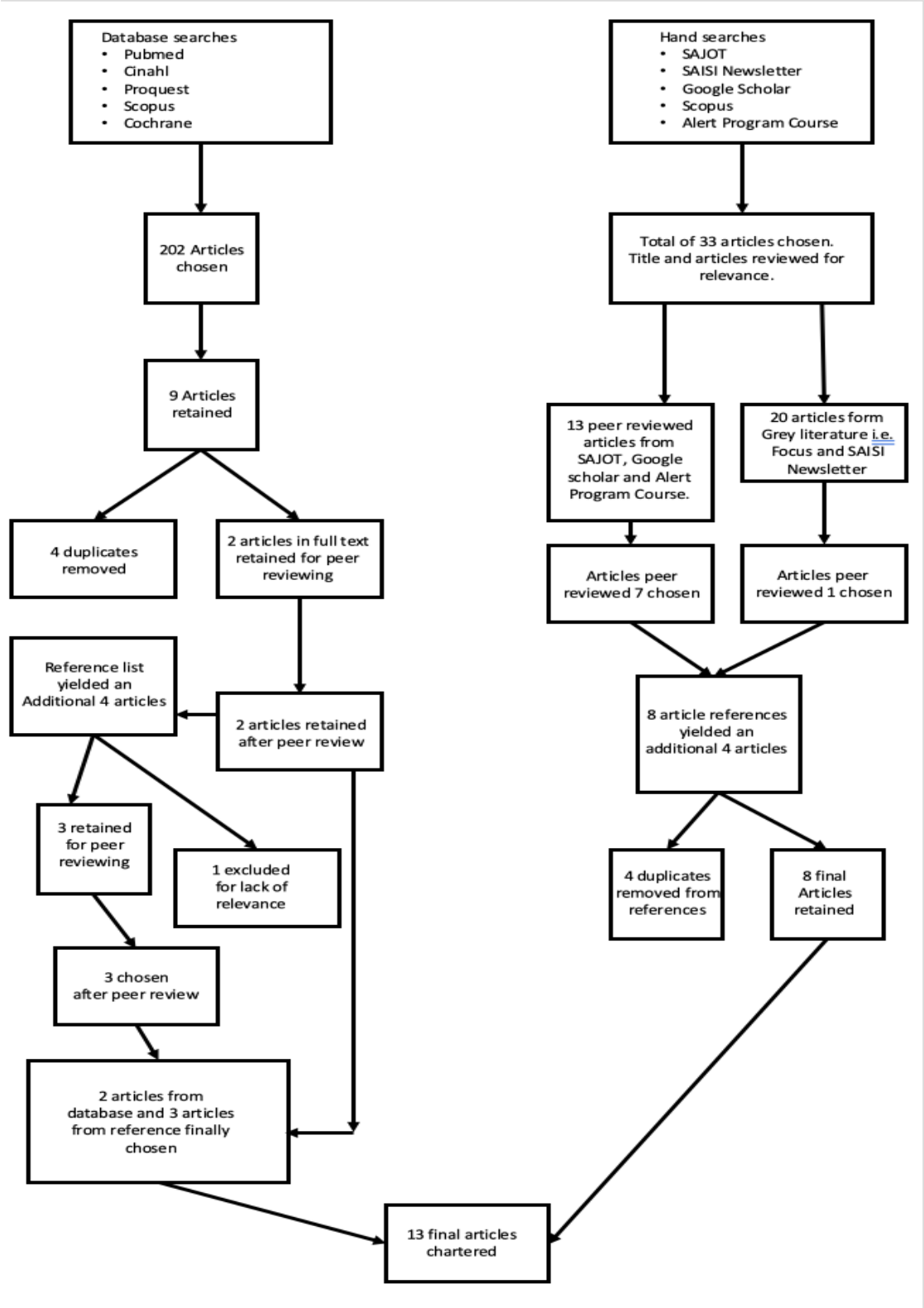


Figure 4.1 Search Strategy illustrated on a Flow Diagram (January 2007- July 2019) Joseph et al. (2021)

4.2.4 Stage 3: Study selection

The title and abstract of publications returned for each search was reviewed to determine the relevance of each publication to the scoping review question. Articles and congress proceedings that focused on assessment, identifying, and treating victims of trauma using sensory-based intervention, were included. The keywords in Table 4.1 were standardised throughout all databases.

4.2.4.1 Inclusion Criteria

Types of Participants

The scoping review initially considered all research papers that included children between six to nine years of age. This however needed to be extended into adolescence, from 10 years to 19 years (WHO), due to the limited number of studies available. Children and adolescents are a vulnerable group, where early intervention could reduce the risk of a child developing cognitive, behavioural, and emotional challenges in their adult years. Male and female participants were included in this study search.

Concepts

Sensory Modulation Dysfunction

The core concept that was searched in this scoping review was sensory modulation disorder/dysfunction, grounded in the theory and principles of ASI®, within the framework of occupational therapy practice. The use of sensory-based interventions based on ASI® was also identified in studies, from a multidisciplinary perspective. In the final selection, studies selected for peer reviewing were all based on the theory and principles of ASI®. Terminologies used to explain behaviours associated with sensory modulation within the theoretical framework of ASI®, included under-reactive behaviours, over-reactive behaviours, or emotional lability in response to sensory stimuli as well as unusual patterns of sensation seeking or avoiding that are observed in emotional states of anxiety, depression, anger, hostility. There were also alternate terms for attentional states i.e. distractibility, disorganisation, impulsivity and hyperactivity (Smith Roley, Blanche and Schaaf, 2001). These included under-responsivity or hypo-reactivity, sensory avoiding or under-reactivity,

over-responsivity or hyper-reactivity, sensory seeking or over-reactivity, which were accepted in the search.

Trauma

The second concept refers to the types of trauma included i.e. physical abuse, emotional abuse, sexual abuse, neglect and/or violence. Articles that were included focused on one or more types of trauma, reported repeated trauma, or a single traumatic incident all resulting in emotional, behavioural and functional problems.

Context

Due to limited research in this field of study, the context for the literature studies was not restricted. It included national and international study populations, children from different socio-economic, cultural, and ethnic backgrounds, children in institutions, children in health care facilities and children invited to enter a study from the community. The scoping review considered studies that had been conducted in the disciplines of occupational therapy, speech and language therapy, psychology, and social work.

4.2.4.2 Exclusion criteria

Articles that focused on medical trauma (when a child undergoes procedures in hospital), physical injury resulting from major or minor accidents, and trauma as a direct result of grief, were excluded. Publications that focused on diagnoses other than trauma using sensory-based intervention to treat learning difficulties, autism, attention deficit disorders, mental retardation, and other neurological conditions, were excluded. Non-English articles were also excluded.

4.2.5 Data Analysis

Searches to analyse and choose the relevant publications was initially done in consultation with the librarian at the University of the Witwatersrand Health Sciences Library (Appendix H). The following guideline for analysis (Table 4.2) was used when choosing articles from the database and hand searches. From the initial 202 articles (Figure 4.1), 13 publications were selected. These 13 publications underwent a process of peer reviewing by the principal researcher's supervisor who was based in the Occupational Therapy Department at the University of the

Witwatersrand. The 13 publications were inserted into a chartered Table 4.3 which was adapted from The Joanna Briggs Institute, (2015).

Table 4.2 Analysis of articles for the Scoping Review

Information on Source	
• Journal	
• Author/s	
• Year of publication	
• Country of origin (where the study was published or conducted)	
• Aims/purpose	
• Inclusion criteria for articles	
• Study population and sample size (if applicable)	
• Methodology/methods	
• Duration of the intervention (if applicable)	
• Database searched	
• Search terms used	
• Number of articles retrieved/reviewed	
• Outcomes and conclusions	

Adapted from McKinstry, Brown and Gustafasson, (2014); Briggs, (2015) ***This item is copied in terms of Fair Dealing in Section 12 of the current Copyright Act*****".**

These articles were tabulated according to the following headings:

- Publications and origin
- Research design
- Participants
- Purpose
- Type of trauma
- Identifying Sensory Modulation Dysfunction
- Treatment of Sensory Modulation Dysfunction
- Core Principles of Ayres Sensory Integration®
- Outcome and conclusions
- Discipline (Occupational Therapy, Psychotherapy, Social Work).

4.3 RESULTS FOR PHASE 1

4.3.1 Introduction

The Scoping Review provides an overview of the extent to which SMD has been identified and treated in CVT. Guided by the Arksey and O'Malley (2005) methodological framework keywords were used in a search strategy to identify relevant studies.

This chapter illustrates the literary scarcity of research pertaining to SMD in CVT. It includes Stage 4, Charting the Data and stage 5, Collating Summarising and Reporting the Results using the Arksey and O'Malley (2005) framework.

The 13 studies from database and hand searches, which met the inclusion criteria, were chartered (Table 4.3). These results are followed by a discussion highlighting that sensory-based interventions, within the theoretical framework of ASI®, alone and in combination with psychotherapy approaches, is a valuable approach for CVT.

4.3.2 Stage 4: Charting of Data

Following the process of peer-reviewing, 13 publications were selected and tabulated in Table 4.3. This table was adapted from Briggs, (2015). The data was tabulated and analysed according to the publication details i.e. the author/s and date of publication and location of publication, research design used in the study, were the participants' children and/or adolescents and their ages, the purpose of the study, the type of trauma, how SMD was identified and what aspects of SMD was identified, if the principles of ASI® were applied, what the outcomes and conclusions of the study were and from which professional discipline's perspective was the study undertaken.

4.3.3 Stage 5: Collating Summarising and Reporting The Results

The searches were done in consultation with a librarian at the University of the Witwatersrand Health Sciences Library (Appendix H).

Location of research studies

Twelve of the studies were published in the USA, with one study published in a South African newsletter. Treatment facilities for CVT included residential care, therapy clinics, therapy centres and schools.

Research Designs

Of the 13 studies selected, nine articles were descriptive studies, with two quantitative and two qualitative studies.

Table 4.3 Results of the Scoping review: Chartered Data

Publication and Origin	Research Design	Participants	Purpose	Type of Trauma	Identification of sensory modulation dysfunction	Treatment of sensory modulation dysfunction	Core Principles of Ayres Sensory Integration®	Outcomes Conclusions	Discipline
E. Warner, J. Koomar, B. Lary, A. Cook, 2013 New York	Description of programme, exploratory conceptual paper.	Children and Adolescence	To develop trauma specific treatment modes for children and adolescence with complex trauma in residential treatment, whose affect and behavioural dysregulation disrupts daily living.	Multiple traumas e.g., early loss, disturbed caregiver systems, emotional, physical and sexual abuse and various forms of neglect.	Self-perception evaluation, Affect/Impulse Interview, Regulation Assessment, SIDES (Structured Interview for Disorders of Extreme Stress)	Sensory Rooms and the SMART programme were developed (Sensory Motor Arousal Regulation Treatment)	Ayres Sensory Integration ® and Psychotherapy modules.	Sensory Integrated theory and sensory modulation techniques supported by appropriate staff training and consultation offers innovative strategies for improving affect and behaviour regulation in traumatized adolescence. Current empirical data to support claims of effectiveness is scant.	Occupational Therapy and Psychotherapy
B. J. Atchison, 2007 (Michigan, Kalamazoo)	Descriptive paper and evidence - based literature reviewed.	Children	Present definitions and concepts about sensory modulation, behavioural aspects of Sensory Modulation Dysfunction, framework for assessment and intervention, advances in research.	Alcohol Foetal Syndrome, peri- and postnatal exposure to physical and emotional trauma, i.e., Abuse and neglect.	Neurodevelopmental assessments, Psychosocial assessments, Interviews, Sensory Profile (Dunn, 1999), Observation.	STEP (Sensation Task Environment Predictability) (Sensory Integration Model of Intervention)	Yes	Sensory Modulation is a desired state of emotional and physical wellbeing. The connection between trauma experiences and brain development holds significant implications for speech and language development.	Speech and Language Pathologist
E. Warner, J. Koomar, A. Westcott, 2009 Boston	Descriptive Paper	None	Discusses trauma as a state change disorder in children.	Emotional Abuse, Neglect, Attachment disruptions, Physical Abuse, Sexual Abuse	None	SMART (Sensory Motor Arousal Regulation Treatment)	Yes	With improved arousal regulation children show, greater expression of feelings, greater self-observation, increased social engagement, greater empathy.	Occupational Therapy and Psychotherapy

Publication and Origin	Research Design	Participants	Purpose	Type of Trauma	Identification of sensory modulation dysfunction	Treatment of sensory modulation dysfunction	Core Principles of Ayres Sensory Integration®	Outcomes Conclusions	Discipline
J. Lebel, T. Champagne, N. Stromberg 2010 USA	Descriptive Paper Part 2	Children and Adolescence	Description of services that promote healing and wellness to give individuals the necessary supports and skills to promote self-awareness, self-regulation, occupational performance, and recovery.	Not specified: Mental Illness and trauma with symptoms of anxiety, depression, dementia, histories of trauma, post-traumatic stress disorder, self-injurious behaviour.	Not specified but sensory based assessments and development of sensory interventions is part of evaluation process.	Sensory Approaches and interventions used for calming and self-soothing include ice applied to wrists, breathing techniques, weighted blankets, and vests.	Incorporates Ayres SI® together with psychotherapy	Significant decrease in inpatient length of stay, staff sick time, consumer injuries, 99% reduction in workers compensation claims. Specific occupational therapy expertise has been invaluable to positive benefits of treatment.	Occupational Therapy and Psychology
J. Lebel, T. Champagne, 2010 USA	Descriptive Paper Part 1	Children and Adolescence	Article establishes the value and relevance of integrating sensory-based, trauma-informed interventions in the delivery of mental health services.	Not specified but indicated as children and adolescence with trauma histories.	Not specified but indicates that proper diagnostic tools, assessments, and training necessary to ensure the understanding of trauma, prevalence, and symptoms.	Individuals recognize and regulate sensory experiences using sensory-based interventions e.g. How does your engine run? ® (Williams and Shellenburger, 1996; 2014) and Sensory Modulation and Environment (Champagne, 2008).	Ayres and psychological approaches e.g., Dialectical Behaviour Therapy and use of Cognitive Behavioural Therapy.	The use of sensory approaches provides more nurturing, healing, and a positive trauma-informed culture care.	Occupational Therapy and Psychiatry
C.C. Whiting, 2017 Massachu-setts	Descriptive paper	Children in an educational setting who have trauma histories.	Highlights how occupational therapists working in public schools play a unique supportive role using a trauma-informed sensory approach.	Loss of consistent caregiver, neglect different forms of abuse and maltreatment.	Analysing environments, tasks, routines. Specific tests not mentioned.	Focuses on "Just right" challenges in a playful, engaging, sensory-rich environment. Designing of individual sensory diets. Aim of therapy is to move from acting out when dysregulated to using proactive strategies to participate effectively in education.	Yes	Occupational Therapist collaborate with professionals from other disciplines to develop comprehensive integrated programmes and intervention for students. Programmes need to be based on assessments as symptoms related to trauma vary. Progress in reducing the impact of trauma, needs to be seen in education, social interaction and play.	Occupational Therapy

Publication and Origin	Research Design	Participants	Purpose	Type of Trauma	Identification of sensory modulation dysfunction	Treatment of sensory modulation dysfunction	Core Principles of Ayres Sensory Integration®	Outcomes Conclusions	Discipline
E. Warner, J. Spinazzola, A. Westcott, C. Lynn and H. Hodgdon, 2014 Zurich	Quasi experimental pilot study	Adolescence and Children	Paper provides preliminary empirical support for the efficiency of sensory motor arousal regulation treatment (SMART), a treatment model which targets somatic regulation as an avenue to behavioural and emotional regulation.	Politicized, complex trauma. Not specified.	Not specific to Sensory Modulation Dysfunction, Child Behaviour Checklist (CBCL) Anxious/Depressed, Withdrawn/ Depressed and Somatic concern Subscale, Post-Traumatic Stress Disorder Reaction Index (PTSD-RI) assessing symptoms of trauma.	SMART Model	Ayres Sensory Integration® principles and child psychiatry models.	Need expressed by clinical staff to extend usage of SMART Model and knowledge about regulation. Findings were a first step in addressing the lack of empirical evaluation of sensory motor-based approaches to trauma intervention.	Psychology and Occupational Therapy
J.A. Koomar, 2009 USA	Descriptive paper	Children and Adolescence	Article reviews current issues related to trauma, identifies overlapping characteristics of trauma disorders and sensory modulation disorders. Discusses the occupational therapist's role in working with children who have experienced trauma.	Loss or lack of consistent caregivers, emotional, physical, or sexual abuse, various forms of neglect, surgical and life-saving situations.	Not specified	Dysregulated state of arousal, hypersensitivity to sounds, touch and movement, express of flight, fight, and freeze.	Ayres Sensory Integration® and SMART Model	Need for continued experimentation to combine therapies to create chanced healing of the child and the family.	Occupational Therapy and Psychotherapy
A.R. Sears, J. Apodaca, H. Sanders, 2016 New Mexico, La Familia-Namaste Treatment Foster Care Programme	Retrospective chart review with HRPO approval	26 children, 4 - 14 years	To provide quantitative evidence towards the body of literature supporting sensory processing deficits in children who have experienced trauma or neglect.	Trauma and neglect	Sensory processing measure completed by primary caregiver. Subscales: social participation, vision, hearing, touch, taste, smell, body awareness, balance, and motion, planning and ideas.	No treatment only evaluation	Yes	Analysis showed a significant number of children (81%) to have a total t-score ranging in "Some Problems" to "Definite Dysfunction"	Occupational Therapy

Publication and Origin	Research Design	Participants	Purpose	Type of Trauma	Identification of sensory modulation dysfunction	Treatment of sensory modulation dysfunction	Core Principles of Ayres Sensory Integration®	Outcomes Conclusions	Discipline
K.Fraser, D. Mackenzie, J. Versnel, 2017 Canada	Scoping Review	Children and Adolescence	With trauma-informed care and interventions becoming an emerging area of practice of OT, it is important that the effects of trauma in children and adolescence are understood to develop and provide effective interventions.	Complex Trauma defined as repeated abuse, witness of physical abuse, prolonged neglect.	Not explained	Sensory-based interventions based on practices by Occupational Therapists	Yes	There is limited empirical evidence, but sensory-based interventions are important for treatment with complex trauma. It is one type of treatment as part of a multidisciplinary treatment programme. Further research is needed to determine types of interventions that are effective.	Occupational Therapy
K. Gorman, K. Kohl, 2016 University of Toledo, 13th Annual International Human Trafficking Conference	Descriptive Paper	Children and, Adolescence and Adults	Discussion on framework of sensory integration, discussion on relationship between sensory integration and trauma informed care (TIC), identify sensory approaches to integrate into practice.	Physical, Sexual, and emotional abuse	Sensory Profile 2 (birth to 14 years), Adolescence/adults Sensory Profile (11 years and older).	Sensory diet interventions, Sensory rooms, Psychotherapy, Sensory Integration.	Ayres Sensory Integration® and Psychotherapy	Sensory approaches can be used in reduction of seclusion and restraint, Reduction in psychotropic medications, preventions, strategy to counteract stress and reduce discomfort, improvise ADL and social skills.	Occupational Therapy and Psychiatry
K.L da Silva, 2011 Rhode Island	Qualitative, Explorative Study using interviews.	Children and 4 Social Workers	Study focused on the sensory treatment approach for children with histories of trauma.	Abuse, Neglect	Not specified	Sensory diet tailored to meet each child's needs to have sensory input to stay focused and controlled throughout the day.	Yes	Although there are various methods of treatment, sensory integration is an additional tool in treating child with trauma. There is a need for research and improved methods. The study provided social workers with valuable insight on the effects of trauma and the use of sensory integration.	Social Work

Publication and Origin	Research Design	Participants	Purpose	Type of Trauma	Identification of sensory modulation dysfunction	Treatment of sensory modulation dysfunction	Core Principles of Ayres Sensory Integration®	Outcomes Conclusions	Discipline
V. Alers, 2008, SAISI Journal	Descriptive Paper	Children	A comparison of the neurophysiological aspects of trauma and sensory integration concepts.	Not specified, Trauma Survivors	Dysregulation, disorganized, insecure, avoidant, under-responsivity, over-responsivity anxiety, tactile defensive, auditory defensive, aversion to movement or gravitational insecurity. Sensory Profile (Dunn, 1999).	Sensory Modulation, Multisensory calming, Vestibular proprioceptive modulation	Yes	The stimulation of pleasure centres, especially vestibular proprioceptive stimulation will help process stress hormones and assist endorphin production. This is specific to healing in trauma victims.	Occupational Therapy

4.4 DISCUSSION FOR PHASE 1

4.4.1 Identification Sensory Modulation Dysfunction in Child Victims of Trauma

All 13 peer-reviewed studies chartered describe a theoretical link between exposure to trauma and sensory modulation based on the ASI®. However, eight articles did not specifically refer to occupational therapy sensory modulation evaluations used to identify SMD (Koomar, 2009; Warner, Koomar and Westcott, 2009; LeBel and Champagne, 2010; Da Silva, 2011; Warner *et al.*, 2013, 2014; Fraser, MacKenzie and Versnel, 2017; Whiting, 2018) and three articles lacked clarity on specific outcome measures in their descriptive and qualitative reviews (Fraser *et al*., 2017; Koomar, 2009; Warner *et al*., 2014). One article included the specific symptoms identified in SMD, associated with trauma. This included dysregulation, being disorganised, insecurity, avoidance, under-responsivity, over-responsivity, anxiety, tactile defensive, auditory defensive, aversion to movement or gravitational insecurity, all of which needed to be assessed (Alers, 2008a). Three articles suggest that sensory-based assessments in conjunction with other diagnostic tools, the majority from the discipline of psychology, should be used as part of the evaluation process, including the analysis of the environment, tasks and routines (LeBel *et al*., 2010; LeBel and Champagne, 2010; Whiting, 2018). Outcome measures and standardised assessments to identify SMD, were specified in four studies for the target group of CVT (Atchison, 2007; Gorman and Kohl, 2016; Sears *et al*., 2016; Warner *et al*., 2014). These assessments, which were standardised occupational therapy and psychology assessments, evaluated typical symptoms of SMD and provided valid results for disruption in affect and self –regulation as a result of past trauma in CVT. Thirty eight percent of studies that used standardised occupational therapy (five out of 13 studies) and 23% psychology evaluations (three out of 13 studies) identified SMD in CVT (Figure 4.2).

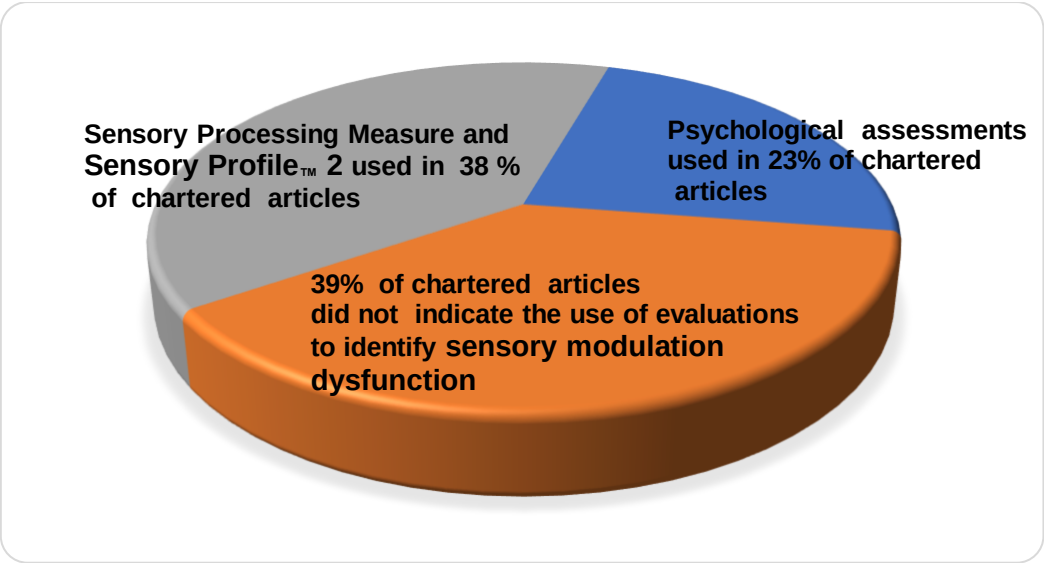


Figure 4.2 Identification studies that used standardised occupational therapy and psychological evaluations in the treatment of CVT

Identification of SMD and typical symptoms of SMD was reported using standardised occupational therapy evaluations, such as, the Sensory Profile™ (Dunn, 1999), the Sensory Profile™ 2 (Dunn, 2014a) and the Sensory Processing Measure™ (SPM) (Parham *et al*., 2007) in three of the 13 studies chartered. These assessments were specifically developed to determine the sensory input the child may have difficulty modulating or processing, as well as the emotional and behavioural components affected by their adaptation to sensory stimuli, and how they may react to or approach participation in daily activities.

In a qualitative study, the sensory challenges faced by CVT with modulation disorders were described. A case study of one CVT (Atchison, 2007) considered the results of the Sensory Profile™ (Dunn, 1999) from a speech therapy perspective. The Sensory Profile™ 2 (Dunn, 2014a) developed from the original Sensory Profile™ (Dunn, 1999), is rooted in development, neuroscience and human behaviour, and is used to assess children from birth to 14 years 1 months. It covers appropriate behaviours for each age group during this active period of human development. This assessment characterises behaviours that children exhibit as sensory processing patterns on two continua i.e., active to passive responses and high to low thresholds. These continua result in four sensory processing patterns i.e., low registration, seeking, avoiding and sensitivity.

The author of the one case study chartered (Atchison, 2007) suggested the use of this assessment, in conjunction with other neurodevelopmental and psychosocial assessments. In this case, the child was over-responsive to tactile, auditory, and olfactory sensory input. He became hyper-aroused, disorganised in task performance, and retreated from environments when these sensory inputs became overwhelming for him.

One quantitative study with a large sample (n=900) which used the Sensory Profile™ (Dunn, 1999), found that 53% of the CVT assessed with the Sensory Profile™ presented with ”Probable difference” and ”Definite difference” in sensory modulation. While 63% of the participants were under-responsive or sensory seeking, they were over-responsive to tactile sensation (42% of the sample) and auditory filtering (66% of the sample), confirming the findings of Atchison (2007) in the case study on a CVT (Gorman and Kohl 2016).

Two other quantitative studies, with small samples concur with research, that SMD is present in child and adolescent victims of trauma. In a retrospective chart review by Sears *et al*., (2016) (n=26) using the Sensory Processing Measure™ (SPM) (Parham *et al*., 2007) sensory processing deficits were identified in children affected by early childhood trauma. The SPM™ (Parham *et al*., 2007) considers aspects of sensory processing on components of everyday function i.e. perception, postural control, praxis and social participation. It provides a complete picture of children’s sensory processing difficulties at school and at home. While the SPM assessed children up to 12 years of age, the SPM-P™ (Parham *et al*., 2007) is extended to assess children as young as two years of age, making early intervention possible. The SPM™2 has recently been developed from the original SPM and extends from 12 years to 21 years of age.

Sears *et al*., (2016) reported that age, gender, and length of stay in an institution did not affect the outcomes of the study but 81% of the participants had T scores indicating “Some Problems” to “Definite Dysfunction” and presented with deficiencies in development, assessed to be extensive and complex. In the subtests for planning ideas and social participation, 84% and 100% of the participants respectively, had various levels of dysfunction.

A quasi-experimental by Warner *et al*., (2014) (n=31) used the Post-traumatic Stress Disorder Reaction-Index (PTSD-RI) (Steinberg *et al*., 2013) to identify disruptions in self-regulation and symptoms of SMD, which was found in 55% of their adolescent participants. The PTSD-RI test subscales, which reflect the sensory modulation symptoms of avoidance and over-responsivity, measure direct impact on affect and impulse control as central problems, which the study showed, impacted behaviour and daily activities in the participants.

In a qualitative study which explored occupational therapy practice with children and adolescents with complex trauma, the Goal Attainment Scale (GAS) (Kiresuk, Smith and Cardillo, 2014) was the most commonly used outcome measure. All studies concur on the need for further research with regards to identification of SMD in this population of children.

4.4.2 Sensory-Based Interventions Used with Child Victims of Trauma

Eleven out of 13 studies provided a descriptive analysis of improvements or the potential for improvement in symptoms of SMD using sensory-based interventions with CVT.

When considering intervention programmes used to treat sensory modulation dysfunction, one specific programme developed for this purpose was described. The Sensory Motor Arousal Regulation Treatment (SMART) programme was mentioned in three articles selected for the review (Warner, Koomar and Westcott, 2009; Warner *et al.*, 2013; 2014). This programme uses a comprehensive treatment approach that is organised to support arousal regulation in traumatised children by integrating sensory integration, sensory-motor psychotherapy, attachment theory and treatment. The programme is based on both the OTPF which addresses sensory-perceptual skills, motor and praxis skills, emotional regulation, cognitive skills, communication and social skills and the Sensory Motor Psychotherapy framework which focuses on engaging regulation skills to change behaviour by diminishing autonomic arousal, enhancing emotional expression, increasing cognition, and focusing on strengths. Components of

Attachment Theory and Treatment which focus on co-regulation and autoregulation using vestibular activities, touch regulation activities, proprioceptive activities and rhythm activities are also included.

Atchison, (2007) suggests that an intervention model for children with sensory modulation dysfunction, based on ASI® approach, known as the STEP–SI (Sensation, Task, Environment, Predictability - Self-Monitoring and Interaction) model is suited to CVT. This model, which is a clinical reasoning process, includes observational analysis of the sensory domains that are challenging and supportive of adaptive behaviour and the sensory components in the context. The model can be applied to home-based programmes and can be implemented by occupational therapists in conjunction with other multidisciplinary team members. It was developed to provide a replicable protocol for research (Miller *et al*., 2002).

Literature indicate that occupational therapists and other professionals also use sensory-based interventions such as: sensory modulation rooms or comfort rooms and sensory diets (Da Silva, 2011; LeBel *et al*., 2010; Warner *et al.*, 2013). These intervention techniques use all sensory modalities (tactile, vestibular, proprioceptive, visual, auditory, olfactory, proprioceptive, and gustatory systems) and provide activities and sensory experiences individually tailored to address frequently experienced sensory sensitivities and dysregulation. Sensory modulation rooms or comfort rooms utilise activities that allow individuals to practice their sensory skills for calming, in a secure environment. Da Silva, (2011), LeBel *et al*., (2010), Warner *et al*., (2013), LeBel and Champagne, (2010) support these interventions and also suggest using the Alert Program®. The Alert Progam® was chosen for the purposes of this study as it specifically targeted self-regulation strategies for sensory modulation, the programme is structured and can be implemented within a group setting.

Considering the variety of sensory-based interventions used in therapy, the overall effectiveness of sensory-based interventions cannot be accurately determined unless it is individually used in empirical studies with a large enough sample size to demonstrate effectiveness.

4.4.3 Effectiveness of Sensory-based interventions using the theoretical principles of Ayres Sensory Integration®.

Sensory-based interventions target the sensory system to remediate or bring about change in an individual. This process in ASI® is described as the ability of the nervous system to take information from the environment, organise the information and interact effectively with the environment. Intervention, therefore, focuses on adaptation of the sensory system, using sensory motor activities or techniques to promote sensory integration, sensory processing and sensory modulation (Fraser *et al.*, 2019). The outcomes of therapy discussed in the chartered Table 4.3, confirm a positive improvement in the affect, self-regulation of behaviour, emotional regulation, arousal regulation, social engagement, stress reduction and improved participation in ADLs.

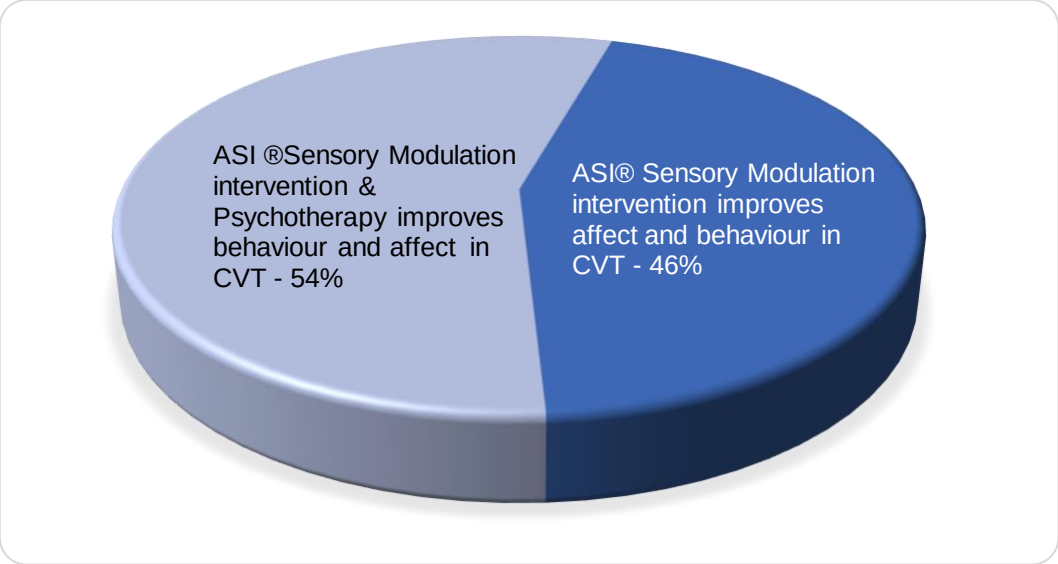


Figure 4.3 Effectiveness of interventions for Sensory Modulation Dysfunction in CVT

Studies either based their findings solely on ASI® sensory-based intervention or ASI® intervention in combination with psychotherapy approaches (Figure 5.2).

The effectiveness of intervention was reported in 46% of studies that based their findings solely on ASI® sensory modulation approach (six out of 13 studies) and 54%

of studies that combined the ASI® approach in combination with psychotherapy approaches (seven out of 13 studies).

The quantitative study selected in which ASI® based intervention was used, provides empirical support, for the effectiveness of SMART programme (Warner, Koomar and Westcott, 2009; Warner *et al.*, 2013; 2014), to treat symptoms of dysregulation in child and adolescent victims of trauma for whom language-based approaches were difficult to implement (Warner *et al*., 2014). However, there was a small sample size (n=31) in this quasi-experimental study, with a matched control design. In this study 10 participants received the SMART programme while 21 had 'treatment as usual. The SMART programme implemented by occupational therapists and psychologists demonstrated the modulating impact of utilising the whole body, demonstrating that sensory inputs mainly from the vestibular, proprioceptive, and tactile systems assist effectively in reducing behaviour problems and symptoms of post-traumatic stress, in children and adolescents. The PTSD-RI (Post Traumatic Stress Disorder Reaction Index) (Warner, Koomar and Westcott, 2009; Warner *et al.*, 2013; 2014) is a self-report questionnaire to screen for exposure to traumatic events and assess PTSD symptoms in school-age children and adolescents. Although the SMART group did achieve lower scores on the PTSD-RI subscales (Re-experiencing, Avoidance, Over-arousal), significant change (p=0.011) in comparison to the 'treatment as usual' group was only recorded for the overall outcome on behaviour using the Child Behaviour Checklist (CBCL). A secondary analysis of the CBCL demonstrated that somatic complaints (p=0.016), symptoms of anxiety and depression (p=0.025) both exhibited significant reductions for the intervention group.

A second article by Warner *et al*., (2013) describes sensory-based interventions applied in a residential programme for traumatised adolescent girls and boys aged seven to 17 years. This programme involved the use of sensory diets and sensory modulation rooms especially for tactile and auditory devices that formed an integral part of their treatment to CVT. Since 2005, the reduction in restraints has been used as a measure of success when evaluating the programmes. A reduction of more than 68% in restraints was found for the girls and 80 to 90% for the boys. Residents and their

family's feedback indicated that the success of this programme was due to the intervention being replicated at home. However, there are no empirical studies using this intervention.

A qualitative study by Da Silva, (2011), explored the experience of four social workers in outpatient and residential clinics, after applying a sensory treatment approach based on ASI®, with CVT**.** All the social workers were trained by the same occupational therapist to use the sensory treatment approach. Using the CBCL, they recorded before treatment and after treatment behaviours of the children, to determine the effectiveness of the intervention. They used calming techniques when the child was stressed or in crisis and a sensory diet on a more frequent basis. All participants were positive about the use of the sensory treatment approach, but all agreed that it must be used with other methods of treatment including Cognitive Behaviour Therapy (CBT), play therapy, Dialectical Behaviour Therapy (DBT), and Eye Movement Desensitization and Reprocessing (EMDR). Therefore, evidence suggests that sensory intervention for CVT should be applied in conjunction with other treatment approaches.

4.4.4 Multidisciplinary Approach

In order to achieve optimal outcomes in CVT, it was repeatedly indicated in these articles that sensory modulation needs to be used within a multidisciplinary team approach. This would include occupational therapists, psychologists, social workers, and other relevant allied health professionals being included in the treatment programme for CVT. There was also a need expressed for empirical studies to provide supporting evidence for this.

Of the 13 studies selected after peer review, five articles used sensory modulation therapy for CVT, administered by occupational therapists within the framework of ASI®. Seven articles based their sensory modulation approaches on ASI® theoretical constructs in combination with psychotherapy approaches, where therapy was administered by occupational therapists, speech therapists, and psychologists (Atchison, 2007; LeBel *et al*., 2010; Warner *et al*., 2014; Whiting, 2018). One article used ASI® as a reference to formulate sensory diets and sensory strategies within a

social work practice (Da Silva, 2011). Figure 4.2 and Figure 4.3 illustrates in percentages the findings from the specific assessment tools and intervention methods used to identify and treat CVT.

The effectiveness of Trauma Informed Care (TIC) (LeBel and Champagne, 2010) acknowledges the key role and emerging need to include sensory modulation approaches as part of multidisciplinary programmes. They also concur on a collaborative process of professionals including psychology, nursing, recreational therapy, art, and music therapy in treating CVT, supporting Warner and Koomar, (2009) who suggest that the neurological, behaviour and relational dysregulation seen in CVT require a combination of professional expertise. The occupational therapist is skilled in selecting age appropriate, sensory-based activities that promote regulation of arousal, attention, and emotion. This guides the child towards achieving with the “just right” challenge. Collaborating with social workers in keeping the treatment plan holistic is important. It ensures skills utilised are focused on integrating the child into the home environment, and includes liaison between the family and child. (Da Silva, 2011).

Whiting (2018) suggests that team collaboration is also important in the school context and valuable for students exposed to trauma, as it contributes to an essential component of their support. The teacher, being the main point person, contributes information on the child’s current performance and information gathered from the caregiver. The school psychologist helps with social emotional development, cognitive strategies and provides individualised positive support for challenging behaviours. The occupational therapist assesses and provides the necessary therapeutic intervention for cognitive, social, emotional, and sensory factors to improve the child’s participation within and outside of the school environment.

4.5 CONCLUSION

With the lack of research in the context of our current South African society, particularly for occupational therapy sensory based intervention, the need for determining and justifying intervention for CVT has become essential across multiple healthcare professional practices. Firstly, this scoping review indicates there were more occupational therapy evaluations administered to CVT compared to psychological evaluations. Secondly, the scoping review identified the need for a multidisciplinary approach in treating CVT. Occupational therapy (using sensory-based interventions based on ASI®) and/or psychotherapy was found to be the most frequently and effectively used therapeutic interventions.

CHAPTER 5: PHASE 2 IDENTIFYING AND DESCRIBING SENSORY MODULATION DISORDER IN CHILD VICTIMS OF TRAUMA

5.1 METHODOLOGY

5.1.1 Introduction

The same sample of child participants and Child and Youth Care Worker/s (CYCWs) based at the same research sites were included in Phase 2 and 3 of the study. Therefore, the research settings, sample, recruitment, and ethical considerations used in Phase 2 and 3 are described first. Different aims and objectives, research designs, research instruments, research procedures, data management and analysis for Phase 2 and Phase 3 of the study are described in Chapters 5 and 6 respectively.

5.1.2 Setting of The Study for Phase 2 and Phase 3

The four child and youth centres (CYC) used during this research study were situated on the East Rand in Gauteng. This location was selected using convenience sampling since the CYCs were accessible to the principal researcher to coordinate, administer, and follow up the process of the research study. The accessibility of these locations was important in the research process as all aspects of the research study, and completion of the intervention with the child participants was the sole responsibility of the principal researcher.

Two of the research sites are governed by the Gauteng Department of Social Development which manages 13 other child and youth centres (CYC) in and around Gauteng. The Mary Moodley CYC and the Igugulethu CYC are situated in the Benoni and Boksburg areas respectively. Epworth Children's Village and Kidshaven are non-government organisations (NGOs) situated in Germiston and Benoni respectively. The four CYC centres were similar in their management hierarchy in that each institution had a management body, a senior social worker, a team of social workers, a senior CYCW, both male and female CYCW, maintenance and facility staff members. The

CYC centres differed in their organisation and planning abilities, experience of staff members, resources available to the children, and their ability to create environments that replicated a family home atmosphere.

Kidshaven and Mary Moodley CYC are situated in the lower socio-economic areas of Benoni, surrounded by small businesses and residential homes. Epworth Children's Village in Germiston and the Igugulethu CYC in Boksburg are situated in the heart of suburbs which are low to middle-class socio-economic areas. Children residing at these centres attend local schools in the area.

All of these centres care for children who have experienced trauma as a result of physical abuse, sexual abuse, family violence and/or neglect. Children are placed at these residential care facilities by social workers after the necessary investigations have been done. The Igugulethu CYC caters for children from birth to 12 years. The Mary Moodley CYC caters for children from birth to 17 years. The Epworth Children's Village caters for children from five years to 16 years. Kidshaven caters for children from six years to 18 years of age. Investigations and assessments by social workers at each centre were ongoing, to determine whether children need to remain at the facility, whether there was a possibility of them being fostered or adopted or returned to family members. Approximately 10% of child participants were of foreign nationality, awaiting placement with the nearest and safest relative in South Africa.

These centres primarily provide social work, psychological and health services to the children on a weekly basis. Services of occupational therapy, speech therapy and physiotherapy are not provided on site. Children are taken to these services when required and according to funding available.

5.1.3 Participant Selection Phase 2 and 3

5.1.3.1 Sampling Population

South Africa's mid-year population for 2021 was estimated at 60.14 million people, according to the report released by Statistics South Africa (Stats SA, 2021). According to this report about 28.3% of the population is aged younger than 15 years. Of those

younger than 15 years of age, the lowest percentage (23.5%) compared to other provinces, reside in the Gauteng Province. A national prevalence study, by the Children's Institute, published in 2016, estimates that one in three children are the victims of sexual violence and physical abuse before they reach the age of 18, whilst 12% of children report neglect and 16% report emotional abuse (Jamieson, Sambu and Mathews, 2017). The majority of children (approximately 90%) at the centres, had families who resided within the Gauteng Province of South Africa.

5.1.3.2 Sample Size

Based on the status at the initial stages of this research study, the sample size recruited for Phase 2 needed to take into consideration the requirements for the RCT in Phase 3. For Phase 3 the sample size for the intervention and control groups α (for a two-tailed study) was set at 0.05 (type I error rate), β was set at 0.8 (type II error rate), q1 (proportion of subjects that are in group 1 - exposed) is set at 0.5, q0 (proportion of subjects that are in group 0 – unexposed) is set at 0.5, the effect size is 0.5 and the standard deviation is set at 1.

It was predicted that 10% may not achieve the "*more than others and much more than others*" or "*less than others and much less than others*" scores in Phase 2, with a loss of 12 participants a total sample of 138 (126+12=138) was required. It was also predicted that it was unlikely that there would be any dropouts or non-attendance in this study as the children are resident and housed at the centres. The response rate distribution was therefore fixed at 50% (since this gives us the largest possible sample size). Using Cochrane's formula for a single group study, a confidence level of 95% it was predicated that the intervention group and the control group would be assigned 69 participants each (Bartlett et al 2001). However, due to limited personnel, financial constraints, time constraints and the confounding variable of natural maturation of the child participants, the sample size was decreased to 128 child participants.

5.1.3.3 Sampling

Using purposive sampling, a total sample, n=128, taken from a population of children from four CYCs on the East Rand in Gauteng was selected, using the inclusion and exclusion criteria stated below. The residential sites chosen were in close proximity to the private practice of the principal researcher. This was done in an effort to reduce travelling time between the sites and ensure easier access during the research process. Eligible children were those who had experienced trauma and were between six years and 14 years 11 months (according to the baseline assessment, CSP™ 2 age range). Inclusion and exclusion criteria were applied to the CVT residing at the four CYCs.

Children

***Inclusion criteria*:**

- Child victims of trauma residing at the CYCs
- Children between the ages between six years and 14 years 11 months who gave assent to being part of this research process (Appendix I)
- Children from all ethnic groups and socio-economic backgrounds
- Experience of first or recurrent trauma
- Children cared for by CYCWs who are literate in the English language

***Exclusion criteria*:**

- Children who have a diagnosed neurological condition or severe mental disability, who would not benefit from the group intervention programme.
- Children receiving occupational therapy for the duration of the study.

The CYCWs who cared for the children were also selected for the study as the assessments and outcome measures required caregiver reports to be completed by the child's carer.

Child and Youth Care Workers

Inclusion criteria

- Child and Youth Care Workers who are literate in the English language
- Child and Youth Care Workers who gave consent to be part of research process (Appendix J)

5.1.3.4 Recruitment

During the periods of recruitment, the principal researcher was solely responsible for setting up appointments with each centre to firstly orientate the CYCWs and social workers (Appendix K) to the research study, obtain their demographic information (Appendix L) and give them the opportunity to individually sign the informed consent forms (Appendix J) if they agreed to be part of the study. It was important to include the social workers in this session as they would be providing the demographic details of the child participants from each child participant's file. Thereafter appointment times were scheduled at the centres with the children aged six years to 14 years 11 months of age, to give each child the opportunity to sign the child assent form which requested that information about them be provided to the principal researcher and that the CYCEs could fill in forms about them (Appendix I).

Table 5.1: Time periods of recruiting CYCWs and child participants at each of the four residential facilities

CYCW and Child Participants	Mary Moodley CYC	Igugulethu CYC	Epworth Children's Village	Kidshaven
Initial date of recruitment	6/1/19	6/1/19	7/2/19	31/7/19
Final date of recruitment	12/1/19	12/1/19	12/2/19	14/8/19

The recruitment of the CYCWs at each facility was done over one week by the principal researcher. Not all CYCWs were available on each day, so recruitment occurred over a number of days to ensure that all eligible staff in each facility were recruited. The study was explained to the CYCWs in detail (Appendix K) before they signed informed

consent. The recruitment at Kidshaven occurred later in the year to increase the number of child participants to an appropriate number for the RCT.

Once all eligible CYCWs were recruited, they assisted to identify eligible child participants for the study (six years to 14 years 11 months). The recruitment period of CYCWs and child participants was completed as indicated in Table 5.1

5.1.3.5 Ethical Considerations for Phase 2 and 3

Ethics clearance was obtained from the University of Witwatersrand's Human Research Ethics Committee, (certificate no. M180136) on 26 January 2018. (Appendix M). The research protocol was approved by the Faculty of Heath Sciences of the University of the Witwatersrand assessors committee (Appendix N). Permission to conduct the research project at the Mary Moodley CYC, Igugulethu CYC, Epworth Children's Village and Kidshaven was obtained from the centre management and the Gauteng Department of Social Welfare Development (Appendix O). The following ethical principles were incorporated into the study.

Respect for Persons

The first ethical principle included in the study incorporates two elements that deal with respecting people in regard to research:

People should be treated as autonomous

The term autonomous means that a person is entitled to self-govern i.e., make his or her own decisions about what to do and what to agree to.

The principal researcher respected the individual's need to make informed decisions about whether to participate in research. The CYCWs and children were invited to participate in the research process by the principal researcher. The principal researcher provided the managers of the CYC Centres, CYCWs, and children with concise information about the study and allowed them to individually decide whether they would like to enrol in the research. For all CYCWs and children, it was indicated that participation was voluntary, and they could refuse to participate or withdraw from the research at any stage with no consequences (Appendix I and J).

People with diminished autonomy should be protected

There are some people in society who may require assistance and guidance to make informed decisions about their well-being and activities that they engage in. This will include young children, adults and children who are very ill, or those with mental disabilities. These groups of people must be protected and only included in research studies under controlled and specific circumstances, as they cannot make accurate informed decisions on their own.

Since the children in this study are from a vulnerable population, care was taken to ensure the research had possible benefit to them and that they were not coerced in any way to participate. The research process was explained to the children at each residential site prior to CYCWs completing the CSP™ 2. Informed assent forms (Appendix I) were completed according to two age categories, six to 10 years, and 11 to 14 years 11 months of age. Each age category was seen in separate groups to allow for age-appropriate explanations of the research process. The assent form contained a simple written explanation that was communicated verbally by the principal researcher (Appendix I). Each child was invited to sign their names or use their thumbprint if they had a challenge with writing. This would indicate their acceptance of being a part of the research process and would allow social workers to provide the principal researcher with background information on the child participants (Appendix P).

There were no objections from the children and all 128 child participants recruited, agreed to participate in the research study. Recruitment of children was stopped when a saturation point was reached i.e., there were no other children at the residential sites between six years and 14 years 11 months who met the inclusion and exclusion criteria.

Care was taken to keep all identifiable data secure by storing it in the principal's researcher's office cabinet, which was only accessible to the principal researcher, for the period of the researcher study programme. During the course of the research this information was only available to the researcher and research assistants. In Phase 2 of the study, the CYCWs completed the CSP™ 2 in the boardroom venues of each

institution. The CSP™ 2 completed questionnaires were collected by the principal researcher and placed in a sealed box. Only the principal researcher had access to the completed forms for scoring. Child participants each received a unique numerical code that identified their data on an Excel spreadsheet. The child participant's names were kept separate from the data captured on the Excel spreadsheet.

In Phase 3 of the study, the CYCWs completed the assessment forms at the pre-test and post-test sessions, evaluating occupational performance and anxiety. These assessments were administered and collected by occupational therapy research assistants. The research assistants used each child's unique numerical code and scored the assessment forms during Phase 3 of the study (RCT).

The social workers at each centre provided the background information on each child. They were the only staff who we had access to the results of the assessments.

Beneficence and Non-maleficence.

The definition of beneficence is an action that is done for the benefit of others. This principle states that research should:

Do no harm

The purpose of health research is to discover new information that would be helpful to society. The purpose of research should never be to do harm. In this research, children were provided with an intervention which was theoretically planned to improve their participation in occupations and reduce anxiety.

Each session with the CYCW's was conducted by professionals who displayed patience and encouraged participation. This was important to ensure that the CYCW's understood the benefits of the pre-test and post-test assessments to the child participants. The intervention sessions conducted by the principal researcher were planned in advance using the predetermined guidelines from the authors of the programme. The use of equipment and materials by the child participants were monitored by the principal researcher and the CYCW present in the session.

Maximise benefits for participants and minimise risks for participants

The purpose of many research studies involving humans is to determine the effectiveness of research. Therefore, participants may be exposed to some form of harm or risks. It is the responsibility of the researcher to do their best to maximise the benefits of the research to the participants and reduce the potential risk factors. This research was planned in conjunction with the CYC management, social workers and CYCWs at each centre. In order to maximise the outcomes for the child participants, assistance with carryover of the programme between sessions was requested by the principal researcher. There were no known risks in the use of the intervention used in this study. The Alert program is not an invasive program, and the child may only suffer some delayed sensory reactions.

Justice

This principle deals with the concept of fairness. Researchers designing trials need to consider their method of recruiting participants and their choice of location to conduct a trial. Both these aspects that pertain to justice needs to be fair to the participants. The concept of fairness gives rise to issues relating to; who benefits from research and who bears the risks of research. This provides the framework for thinking and making decisions in ways that are fair and equitable.

The participants included in research were specifically recruited because they are a population that requires intervention which is not readily available to them. The intervention was provided to a population of people with whom it is likely to be used in the future and the principal researcher ensured that it is was safe, effective, and acceptable to all potential participants. The principle of justice also indicates that questions being asked should be of relevance to the context of the participants in the study, which was ensured in this study. All child participants continued to receive social work, psychological and health services during the period of the study.

Since other studies have provided evidence of SMD in CVT it was important to determine the extent of this dysfunction in the children in this study and if intervention

was required. The purpose of this study was to establish the sensory modulation of children living at the CYC who have experienced trauma.

5.1.4 Aim and Objectives for Phase 2

Aim: To identify and describe the prevalence of sensory modulation dysfunction in CVT in residential settings.

Objective: To identify and describe sensory modulation dysfunction in CVT in residential settings in Gauteng, South Africa.

The following areas of sensory modulation will be assessed and described:

- Sensory Systems i.e., auditory, visual, touch, movement, and body position
- Behaviours i.e., Conduct, Social Emotional and Attentional
- Quadrants i.e., Seeking, Avoiding, Sensitivity and Registration

5.1.5 Research Design

A quantitative descriptive research design was used in this phase of the study to describe SMD in CVT in childcare residential setting. The CSP™ 2 (Little *et al.*, 2017; Dunn, 2014a) was used as the baseline assessment to determine the frequency of sensory modulation difficulties in CVT within the chosen population of children from six years to 14 years 11 months from four residential sites. The CSP™ 2 (Dunn, 2014b) was chosen for this study to provide the most in depth evaluation of the children's functional participation, as it was not possible to access information from the school and the community,

5.1.6 Research Instrument

5.1.6.1 The rationale for use of a standardised sensory modulation assessment Child Sensory Profile™ 2 with child victims of trauma

Literature reports that sensory reactivity has been assessed using both psychological evaluations and occupational therapy assessments which are aimed at identifying SMD in CVT. The Post-traumatic Stress Disorder Reaction-Index (PTSD- RI) (Steinberg *et al*., 2013) has been used to identify disruptions in self-regulation and symptoms of SMD (Re-experiencing, Avoidance and Over-arousal) (Warner *et al*., 2014). In occupational

therapy, specific sensory modulation assessments have been designed to determine the sensory input which a child may have difficulty modulating or processing, as well as the emotional and behavioural components affected by their adaptation to sensory stimuli. These assessments can be used to determine how the child may respond to or approach participation in daily activities. They include the Sensory Processing Measure™ (SPM™) developed by Parham *et al*., (2007) and revised by Parham *et al*., (2021), and the Sensory Profile™ developed by Dunn, (1999) and revised by (Dunn, 2014b). The Sensory Profile™ is also available in a short form. These assessments have been used for evaluating sensory modulation in CVT (Gorman and Kohl, 2016; Yochman and Pat-Horenczyk, 2020). For the purpose of this research the Child Sensory Profile™ 2 (CSP™ 2) (Dunn, 2014a) which screens sensory modulation in children was used.

These assessments have been used for evaluating sensory modulation in CVT to provide insight and clarity into their behaviour and emotional responses, as these relate to the child's daily living activities (Gorman and Kohl, 2016). Yochman and Pat-Horenczyk, (2020) examined the sensory modulation of 134 children exposed to continuous traumatic stress due to political violence. Using the Short Sensory Profile (Dunn, 2014a) significant differences were found for children according to their level of post-traumatic stress symptoms with 62% having clinical deficits in sensory modulation. Gorman and Kohl, (2016) reported similar results using the Short Sensory Profile (Dunn, 2014a) on a sample of 900 CVT. They found that 53% of the participants presented with "Probable difference" ("*more or less than others"*) and" Definite difference" ("*much more or less than others"*) in sensory modulation. They also reported that 63% of the participants were under-responsive or sensory seeking, 42% were over-responsive to tactile sensation and 66% to auditory filtering (Sears *et al*., 2016). Viviano (2001), however, found 80% of the children assessed with the Sensory Profile (Dunn, 1999), experienced traumatic stress reactions and had difficulties with sensory modulation, particularly sensory seeking, emotional reactivity, and inattention.

Using the Sensory Processing Measure SPM™, Sears *et al*. (2016) reported 81% of CVT had T scores indicating "Some Problems" to "Definite Dysfunction" for sensory

processing. They also presented with deficiencies in development assessed to be extensive and complex. In the subtests for planning ideas and social participation, 84% and 100% of the participants respectively, had various levels of dysfunction. They found that age, gender and length of stay in an institution for CVT did not affect the outcomes in terms of sensory processing dysfunction (Sears *et al*., 2016). These studies indicate the importance of evaluating sensory modulation in CVT to determine the area of dysfunction that could be contributing to a child's difficulties in participating in daily activities

The CSP™ 2 is a caregiver report screening evaluation designed in a simple format. The decision to choose this test was based on its validity and reliability and the fact that it is user friendly. It was completed by the CYCWs who are the child's primary caregivers (Dunn, 2014b). This assessment instrument consists of 86 items that assesses six sensory systems: auditory processing, visual processing, touch processing, movement processing, body position processing and oral sensory processing. There are three sections included assessing behaviour: conduct, socio-emotional and attention. The CSP™ 2 is unique in that it only measure sensory modulation as a construct. The validity, reliability and the child's score on the sensory systems are analysed according to the four quadrants of the CSP™ 2 (Dunn, 2014b) (Figure 3.6).

5.1.7 Research Procedure

With the help of the social workers at the four research sites, 128 children were identified as CVT and were included in the study. The CYCWs who were caregivers of these children participated in this phase of the study.

The CYCWs who agreed to participate in the study were invited to complete the CSP™ 2 (Dunn, 2014b) of the children under their care. The principal researcher held a group session with the CYCWs prior to administration of the CSP™ 2 (Dunn, 2014a), to demonstrate and provide a one-page guideline (Appendix Q) for completing the CSP™ 2 (Dunn, 2014a). The CYCW selected children for whom they care and they could choose the children they knew well on whom to complete the assessment As the primary caregiver, the responses of the CYCWs were based on their knowledge and

observations of the children whom they care for. A total of 71 CYCWs completed the CSP™ 2 (Dunn, 2014a) forms on the identified 128 children selected for the study.

5.1.8 Data Management

The principal researcher was solely responsible for scoring the CSP™ 2 (Dunn, 2014b) for the 128 child participants, and did a first round of checks on the accuracy of the scoring. Thereafter the principal researcher's administrative assistant did a second round of checking on the accuracy of the scoring, ordered the screening forms into categories according to the research sites and captured the data on an Excel spreadsheet. A third round of checking was done by the principal researcher to ensure that the research identification numbers on each score sheet matched the research identification number on the Excel spreadsheet with personal identifying data. The Excel spreadsheet listed each child's research ID, gender, age at assessment, test date, school grade and research site. The data collection section on the Excel spreadsheet included the sensory section scores for each of the 52 items listed on the CSP™ 2 (Dunn, 2014b), the behavioural section scores for the remaining 34 items on the CSP™ 2 (Dunn, 2014b), and the summary quadrant scores.

5.1.9 Data Analysis

A descriptive quantitative analysis using Statistica v13.3 was done using frequencies and percentages. Demographic data for child participants and assessors was also tabulated in percentages (Table 5.2 and Table 5.3).

The raw scores on the CSP™ 2 were analysed according to the categories: "*much less than others and less than others, just like the majority of others, more than others and much more than others"* on the sensory profile classification system. The percentage of CVT who presented with SMD was determined using the scores indicated on the normal curve for the Quadrants, Sensory and Behaviour Sections. A cut off score above 50% of participants for the Quadrants, Sensory Section and Behaviour Sections with "*more/much more than others or less/much less than others"*, was set to identify the frequency of SMD in this sample of CVT.

The mean scores for the Quadrants, Sensory and Behaviour Sections for the sample in this study were compared to the mean scores for typical children reported in the CSP™ 2 User's Manual (Dunn, 2014b), to determine significant differences, using a chi squared test.

5.1.10 Rigour of Study

The external validity of the study was influenced by one variable in particular which had an impact on the accuracy of the responses on the CSP™ 2 (Dunn, 2014a). The CSP™ 2 (Dunn, 2014a), a caregiver report questionnaire was used as it is considered the gold standard for assessing sensory modulation. However, the completion of the assessment is dependent on the rater's knowledge and observation skills of the child participants, which may have influenced the outcome of this study. CYCWs are responsible for caring for up to 20 children, therefore they may not have a close enough attachment or bond with every child to have observed all the categories of sensory responses required by the CSP™ 2.

Four residential care centres were used for the purpose of increasing the sample size and validity of the study. The large enough sample size ensured a greater possibility of generalising the results from this study to a wider population of CVT within the South African context.

The use of the CSP™ 2 (Dunn, 2014a) allowed for a large sample size to be assessed in a relatively short period. The duration of the evaluation was approximately 20 minutes, which made it a useful tool when dealing with large groups of caregivers. The internal validity of the study was controlled by ensuring that the questionnaire was standardised by having a common one-page instruction sheet (Appendix Q) on the CSP™ 2 (Dunn, 2014a). This was used to orientate all the CYCWs at each CYC to the assessment tool. There was sufficient information in the manuals of the assessment tools validating their use including inter rater reliability.is 0.49 -0.89. This may have been a limitation of the study which may have influenced the outcome of this study since an interrater reliability was not determined for the CYCWs in this study.

The data from the CSP™ 2 (Dunn, 2014b) questionnaire was analysed as a combined unit of CVT from all centres. To add to the rigor of the study, data checking of the CSP™ 2 forms included three checks of accuracy by the principal researcher and the administrative assistant.

Finally, occupational therapy services were not available onsite at any of the CYC and none of the child participants were attending occupational therapy at the time of this research study.

5.2 RESULTS FOR PHASE 2

5.2.1 Introduction

Four CYC centres in Gauteng were selected as the research sites. Using purposive sampling, 128 CVT between the ages of 6 years and 14.11 years were recruited. These participants were selected according to specific exclusion and inclusion criteria (5.1.3.3). A total of 71 CYCWs completed the CSP™ 2 based on their observations of each child from the sample population.

In this chapter, a baseline assessment was administered to all child participants at the four research sites to identify CVT with sensory modulation dysfunction. Demographics of both the CYCWs who completed the baseline assessment and the child participants on whom the assessments were completed are detailed at the beginning of this chapter, followed by the results of the CSP™ 2 (Dunn, 2014b) and the discussion based on the results.

5.2.2 Demographic Information of Childcare workers

According to the National Care and Protection Policy (2019), the protective services for children in South African include foster care, temporary safe care, residential CYC and adoption. Within the child population of South Africa, the survival, development, and protection of these vulnerable groups are at risk, therefore the need for trained and equipped CYCWs. All 71 CYCWs from the four research sites had completed a Diploma in Child and Youth Care. Out of the total of 71 childcare workers, 50.7% were between 40 to 49 years of age, the majority were female and 15.49% were in the process of

additional tertiary education courses. Social workers participated in the study by providing the background information on each child participant (Table 6.2 and Table 6.3).

The child and youth care workers across four residential sites were similar in terms of age range, gender ratio and qualifications. There majority of female CYCWs appeared to be a common occurrence in other research studies as well. Cluver *et al*., (2016) in their study which focused on reducing child abuse amongst adolescents in low and middle-income countries within the South African context, indicate that 94% of caregivers in institutions were female. Their study also indicated that 45% of the caregivers were schooled to primary level or less. In this current research study, the criteria for employment as a CYCW was a Diploma in Child and Youth Care arranged by the Department of Social Welfare, which was a prerequisite for the government and NGO residential sites.

Table 5.2 Demographics of childcare workers (n=71)

Demographics		n	%
Age in years	20 - 29	2	2.82
	30 - 39	17	23.94
	40 - 49	36	50.70
	50 - 59	14	19.72
	60 - 69	2	2.82
Gender	Male	6	8.45
	Female	65	91.55
Qualifications	Diploma in CYC + No matric	10	14.08
	Diploma in CYC + Matric	39	54.93
	Diploma in CYC + Matric + Diploma or bachelors' student	11	15.49
	Social Worker or Auxiliary Social Worker	11	15.49

The importance of training of CYCWs, is evidenced in Scott (2006) master's research study which examines a community-based model of supervision for child and youth care, within a South African context. In the current study CYCWs received specific training from the National Association of Child Care Workers (NACCW). This training is supported by Jamieson (2013) in a Technical Report, which provides the scope of practice of a CYCW in the South African context. Within this context, the Children's Act

No.38 of 2005 (Republic of South Africa, 2005) has aimed to fulfil a child's constitutional rights to protection from abuse, maltreatment and neglect by providing care to these vulnerable children. Although the role of CYCWs extends into many communities within the South African context, for the purpose of the current research study, the focus was on engaging the CYCW within residential facilities. According to the statistics provided in a Technical Report (Jamieson, 2013), Gauteng needed 934 CYCWs in 2014/2015. The Department of Social Welfare in this report indicated a target of 1.4 million children from the national orphan data who required care. Their calculation estimated 38 to 45 children per CYCW. Within the residential sites of the institutions used in this study, the ratio was one CYCW to about approximately 15-20 children.

5.2.3 Demographics of Child Participants

The sample of 128 child participants on whom the CSP™ 2 was completed, consisted of 64 males and 64 females. They were in the first to eighth grade at school. Seven children were in a bridging class to assist with their individual barriers to learning. Research evidence details the effects of trauma on both boys and girls, with girls being at a higher risk compared to boys (UBS Optimus Foundation, 2015, 2016; Ward *et al.*, 2018; Unique, 2012). In this current study, the sample of CVT from four residential care sites included an equal number of boys and girls, both children and adolescents.

Table 5.3 Demographics of Child Participants (n=128)

		n (%)	
Gender	Female	64 (50.00)	
	Male	64 (50.00)	
Age in years by gender		**Mean (SD)**	**Min-Max**
	Female	9.71 (2.33)	6 -14.11
	Male	9.32 (2.21)	6 -14.11
Percentage of age categories	6 - 12	80.47	
	13 - 14	19.53	

With regards to the age range of child participants selected for this study, it was in line with the inclusion criteria for this study and the age range permitted on the CSP™2, which was used as the baseline assessment.

Table 5.4 highlights the forms of abuse and maltreatment identified in this study. Gregorowski and Seedat (2013) addressed childhood trauma within the developmental context of South Africa. In their study they indicate that abuse, neglect and loss including psychosocial stressors such as exposure to alcoholism and violence, are types of trauma contributing to mental health difficulties in children and adolescents. Hsiao *et al.* (2018) indicate that half of all homicide cases in South Africa are related to child abuse and neglect. Numerous research studies within the South African context will testify to the types of trauma indicated in Table 5.4.

In this study, all children admitted to the residential care facilities had been exposed to various types of trauma similar to Gregorowski and Seedat (2013) study. From the background information of the children screened, the most frequent type of trauma in this study was neglect and abandonment. Although participants may have experienced more than one type of trauma (either in their past or in the recent months leading up to their admission), Table 5.4 indicates the primary trauma that resulted in a child being admitted to the residential care facilities in this study.

Table 5.4 Type of trauma experienced by child participants (n=128)

Trauma	n=128	%
• Neglect	53	41.4
• Abandoned	16	12.5
• Witness of violence	14	10.9
• Death of parent	12	9.4
• Physical abuse	10	7.8
• Sexual abuse	7	5.5
• Emotional abuse	5	3.9
• Exposure to drugs	4	3.1
• Abuse (not defined)	3	2.3
• Exposure to alcoholism	2	1.6
• Exposure to sexual abuse	1	0.8
• Victim of violence	1	0.8

Of the 128 children included in the study the types of abuse found were similar to those reported in the literature in the South African context (UBS Optimus Foundation, 2016), although the percentage of children experiencing various types of trauma differed. Sexual abuse was only reported for the female participants (5.5%) which was lower than the rate for this type of abuse at 19.8% children in South Africa. The highest incidence of trauma was neglect which was experienced by over 40% of the participants. This was a much higher rate than the one in eight children described in the UBS Optimus Foundation (2016) report. Only 7.8% of participants had experienced physical abuse and 3.9% emotional abuse, which was lower than the reported 33% and 16% for South African children (UBS Foundation, 2016). The percentage of participants who had witnessed trauma was higher for the males but at 9.5% lower than the expected 16% (UBS Optimus Foundation, 2016). It can be deduced that CVT who were neglected were more likely to be admitted to residential facilities such as those in the setting for this research, due to the high incidence of this type of trauma present within the South African context. The above group of children were screened for SMD through the use of the CSP™ 2.

5.2.4 Child Sensory Profile (CSP™ 2)

From the screening of the 128 participants for SMD the scores of 11 participants (8.6%) fell into the typical range, 'just like the majority of others' on all 13 sections of the CSP™ 2 (Table 5.5).

Table 5.5 The frequency of scores on Quadrants, Sensory Sections and Behaviour Sections on the Child Sensory Profile 2 (n=128)

	Like the Majority of others	**"Less and Much less than other"**	**"More and much more than others"**
	%	%	%
Sensory Sections			
Auditory	58.59	3.90	37.50
Visual	35.15	14.85	**50.00***
Touch	40.62	0.78	**58.60***
Movement	54.68	0.00	45.32
Body Position	53.12	1.56	43.32
Oral	68.75	1.56	29.69
Behavioural Sections			
Conduct	50.00	0.00	**50.00***
Socio Emotional	32.03	0.00	**67.97***
Attentional	46.09	0.00	**53.91***
Quadrant Scores			
Sensory Seeking	57.03	3.13	39.84
Sensory Avoiding	37.50	1.56	**60.94***
Sensory Sensitivity	36.71	0.78	**62.51***
Low Registration	43.75	0.78	**55.47***
*** A score of 50% or more in the "less and much less than others" or the "more and much more than others" categories.**			

The remaining 117 participants (91.4%), presented with SMD in the categories:" less *than and much less than others"* and "*more than and much more than others*" in one or more areas of the summary scores i.e., Quadrants, Sensory sections, and Behavioural sections.

Results for the ***Sensory*** *Sections* (Table 5.5, Figure 5.1), show the highest percentage, 58.60%, of the children who displayed Sensitivity to Touch Processing "*more than others*" and "*much more than others*" and 50% displayed Sensitivity to Visual Processing "*more than others*" and "*much more than others*".

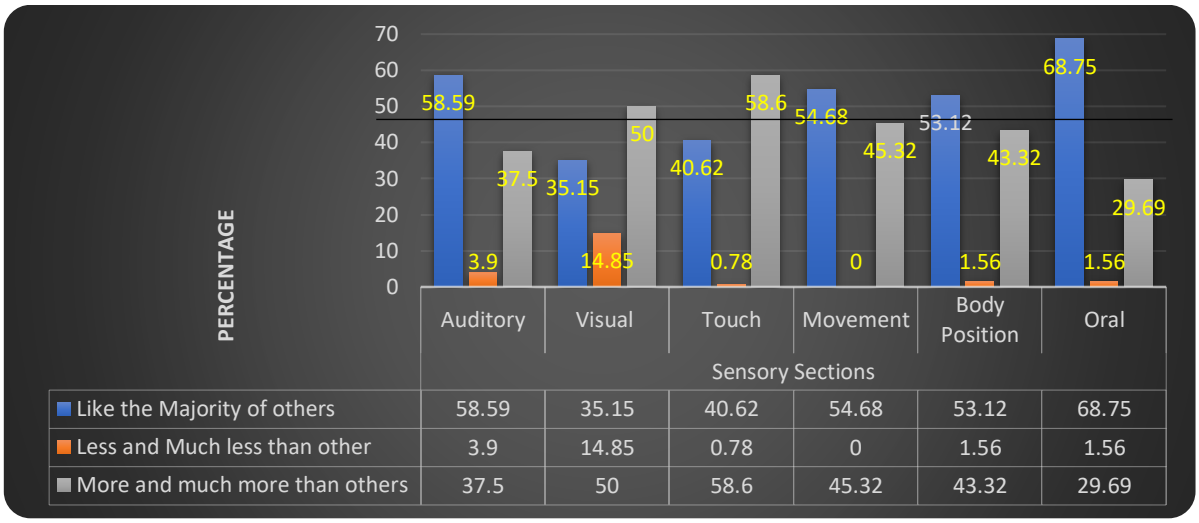


Figure 5.1 Sensory Sections from the CSP™ 2 assessment (n=128)

From the ***Behaviour*** *Sections* (Table 5.5, Figure 5.2), the highest percentage, 67.97% of the children scored "*more than others*" and "*much more than others*" for social - emotional responses.

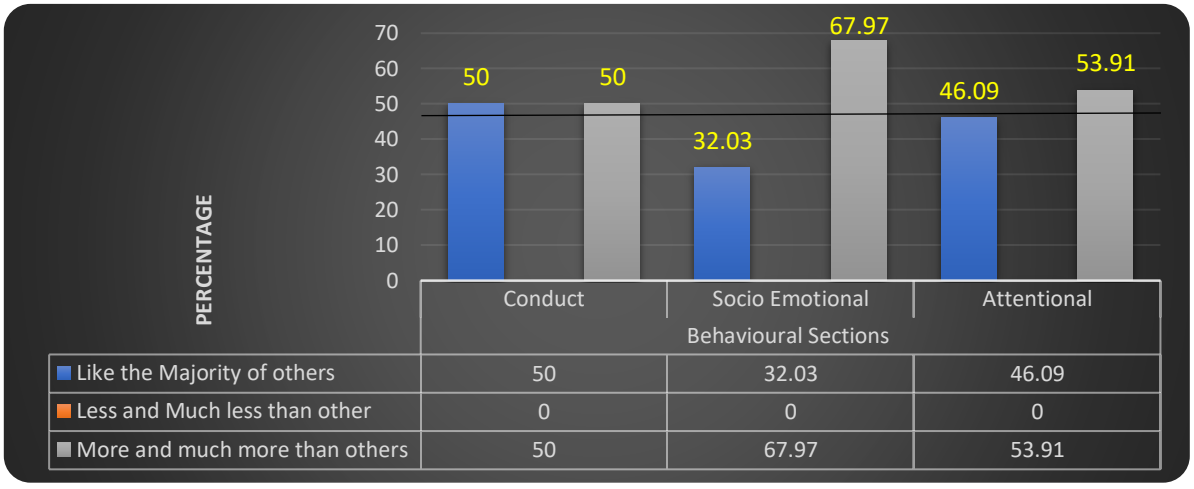


Figure 5.2 Behavioural Section from the CSP™ 2 assessment (n=128)

From the ***Quadrant*** scores (Table 5.5, Figure 5.3), the highest percentage, 62.51%, of the children displayed Sensory Avoiding behaviours: "*more than others*" and "*much more than others*."

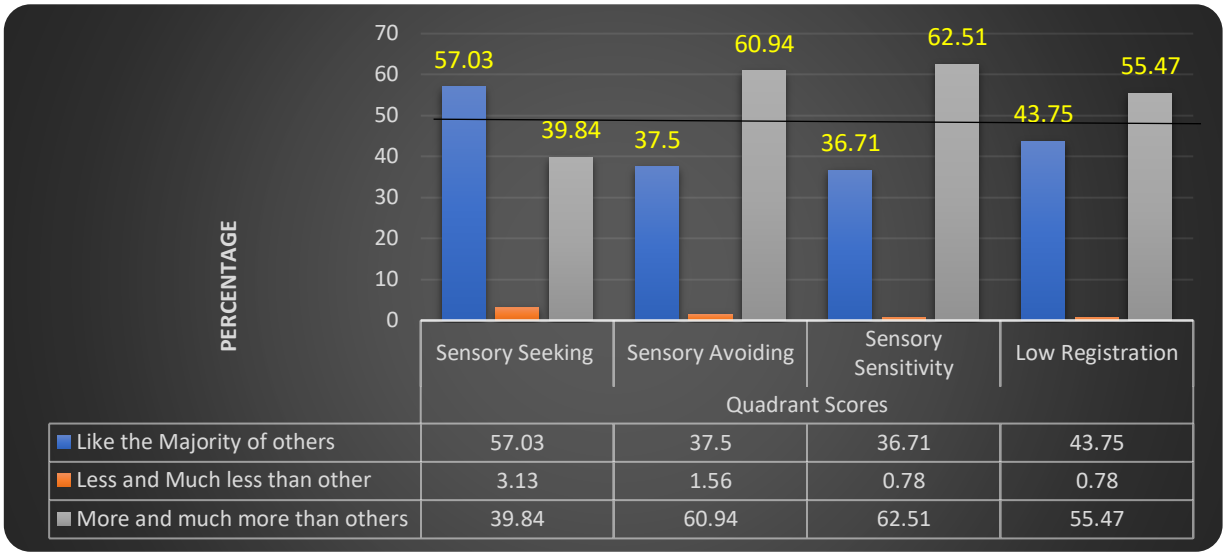


Figure 5.3 Quadrant Section Results from the CSP™ 2- assessment (n=128)

In this category of scores, more than 50% of participants presented with behaviours of Sensory Sensitivity and Low Registration. Children may engage in behaviours "*more than others or much more than others*" and "*less than others or much less than others*" in one or more quadrants (Dunn, 2014a).

5.2.5 Comparison of participant scores to mean scores reported for the Child Sensory Profile™ 2

Data analysis revealed that the participants in the sample of CVT had a different pattern of sensory responsivity with the raw scores on the CSP™ 2 being higher than those reported by Dunn, (2014) for the typically developing child, "*just like the majority of others*," indicating possible sensory modulation difficulties in CVT (Table 5.5). The mean score patterns for the CVT that fell within the ranges for "*more than others*" and "*much more than others*" were for the Touch Processing section, the Socio-emotional and Attentional Behavioural sections as well as the Sensory Avoiding, Sensory Sensitivity and Low Registration quadrants.

There were significant higher mean scores for the touch processing section (p=0.048) and the attentional behavioural sections (p=0.032) in CVT than typical children. Similar differences were seen in the mean scores between the CVT population and the typical population for the quadrants indicating low thresholds, Sensory Sensitivity (p=0.011) and Sensory Avoiding (p=0.009), as well as high thresholds Low Registration (p=0.029) had significant differences. These are the sections and components of sensory modulation with which this sample of CVT experienced definite challenges. According to Little *et al.* (2018) (Table 5.6) there is no statistically significant difference in the sensory profiles between CVT and ADHD/ASD in the sensory sections, behaviour sections and quadrant scores. A comparison of the mean scores between these neurological conditions and the typical child shows higher scores across all sections and quadrants for ADHD and ASD, indicating that their experience of processing sensory information is more extreme and definitely different from the typical child. In comparison to CVT, ASD and ADHD scores were similar confirming that sensory processing difficulties in CVT also occur on a neurological level presenting as SMD. However, CVT present with a unique pattern of Sensory Avoiding and Sensory Sensitive behaviours and emotional responses that is statistically significant compared to the typical child. This vigilant sensory subtype with increased sensitivity and avoidance (Little *et al.*, 2017) behaviours are more likely to affect the child's occupational participation and levels of anxiety.

Table 5.6 Comparison of mean and standard deviation scores on the Child Sensory Profile™ 2 for CVT and typical children (Dunn, 2014b) as well as children with ADHD and ASD (Little *et al*., 2018)

	Child Victims of Trauma (n=128)	Typical (n=65) (Dunn, 2014b) (*"just like the majority of others")*		ADHD (n=78) (Little *et al.*, 2018)		ASD (n=77) (Little *et al.*, 2018)	
	Mean (SD)	**Mean (SD)**	**p-value**	**Mean (SD)**	**p-value**	**Mean (SD)**	p value
Sensory Processing							
Auditory processing	21.9 (7.6)	14.9 (6.7)	0.301	23.5 (7.4)	0.881	23.2 (7.3)	0.972
Visual Processing	16.8 (6.2)	12.3 (3.7).	0.570	18.1 (5.4)	0.965	15.4 (5.1)	0.859
Touch Processing	25.5 (10.9)	12.4 (6.3)	0.048*	20.25 (9.3)	0.461	21.8 (10.5)	0.665
Movement Processing	19.0 (7.6)	11.6 (5.1)	0.201	16.4 (6.8)	0.735	17.2 (8.4)	0.867
Body position Processing	15.6 (7.7)	9.00 (4.6)	0.307	13.8 (7.2)	0.885	13.7 (6.8)	0.884
Oral processing	20.7 (8.9)	13.8 (6.5)	0.296	20.2(10.6)	0.989	26.7(8.4)	0.476
Behaviour							
Conduct	23.3 (8.7)	14.7 (6.2)	0.188	25.4 (9.6)	0.885	25.4(9.7)	0.885
Socio-emotional	27.9 (13.0)	20.4 (7.9)	0.313	34.1(14.8)	0.525	36.5 (11.8)	0.321
Attention	28.9 (10.9)	14.5 (6.8)	0.032*	30.1 (11.1)	0.994	27.4 (10.5)	0.791
Quadrants							
Sensory Seeking	46.4 (17.7)	30.9 (12.9)	0.085	47.3 (17.6)	0.984	43.6(19.0)	0.916
Sensory Avoiding	55.2 (19.0)	30.9 (11.4)	0.009**	50.3 (18.9)	0.696	53.7 (15.9)	0.987
Sensory Sensitivity	49.0 (15.7)	26.6 (10.6)	0.011**	40.0 (15.4)	0.396	49.6 (14.0)	0.992
Low Registration	48.4 (18.0)	28.0 (11.1)	0.029*	43.9 (16.7)	0.754	48.2 (14.9)	0.997

Significant p≤ 0.05*, p≤ 0.01**

5.2.6 Summary of Results:

According to the current research study the sensory profile reflected that the sample experienced "*more than others*" for Touch processing (indicating a sensory profile characterised by an extreme response to tactile stimuli), visual stimulation, conduct and social-emotional behaviours and attention. Results further suggest that the majority of CVT included in this study process sensory information differently from typical children in touch processing and attention. The sample also reacted differently than the typical

sample in Sensory Sensitivity and Sensory Avoiding quadrants (low thresholds), as well as in the Low Registration quadrants (high thresholds).

5.3 DISCUSSION FOR PHASE 2

5.3.1 Introduction

In this section the results of the CSP™ 2 assessment is discussed according to the Sensory Section, Behavioural Sections and Quadrant Sections. Each of these sections highlights the results that showed statistical significance and described comparisons to the typical ADHD and ASD child.

5.3.2 Sensory Modulation

A child's overall performance on the CSP™ 2 must be understood and related to their background and their living environment. Sensory modulation is influenced by the processing of sensory input from their environments. The trauma backgrounds of the participants as stated in the social work files indicated abandonment, sexual abuse, neglect, death of a parent, witness of violence, abuse (not defined), physical abuse, emotional abuse, exposure to drugs, exposure to sexual abuse, the victim of violence and exposure to alcoholism. The results of this study need to be understood within the context of these types of trauma backgrounds.

The child participants living situations are residential care facilities that meet the basic needs of a child i.e., food, shelter, care, and education. Every child participant has been separated from a household environment to a place of communal living with CYCWs as their caregivers, who are regularly alternating due to changes in their shifts. Child participants need to adapt to these changes on a weekly basis.

This study indicated that 91.4% of CVT from the four residential sites displayed responses that indicated SMD in one or more sections or components of the CSP™ 2. The findings of this research were supported by a number of studies indicating that dysregulation of the central nervous system in CVT results in difficulties in processing sensory information with either under or overreaction to sensory input (Da Silva, 2011; Fraser, MacKenzie and Versnel, 2017; Howard *et al.*, 2020; Yochman and Pat-

Horenczyk, 2020). The child may fluctuate between diminished awareness of sensory stimuli to hypersensitivity or avoidance (Atchison, 2007).

The percentage of CVT with SMD in the current study was higher than the 80% indicated in studies by Howard *et al*. (2020) and Viviano (2001) using the Sensory Profile (Dunn, 1999); as well as the 53% to 62% indicated in the study by Gorman and Kohl (2016) and Yochman and Pat-Horenczyk (2020) respectively. These differences may be due to the environment in which the children in this study live which have limited professional personnel, limited CYCWs and limited areas of stimulation. Robinson and Brown (2016) highlighted the impact of the environmental aspects of sensory processing in trauma-affected children. This is specifically in relation to the physical environment of children's residential homes. They indicate that the environment in residential homes may exacerbate the SMD of CVT, as they may not provide adequate input required to address these issues.

Research also indicates a relationship between sensory modulation and specific types of trauma (Howard *et al*., 2020). In Howard et al. (2020) children with a history of abuse and neglect had domain specific sensory processing differences in comparison with children who had no history of maltreatment. This study used the Short Sensory Profile (Dunn, 1999) and indicates that children with a history of abuse (n=147) yielded impairments in tactile sensitivity (84.4%) which was similar in the current study, and taste/smell sensitivity (47.6%) which was not dysfunctional in the majority of the sample in the current study. Eighty three point two percent (83.2%) of children with a history of neglect (n=125) displayed sensory avoiding (under-responsive) or sensation seeking (over-responsive) behaviours across the domains on the Short Sensory Profile (Dunn, 1999), which was similar to the findings in the current study as explained in the Quadrant Section scores in section 5.3.5. The similarities in the above mentioned studies inclusive of the current study, highlights tactile sensitivity with avoidance and seeking behaviours. This is often due to the mistrust that CVT develop in relation to adult figures in their lives who have often been the perpetrators of the trauma they have experienced. In the current study underresponsive behaviours were observed in a lower percentage of children withdrawing, avoiding social contact, or remaining passive

during the program. Overresponsive behaviours were observed in the majority of children constantly seeking out sensory input and often being disorganized in their responses. Both groups of children required support to self-regulate.

5.3.3 The Sensory Sections

The objective of Phase 2 of this study was to determine the effect of sensory modulation according to sensory systems i.e., auditory, visual, touch, movement, and body position in the child participants. The CSP™ 2 consists of the Auditory, Visual, Touch, Movement, Body Position and Oral Processing Sensory Sections. The majority of children in this study presented with atypical Touch Processing and Visual Processing responses "*more than others and much more than others*".

Touch Processing for *"more than others and much more than others"*

The processing of touch sensation is of high significance in CVT. It's influence on CVT has been widely researched (Warner, Koomar and Westcott, 2009; Kaiser, Gillette and Spinazzola, 2010; Gorman and Kohl, 2016). Nijenhuis *et al*., (1998) indicate that CVT have in particular also reported excessive sensitivity to touch stimuli, resulting in emotional or aggressive responses. This evidence indicates that the majority of children reflected difficulty in self-regulating activities and personal engagements with regards to touch sensation in the Sensory Section of the CSP™ 2, i.e., 58.6% of the CVT sample scored "*More than others and much more than others"* for Touch sensation. The experience of abuse in all its forms engages the child's physical body, therefore the sensitivity and aversive responses to touch.

The mean score of CVT was higher as compared to typical children (p=0.048) for Touch Processing. In their study Warner, Koomar and Westcott, (2009) did indicate that touch in therapy can trigger negative responses in CVT who have low neurological thresholds resulting in oversensitivity to touch. The current research study supports the findings of Nijenhuis *et al*., (1998) indicating that children with low thresholds had higher scores than typical children and were reported to become distressed during grooming, have an emotional or aggressive response to being touched and were distractible in social situations. Nijenhuis *et al*., (1998) and Sakson-Obada (2010) further explain that when

children with low thresholds for touch processing are not able to avoid social situations, they may respond with frustration, anxiety and outbursts due to being in close proximity to others. This may affect their ability to form and maintain friendships.

Touch, therefore, has significant implications in treatment planning for mental healthcare providers, especially occupational therapists who have the expertise to assess this area of the sensory processing (Gorman and Kohl, 2016). Warner *et al*., (2014) explains that the tactile system together with the vestibular and proprioceptive system was found to be crucial in the regulation of the arousal state specifically with regards to achieving an organised and calming state in CVT. It is therefore important to have an advanced understanding of the potentially traumatic effects of touch for CVT so that therapy programmes are planned according to the individual child's needs. A child who is for example hypersensitive to touch can be first introduced to safe touch using only the sensory integration equipment, without the clinician's direct touch. This can later be graded to situations allowing significant others to provide close touch to increase comfort and safety, in relation to touch experiences unique for the child.

Visual Processing for *"more than others and much more than others"*

In this study 50% percent of children obtained a score "*more than others and much more than others"* for visual processing. A comparison between CVT and typical children did not indicate a significant difference in visual processing (p=0.57). Mueller-Pfeiffer *et al*., (2013) did however find that the alteration occurred in the ventral visual stream, or the component of the visual system associated with processing objects in the visual sensory system in CVT. Visual processing difficulties can therefore be seen in children associated with post-traumatic stress disorder. This has been linked to dysfunctional attention processes and could have implications for the participation of CVT in functional activities related to school tasks, play, personal care, and social engagements. In the current study, many CVT were reported to be distracted by visual details and movement of others in the residential care environments during homework and study time, resulting in poor attention, which affects their learning. Significant others in the child's environment need to understand the over-responsivity or under-

responsivity to visual input including light and glare in the child's environment and make the necessary accommodations when there are high levels of emotional responses or there is decreased attention to an active environment.

5.3.4 The Behavioural Sections

The second objective of Phase 2 of this study was to determine the effect of sensory modulation according to behaviours i.e., conduct, social, emotional, and attentional in the child participants. The behavioural section of the CSP™ 2 includes the responses to sensory input that are associated with the behaviour and the ability of the child to participate in their environment (Kaiser, Gillette and Spinazzola, 2010). The "probable difference" and "definite difference" scores for CVT in this section (*"more than others and much more than others"*) indicate difficulty with managing behaviours.

Conduct Behaviours for *"more than others and much more than others"*

Although 50% of the children who had experienced or were exposed to trauma demonstrated Conduct behaviours "*more than others and much more than others"* the mean score for this behavioural section was not significantly higher from the mean score for typical children (p=0.188). Frequent conduct behaviours reported by CYCWs in this study was refusal to cooperate and temper tantrums that may link to the socio-emotional behaviours.

Socio-Emotional Behaviours for *"more than others and much more than others"*

For *Socio-Emotional behaviour* 67.97% of the child participants were scored as "*more than others and much more than others".*' SMD for this behavioural section did not display a significant difference in comparison to typical children (p=0.313*)*. The individual items from the CSP™ 2 highlighting the social emotional difficulties included challenges with changes in routine, strong emotional outbursts, needing protection from life and an inability to read others body language. According to Engel-Yeger, Palgy-Levin and Lev-Wiesel, (2013), individuals with post-traumatic stress symptoms, scoring on the edge of the continuum (in this study "*more than others and much more than*

others") have elevated emotional burdens which negatively influences their affective state.

Therefore, it was not unexpected that the children in this study who had experienced or were exposed to trauma would have social-emotional difficulties, which could affect their behaviour or adaptation to the environment. Their difficulty in dealing with change may be seen in acting out behaviours, aggression as a result of criticism, challenging activities and low frustration tolerance which affects their social and emotional responses (Dunn, 2014a). Van der Kolk, (2003) reported that CVT, especially those who have been chronically abused have problems regulating their arousal levels, which contributes to their environmental sensitivity. This implies that a child who is highly stressed, with sensory modulation dysfunction, may react negatively to other children within a residential site, especially those with challenging behaviours and erratic emotions. Therefore, together with past traumatic experiences, the commitment of and care provided by childcare workers and peer group relationships (Gialamas *et al*., 2014) could also impact on a child's socio-emotional responses at the residential sites.

Attentional Behaviours for *"more than others and much more than others"*

In this research study, 53.91% of CVT displayed "more *than others and much more than others"* responses in Attentional Behaviours. While distractibility has its roots in many neurological conditions, with CVT distractibility may indicate a high level of disengagement with the environment, in an attempt to avoid situations and people (Sheathe, *et al*., 2019; Taylor, 2019).

Attentional behaviours in those who are hyper-responsive in this study were reported as an inability to pay attention and looking away from tasks due to being acutely aware of stimuli in their environment. This caused a distraction and prevented them from being productive on a task. These findings are supported by the higher Attentional Behaviour mean score ($p=0.032$) when compared to typical children, "just like the majority of others".

5.3.5 Quadrant Sections

The third objective of Phase 2 of this study was to determine the effect of sensory modulation according to the quadrants Sensory Avoiding, Sensory Sensitivity, Low Registration and Sensory Seeking in the child participants. The quadrants represent how quickly the child reacts to input from the environment (high or low threshold) and how actively or passively the child uses self-regulation strategies to cope with sensory input (Dunn, 2014b).

Sensory Avoiding and Sensory Sensitivity *'more than others and much more than others'*

In the Quadrant Section of the CSP™ 2, the low threshold scores for Sensory Avoiding were demonstrated by 60.94% of participants and Sensory Sensitivity by 62.51% of participants. For Sensory Avoiding (p=0.009) and Sensory Sensitivity (p=0.011), the mean scores of CVT was higher as compared to typical children, displaying behaviours that were "*more than others"* ("probable difference"). These children will thus be more likely to over-respond to sensory input i.e., they will have enhanced awareness of important stimuli in the environment. Therefore, the anticipation of harm and danger associated with a trigger or stimulus can generate immediate and powerful responses (Dunn, 2014b), as is often seen in children who have experienced trauma. These children may understandably respond with protective responses associated with a lower inhibitory processes (McLaughlin, Sheridan and Lambert, 2014) when exposed to any unfamiliar situation which they experience as a threat, due to their past exposure to traumatic environments. The quadrant scores indicate the children may react passively and actively to sensory input from the environment.

Children who are *Sensory Avoidant* most often use active self-regulation strategies to manage situations that are overwhelming by actively withdrawing from a situation to reduce sensory input (Dunn, 2014b). Evidence from literature (Dunn, 2014b), supports the findings from this current study which indicates that CVT may go to great lengths to actively create order and routine in their environments to protect themselves. They would do this by reducing unanticipated sensory input to keep their environment

predictable, or they may use avoiding patterns by keeping away from new stimuli and retreating from unfamiliar situations (Dunn, 1997). Ogden, Pain and Fisher (2006) concur that avoidance and withdrawal compose a core diagnostic cluster in trauma-related conditions.

Sensory Sensitivity behaviours include the use of passive self-regulation strategies to manage situations which may present as tantrums and aggressive behaviours. They are unable to block out stimuli and get easily overwhelmed. These children experience the environment as highly unpredictable, provoking anxiety (Duncan, 1996). They react more quickly and more intensely than others, have a high level of awareness of the environment, discriminate and attend to details as situations arise and are more discerning about the way they choose to respond to a particular situation (Dunn, 2014b). For the CVT their sensitivity may cause them to remain in a state of being overwhelmed, often responding negatively to their peer group or CYCW. Clinical experience with CVT shows that triggers of past or present trauma can be in the form of facial expressions, words, tone of voice or actions that would elicit immediate negative responses from a CVT, more easily than in a typical child.

Low Registration and Sensory Seeking *"more than others and much more than others"*

The Quadrant Section of the CSP™ 2 represented high neurological threshold scores which were displayed by 55.47% and 39.84% of participants respectively, for responses as being "*more than others and much more than others*".

For *Low Registration* the mean scores of CVT was higher as compared to typical children (p=0.029). Low Registration indicates that these children use passive self-regulation strategies and often notice sensory input less than a typically responsive child. This results in not always attending to sensory information and having a low awareness of processing of sensory information and a low awareness of others (Dunn, 2014b). They can demonstrate behaviour in which they seem uninterested in activities, unresponsive to others and appear overly tired. The results for Low Registration found in this study is similar to that found by Atchison (2007) and Howard *et al*., (2020) who reported that, children who have experienced prolonged exposure to trauma or neglect

present as more under-responsive. In some cases, this under-responsivity may be a reaction or shut down of an extremely over aroused system (Lane, 2002). Neurologically when the body is under extreme stress as in the case of CVT, the sympathetic nervous system (arousal) either fights or flees in response to stress. When neither is possible for a child, the sympathetic system's (arousal) response can be extreme when the amount of stress is too much for the body to handle. It is at this point that the parasympathetic system (calming) spikes to extreme levels so that it overwhelms the sympathetic nervous system resulting in a freeze/shut down response. From clinical experience and literature (Atchison, 2007; Warner *et al*., 2009; 2014), a child in shut down will dissociate, have an inability to think clearly in terms of accessing words and emotions or actively moving their bodies. This period of shutdown and under-responsivity can be momentary or last indefinitely especially if the perpetrator of the trauma continues to exist in the child's surroundings. The understanding of this response is vital for treatment planning, as a "bottom up" approach (sensory-based intervention) would be more effective in the initial stages of a child's trauma therapy as compared to cognitive approach (talk therapy) (Lane 2002).

Sensory Seeking behaviours are exhibited by using active self-regulation strategies in which the child always seeks more and more sensory input to stay self-regulated (Dunn, 2014b). Contrary to the findings of Viviano (2001) a lower percentage of children in the current study presented with Sensory Seeking behaviours, indicating that CVT with high thresholds did not commonly use active self-regulation to obtain sensory input. This may also be as a result of the lack of sensory input available in their living environment (Little *et al*., 2018).

5.3.6 Comparison to Other Conditions

A higher percentage of the profile of CVT falls into the vigilant sensory subtype with increased sensitivity and avoidance (Little *et al.*, 2017) as the majority of CVT avoid sensory experiences and show aversion to sensory input. The vigilant sensory profile is rarely seen in typically developing children and is usually indicative of some neurological or neurophysiological change or disorder. It is associated with increased

hyper-responsiveness as has been reported in CVT (Yochman, Parush and Ornoy, 2004).

Other neurophysiological conditions in which sensory modulation change has been reported as deferring from typical children include ADHD and ASD. The sensory profiles in these conditions (Little *et al.*, 2017) CVT do differ. Although between 12.4% - 25.7% of children with ADHD and ASD do also fall into the vigilant sensory subtype (Little *et al.*, 2017), CVT had a slightly higher score for touch processing indicating greater over-responsivity to touch than children with ADHD and ASD (although not as much sensory seeking as ADHD, ASD children who fall into the intense sensory subtype) . The findings indicate a unique sensory profile for CVT with great over-responsivity to touch, which has probably been experienced negatively e.g., physical, and sexual abuse, violent acts against their bodies due to traumatic experiences. This has resulted in the CVT participants in the current study presenting with higher scores in the Avoiding quadrant indicating active response to their low threshold for sensory input, although their scores on the Sensitivity and registration quadrants were similar to children with ASD.

Although the CVT participants presented with scores indicating "*more than most*" for Behaviours (Conduct, Socio-emotional and Attention), their scores were lower than those reported for children with ADHD and ASD, particularly for socio-emotional scores. These scores when plotted on a bell curve are designed to look at differences from the typical child and not only statistical significance. This may be due to CVT having less impulsivity and less motivation to engage socially due to the impact that trauma has on their emotional state. Their lower scores in socio-emotional behaviours can also be linked to their comparatively higher mean scores in sensory avoiding and sensory sensitivity. The latter two-quadrant scores were statistically different for CVT when compared to typical children (Table 5.6), but not for ADHD and ASD children. This may also be due to the overwhelming impact of trauma, which may result in the child withdrawing, becoming highly anxious, or responding with aggressive behaviours. Responses to situations and events in daily life would be less overwhelming for the typical child.

5.4 CONCLUSION

The CSP™ 2 was used to effectively identify and describe the current situation of SMD in CVT in the four residential settings that were chosen for this study. There was sufficient research evidence that aligned Sensory Avoiding behaviours and Sensory Sensitivity behaviours to CVT for them to be considered as presenting with sensory modulation dysfunction.

CHAPTER 6: PHASE 3 RANDOMISED CONTROL TRIAL: EXPLORING THE EFFECTIVENESS OF A SENSORY-BASED INTERVENTION ON OCCUPATIONAL PARTICIPATION AND ANXIETY LEVELS

6.1 INTRODUCTION

In reference to the philosophical basis of this study, the methods implemented in Phase 3 needed to be ethically sound. The results needed to provide meaningful outcomes (occupational participation and anxiety) that would benefit this vulnerable population i.e., CVT. It was therefore important to apply the most valid and reliable methods, research design (RCT), assessment and interventions that would be relevant for this study (Spieth *et al*., 2016). It was also important to have clearly defined statistical analysis to interpret the data and make deductions from them.

6.2 AIM AND OBJECTIVES FOR PHASE 3

Aim: To determine the effectiveness of a sensory-based intervention using the Alert Program® on occupational participation and anxiety levels in CVT in residential settings.

Objectives:

- to determine the effect of a sensory-based intervention using the Alert Program® on occupational performance in CVT in a South African setting.
- to determine the effect of a sensory-based intervention using the Alert Program® on occupational participation in CVT in a South African setting.

6.3 STUDY DESIGN

A randomised control trial (RCT) was used to evaluate the effectiveness of the Alert Program® (Williams and Shellenberger, 1996; 2014). In this research study, the effectiveness of the Alert Program® (Williams and Shellenberger, 1996; 2014) was

evaluated. Using the variables of anxiety and occupational performance, the changes in the control group (who did not receive the intervention) was compared to the intervention group.

The study was prospective and followed patients forward over a period of nine weekly sessions of therapy. This was the maximum number of sessions that could be accommodated by the centres considering their schedules. Guidelines for the sessions was also given by authors of the Alert Program. Random assignment is the key element of parallel designs and one of the most valued research methodologies for examining efficiency or effectiveness of interventions (Houle, 2015). This study followed the parallel group design (Houle, 2015) illustrated in Figure 6.1. An RCT is regarded as the gold standard in research studies that provides evidence that a treatment causes on an observed outcome.

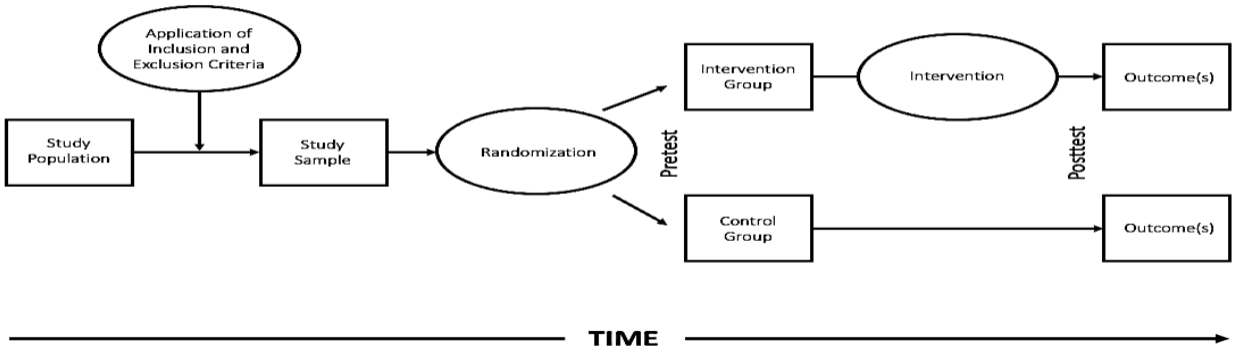


Figure 6.1: Schematic Design of Randomised Control Trials (Hole, 2015)
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6.3.1 Randomisation Process

Following the baseline assessment of 128 children selected, using the CSP™ 2, 11 child participants who presented with no SMD were excluded from the study and 117 child participants included (Table 6.1).

Table 6.1 Randomisation: Allocation of Participants

Code	Research Sites	Number of participants prior to pre-test assessment	Allocation of Participants	
			Intervention (1)	**Control (2)**
1	Epworth Village	20	9	11
2	Igugulethu CYC	27	17	10
3	Kidshaven	47	24	23
4	Mary Moodley CYC	23	13	10
	Total	**117**	**63**	**54**

A total group of 117 children were recruited from Mary Moodley CYC, Igugulethu CYC, Epworth Village and Kidshaven that were part of the pre-test assessments, intervention, and post-test assessments in Phase 3 of the study.

The child participant codes were sent via email to the principal researcher's supervisor and a computerised random mechanism number generator was used to select children for the intervention group. This effectively reduced bias and blinded the principal researcher from being involved in choosing the children that would be placed in the intervention group. The programme drew a simple random sample of 63 numbers from 1 to 117 without replacement and these 63 numbers constituted the intervention group whilst those children's numbers that were not chosen constituted the control group. From this total of 117 child participants, there was one dropout due to a child being discharged from the residential care facility after the randomisation prior to the pre-test assessments. This resulted in 116 child participants entering the intervention phases. One participant was lost near the end of the programme since they were discharged into suitable placement. Details of placement were confidential and not shared with the researcher. This child was lost to follow up in the study. The final number of participants was 115 with 61 participants in the intervention group.

6.3.2 Blinding

The principal researcher was blinded to the assessment results of the two outcome measures the SCAS and the SCOPE used to assess anxiety and occupational

performance in the child participants. All these caregiver report assessments were completed by the CYCWs who were the primary carers of the child participants in the study. Research assistants who were occupational therapists oversaw the administration of the outcome measures and completed the scoring. Therefore, although the principal researcher was aware of each child's sensory profile, she was blinded to the scores on the SCAS and the SCOPE.

6.4 OUTCOME MEASURES

6.4.1 Short Child Occupational Profile (SCOPE)

The Short Child Occupational Profile (Appendix E) measures occupational participation (Bowyer *et al*., 2008) . The Scope is a simple and quick assessment that captures a child's strengths and challenges according to their developmental stage. This assessment gathers information required to plan treatment with the child's therapy team and caregivers. It consists of 25 items organised into six sections i.e., volition, habituation, communication and interaction skills, process skills, motor skills and participation in their environment.

Item-level score uses a letter rating scale of four ordered categories (FAIR).

- F = facilitates
- A = allows
- I = inhibits
- R = restricts participation

The rating "F" is assigned value of 4, "A" is 3, "I" is 2, and "R" is 1. Scores are assigned by numbers for each section which are added to obtain a total overall rating. These scores are converted to total scores, but raw scores allow comparison of sections to describe the direction of change during the re-evaluation.

6.4.2 Spence Child Anxiety Scale (SCAS) – Parent Report

The SCAS is a screening tool used to assess the severity of anxiety symptoms which are broadly in line with the dimensions of anxiety disorder proposed by DSM-IV™ (Spence, 1999) (Appendix F). The scale assesses six domains of anxiety i.e., generalised anxiety, panic/agoraphobia, social phobia, separation anxiety, obsessive-

compulsive disorder and physical injury fears (Spence, 1997). The rater scores the child on a 4-point Likert Scale from “Never” “Sometimes” “Often” to “Always.” Each response is scored from 0 to 3. A maximum total score of 114 is possible. Child anxiety may be reported as elevated total scores and high scores on one or more subscales.

Scores are rescaled so that the standard T scores have a mean of 50 and an SD of 10. A T-score of 10 above the mean of 50 represents a value of 1 SD. Scores within one standard deviation (i.e., a T score of 10) above the mean is indicative of normal ranges of anxiety. A T-score of 60 (i.e., a T-score of 10 points above the mean T-score of 50) is approximately 1 standard deviation above the mean and indicates sub-clinical or elevated levels of anxiety. It justifies the need for further investigation and confirmation of a diagnostic status using a clinical interview (Spence, 1997). The procedure of assigning T Scores for the SCAS followed the outline by Achenbach and Rescorla, (2001).

- T = 70: 98th %ile
- T = 65: 94th %ile
- T = 60: 84th %ile
- T = 55: 70th %ile
- T = 50: 50th %ile (midpoint)
- T = 45: 32nd %ile
- T = 40: 16th %ile (1SD below the mean)

6.5 INTERVENTION: THE ALERT PROGRAM®

6.5.1 Rationale for Using a Sensory-Based Intervention for Child Victims of Trauma. The Alert Program®

The consequences of trauma in child victims has severe and permanent psychological and emotional repercussions, penetrating into adult life, if appropriate and accurate therapeutic interventions are not applied (Robinson and Brown, 2016; Viviano, 2001). Sensory-based therapy can prevent regression in CVT not only in emotional and behavioural aspects of development but in participation in ADLs (Howard *et al*., 2020).

Shonkoff *et al*., (2012) provides extensive evidence for the impact of early childhood stress on mental well-being in adulthood. This implies that therapy intervention in paediatric practices must aim to alleviate or reduce the effects of early childhood stress in CVT to prevent adult mental illness or disorders.

Sensory-based interventions takes precedence as a bottom-up strategy in CVT when 'top-down' therapies are difficult to implement (Van der Kolk, 2014; Warner *et al*., 2014). Sensory-based interventions as a "bottom up" approach directly addresses the body's internal influences of sensory processing, attention and emotion affected by trauma. Between the age of six years to 14 years 11 months, from early childhood to teenage years, creating a regulated sensory-rich environment for play, social interaction, opportunities to be a part of sporting activities, involvement in the community, and learning is vital to a child's emotional health, especially for this population of CVT. By creating these contexts children are given the opportunity to adapt to various sensory input and learn emotional regulation.

The inclusion of sensory-based interventions into the therapy programmes for CVT is supported predominantly within multidisciplinary team approaches. The effectiveness of sensory interventions in the studies chartered in Phase 1, on the Scoping Review, was determined by qualitative and quantitative research designs. Da Silva (2011), indicated that ASI® is an additional tool in treating trauma victims and (Warner *et al*., 2014) concurred from the outcome of their study, on the lack of empirical studies to evaluate sensory-based approaches in trauma care.

In terms of the outcomes of sensory-based interventions, it was hypothesised that occupational performance and anxiety in CVT could be impacted in a positive manner. This type of intervention would enable CVT to self-regulate their level of arousal resulting from their traumatic experiences. This would enable them to function more effectively in their daily living occupations despite their traumatic experiences. Each CVT, as indicated in the Ecological Model of Sensory Modulation, has a unique contextual background, which has in many cases been disrupted. It is expected that this would stagnate their development as children and teenagers. Giving them

opportunities to experience healthy sensory input allows them the opportunity to internally experience and regulate their emotions and behaviours within a safe environment, and hopefully carry their experience of meeting the “just right” state of self-regulation into the real world (Williams and Shellenberger,1996; 2014). This allows the child to engage with their occupations in a meaningful manner. For the CVT their occupations would be self-care, school tasks, social engagement, and play. With time, skilfully directed intervention, and support, it is hoped that the effects of the cycle of trauma does not continue into adulthood or is reduced to enable the child to function effectively and productively within their families and occupations.

The Alert Program® of Williams and Shellenberger, (1996; 2014) was chosen as the sensory-based intervention for the purposes of this research study, as it was most closely aligned to ASI® theory and principles compared to other sensory-based interventions searched. It is a combination of activities, strategies, and lessons that use sensory integration techniques (Williams and Shellenberger, 1996; 2014). The Alert Program® assists children understand the principles of sensory integration and self-regulation by comparing their bodies to a car engine (Figure 3.9).

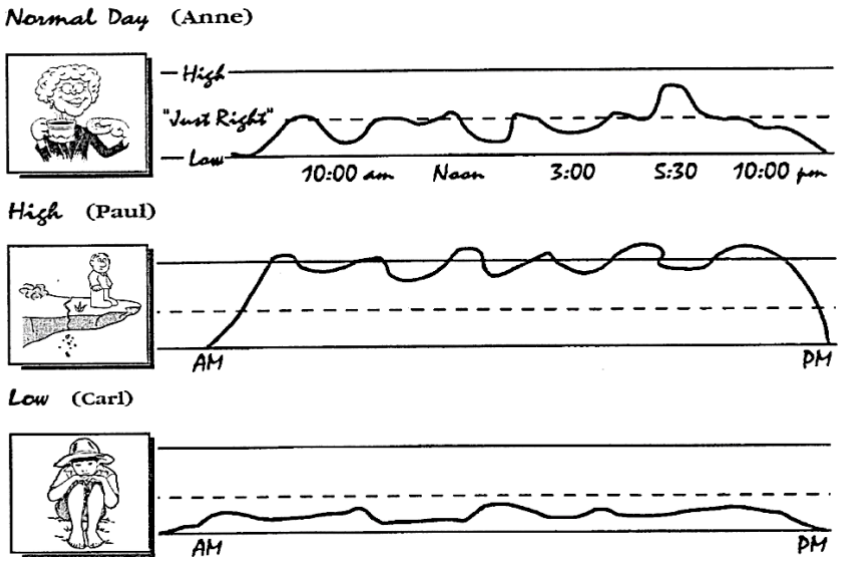


Figure 6.2 Examples of Engine Levels (Williams and Shellenberger, 1996, p.1-8)
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In this analogy the child's engine i.e. their body is described as sometimes running "high", "low" or "just right" (Williams and Shellenberger, 1996; 2014). In addition, the Alert Program® teaches children that there are five ways to change how alert they feel: put something in the mouth, move, touch, look, or listen. This helps the children understand that they need the right amount and the right type of sensory stimulation to help them cope and function at their best. Through experiential knowledge gained over the duration of the programme, the child learns to recognise, maintain and change their alertness level so that it is more appropriate to the demands of a situation or task (Williams and Shellenberger, 1996; 2014).

An important goal of the Alert Program® is to teach children how to carry-over their self-regulation strategies outside of the therapy session, with the assistance of the child's primary caregivers. Arousal levels which describe how alert one feels, changes in response to the environmental events that a child encounters. Figure 3.10 illustrates the difference between low arousal and sensory overload in response to different levels of stress in the environment.

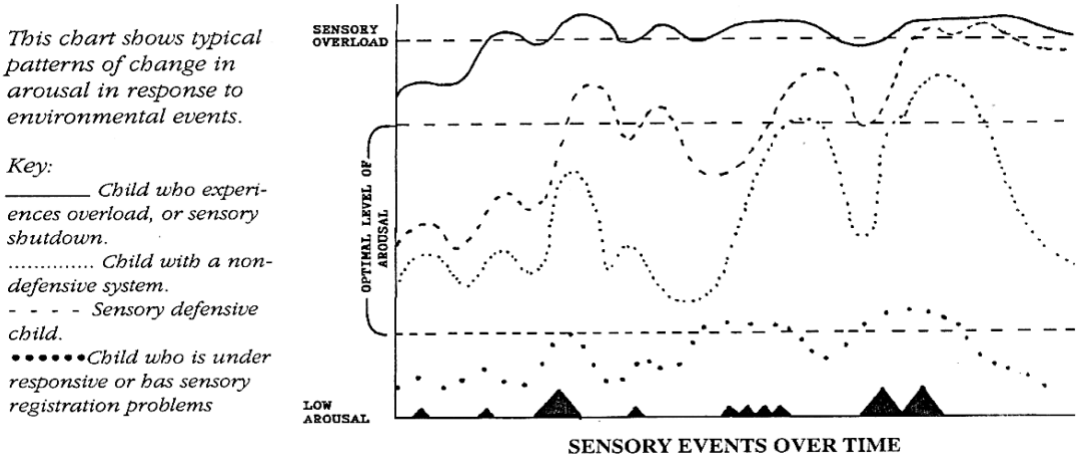


Figure 6.3 Variance in arousal states and their relationship to sensory defensiveness (Wilbarger and Wilbarger, 1991 in Williams and Shellenberger, 1996, pp.1-9**)**

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The Alert Program® (Williams and Shellenberger 1996; 2014) is systematic in its experiential approach and provides participants with tools for self-regulation (the ability

to inhibit the automatic response and do something else in order to plan and control one's behaviour) (MacCobb *et al*., 2014) using sensory strategies.

Table 6.2 Core Elements of Ayres Sensory Integration® used in the implementation of therapy

Core Process Elements	Description of Therapist's Behaviour and Attitude
• Provide sensory opportunities	Presents the child with opportunities for various sensory experiences, which include tactile, vestibular, and/or proprioceptive experiences. Intervention involves more than one sensory modality.
• Provide just-right challenges	Activities tailored so as to present challenges to the child that are neither too difficult nor too easy, to evoke the child's adaptive responses to sensory and praxis challenges.
• Collaborate on activity choice	Treats the child as an active collaborator in the therapy process, allowing the child to actively exert some control over activity choice; does not predetermine a schedule of activities independently of the child.
• Guide self-organisation	Supports and guides the child's self-organisation of behaviour to make choices and plan own behaviour to the extent the child is capable; encourages the child to initiate and develop ideas and plans for activities.
• Support optimal arousal	Ensures that the therapy situation is conducive to attaining or sustaining the child's optimal level of arousal by making changes to environment or activity to support the child's attention, engagement, and comfort.
• Create play context	Creates a context of play by building on the child's intrinsic motivation and enjoyment of activities; facilitates or expands on social, motor, imaginative, or object play.
• Maximise child's success	Presents or modifies activities so that the child can experience success in doing part or all of an activity that involves a response to a challenge.
• Ensure physical safety	Ensures that the child is physically safe either through placement of protective and therapeutic equipment or through the therapist's physical proximity and actions.
• Arrange room to engage child	Arranges the room and equipment in the room to motivate the child to choose and engage in an activity.
• Fosters therapeutic alliance	Respects the child's emotions, conveys positive regard toward the child, seems to connect with the child, and creates a climate of trust and emotional safety.

During the process of implementing this sensory-based intervention, the therapist needs to consider a few core elements throughout the therapy process. Parham *et*

al.(2007) based these core elements on Ayres research and findings between 1972 and 1989 (Table 6.2)

For the purposes of this research, SMD in CVT was addressed using a sensory-based intervention, the Alert Program® (Williams and Shellenberger,1996; 2014). Although The Alert Program® is not considered a pure form of SI, core elements were considered and incorporated during the implementation of the intervention, since the Alert Program® does incorporate an ASI® approach and techniques, together with cognitive approaches. The Alert Program® was considered as appropriate for the study for the following reasons:

- Although it is partially a "top-down" approach using words such as "high", 'low' and "just right," the foundation theoretical principles of Ayres Sensory Integration (ASI®) are seen in the experiential nature of the programme using a variety of practical sensory strategies to improve self-regulation. Challenging behaviours in CVT can be difficult to manage without age-appropriate activities.
- As compared to a pure Ayres Sensory Integration (ASI®) approach which requires individualised therapy, the Alert Program® has been designed to be implemented both individually and in groups (Williams and Shellenberger, 1996; 2014). In this study it was implemented with small groups of children and adolescents. The ratio of CVT at the residential centres in this study to the number of CYCWs (primary caregivers) was approximately 15-20 children to one CYCW therefore, interventions needed to be implemented in groups. Individualised programmes were not practical for the purpose of this study. Considering our current socio-economic climate these facilities would not afford employing multiple therapists, therefore it would be difficult to administer sensory-based interventions in individual therapy. When therapists are appointed, it would usually be one therapist per residential site which caters for over 100 children. For CVT group interaction is also an important part of their healing process as it offers support from their peer group, and

opportunities to learn how to manage their emotions and behaviours in a safe environment.

- For residential care facilities for CVT, it was a cost-effective intervention programme. The Alert Program® (Williams and Shellenberger,1996; 2014) provided low cost activities and that could be easily transferrable into a child's ADLs. The programme allows experimentation with a variety of tasks in different settings. With limited resources at most residential facilities that care for CVT, this programme allowed for adaptation for a variety of choices in sensory motor activities.
- Considering the differing educational levels and time constraints of the CYCWs at the residential care facilities, it was important to choose a programme that would be practical and flexible in its implementation.

6.6 RESEARCH PROCEDURE

6.6.1 Training of Research Assistants and Child and Youth Care Workers

Completing the outcome measures

Four research assistants (Appendix R) who assisted with data collection were qualified occupational therapists with experience in the field of paediatrics, and currently working in private practice or lecturing at the University of Witwatersrand. Two research assistants required training on the use of the SCOPE and SCAS outcome measures used in this phase of the study (Appendix S). This training was conducted by the principal researcher. The other two research assistants had sufficient knowledge of the instruments to administer them without training. All research assistants discussed their method of administration of the research instrument with the principal researcher. Each of the four research assistants were responsible for guiding the CYCWs in their use of these assessments at one of the CYCs. A guideline was provided by the principal researcher for administration of the outcome measures (Appendix T)

Orientation of Child Youth Care Workers to the Alert Program®

The training of caregivers involved in a child's life is a critical component to the success of the programme. When adults are trained and learn how to observe changes in alert levels for themselves, they will later be able to support children's choices of self-regulation strategies. The CYCWs were therefore equipped during the orientation session to observe alert levels and support the child's choice of appropriate self-regulation strategies that would enable them to productively engage in their ADLs. To equip the CYCW, an orientation session was presented at each CYC with all the CYCWs involved in the study, prior to the nine-weekly sessions of the intervention. Appendix U provides an outline of this session presented to the CYCWs by the principal researcher. During the session the CYCWs learnt about their own self-regulation using the Sensory-Motor Preference Checklist (for Adults) (Williams and Shellenberger,1996; 2014; p. A95) and the 5 column activity outline of the Online Course (TherapyWorks Inc, 2021). The principal researcher shared the eight key concepts as recommended in the Alert Program® Online Course (TherapyWorks Inc, 2021). Besides this orientation session, the CYCWs who were part of the therapy sessions were also encouraged to share their engine levels throughout the sessions and experience the self-regulation strategies with the children. This is detailed in Mile marker 9 of the Alert Program® (Table 2.2), indicating caregiver participation in learning and supporting the children's choices of self-regulation strategies.

6.6.2 Assessment of Child Participants Pre-Intervention

The 116 participants who presented with SMD in one or more areas of sensory processing were assessed using with the SCAS and the SCOPE, prior to implementation of the Alert Program® (Williams and Shellenberger, 1996; 2014). At each session prior to administration of the outcome measures, the research assistants explained the SCAS and SCOPE to the 71 CYCWs who had been recruited into the study. This orientation involved familiarising the CYCWs with the outcome measures, what aspects of the child was being tested, the scoring scales of measurement and encouraging them to give attention to the detail of what was required on each question.

The CYCWs were required to record their observations of each child they had chosen to assess, by completing the Likert scales for the SCAS and the SCOPE. The research assistants were present throughout the period that the CYCWs completed the assessments to answer questions and check the completeness of the data.

6.6.3 Intervention Using the Alert Program®

The intervention group received the Alert Program® presented by the principal researcher with a minimum of one CYCW assisting to manage the children. An assistant employed by the principal researcher was available to assist with setting up and packing away of the activities, under the guidance of the principal researcher. This assistant had an early childhood development qualification. Intervention was completed over a nine-week period. Considering the sample sizes at each site and the age categories, it was necessary to do more than one group session at Igugulethu and Kidshaven (Appendix V).

The outline of the sessions was adhered to as closely as was possible with a few minor adjustments. The reasons for these minor adjustments were:

1. to accommodate the number of CYCWs who were present to support and assist during the therapy session,
2. for the purpose of reducing the cognitive input (“top-down”) and increasing the sensory motor input (bottom-up)
3. to accommodate the group’s attention span and level of motivation for the session.

All intervention was started within 15 days of the CSP™2 assessments being completed due to CYCWs not being available on certain days to complete the outcome measures. The intervention was completed over 56 - 57 days on Friday afternoons and Saturday mornings when the participants were available and not at school (Table 6.3). The maximum number of sessions that child participants were absent was over two sessions. Although it had been decided that child participants who were absent for more than one session needed to be discharged from the intervention sessions, the

principal researcher decided to include them into the remainder of the intervention programme (Table 6.1).

Table 6.3 Time frame of sensory modulation assessment, pre-test assessment and intervention

Name of CYC Centre	Time lapse between: CSP™2 and pre-test assessment	Period of Intervention	Day and time of Intervention Sessions
Mary Moodley	Six days	57 days	Fridays 5:30pm - 6:30pm
Igugulethu	Four days	57 days	Saturdays **Group One** 10am -11am **Group Two** 11am – 12noon
Epworth	Seven days	57 days	Fridays 3pm - 4pm
Kidshaven	15 days	57 days	Fridays **Group One** 3pm - 4pm **Group Two** 4pm - 5pm **Group Three** 5pm - 6pm

The CYCWs were encouraged to attend the Alert Program® sessions, but this was not always possible since they worked shifts. The principal researcher provided the CYCWs with a guideline and activity suggestions to implement with children after completion of the programme (Appendix W).

During this time the control group (n=54) received no added intervention and continued with the status quo of services offered at the CYCWs. Although it would have been beneficial to the control group to receive the intervention after the study, there were many obstacles that prevented the principal researcher from providing this intervention. This included the availability of the CYCWs due to fluctuating schedules, their commitment to engaging in tasks that went beyond their normal duties as well as the principal researcher's time constraints in making continuous adjustments to her personal work schedule to accommodate a repetition of the programme at four centres. These factors created a practical challenge in implementing the programme for the control group after the nine-weekly sessions of therapy. During the period of intervention, the control group continued to receive their services as usual including the

activity group programmes coordinated by the CYCWs, social work consultations, medical and psychological services, as and when required. They were not deprived of any input they normally received which was within the ethical principles applied to the study.

Reassessment of the child participants post intervention

On completion of the intervention the CYCWs were asked to repeat the SCAS and the SCOPE post-test assessments under the guidance of the research assistants. Due to change in shifts some CYCWs that had completed the pre-test assessments were not present during the post-test assessment period. It was therefore necessary to allow alternate CYCWs who had been recruited into the study and who were available, to complete the SCAS and SCOPE on children they had not assessed previously.

Table 6.4 indicates the time frame between the completion of the intervention and the times at which the post-test reassessments were completed. This time differed at the research sites due to logistical reasons and availability of the CYCWs. The post-test reassessments were completed between two and 43 days after the end of the intervention.

Table 6.4 Time frame between completion of intervention and post-test assessment

Name of CYC Centre	Time lapse between completion of intervention and post-test assessment
Mary Moodley	14 - 32 days
Igugulethu	02 - 43 days
Epworth	13 days
Kidshaven	18 - 21 days

6.7 DATA MANAGEMNENT

Following the scoring of the assessments by the research assistants, the score sheets were placed in a sealed box. This was given to an administrative assistant who captured the data on an Excel spreadsheet.

6.8 DATA ANALYSIS

Descriptive quantitative statistics were used for the demographic data. The raw scores for the SCAS (Spence, 1997) and SCOPE (Bowyer *et al*., 2008) were ordinal data. This study was a two-tailed test with a non-directional hypothesis using a standardised test of significance, to determine if there is a relationship between the variable in either direction since it sought to identify any change in parameters. Thus, a decrease or increase in the occupational performance and anxiety levels was analysed. The SCOPE raw scores were added for each subsection and the total assessment and the SCAS scores were converted to interval scores in the form of T scores as indicated in the outcome measure manuals.

Since the data for both groups were normally distributed, both mean and median scores were analysed. Within Group Analysis was completed using paired nonparametric Wilcoxon sign ranked tests and effect sizes (Cohen's *r*). Following the period of intervention, the difference in the change in occupational performance and anxiety levels from the pre-test to the post-test between the control group and intervention group, was calculated. Between group analysis was completed using Mann Whitney U tests and effect sizes (Cohen's *r*). All analysis was set at significance of $p \leq 0.05$.

6.9 RIGOR OF THE STUDY

The external validity of the study was influenced by the accuracy of the responses on the SCOPE and SCAS scoring which was dependent on the rater's judgment and observation skills. The CYCW may not have a close enough attachment or bond with the child to have observed all the categories of responses required.

Due to the use of four CYC centres to increase the sample size and validity of the study, the external validity of the study was influenced by factors that differed between the centres. This included the use of different research assistants to oversee the administration of the pre-test and post-test assessments at the four research sites, and the possible different ways of presenting the standardised procedures for the administration of the assessments.

Also influencing the external validity would have been the inclusion of five children who had missed two sessions during the period of the intervention. To ensure rigour in the study, it was initially decided that participants could not miss more than one session. Due to unforeseen circumstances five participants did miss two consecutive sessions. This decision to exclude these participants was difficult as the participants arrived at the group sessions requesting to be a part of the group. Being minors and considering their trauma backgrounds it was ethically difficult to reject their request. The principal researcher made the decision to allow them to continue and included their data in the analysis, as they did attend the majority of the sessions i.e., seven out of nine sessions.

One participant turned 15 years post randomisation but was allowed to continue with the intervention programme. Taking careful note of the age was an oversight on the part of the principal researcher during the data collection in Phase 2 of the study.

It was vital in this research to utilise a large enough sample size to increase the internal validity of the results, in an attempt to provide the purest form of an RCT with clear empirical evidence. Blinding of the principal researcher to the pre-test and post-test assessment results was used to remove bias and increase the internal validity of the study. This contributed positively to validating the effectiveness of a sensory-based intervention and objectively comparing the intervention and control groups.

Data checking included three checks of accuracy by the principal researcher and the administrative assistant. The final Excel spreadsheet which was inclusive of both outcome measures was emailed to the supervisor. On another day thereafter, in the presence of the principal researcher, the supervisor did a manual check of the scores for each child participant and signed it. A few minor errors in scores required the

principal researcher to return to the Excel spreadsheet with the scores and recheck the calculations. Once the errors were found and adjusted, the administrative assistant made the necessary corrections on the Excel spreadsheet.

Occupational therapy services were not available onsite at any of the centres. None of the child participants were attending occupational therapy at the time of this research study.

The Alert Program® Online Course (Williams and Shellenberger, 2014) was completed by the principal researcher between November 2018 and January 2019 (Appendix X). This course assisted the principal to ensure that the Alert Program® was replicated according to the recommended guidelines. Email communications were requested by the principal researcher from the authors of the Alert Program®, (Williams and Shellenberger, 1996; 2014). These authors supported the process and answered questions posted by the principal researcher during the intervention period. Using the Leaders Guide for the Alert Program® and the valuable insights provided by the authors of the Alert Program® (Williams and Shellenberger, 1996; 2014) the principal researcher ensured that the weekly sessions were standardised in its preparation across all sites (Appendix G).

However, as indicated above, the implementation and presentation needed to be adapted according to the group size and age categories at each centre. Furthermore, the principal researcher's supervisor Dr Janine van der Linde, conducted a peer review of the intervention at Kidshaven to ensure that the administration of the Alert Program® met the recommended guidelines for administration.

6.10 RESULTS FOR PHASE 3

6.10.1 Introduction

This section includes the results and discussion of the Randomised Control Trial (RCT) which utilised the format of the Consolidated Standards of Reporting Trials (CONSORT) Statement (2010). The criteria for reporting an RCT has been pre-established by CONSORT (Falci and Marques, 2015) based on a 25-item checklist that

details the standard of how the trial was designed. Figure 6.4 illustrates the Consort flow diagram of participants throughout the study.

6.10.2 Consort Statement

The results from the RCT established the effect of the Alert Program®, a sensory-based intervention for CVT within the South African context. The effect of the Alert Program® was established in an intervention group and compared to child participants in the control group who did not receive the sensory-based intervention programme. In the intervention group one child participant was discharged prior to the pre-test assessments, after randomisation, due to suitable placement being obtained. One child participant was also discharged during the intervention period prior to the post-test assessments. The reason for the child being discharged was not disclosed to the researcher (Table 6.1).

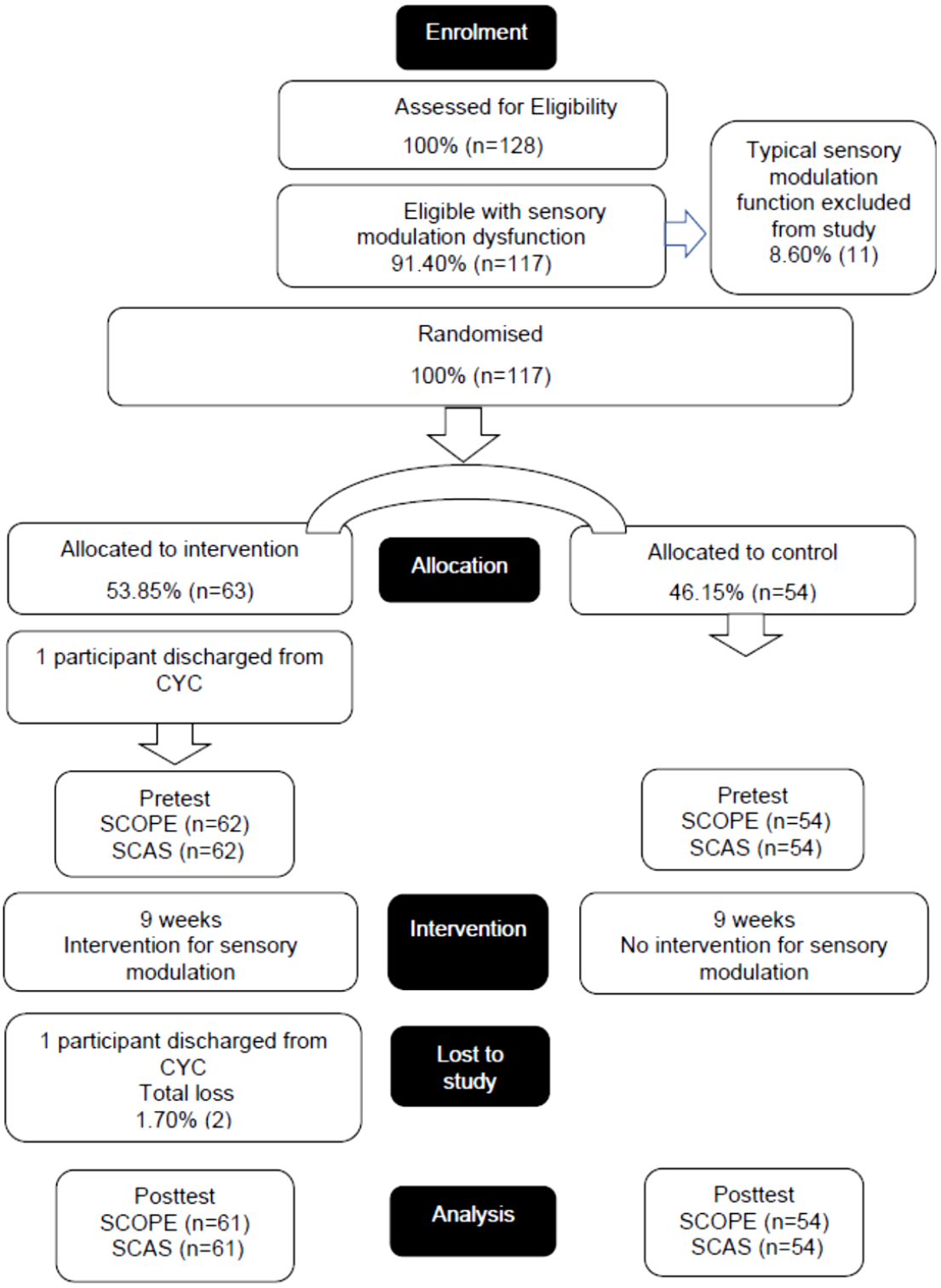


Figure 6.4: Consort flow diagram of participants throughout the study

Table 6.5 Losses and Reasons for inclusion during and after the intervention phase

Research ID	Losses	Participants: possible exclusion of scores in data analysis	Reasons for inclusion of data in analysis
36	No loss	Child turned 15 years post randomisation but was allowed to continue with the intervention programme. Taking careful note of the age was an oversight on the part of the principal researcher during data collection in Phase 1.	Child turned 15 years of age in the middle of the intervention programme of nine weeks
133	Loss from discharge	Discharged prior to pre-test assessment after the screening tests to obtain the baseline data.	
56	Loss from discharge	Discharged in the middle of the intervention programme.	
103	Absenteeism	Absent for two consecutive sessions	Principal researcher's decision.
111		Absent for two consecutive sessions	Principal researcher's decision.
112		Absent for two sessions with one week attended in between	Principal researcher's decision.
116		Absent for two consecutive sessions	Principal researcher's decision.
117		Absent for two consecutive session	Principal researcher's decision.

The five children who did miss two consecutive sessions, in consideration of their trauma backgrounds, as decided by the principal researcher, were allowed to continue and their data were included in the analysis as they did attend seven out of nine sessions of the programme. One child who turned 15 during the intervention period was also allowed to continue in the study.

6.10.3 Demographics for Child Participants

The following table illustrates the demographics and clinical characteristics of the intervention and control groups of child participants (Table 7.2)

There were an equal number of females and males in the total group. The age difference between males and females in the total group was calculated as one year.

The average age in the intervention group was nine years for both male and female. The average age in the control group was 10 years for both male and female. The minimum and maximum age for both male and female groups was six years and 14 years 11 months respectively.

Table 6.6 Baseline demographics and clinical characteristics for the intervention and control group (n=115)

	Total Group		**Intervention Group**		**Control Group**	
Gender	n =115 (%)		n = 61 (%)		n = 54 (%)	
Female	57 (50.0)		32 (53.23)		25 (46.30)	
Male	58 (50.0)		29 (46.77)		29 (53.70)	
Age	**Mean Age**	**Min-Max**	**Mean Age**	**Min-Max**	**Mean Age**	**Min-Max**
Female	9.71 (2.33)	6 -14	9 (2.30)	6-14	10 (2.39)	6-14
Male	9.32 (2.21)	6 -14	9 (1.83)	6-13	10 (2.44)	6-14
	Frequency of Trauma by Gender		**Frequency of Trauma by Gender**		**Frequency of Trauma by Gender**	
Female	**1/57 (abuse-not defined)** 1/57 (exposure to alcoholism) 2/57 (emotional abuse) 2/57 (exposure to drugs) 3/57 (witness of violence) 4/57 (death of parent/s) 5/57 (physical abuse) 7/57 (sexual abuse) 8/57 (abandoned) **24/58 (neglect)**		1 (exposure to alcoholism) 2 (witness of violence) 2 (emotional abuse) 2 (exposure to drugs) 3 (death of parent/s) 3 (physical abuse) 4 (sexual abuse) 5 (abandoned) 10 (neglect)		1 (death of parent/s) 1 (witness of violence) 1 (abuse (not defined) 2 (physical abuse) 3 (abandoned) 3 (sexual abuse) 14 (neglect)	
Male	**1/58 (emotional abuse)** 1/58 (abuse undefined) 1/58 (exposure to drugs) 1/58 (exposure to alcoholism) 1/58 (victims of violence) 4/58 (physical abuse) 6/58 (death of parent/s) 8/58 (abandoned) 8/58 (witness of violence) **27/58 (neglect)**		1 (physical abuse) 1 (emotional abuse) 1 (exposure to drugs) 1 (exposure to alcoholism) 3 (death of parent/s) 5 (abandoned) 5 (witness of violence) 12(neglect)		1 (abuse undefined) 1 (victims of violence) 3 (abandoned) 3 (death of a parent/s) 3 (witness of violence) 3 (physical abuse) 15 (neglect)	

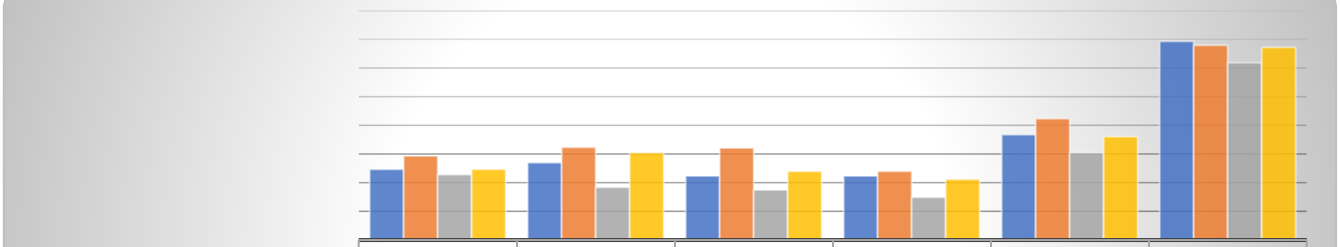
In the experimental group, the pre-test and post-test assessments of 61 child participants were analysed. In the control group the pre-test and post-test assessments of 54 child participants were analysed. The analysis of these results was conducted on the original groups randomised into the intervention (experimental) and control groups.

6.10.4 SCOPE (Short Child Occupational Profile Evaluation)

The SCOPE was used to assess personal and environmental factors affecting occupational participation in the sample of CVT. Both the intervention group and the control group were rated by the CYCWs at each residential site. The pre-test and post-test scores were analysed using both mean and median scores due to the ordinal nature of the data.

6.10.4.1 Within Group results for intervention and control group

Figure 6.5 indicates that the intervention and control group had an increase in their level of occupational participation on the post-test assessments. However, from a descriptive analysis of the results, the control group had lower scores and did not achieve the level of occupational participation achieved by the intervention group for the subtests on the SCOPE.



	Volition	Habituation	Communication / Interaction skills	Process Skills	Motor Skills	Environment
Intervention group Pre test	12.48	12.70	12.25	12.25	13.67	16.93
Intervention group post test	12.93	13.23	13.21	12.39	14.25	16.80
Control group Pre test	12.28	11.83	11.76	11.48	13.06	16.20
Conterol group Post test	12.48	13.06	12.39	12.13	13.61	16.74

Figure 6.5 Mean SCOPE scores for the intervention and control group pre-test assessments and post-test assessments

Intervention Group

There was a positive increase in occupational performance, from the pre-test assessment to the post-test assessment, in the group who received the intervention programme (Table 6.7). The mean score of 80.36 on the pre-test increased to 82.84 on the post-test. Although this increase showed an improvement in occupational performance following the intervention, the difference between the total mean scores for the pre-test and post-test was not statistically significant with a small effect size of 0.14 indicating little clinical change. No minimal clinical difference values are available in the literature for these assessments

Table 6.7 Pre-test and post test scores for the Intervention Group (n=61)

SCOPE	**Pretest scores**		**Post test scores**		**Pre vs. Post test scores**	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	p value	Effect size Cohen's r
Volition	12.51 (2.80)	13.00(11.00-15.00)	13.00 (2.74)	14.00 (11.00-15.00)	0.149	0.18
Habituation	12.70 (2.88)	13.00 (11.00-15.00)	13.23 (2.72)	14.00 (12.00-15.00)	0.187	0.17
Communication/ Interaction skills	12.25 (2.62)	12.00 (10.00-15.00)	13.21 (2.48)	14.00 (12.00-15.00)	**(0.029*)**	**0.28***
Process Skills	12.23 (2.47)	12.00 (11.00-14.00)	12.20 (3.16)	12.00 (11.00-15.00)	0.852	0.03
Motor Skills	13.67 (2.41)	14.00 (12.00-16.00)	14.25 (1.98)	15.00 (13.00-16.00)	0.156	0.19
Environment	17.02 (3.33)	18.00 (15.00-20.00)	16.80 (3.25)	18.00 (15.00-20.00)	0.809	0.04
Total SCOPE (Occupational Performance)	**80.36 (13.28)**	82.00 (72.00-90.00)	**82.84 (11.86)**	84.00 (77.00-91.00)	0.264	0.14
Significance p ≤0.05* Significance p ≤0.01**				Small effect size 0.1 Medium effect size 0.3* Large effect size 0.5**		

The one subtest on the SCOPE which indicated significant change in the intervention group (p=0.029) was Communication and Interaction skills. Although the effect size indicating clinical significance was small in this subtest, it indicated the greatest clinical change (r=0.28) in comparison to the remaining five subtests.

Control group

There was an increase in occupational participation, from the pre-test to the post-test assessments in control the group (Table 6.8). The mean of 76.65 on the pre-test assessment increased to 80.41 on the post-test assessment. This was not expected considering that there was no intervention in the control group. Confounding variables, which may have affected the control group results, are presented in the discussion.

Table 6.8 Pre-test and post test scores for the Control Group (n=54)

SCOPE	Pretest scores		Post test scores		Pre vs. Post test scores	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	p value	Effect size Cohen's r
Volition	12.28 (3.16)	13.00 (10.00-15.00)	12.51 (2.60)	13.00 (10.00-15.00)	0.591	0.07
Habituation	11.83 (3.29)	12.00 (10.00-14.00)	13.06 (2.53)	13.50 (12.00-15.00)	**(0.027*)**	**0.30***
Communication/ Interaction skills	11.76 (3.02)	12.50 (10.00-14.00)	12.39 (2.44)	12.50 (11.00-14.00)	0.219	0.17
Process Skills	11.48 (2.75)	12.00 (9.00-14.00)	12.13 (2.32)	12.00 (10.00-14.00)	0.137	0.20
Motor Skills	13.06 (2.48)	14.00 (12.00-15.00)	13.63 (2.51)	15.00 (12.00-16.00)	0.249	0.16
Environment	16.24 (3.55)	17.50 (13.00-19.00)	16.76 (3.11)	17.00 (15.00-20.00)	0.409	0.11
Total SCOPE	**76.65. (14.81)**	78.50 (68.00-88.00)	**80.41 (11.76)**	81.50 (75.00-89.00)	0.112	0.22
Significance p ≤0.05* Significance p ≤0.01**				Small effect size 0.1 Medium effect size 0.3* Large effect size 0.5**		

The subtest of Habituation in the control group showed a significant increase on the post-test scores (p=0.027) and a medium effect size (r=0.30) indicating a clinically significant value. It is most likely that confounding variables impacted the raters' scores and the outcome showed an unexpected increase in the child's ability to perform Daily Routines, Responses to Transitions, Routines and Roles in this group.

6.10.4.2 Between Group results for intervention and control group

There was no significant difference between the groups in terms of the change of SCOPE scores after intervention scores (Table 6.9), following the nine weekly sessions of the Alert Program®.

Table 6.9 Changes between pre-test and post-test scores for the Intervention and Control Group

SCOPE	CHANGE IN SCORE					
	Intervention Group		Control group			
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	p value	Effect size Cohen's r
Volition	0.49 (3.54)	0.00 (-1.00-2.00)	0.24 (3.71)	0.00 (-2.00-2.00)	0.720	**0.05***
Habituation	0.52 (3.59)	0.00 (-1.00-2.00)	1.22 (4.06)	1.00 (-1.00-4.00)	0.268	-0.15
Communication/ Interaction skills	0.97 (3.44)	1.00 (-1.00-3.00)	0.63 (3.65)	0.50 (-2.00-4.00)	0.644	0.06
Process Skills	-0.03 (3.96)	0.00 (-2.00-2.00)	0.65 (3.31)	0.50 (-1.00-3.00)	0.301	-0.14
Motor Skills	0.57 (3.23)	0.00 (-1.00-2.00)	0.57 (3.31)	0.50 (-1.00-3.00)	0.915	-0.01
Environment	-0.21 (4.56)	0.00 (-3.00-3.00)	0.52 (4.30)	0.00 (-2.00-5.00)	0.270	-0.16
TOTAL SCOPE	**2.48 (17.84)**	**2.00 (-10.00-12.00)**	**3.76 (18.18)**	**5.50 (-4.00-12.00)**	0.530	-0.08
Significance p ≤0.05* **Significance p ≤0.01****				**Small effect size 0.1** **Medium effect size 0.3*** **Large effect size 0.5****		

However, when comparing the change of the mean and median scores of the intervention and control group graphically (Figure 6.6), the improvement in occupational participation for the intervention group appeared higher than the control group for the post-test assessments.

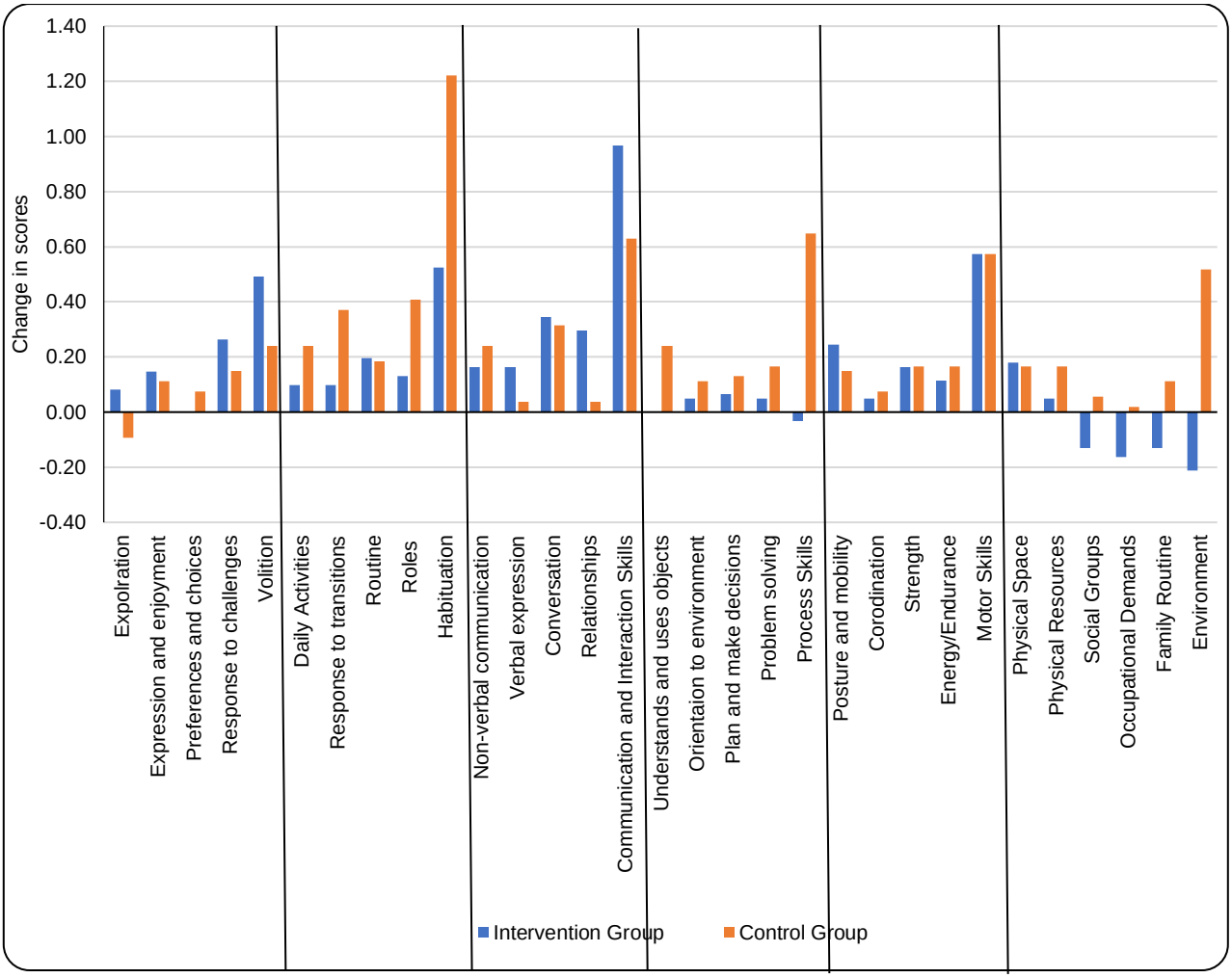


Figure 6.6 Differences between the intervention group and the control group for each subtest and their items on the SCOPE

Volition: Three item mean scores showed a *greater change in the mean score for the intervention group as compared to the control group* i.e., Exploration (0.08) and (-0.09), Expression of Enjoyment (0.14) and (0.11), and Response to Challenges (0.26) and (0.15), respectively. Three out of four items showed an improvement in Volition after the nine-week intervention programme; therefore, the total Volition mean change score was greater (0.49) in the intervention group as compared to the control group (0.24).

Habituation: Three item mean scores showed *greater change in the mean score for the control group as compared to the intervention group* i.e., Daily Activities (0.24) and

(0.10), Response to Transitions (0.37) and (0.10), and Roles (0.40) and (0.13) respectively. As a result of three out of four items scoring higher for the control group, the total Habituation change score showed a greater change in the control group mean score (1.22) as compared to the intervention group (0.52).

Communication/Interaction Skills: Three items in this subtest *showed a higher change in score for the intervention group as compared to the control group*, Verbal/Vocal Expressions (0.16) and (0.04), Conversation (0.34) and (0.31), and Relationships (0.30) and (0.04) respectively. As a result of three out of four items scoring higher for the intervention group, the total Communication/Interaction Skills change score was higher (0.97) for the intervention group as compared to the control group (0.63).

Process Skills: In this subtest in all items *change scores were higher for the control group compared to the intervention group.* Understands and users' objects (0.24) and (0.00), Orientation to Environment (0.11) and (0.05), Planning and Making Decisions (0.13) and (0.06), and Problem Solving (0.17). Due to all four items on this subtest having higher change scores in the control group, the total change score for Process Skills was higher for the control group (0.64) when compared to the intervention group (-0.03).

Motor Skills: For Posture and Mobility the *intervention group change score was higher than the control group* (0.26) and (0.15) respectively. For Coordination and Endurance, the *control group change score was higher than the intervention group*, (0.07) and (0.05) and (0.16) and (0.11) respectively. The change score for strength remained the same for the intervention and control group. The total Motor Skills change score was equal for the intervention and control group (0.57).

Environment: This subtest reflects how the environment affects the child rather than the child's response to the environment. Only one item, physical space, showed a *greater change in the mean scores for the intervention group* (0.18) *as compared to the control group* (0.17). The remaining items of physical resources, social groups, occupational demands, and family routine, within the residential care sites was a

constant for the duration of the nine-week therapy programme. There was therefore no significant change in the mean scores post intervention in the intervention and control group. According to the SCOPE (Browyer, 2005, p. 31), when an item rating increases over time, it demonstrates that the child's performance on that item is more likely to support his/her occupational participation.

6.10.5 SCAS (Spence Children's Anxiety Scale)

The SCAS - Parent Version (Spence, 1999), a standardised screening tool was used as an outcome measure to assess the effectiveness of the sensory-based intervention on symptoms of anxiety. A clinical diagnosis of anxiety for an individual child can be considered when there are elevated and clinical levels of anxiety**.**

6.10.5.1 Within Group results for intervention and control group

Intervention Group

The results of the SCAS indicated an overall decrease in the mean scores for six out of six subtests i.e., panic attacks, physical injury fears, social phobia, obsessive-compulsive and general anxiety with a significant decrease in separation anxiety (Table 6.10).

Table 6.10 Pre-test and post test scores for the Intervention Group (n=61)

SCAS	Pre test scores		Post test scores		Pre vs. Post test scores	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	p value	Effect size Cohen's r
Panic Attack and Agoraphobia	4.34 (4.95)	2.00 (1.00-6.00)	2.64 (3.72)	2.00 (0.00-3.00)	0.050	0.25
Separation Anxiety	4.56 (3.85)	3.00 (2.00-7.00)	2.79 (3.12)	2.00 (1.00-4.00)	**0.006**	**0.35***
Physical Injury Fears	3.97 (3.12)	4.00 (1.00-6.00)	3.25 (3.14)	2.00 (1.00-5.00)	0.167	0.18
Social Phobia	5.30 (4.04)	5.00 (2.00-9.00)	3.98 (2.99)	4.00 (2.00-6.00)	0.054	0.25
Obsessive compulsive	4.44 (3.77)	4.00 (1.00-7.00)	3.49 (2.81)	3.00 (1.00-5.00)	0.136	0.19
Generalized Anxiety disorder/overanxious disorder	4.52 (3.37)	4.00 (2.00-6.00)	3.56 (3.21)	3.00 (1.00-4.00)	0.103	0.21
Total SCAS	**27.13 (20.31)**	**22.00 (13.00-42.00)**	**19.70 (15.73)**	**17.00 (9.00-25.00)**	**(0.032)***	**0.28**
T score	**56.57 (10.31)**	**55.00 (48.00-67.00)**	**52.69 (9.23)**	**53.00 (45.00-59.00)**	**(0.024)***	**0.29**
Significance p ≤0.05* Significance p ≤0.01**				Small effect size 0.1 Medium effect size 0.3* Large effect size 0.5**		

A positive change was found in the level of anxiety in the 61 child participants who received the nine-week period of intervention, with a notable decrease in the overall SCAS score as well as the overall T scores (Figure 6.7).

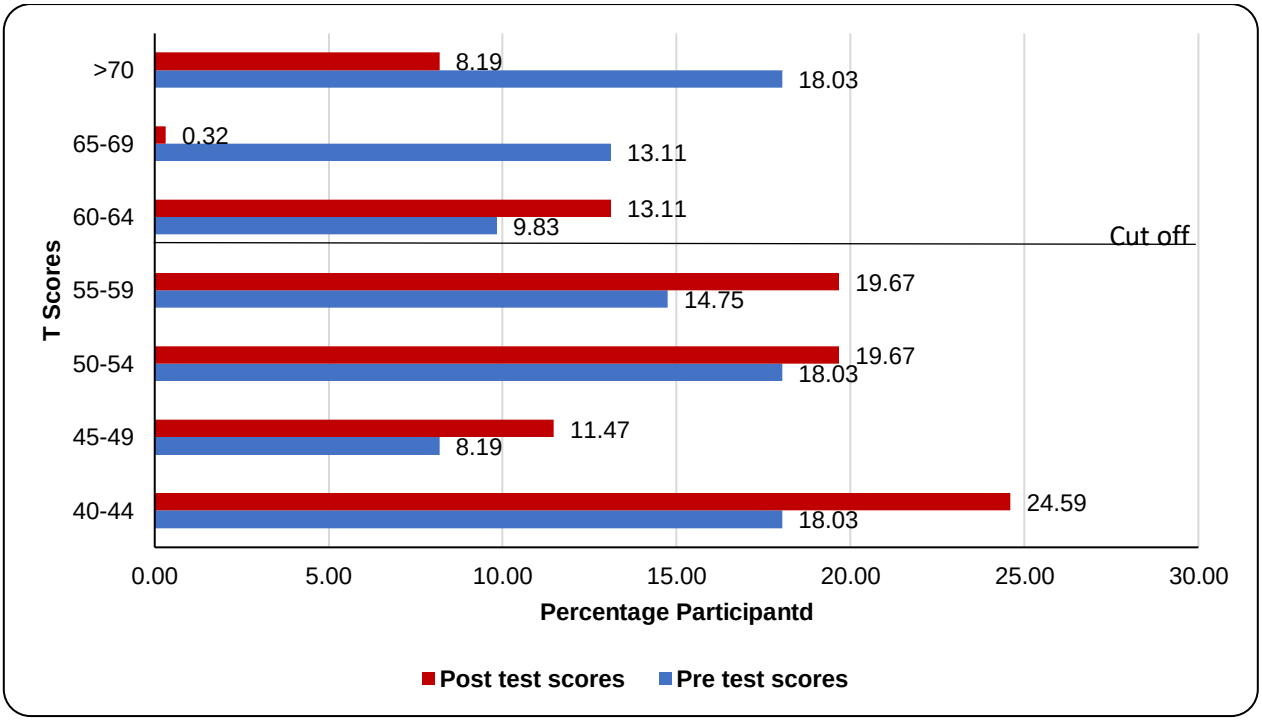


Figure 6.7: Percentage of participants in the intervention group pre-test and post-test scores falling above and below the cut off for subclinical and clinical anxiety using T Scores

Key

1. T score Mean is 50
2. T score within 10 = normal anxiety levels (1SD = 10)
3. Above cut off point indicates clinical or subclinical psychopathology = T score of 60 and above
    a. T score -1SD above 60 indicates subclinical or elevated levels of anxiety which would require a diagnosis using a clinical interview.
    b. T score of >70 indicates clinical levels of anxiety

The total SCAS pre-test T score 56.57 decreased on the post-test to 52.69. These results indicate a decrease in anxiety symptoms following the period of intervention. Within the intervention group, there was a clinical change from the pre-test assessment to post-test assessments for separation anxiety (with a medium effect size, r=0.35). Overall clinical significance was low with small effect sizes noted in the total SCAS score (r=0.28) and T scores (r=0. 29).

Figure 6.7 indicates that for the intervention group, in the pre-test assessment there was a reduction in the percentage of participants with clinical and subclinical anxiety

from 40.97% on the pre-test scores to 21.62% according to the post-test scores. Subclinical or elevated levels of anxiety (-1SD) i.e., underlying anxiety that is not clinically observable, was present in 22.94% and was reduced to 13.43% of the child participants according to post-test scores. Clinical levels of anxiety (-2SD) present in 18.03% of the participants was reported in 8.19% of participants on the post-test scores. Participants with levels of anxiety in the normal range increased from 59% on the pre-test scores to 75.40% on the post-test scores supporting the significant decrease in anxiety on the post-test assessment.

Control Group

The results of the SCAS in the control group indicated an overall decrease in the mean scores for six out of six subtests i.e., panic attacks, separation anxiety, physical injury fears, social phobia, obsessive compulsive, and general anxiety (Table 6.11).

Table 6.11 Pre-test and post-test scores for Control Group (n= 54)

SCAS	Pre-test scores		Post-test scores		Pre vs. Post-test scores	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	p value	Effect size Cohen's r
Panic Attack and Agoraphobia	4.52 (5.03)	2.50 (1.00-6.00)	3.78 (3.93)	3.00 (1.00-5.00)	0.655	0.06
Separation Anxiety	4.50 (4.42)	4.00 (1.00-8.00)	4.09 (3.07)	4.00 (2.00-6.00)	0.941	0.01
Physical Injury Fears	3.78 (3.01)	4.00 (1.00-6.00)	3.80 (3.26)	3.00 (1.00-6.00)	0.988	0.00
Social Phobia	5.74 (4.33)	4.50 (2.00-9.00)	4.70 (3.07)	4.00 (3.00-6.00)	0.179	0.18
Obsessive compulsive	3.93 (3.60)	3.00 (1.00-6.00)	4.69 (3.83)	4.00 (1.00-7.00)	0.163	0.19
Generalized Anxiety disorder/overanxious disorder	4.63 (3.74)	4.00 (2.00-6.00)	4.48 (3.09)	4.00 (2.00-6.00)	0.806	0.03
Total SCAS	**27.09 (20.73)**	**21.50 (10.00-39.00)**	**20.63 (16.18)**	**17.00 (11.00-26.00)**	0.139	0.20
T score	**56.70 (10.27)**	**58.00 (49.00-66.00)**	**53.91 (9.17)**	**54.50 (48.00-60.00)**	0.196	0.18
Significance p ≤0.05*				Small effect size 0.1		
Significance p ≤0.01**				Medium effect size 0.3*		
				Large effect size 0.5**		

None of the changes were significant in this group with small effect sizes showing little clinical change. Figure 6.8 indicates that for the control group, in the pre-test assessment, there was a reduction in the percentage of participants with clinical and subclinical anxiety from 42.57% on the pre-test scores to 33.84% according to the post-test scores.

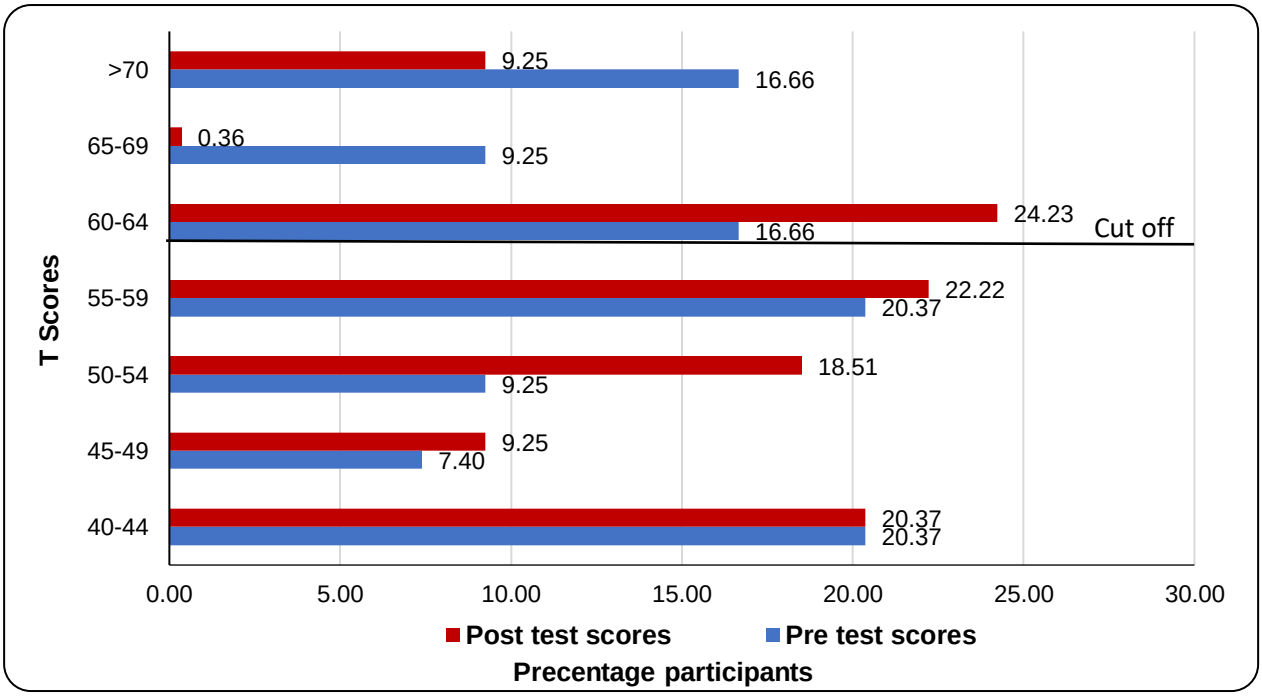


Figure 6.8: Percentage of participants in the control group pre-test and post-test scores falling above and below the cut off for subclinical and clinical anxiety using T Scores

Key

4. T score Mean is 50
5. T score within 10 = normal anxiety levels (1SD = 10)
6. Above cut off point indicates clinical or subclinical psychopathology = T score of 60 and above
    a. T score -1SD above 60 indicates subclinical or elevated levels of anxiety which would require a diagnosis using a clinical interview.
    b. T score of >70 indicates clinical levels of anxiety

Subclinical or elevated levels of anxiety (-1SD) i.e., underlying anxiety that is not clinically observable, was present in 25.91% and was reduced to 24.59% of the child participants according to post-test scores. Clinical levels of anxiety (-2SD) present in

16.66% of the participants was reported in 9.25% of participants on the post-test scores. Participants with levels of anxiety in the normal range increased from 57.39% on the pre-test scores to 70.35% on the post-test scores indicating a decrease in anxiety on the post-test assessment.

6.10.5.2 Between Group results for intervention and control group

Using the Mann Whitney U test for non-parametric data, the changes in the intervention group following the nine weekly sessions of the Alert Program® (Williams and Shellenberger, 1996) was compared to the changes in the control group.

Table 6.12 Changes between pre-test and post-test scores for the Intervention and Control Group

SCAS	**Change in score**					
	Intervention Group		**Control group**			
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	p value	Effect size Cohen's r
Panic Attack and Agoraphobia	-1.70 (6.01)	0.00 (-5.00- 1.00)	-0.74 (6.03)	0.00 (-4.00-2.00)	0.290	-0.14
Separation Anxiety	-1.77 (4.63)	-1.00 (-5.00-1.00)	-0.41 (5.54)	0.00 (-3.00-3.00)	0.067	-0.24
Physical Injury Fears	-0.72 (4.12)	0.00 (-4.00-2.00)	-0.02 (4.31)	0.00 (-2.00-2.00)	0.307	-0.13
Social Phobia	-1.31 (4.27)	-1.00 (-3.00-1.00)	-1.04 (4.88)	-1.00 (-2.00-2.00)	0.757	-0.04
Obsessive compulsive	-0.95 (4.52)	-1.00 (-3.00-1.00)	0.76 (5.14)	2.00 (-2.00-5.00)	**(0.038) ***	-0.27
Generalized Anxiety disorder/overanxious disorder	-0.97 (4.56)	-1.00 (-3.00-2.00)	-0.15 (4.44)	1.00 (-2.00-3.00)	0.146	-0.19
Total SCAS	**-7.43 (24.88)**	**-4.00 (-22.00-5.00)**	**-6.46 (27.07)**	**-5.00 (-22.00-11.00)**	0.844	-0.03
T score	-3.88 (12.61)	-4.00 (-12.00-5.00)	-2.80 (14.27)	-3.50 (-11.00 - 9.00)	0.726	-0.14
Significance p ≤0.05* Significance p ≤0.01**				Small effect size 0.1 Medium effect size 0.3* Large effect size 0.5**		

The post-test total mean for the control group (20.63) (Table 6.11) was higher than the post-test total mean for the intervention group (19.70) (Table 6.10)**.**

Although there were no statistical or clinically significant in the change from pre-test to post-test total or T scores, between the two groups, a more detailed examination of these scores indicates a greater decline in anxiety levels mean scores for the intervention group (-7.43) as compared to the control group (-6.46) (Table 6.12).

For the subtest on Obsessive Compulsive Disorder, a significant statistical change (p=0.038) indicated a greater decline in anxiety levels for the intervention group (-0.95) as compared to the control group where anxiety increased (0.76).

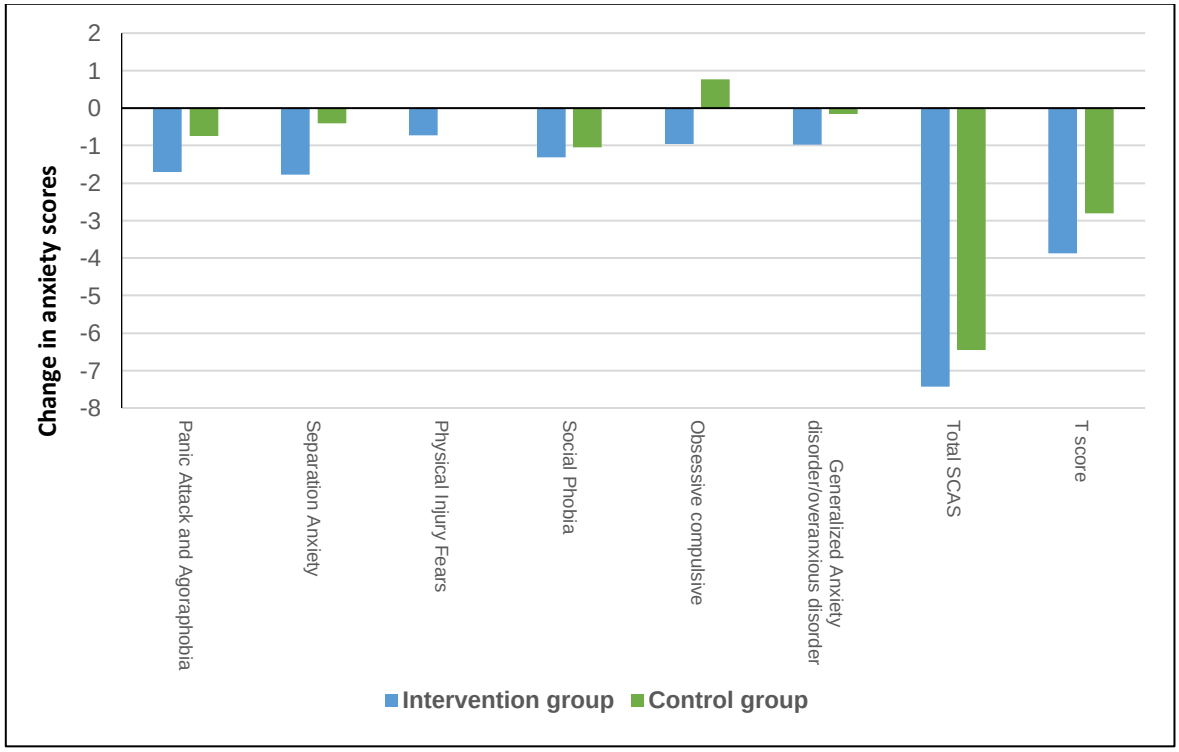


Figure 6.9: Change in levels of anxiety between the intervention and control group

The negative change scores in the bar graph (Figure 6.9) indicate a greater decline in anxiety levels for the intervention group compared to the control group, for the individual subtests as well as the total score and the T scores.

Individual subtests of Panic Attacks and Agoraphobia (-1.70), Separation Anxiety (-1.77) and Social Phobia (-1.31) showed the greatest change in scores for the intervention group.

6.10.6. Summary of Results

The research question for Phase 3 of this study focused on the effectiveness of a sensory-based intervention on occupational participation and anxiety in CVT. The hypothesis that was tested indicated that there will be a difference in occupational participation and anxiety levels in a group of CVT living in residential care, (intervention group) as compared to a group that does not receive the intervention (control group). Using the SCOPE and SCAS as pre-test and post-test assessments, the data was analysed using quantitative descriptive analysis with bar graphs and tables as well as statistical analysis. The checklist from CONSORT (2010), was then used to systematically present the results with the sensory-based intervention as the independent variable and the SCOPE and SCAS as the dependent variables.

Although the null hypothesis was accepted, there was a greater decline in anxiety levels in the intervention group as compared to the control group, with no statistical or clinical difference. There was also no significant difference between the intervention and control group in terms of the change in the SCOPE scores after the intervention period, although an improvement in occupational participation for the intervention group was higher than the control group for the post-test assessments.

The findings from the Scoping Review in Chapter 5 indicated that there was a need for empirical research that could contribute to understanding SMD and the use of sensory-based interventions in the treatment programme for CVT. It was therefore important to present the results of the RCT systematically using the CONSORT (2010) checklist.

6.11 DISCUSSION

6.11.1 Introduction

In this section, each objective of the RCT will be discussed according to the results of the SCOPE and SCAS. Confounding variables that impacted the accuracy of the outcome measures, are explained. The Alert Program® (Williams and Shellenberger, 1996) is integrated into this discussion to highlight the effectiveness of a sensory-based intervention on occupational participation and anxiety levels in CVT.

The discussion also considers the demographics of the adults and children who participated in this phase of the study, within the South African context and the setting of the CYC. As explained in section 6.1.3 CVT who were neglected were more likely to be admitted to the residential facilities, as in the current research study.

6.11.2 Effect of a Sensory-Based Intervention on Occupational Participation and Anxiety

6.11.2.1 Occupational Participation

The first objective of this phase of the study was to determine the effect of a sensory-based intervention using the Alert Program® (Williams and Shellenberger, 1996), on occupational participation in CVT in a South African residential setting context.

The Short Child Occupational Profile Evaluation (SCOPE) was used to assess each child participant's occupational participation. The residential research sites chosen for this study had similar daily activity and task routines for the child participants. This included scheduled meals, baths, homework, play and sleep times. On certain days of the week, planned activity groups were scheduled and coordinated by a social worker or CYCW.

The results for the intervention group showed a positive change in the total mean score for occupational participation from the pre-test to the post-test assessment following the nine weekly sessions of the Alert Program® (Williams and Shellenberger, 1996;

2014) (Table 7.3). This concurs with research done by Yochman and Pat-Horenczyk, (2020) who found that addressing sensory processing deficits influences the child's ability to function in their daily lives and supports the suggestion by Ayres (1979), that sensory inputs are necessary to keep the nervous system regulated and organised resulting in meaningful engagements in occupations.

A positive change was also found within the control group (Table 7.4) when comparing the total pre-test to the total post-test scores. This change in this group could not be attributed to the sensory-based intervention as the control group had no knowledge of the intervention and did not in any way benefit from the weekly therapy sessions. There was however the possibility of confounding variables (refer to 6.11.3)affecting the scores on the outcome measures. Although the SCOPE results indicate no significant difference between the change in scores (Table 7.5) for the intervention and control group from pre-test to post-test assessments, a significant change was found for different subtests related to categories of occupational participation for CVT within each group. In the control group scores for Habituation were higher, while significant change on the items of the subtest for the intervention group occurred for Communication and Interaction. The latter supported the alternative hypothesis (H_A) indicating that for this component the sensory-based intervention did have a positive effect (Figure 7.3). The sensory-based intervention i.e., the Alert Program® impacted the child participants Communication and Interaction skills within the group therapy situation, to a greater extent as compared to Habituation which was less sensitive to changes in the intervention group. Habituation was incorporated into routines that the children generally engaged in from day to day without major changes.

Based on analysis of the SCOPE by Kramer *et al*., (2008) items on the SCOPE represent 11 different levels of difficulty in achieving occupational participation. The intervention groups achieved positive change in Communication and Interaction (conversation, relationships, and verbal skills) with a difficulty score of 2.66 related to restriction of occupational participation if dysfunction is present. The difficulty score for Habituation (roles, routine, and daily activities) showed a positive change in the control, 0.46. based on the analysis of the SCOPE) Kramer *et al*., (2008) , Therefore,

improvement in Communication and Interaction is five times more likely to facilitate occupational participation. Thus, the intervention group appear to have benefited from the nine weekly sessions of the Alert Program® (Williams and Shellenberger, 1996; 2014) in terms of their occupational participation relative to the control group.

This improvement in the communication and interaction (Schoonover, 2002), is more likely to be sensitive to sensory-based interventions which are by nature highly engaging. Higher cognitive functions at both emotional and social levels including communication and interaction are supported by self-regulation which occurs at lower levels of the nervous system and forms part of the programme (Williams and Shellenberger, 1996). Arousal levels and self-regulation achieved appears to have directly impacted the participant's willingness to communicate and interact on a verbal level, in conversation or spontaneously trying to engage in relationships within the group.

Communication and interaction were facilitated by the therapeutic dynamics of each session of the Alert Program® (Williams and Shellenberger, 1996; 2014)**.** The programme was flexible in allowing space and time for children to interact with each other. The child participants' arousal levels were carefully observed by the principal researcher to avert any conflicts that may arise within the group. Each group session incorporated all four items of Communication and Interaction Skills which was evaluated by on the SCOPE:

1. Non-verbal communication - the child acts out different arousal states of "high", "low" or 'just right' during the song sessions and during group discussion times.
2. Verbal expression - while engaging with other kids during the gross motor activities and interacting with the therapist when charting their engine levels.
3. Conversation during the group discussion at the end of each session.
4. Fostering healthy relationships under the guidance of the therapist. During the course of the Alert Program® (Williams and Shellenberger, 1996) the children practice and learn to monitor and maintain their level of alertness which sets

them up for building relationships through appropriate interaction with their peer group.

Volition was the only other subtest for which the intervention group had more improvement than the control group (Figure 7.3) although the absence of statistically and clinically significant change in scores were noted**.** According to the SCOPE (Bowyer *et al*., 2008), volition is used to explain a person's motivation for occupation. The sensory-based intervention may have influenced the outcome for the intervention group. As explained by Martini *et al*., (2016), understanding the concept of self-regulation learning (as experienced in the Alert Program®) links the cognitive and volitional factors which play a role in self-regulation impacting personal causation or knowledge about our abilities (Kielhofner, 2008). Volition changes continuously with new experiences that can reinforce or challenge the meaning a person attaches to their activities and capabilities. The intervention group that received the nine weekly sessions of the Alert Program® (Williams and Shellenberger, 1996) was consistently challenged with new experiences, which according to Kramer *et al*., (2008) is an item on the SCOPE that can be prioritised as impacting occupational participation at a level of 1.25. Thus, improved occupational participation could be expected in the intervention group due to the stimulation of their awareness of their abilities, as well as the recognition and regulation of their arousal states through a variety of self-regulation strategies and activities. This in turn appeared to have a positive impact on their volition (Martini *et al*., 2016).

Habituation, according to the SCOPE (Bowyer *et al*., 2012), consists of routines, habits and roles such as sleep, waking, bathing, eating, playing and self-care activities that the child learns to organise. Through repetition, the task or behaviour becomes automatic and habit forming that over time becomes internalised into a role (Bowyer *et al*., 2005). When dysfunctional, Habituation, is less likely to affect occupational participation as was suggested above (Kramer *et al*., 2009). Therefore, the items that showed improvement in Habituation for the control group, and to a lesser extent in the intervention group, are not as likely to impact as much on their occupational

performance. It is unlikely that the Alert Program® (Williams and Shellenberger, 1996), had a significant effect on Habituation as the child participants routines, habits and roles were established within the institution before the intervention.

Various confounding variables related to the SCOPE items and the administration of the SCOPE could have had an impact on the scores that resulted in the positive change in the intervention and control group scores, on certain subtests and items, being higher than the intervention group on the post-test. These variables could account for some of the change in Environment and Process Skills scores for the control group. Difficulty in distinguishing these items on these two subtests has been identified as affecting scoring on the SCOPE (Bowyer *et al*., 2012), which may have affected the results in the current study.

Since the subtest on Environment rated the effect of the physical environment and resources on the child's occupational participation, it was expected there would be no differences between the groups since both groups reside in the same facilities. Since no change in the scores was expected during the course of the research study, it can be assumed that the changes seen in these scores may be due to difficulties in scoring the SCOPE and as the result of a "halo effect" or the tendency of the rater to assign similar ratings on conceptually different traits. In terms of the differing levels of maturity and qualifications of the CYCWs, this was a highly possible influencing factor since this is more common in raters who are not occupational therapists (Bowyer *et al*., 2012). Also, the method used to train the CYCWs before administration, according to research by (Bowyer *et al*., 2012), should not have impacted their ratings.

Although the results of this study indicated changes in the environment and process skills as well as other subtests, this may have been due to the differences in the manner in which the subtest was rated, which is recognised as a possibility in the SCOPE, rather than that the intervention process having affected these particular subtests. The Alert Program® (Williams and Shellenberger, 1996; 2014) also appears not to have impacted motor skills since the change in the intervention group and control group were the same and may indicate normal maturation during the study period.

The control group mean scores indicated that their occupational performance was lower than the intervention group for every subtest on the post-test of the SCOPE (Table 7.3 and Table 7.4). The lack of equivalence in the pre-test scores for the intervention and control groups could have been impacted by the rater's subjectivity. Although the SCOPE underwent a process of rigorous and sophisticated psychometric development (Bowyer *et al*., 2008; Stevenson, and White, 2015), scoring is nevertheless dependent on the rater's judgment and observational skills of the child. Therefore, this may result in a lower variation in pre-test and post-test score changes due to the use of a "restriction range" that could also have distracted the validity in scoring. According to Kramer *et al*., (2009), ratings may be overused and clustered around one point of the rating continuum indicating that the rater either did not know the child well or was not sensitive to the differentiation of the ratings around one subtest (Myford and Wolfe, 2004). The tendency to use middle and high ratings on a SCOPE category has been noted with a loss of sensitivity to changes in occupational participation.

The results for change in occupational participation may have been affected by the need to observe behavioural change over a longer period as these changes may not occur or be obvious in the first or second week immediately after the intervention is stopped (Lally *et al*., 2010). Repeating this assessment after three months, then again after nine months may provide a more accurate reflection of a change in occupational participation. It was seen that the change in SCOPE scores at Epworth, where post-test assessments occurred up to 13 days after the intervention was stopped, were lower than those at the other facilities where assessments occurred up to six weeks later.

6.11.2.2 Anxiety

The second objective of this phase of the study was to determine the effect of a sensory-based intervention using the Alert Program® (Williams and Shellenberger, 1996; 2014) on levels of anxiety in CVT in a South African residential setting context.

The parent version of the (SCAS) (Spence, 1999) was used to screen the child participants for anxiety symptoms. It provided important and required information to add

to future assessments, diagnostic processes, and plans for intervention. This is significant since trauma not only impacts behaviours that are overtly observed in the way a child participates in their occupations but also impacts their emotions resulting in a state of dysregulation. Emotional dysregulation includes depression, erratic moods and anxiety that may be associated with “clinically significant distress or impairment in social, academic, occupational or other important areas of functioning” according to the DSM-5™ (American Psychiatric Association, 2013 p.191).

Although the SCAS is a standardised assessment with well-established psychometric properties (Spence *et al*., 2003), the scoring also relies on subjective rater judgment and observational skills of the child. No research on the effect of rater scoring on the results of the SCAS was found but similar effects to those described for the SCOPE may have played a role in the current study where a change in anxiety was seen in both the intervention and control groups. This may account for over 40% of CVT in the current study presenting with symptoms of subclinical and clinical anxiety, compared to the 28.3% reported by Paul (2019) for traumatised children. The children in her study while also in residential care, had however only been exposed to domestic violence and not all types of trauma as found in the current study. This may account for the difference found.

Within the intervention group (Table 7.6) the significant decrease in the total mean score on the SCAS indicated a reduction in anxiety with statistical significance and clinically significant effect size. The decrease in the number of participants with subclinical and clinical levels of anxiety (Figure 7.4) after the nine weekly sessions of therapy indicates that the Alert Program® (Williams and Shellenberger, 1996; 2014) resulted in a positive impact on levels of anxiety in CVT with 75.4% participants having levels of anxiety below the cut off for anxiety disorder on the post-test assessment, compared to 59% on the pre-test assessment. Although all anxiety related to all the subtest means on the SCAS was reduced on the post-test assessment, the decrease in Separation Anxiety Panic Attack and Agoraphobia reflected a significant reduction with small to moderate effect sizes indicating clinical relevance in the change seen (Table 7.6). These results indicate a reduction in anxiety-related to frequent and

unexpected panic attacks, fear or anxiety of being in situations where you feel you cannot escape as well as excessive fear or anxiety concerning separation from those to whom the individual is attached (American Psychiatric Association, 2013 pp. 190-191). These results align with those of Cortes *et al*., (2005) who confirm that generalised anxiety, separation anxiety disorder, specific phobias and social anxiety are commonly reported in CVT. Separation and loss including removal from a parent's home as in the case of the participants in the current study was a common reason for admission.

The control group presented with similar types and levels of anxiety as those found in the intervention group but there was no significant change for most of the subtests or the overall score in the control group during the study period (Table 7.7 and Figure 7.5). There was however an overall increase in participants in the control group from 57.39% in the pre-test assessment to 70.35% in the post-test assessments having levels of anxiety below the cut off for anxiety disorder. There was a significant increase in Obsessive-Compulsive behaviours for the control group (Table 7.7) which according to the DSM-5™ (American Psychiatric Association, 2013 p.235) are characterised by "recurrent and persistent thoughts, urges or images that are experienced as intrusive and unwanted, whereas compulsions are repetitive behaviours or mental acts that an individual feels driven to perform in response to an obsession or according to rules that must be applied rigidly". Thus, the change in the Obsessive-Compulsive behaviour subtest scores differed significantly between the intervention and control group since the intervention group had a small positive change on this subtest (Table 7.6). However, the changes in anxiety in the control group may have been impacted by various confounding variables discussed below.

Due to a decrease in anxiety in the control group, the change in the SCAS scores over the study period did not differ significantly between the intervention and control group (Table 7.9). However, the intervention group showed a greater decrease in anxiety levels across all subtests (Figure 7.5), indicating the positive impact of the nine weekly sessions of the Alert Program® (Williams and Shellenberger, 1996; 2014) on the levels of anxiety in the child participants. This supports conclusive research evidence on the

effectiveness of sensory-based interventions as part of the intervention for children with anxiety disorder (Cheng and Boggett-Carsjens, 2005; Engel-Yeger and Dunn, 2011; Khodabakhsh, 2016; Tauby, 2016).

Although the effect of the intervention was limited in the current study, research does provide evidence on the benefits of the Alert Program® (Williams and Shellenberger, 1996; 2014) (Appendix G) for children who experience anxiety. Williams *et al*. (2020) indicate that the Alert Program® (Williams and Shellenberger, 1996) was found to be successful in helping pre-adolescents with anxiety disorders. These adolescents were able to gain skills and knowledge about self-regulation strategies and activities that would assist in managing their levels of anxiety. Barnes *et al*. (2008) indicated a small improvement in self-regulation skills for emotionally disturbed children after implementation of the Alert Program®. Although not all studies indicated above were specific to anxiety disorders, it can be deduced that emotional disturbances and difficult social-emotional behaviours are most likely to include anxiety-related conditions. Anderson (2013), acknowledges in his research, the positive impact that occupational therapy interventions (which would include sensory-based interventions) have on children and adolescents experiencing anxiety to improve their daily occupations. It can therefore be deduced that sensory-based approaches if applied to symptoms of anxiety can contribute to decreased levels of anxiety and consequently have a positive impact on a child's daily functional activities (Ayres, 1972; 1979; Dunn, 1997).

It appears that a change in anxiety behaviour as a result of the intervention also occurs over a longer period (Lally *et al*., 2010) and observations done within 13 days of the intervention as at the Epworth site were lower than the changes reported at other facilities where most of the assessments occurred at a later date.

6.11.3 Confounding Variable Affecting the SCOPE and SCAS Outcome Measures

Various variables affected the accuracy of the scores on both outcome measures used in the RCT. This resulted in problems with the reliability and validity and it was therefore not possible to accurately say that there were changes. The ratings on both

questionnaires used in RCT was dependent on the accuracy of CYCWs observations of the child. These confounding variables influenced scoring on both the intervention group and the control group. Contamination could have resulted in the data being biased. The possibility exists that CYCW may have used their experiences from each group therapy session with the intervention group, in their interaction with the control group who did not receive the intervention. The result of this can minimise any real difference that exists between the groups. The participants live in the same facility and possibly have contact daily, so contamination may have occurred between the participants since those in the intervention group may have shared what they learnt with those in the control group.

Inconsistent ratings of the participants were also another variable that may have impacted the results. At the Igugulethu and Mary Moodley CYC, it was left to the principal researcher to arrange the times and dates for the CYCW to complete the pre-test and post-test assessments. In some cases, the pre-test and post-test assessments on a given participant were not completed by the same rater. Although sessions with CYCWs were pre-arranged, there was no guarantee that the specified CYCW would be available on a particular day. Although shift hours of work were in place, it was highly flexible and CYCWs who were not able to come on duty on a particular day due to transport, ill health, or family responsibilities. They were often replaced by another CYCW available. This may have had a significant influence on the objectivity of the pre-test and post-test scores.

The CYCWs are relatively low paid employees required to complete long shifts which require both physical and mental effort in their daily work routines. Thus, they may not know the children as well as someone who does not care for up to 20 children. This may have affected the accuracy of ratings when completing the SCOPE and SCAS. This was a particular concern at all the residential centres as the bond that a particular CYCW has with a child, would be a factor to consider when scoring the SCOPE and SCAS. A closer attachment and bonding to a particular child would enable the CYCW to be more aware of the child's abilities and challenges in his or her ADLs and his or her emotional responses. Inaccuracy in observations on the part of the CYCWs and

limited knowledge of reporting skills needs to be considered as affecting the outcome measure results.

Although CYCWs received an orientation to the Alert Program® (Williams and Shellenberger, 1996; 2014), they were not able to make time to carry over self-regulation activities into the daily lives of the children, outside of the sessions. Although the management at the centres granted permission to conduct the research, it was evident from the principal researcher's experience that follow up sessions or suggestions for self-regulation strategies was not perceived as a high priority for these centres. This was due to the limited staff, daily time constraints and other responsibilities of CYCW and social workers. As this was the first time the majority of CYCWs had participated in an intensive research process, they would likely have benefited from more than one session of orientation before the implementation of the Alert Program®.

6.11.4 Summary of Discussion

The main aim of the Alert Program® (Williams and Shellenberger, 1996; 2014) was to create awareness in each child of how to use self-regulation sensorimotor strategies to manage arousal states. This would mean a change in their state of arousal according to the needs of a task. The appropriate state of arousal enables us to achieve optimal functioning in our daily activities. The Alert Program® (Williams and Shellenberger, 1996) based on Ayres' (1972; 1979) theory has a direct link to our central nervous system and provides the experience of our state of arousal (how alert one feels) while engaged in different activities (Williams and Shellenberger, 1996; 2014).

On the SCOPE, Communication and Interaction, and Volition showed more significant improvement for the intervention group as compared to the control group. Improvement in these areas is more likely to have a greater impact on a child's overall occupational participation. On the SCAS there was a greater change in the levels of anxiety in the intervention group as compared to the control group, following the nine weekly sessions of therapy (Table 7.6 and Table 7.7). The results indicate that the sensory-based intervention had a positive impact on the levels of anxiety for the intervention group.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

The objectives of the three phases of this study were:

1. to map literature on sensory modulation dysfunction in children who have experienced trauma
2. to identify and describe sensory modulation dysfunction in CVT in residential settings in Gauteng, South Africa
3. to determine the effect of a sensory-based intervention using the Alert Program® on occupational participation and anxiety in CVT in a South African setting

7.1 MAIN FINDINGS

In determining the extent that SMD has been identified and treated in CVT, the peer-reviewed studies chartered described the theoretical link between trauma and sensory modulation based on the principles of Ayres' Sensory Integration. While 54% of the articles used sensory-based interventions and psychotherapy in the treatment of CVT, 46% of the articles used sensory-based interventions as a "stand-alone" therapeutic intervention in CVT. The main interventions mentioned are the SMART programme, the Sensation, Task, Environment, Predictability-Self-Monitoring, and Interaction (STEP-SI) model, the Alert Program®**,** sensory rooms and sensory diets which provide activities and sensory experiences to address dysregulation in CVT. Collaborating with the skills and expertise of a multidisciplinary team was suggested as the most effective approach in the treatment plan for CVT with a major gap being in the lack of empirical evidence available that focuses on sensory modulation in CVT.

Phase 2 of the study which determined the current situation of SMD in CVT in residential settings confirmed the theoretical link between trauma and SMD as assessed on the CSP™ 2. The results indicated that 58.6% of CVT participants presented with touch sensitivities and 50% presented with visual processing sensitivities "*more than others and much more than others*". These findings were supported by a substantial amount of research evidence on the excessive sensitivity to

touch stimuli in CVT (Warner, Koomar and Westcott, 2009; Kaiser, Gillette and Spinazzola, 2010; Gorman and Kohl, 2016), resulting in emotional dysregulation. There was however less extensive literature reporting the impact trauma has on the visual system (Mueller-Pfeiffer, 2013) resulting in dysfunctional attentional processes. Thus, it was not unexpected that in the behavioural section of the CSP™ 2, 53.91% of CVT participants presented with attentional behaviours and 67.97% presented with socio-emotional responses that were elevated "*more than others and much more than others*". Socio-emotional responses are often the most challenging area of the CVT sensory system which can be observed in aggression, low frustration tolerance and acting out behaviours.

Thus, the majority of CVT participants fell into the low threshold quadrants presenting with sensory avoiding and sensory sensitivity behaviours which were present in 60.94% and 62.51% of participants "*more than others and much more than others*". A higher percentage of the profile of CVT fell into the vigilant sensory subtype (Little *et al*., 2017) with increased sensitivity and avoidance. Their typical behaviour patterns may be observed in either withdrawing from situations to reduce sensory input or engaging in passive self-regulation strategies such as tantrums or aggressive behaviours, in an attempt to block out situations that overwhelm them (Figure 3.6).

Based on the results of the CSP™ 2, SMD was confirmed in the sample of CVT in residential facilities. Therefore, an RCT was implemented to determine the effect of a sensory-based intervention on occupational participation and anxiety in CVT. The principal researcher was aware of the socioeconomic limitations within the residential facilities and therefore attempted to use a cost effective intervention and assessment tools. The study did yield some positive results for the intervention group and the control group. These positive changes were seen in occupational participation which was assessed using the SCOPE and anxiety which was assessed using the SCAS. The within-group post-test results on the SCOPE for the intervention group indicated an increase in the total mean score for occupational participation following the period of intervention. Mean scores on the SCOPE Communication and Interaction skills subtest (Table 7.3), showed a statistical significance and a small clinical change with a positive

change in the Volition subtest as well. A comparison between groups indicated that although a positive change in occupational participation was also evident in the control group, particularly a significant change in the Habituation subtest, the control groups scores for occupational participation remained lower than those for the intervention group (Figure 7.2). Literature confirmed that the subtests in which positive change occurred in the intervention group had a greater impact on the occupational participation (Bowyer *et al*., 2012) when dysfunction in these components is addressed, thus supporting a positive effect of the intervention in this study.

A change in anxiety was determined since research links reduction of anxiety to sensory-based interventions, which addresses the self-regulation (Case-Smith *et al*., 2015). In the current study, sensory-based interventions were found to be effective in reducing subclinical and clinical levels of anxiety in CVT. This was evident from the SCAS within-group results (Table 7.6) for the intervention group when compared to the control group (Table 7.7). Separation anxiety showed a statistical and clinical difference in the post-test results for the intervention group indicating an improvement in this subtest for anxiety. These results demonstrate the positive impact of the nine weekly sessions, using a sensory-based intervention, on the anxiety levels in the CVT participants. There was no statistical or clinical difference across the subtests for the control group. Although there was no statistically significant difference in the overall mean between the intervention and control group (Table 7.8), the change in scores indicated a greater decrease in anxiety levels in the intervention group compared to the control group. The statistically significant change between the groups for the obsessive-compulsive subtest was due to an increase in this type of anxiety evident in the control group. The changes in habituation and obsessive-compulsive behaviour in the control group may have been due to the confounding variables identified in the study.

7.2 STRENGTHS AND LIMITATIONS

7.2.1 Strengths

The scoping review included descriptive studies which indicated a strong association between trauma and symptoms of SMD in CVT. The review effectively illustrated

evidence for sensory-based interventions for CVT with limited acknowledgement of occupational therapy interventions. The small number of articles, which could be selected for the review, indicated to lack of research into the effect of sensory-based interventions in CVT indicating the need for this study.

The second phase of the study confirmed SMD in CVT with a clearly defined set of sensory and socio-emotional behaviours, as identified in the literature and in the participants. Evaluating these sensory responses highlighted the need to go beyond what is observed in CVT and confirmed the need for the application and practice using bottom-up sensory-based approaches in therapy. From the databases searched in the scoping review, the CSP™ 2 had not previously been administered as an assessment for CVT. This research study is unique in that it used this assessment in identifying SMD in CVT and describing the sensory profile of these participants. The results indicated evidence for sensory avoiding and sensory sensitivity behaviours in CVT.

The use of the CSP™ 2 in Phase 2 of the study added validity and rigour to the study as a baseline assessment since the items on the assessment were related to practical, daily activities and observable responses in the child participants. Therefore, the CYCWs were able to easily comprehend what was required when completing the assessment. Explaining a one-page instruction sheet before the administration of the test was sufficient for the CYCWs to comprehend the test instructions, including how each child participant should be rated.

In the third phase of the study the unique use of a sensory-based intervention, the Alert Program® (Williams and Shellenberger 1996; 2014), provided an opportunity to use a well-established programme with CVT that has not previously been reported in research. The use of the Alert Program® ensured that a clinically researched and published intervention was implemented which adhered to the theoretical foundation of ASI®. The programme was found to be an appropriate child-friendly sensory-based intervention, which included age-appropriate bottom-up enjoyable tasks for child participants. Therefore, it could be easily comprehended and was suited to the context of the study. Even though there were varying levels of experience and qualification

amongst the CYCWs, they could grasp the concepts and understand the implementation process without difficulty. This equipped them to guide the practice of techniques taught between sessions, for the child participants. It was both rewarding for the principal researcher and the child participants to experience the interaction within the group, gain awareness of how the self-regulation strategies assisted their emotional states during the session and hear the positive feedback from CYCW as to the insight they gained into the child participants emotional states and behaviours by being a part of the sessions. Considering the financial restrictions at most residential facilities within the South African context, this programme was cost-effective in terms of the materials and equipment required. The use of an RCT as a research design added to the rigour of the study and ensured that the principal researcher was blinded to the administration and scoring of the pre-test and post-test assessments. This was vital to validate the results of the outcome measures used in this study. The fact that the principal researcher was solely responsible for the intervention, ensured that each session was replicated according to the recommended guidelines of the Alert Program® (Williams and Shellenberger, 1996, 2014). This increased the internal validity of the research. The theoretical link between trauma and occupational participation as well as anxiety levels was established before the intervention. The outcome measures used in this study had not previously been used to determine the effect of a sensory-based intervention for CVT, however, both had been clinically researched and found to be effective for measuring occupational participation and levels of anxiety.

Both the SCAS and the SCOPE provided valuable data on the child's occupational participation in their daily activities and their anxiety levels. The SCAS appeared to be more sensitive to behavioural changes, with the post-tests being administered after a relatively short period on completion of the intervention. Both post-test assessments provided evidence to support the use of these outcome measures with CVT. The period of time taken to administer these assessments also provided insight into the length of time they may need to be administered to effectively measure behaviour change, related to sensory-based interventions.

7.2.2 Limitations

A limitation in the scoping review was the difficulty in empirically generalising the findings to the wider population of CVT. This was due to the type of studies (a quasi-experimental study, a retrospective chart review with matched controls and a qualitative study) and the small sample sizes in the studies chartered. Therefore, it reduced the rigour of the studies and the level of effectiveness of these programmes, which could not be accurately determined. The theoretical principles of ASI® were used in combination with other approaches and child psychiatry models in two quantitative studies reducing the ability to evaluate the effectiveness of ASI® sensory-based interventions as a "stand-alone" approach.

In Phase 2 and 3, one of the limitations was the subjective nature of the CYCW reports on the outcome measures used. The CSP™ 2, SCOPE and SCAS assessments relied on the CYCWs observations. Utilizing these pre-designed assessment tools restricted the researcher to the possible subjective nature of the CYCW reports on the child. Although the assessment tools used in this study were relatively easy to administer, the reading that was required on the part of the CYCWs was relatively intensive. It is unclear as to whether the CYCW actually read each statement. Fatigue due to their long hours at work played a role in the accuracy of their observations and scores.

The objectivity of the CYCWs could be lost during the rating process since familiarity with each child on whom they completed the questionnaire, may have varied. The principal researcher did not have a relationship with the caregivers other than training them on the Alert Program. This affected her ability to understand how well they knew the children they were rating since research assistants guided the assessment training and completion of the forms. This was due to the length of their relationship with each child participant being different at each of the residential sites. Another limitation in this study was the differing levels of the CYCWs experience and education which could have affected their accuracy in completing the assessments. The assessments chosen for this research were the most valid and reliable tests that could be found for the

purposes of this study. The limitation in the caregiver reporting and relying on their observations of the child is acknowledged in the CSP™ 2, SCOPE and SCAS.

Limited financial resources restricted the number of hours the research assistants were available to assist the CYCWs to administer the pre-test and post-test assessments. Meeting schedules and responsibilities of the CYCWs often fluctuated and differed from what was originally planned for the week. This often altered the time frames allocated to a centre for the research study and subsequently altered the times for completion of the pre-test and post-test assessments. Therefore, the CYCWs who were present on the day the research assistant was available, needed to be utilised to complete the assessments. Different CYCWs sometimes completed the pre-test and post-test assessment for a given child participant. This affected the validity of the data from the assessments, particularly the SCOPE which has limited interrater reliability. However, this could not be avoided due to the change in shifts of the CYCWs, frequent absenteeism and times of availability of the research assistants.

Due to a lack of funding and personnel, a further limitation was that the school environment of the child participants in this study was not explored, using the School Companion Sensory Profile™ 2. This could have added greater depth and insight into the data collected for this study. Lack of finances also restricted the purchase of items and basic equipment (see Appendix G) that could enhance options for self-regulation outside of the therapy sessions.

In Phase 3, the time for the implementation of the programme had to be reduced to nine sessions even though the guidelines of the Alert Program® have 12 Mile Markers which cover three stages of the Alert Program®. The programme recommends that it is not appropriate to move to another mile marker if the student does not adequately grasp the prior level. Due to the time frames allocated to the principal researcher for implementation of the sessions, the daily allocated responsibilities of the CYCWs, the differing schedules of the four research sites and the principal researcher's limited financial and personnel resources, it was not possible to extend the intervention period. This could have comprised the integrity of the programme. The integrity of the

programme may have been further compromised by the short time available to train the CYCWs about the intervention. The time was limited because of the time frame allocated by the centre to the principal researcher, the workloads of the CYCW and their daily responsibilities. Only one session of orientation and training on the Alert Program® was provided, which could have limited their understanding of the programme.

According to the Alert Program®, it was important for the CYCWs to experience self-regulation strategies within the sessions, as an integral part of the programme, to enable them to continue to observe and support the children outside of the therapy session, with self-regulation strategies. However, there were several limitations to the CYCWs being able to follow through with this part of the Alert Program®. These limitations included a lack of resources and a lack of access to emails or cell phones to communicate with the principal researcher when she was not at the centre. Computers were only accessible to the social workers who managed the high caseload of children at each centre. Therefore, social workers could not take on the responsibility of communicating information from the principal researcher to the CYCW regularly.

The CYCWs already had busy schedules which affected their willingness to continue supporting the child outside of the therapy session with self-regulation strategies. They were however given a guideline and activity suggestions to implement with children after completion of the programme (Appendix W). It was also evident from observation and interaction with the CYCWS after the post-test assessments, that their motivation to contribute any additional time to the research process was very low. Their lack of motivation could have also contributed to their inconsistency in attending group sessions and supporting children with self-regulation strategies outside of the session. This limited the benefit the programme had to the child participants.

The success of implementing an RCT using a sensory-based intervention, such as the Alert Program®, would be most effective if a pilot study is conducted before the RCT is implemented. This would be a key factor in determining the feasibility of using the

programme, especially if there is limited adult support within and outside of the therapy sessions.

Although child participants were eager to be a part of the intervention programme, they sometimes did not adhere to the time frames allocated to their group. This was often due to the lack of adequate preparation on the part of the CYCWs. Time was often wasted gathering the participants resulting in the sessions not starting punctuality. Also, the session times sometimes overlapped with the time schedules at the centres. This resulted in the principal researcher having less time for the intervention session than what was originally planned.

During the intervention, contamination may have occurred since the intervention group resided within the same dormitories as the control group The CYCWs may have transferred their knowledge from the group sessions to their interaction with the control group, resulting in the minimal post-test difference between the intervention and control group.

7.3 CONCLUSION

This study supports the findings of several other studies which indicate that experience and exposure to trauma is linked to the behaviour and emotional patterns in children. The children in this study displayed a different sensory profile with higher mean scores in the Sensory Sensitivity and Sensory Avoiding quadrants. SMD is neurogenic, arising from changes within the nervous system. In this study, these changes were consistent with sensory modulation which mostly related to over-responsivity to sensory input, particularly touch sensation, as well as attentional behaviours that could affect participation in everyday activities and socialisation. Despite the limitations that restricted the accuracy in implementation of the treatment programme, there were small, relevant, and significant improvements that added credibility to the use of the baseline assessment, the outcome measures and the sensory-based intervention. This had a minimal but positive impact on occupational participation and levels of anxiety in CVT.

Thus, the study provided provisional advocacy for the assessment and treatment implications for CVT using sensory-based intervention programmes. Confirming SMD in this study with CVT added credibility to the use of the CSP™ 2 in assessing this population of children. The findings from this comprehensive baseline assessment confirmed the need to further investigate the effectiveness of sensory-based interventions in the treatment plan for CVT. Various confounding variables influenced the outcome of the intervention and subsequent results. This would ultimately affect the ability to generalise the findings of this study to the wider population of CVT, within the South African context.

Despite the possible flaws in the methodology especially with regards to data collection utilizing available CYCWs, the lack of standardization between the research sites in terms of the time of completing the intervention and the post-tests, the many confounding variables that could have been avoided with a pilot study conducted prior to embarking on the main research and utilizing a large sample size which in retrospect decreased the attention to detail on the methodology; the research did address the need for establishing effective bottom-up sensory-based strategies in the treatment of CVT with the implementation of an RCT being a significant contribution to empirical research in the study of sensory-based strategies for CVT. The overall study was relevant and timely in terms of the current milieu in South African communities

7.4 RECOMMENDATIONS

7.4.1 Research and Practice

In our current social contexts, the devastating impact of trauma inflicted on children has become a “pandemic” infiltrating both rural and urban communities. Headlines in media are constantly highlighting the most gruesome crimes against children, who experience profound trauma in many areas of their lives. Practitioners who have face to face contact with children in their respective therapy environments need to be proactive, prepared, and skilled to provide the appropriate therapeutic interventions for CVT. A collaboration of the unique approaches and expertise of different practitioners can provide the individual child with the necessary therapeutic support that would ultimately

enable them to function productively in their school, home, and play environments. Occupational therapists through their specialised knowledge and training in using diagnostic tools such as the CSP™ 2 (Dunn, 1999; 2014b) or the Sensory Processing Measure (Parham *et al*., 2007) can provide insight and evidence of a child's sensory processing abilities and challenges. The symptoms of SMD that can be identified using these assessments correlate with physiological responses in trauma victims (Atchison, 2007; Kaiser *et al*., 2010; Warner *et al*., 2009). This results in a state of dysregulation that in research and practice shows a positive response to sensory-based treatment programmes. Integrating sensory-based interventions incorporate "just right" challenges (LeBel *et al*., 2010; Warner *et al*., 2013; Williams and Shellenberger, 1996; 2014) within a multidisciplinary team in the treatment of CVT. This is integral to ensure that a mental health system delivers the best possible care to CVT (LeBel *et al*., 2010). The addition of occupational therapy in the treatment of CVT is an integral component since occupational therapy sensory-based programmes have a strong focus on function. Function relates to the daily activities and occupations of a child. Intervention should be provided by an occupational therapist with advanced skills in both sensory integration and trauma care.

Literature has added credibility to the science behind occupational therapy programmes that makes use of sensory-based processes to address outcomes related to self-regulation and function in the daily activities of CVT. However, further research is required since limited empirical evidence currently exists, which focuses on the effectiveness of using sensory-based interventions (based on the principles of ASI ®) in the treatment of CVT. Over the last decade, there has been an increased involvement in treating CVT. Identification and treatment of CVT using sensory modulation principles is becoming an area of increasing interest, not only in the field of occupational therapy (Fraser *et al*., 2017). However, without sufficient empirical research, there is a need to improve on methodology to determine the effectiveness of sensory-based interventions in CVT.

The following research is suggested:

- The neurobiological impact of trauma in child and adolescent victims, and its effect on the sensory processing areas of function.
- SMD and the functional outcomes for CVT as it relates to their ADLs, play, school, and social participation.
- RCTs (randomised control trials) to provide empirical evidence for using sensory modulation evaluations and sensory-based programmes to treat CVT.
- The functional improvement in CVT with and without sensory-based interventions as part of a multidisciplinary team approach.

7.4.2 Implementation of the Alert Program® with Child Victims of Trauma in Residential Facilities in South Africa.

In using a sensory-based intervention, such as the Alert Program®, in the treatment of CVT, it would be beneficial to repeat the sessions over a period of time, in order to build on the child's understanding. This will enable children to further integrate their self-regulation experiences learnt in the sessions. With regards to the Alert Program®, email communications with the authors of the programme indicated that there was no specific period that had been documented to repeat the programme. Also, the number of times that the programme can be repeated is dependent on the needs of a particular situation. The authors suggest that the programme of self-regulation strategies is repeated at the beginning of each year in order to remind children and reinforce Alert Program® concepts. Starting with the programme at a pre-school level would benefit children as they mature and grow in their understanding of the Alert Program® concepts, in particular, how to implement self-regulation strategies in their daily lives. As in this study, implementing therapy programmes for a large population of children would be most effective when there is more therapy staff and caregivers to assist with the implementation process.

Educating the management at the residential sites about the intervention programme would be as important as educating the CYCW and social workers. This would encourage financial support for the programme and support of time schedules of

CYCWs when they are required to be part of the group process. Adult supervision is essential during the implementation of a sensory-based session in a group and should form part of the initial planning prior to implementation of therapy sessions. Adult supervision is also important to oversee the safety of children, to observe the self-regulation strategies used and give children feedback on their engine levels.

If the Alert Program® or any other sensory-based interventions are used in the treatment of CVT, carry-over of self-regulation strategies or activities to the child's daily routines would be integral to the success of the programme. If there is limited support from CYCW due to their time constraints, the Alert Programme® Mile Marker nine (Table 2.3) can serve as a record that could be kept by the head of the CYCWs. The CYCWs would be able to refer to this at any time to assist children with their chosen self-regulation activities.

Following the nine weekly sessions of intervention, it would be beneficial for the CYCWs to have a feedback session. This session can commence with the five-column activity (Table 2.3) to identify their individual self-regulation strategies which assists them to stay alert. This can be followed by the "Just right" and "Five ways" songs (Williams and Shellenberger, 2006) that the child participants used during the intervention sessions. Finally, the CYCWs learn about tools for self-regulation strategies which children chose, while emphasising the importance of movement breaks that need to be included in their daily routine.

REFERENCES

Adom D, Hussain EK and Joe AA (2018) Theoretical and conceptual framework: Mandatory ingredients of a quality research. *International Journal of Scientific Research* 7(1): 93–98.

Alers V (2008a) A Comparison of the Neuro-physiological Aspects of Trauma and Sensory Integration Concepts. SAISI Newletter, Vol.18: 3. *SAISI Newletter* 18(3): 17–18.

Alers V (2008b) The 20th Vona du Toit Memorial Lecture 2007: Proposing the social atom of occupational therapy: Dealing with trauma as part of an integrated inclusive intervention. *South African Journal of Occupational Therapy* 38(3): 3–10.

American Occupational Therapy Association (2020) Occupational therapy practice framework: Domain and process (4th ed.). *American Journal of Occupational Therapy* 74(Suppl. 2): 7412410010.

American Psychiatric Association (2013) *Diagnostic and Statistical Manual of Mental Disorders DSM-5^{TM}*. 5th editio. Arlington: American Psychiatric Association.

Anderson PJ (2013) Improving functional outcomes for children and adolescents with anxiety related disorders through occupational thrapy : a narrative review. *Edith Cowan University*: 315–316.

Arksey H and O'Malley L (2005) Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology: Theory and Practice* 8(1): 19–32. DOI: https://doi.org/10.1080/1364557032000119616.

Atchison BJ (2007) Sensory Modulation Disorders Among Children With a History of Trauma : .*Language, Speech, and Hearing Services in Schools* 38(2): 109–116. DOI: https://doi.org/10.1044/0161-1461(2007/011).

Ayres AJ (1972) *Sensory Integration and Learning Disorders*. Los Angeles, C.A: Western Psychological Services.

Ayres AJ (1979) *Sensory Integration and the Child.* Los Angeles: Western Psychological Services.

Ayres AJ (1989) *Sensory Integration and Praxis Tests*. Los Angeles: Western Psychological Services.

Ayres AJ (2005) *Sensory Integration and the Child*. 25th anniv. Los Angeles, C.A: Los Angeles, C.A.

Ayres AJ (2018) The development of sensory integration : a case study in the development and fragmentation of a scientific therapy network Understanding Ayres Sensory Integration ®. 12(2007): 2018. DOI: https://doi.org/10.1080/02691728.2016.1241322.

Bailliard AL and Whigham SC (2017) Linking Neuroscience , Function , and Intervention : A Scoping Review of Sensory Processing and Mental Illness.

Bar-Shalita T, Yochman A, Shapiro-Rihtman T, et al. (2009) The Participation in Childhood Occupations Questionnaire (PICO-Q): a pilot study. *Physical & Occupational Therapy in Pediatrics* 29(3): 295–310. DOI: dx.doi.org/10.1080.01942630903028440.

Barnes KJ, Vogel KA, Beck AJ, et al. (2008) Self-regulation Strategies of Children with Emotional Disturbance. *Physical & Occupational Therapy In Pediatrics* 28(4): 369–387. DOI: https://doi.org/10.1080/01942630802307127.

Bartlett , JE Kotrlik, JW and Higgins, C.C., 2001. Organizational research: Determining appropriate sample size in survey research appropriate sample size in survey research. *Information Technology, Learning, and Performance Jjournal*, *19*(1), p.43.

Baum CM and Law M (1997) Occupational Therapy Practice: Focusing on Occupational Performance. *American Journal of Occupational Therapy* 51(4): 277–288. DOI: https://doi.org/10.5014/ajot.51.4.277.

Behi R and Nolan M (1996) Causality and control: threats to internal validity. *British Journal of Nursing*. DOI: https://doi.org/10.12968/bjon.1996.5.6.374.

Ben-Sasson A, Hen L, Fluss R, et al. (2009) A meta-analysis of sensory modulation symptoms in individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders* 39(1): 1–11. DOI: https://doi.org/10.1007/s10803-008-0593-3.

Bessel A and Van Der Kolk B (2009) Developmental trauma disorder: Towards a rational diagnosis for chronically traumatized children. *Praxis der Kinderpsychologie und Kinderpsychiatrie* 58(8): 572–586. DOI: https://doi.org/10.13109/prkk.2009.58.8.572.

Bhreathnach E (2009) Trauma, sensory processing and attachment. Sensory-Attachment Intervention. In: *Family Futures Conference:Innovative Body Based Interventions with Traumatised Children.*, London, 2009. Available at: https://nanopdf.com/download/trauma-sensory-processing-amp-attachment_pdf.

Boehnlein JK (2007) Religion and spirituality after trauma. In: *Understanding Trauma: Integrating Biological, Clinical, and Cultural Perspectives*, pp. 259–274. DOI: https://doi.org/10.1017/CBO9780511500008.016.

Bowyer P, Kramer J, Otr L, et al. (2008) *The Short Child Occupational Profile*. Illinois: Department of Occupational Therapy, College of Applied Health Sciences, University of Illinois of Chicago.

Bowyer P, Lee J, Kramer J, et al. (2012) Determining the clinical utility of the short child occupational profile (SCOPE). *British Journal of Occupational Therapy* 75(1): 19–28. DOI: https://doi.org/10.4276/030802212X13261082051373.

Briggs J (2015) *The Joanna Briggs Institute Reviewers Manual: Methodology for JBI Scoping Reviews*. Sydney: The Joanna Briggs Institute.

Brown A, Tse T and Fortune T (2019) Defining sensory modulation: A review of the concept and a contemporary definition for application by occupational therapists. *Scandinavian Journal of Occupational Therapy* 26(7): 515–523. DOI: https://doi.org/10.1080/11038128.2018.1509370.

Bundy A and Lane S (2020) *Sensory Integration Theory and Practice*. Third edit. Philadelphia: F.A.Davis Company.

Bundy AC, Lane SJ and Murray EA (2002) *Sensory Integration Theory and Practice*. Second edi. Philadelphia: F. A. Davis Company.

Bundy, A., Lane , S., 2019. Sensory integration: Theory and practice (3rd ed). FA Davis. Philadelphia

Burns BR (2000) *Introduction to Research Methods*. Frenchs Forest: Pearson Education. DOI: 10.4324/9781315213033-1.

Case-Smith J and Arbesman M (2008) Evidence-Based Review of Interventions for Autism Used in or of Relevance to Occupational Therapy. *American Journal of Occupational Therapy* 62(4): 416–429. DOI: https://doi.org/10.5014/AJOT.62.4.416.

Case-Smith J, Weaver L and Fristad M (2015) A systematic review of sensory processing interventions for children with autism spectrum disorders. *Autism* 19(2): 133–148. DOI: https://doi.org/10.1177/1362361313517762.

Champagne T (2010) *Sensory Modulation and Environment: Essential Elements of Occupation*. 3rd ed. Sydney, Australia: Pearson Assessment.

Chapparo C and Ranka J (1997) *Towards a model of occupational performance: Model development*. *Occupational Performance Model (Australia)*. Elsevier. Availableat:http://www.occupationalperformance.com/wp-content/uploads/2014/01/origin.pdf.

Cheng M and Boggett-Carsjens J (2005) Consider sensory processing disorders in the explosive child: case report and review. *The Canadian Child and Adolescent Psychiatry Review* 14(2): 44–8.

Cluver L, Meinck F, Yakubovich A, et al. (2016) Reducing child abuse amongst adolescents in low- and middle-income countries: A pre-post trial in South Africa. *BMC Public Health* 16(1): 1–11. DOI: https://doi.org/10.1186/s12889-016-3262-z.

Cohn E, LJ M, Tickle-Degnen L, et al. (2000) Parental hopes for therapy outcomes: children with sensory modulation disorders. *American Journal of Occupational Therapy* 54(1): 36–43. DOI: https://doi.org/10.5014/ajot.54.1.36.

Collins W (1984) *Development During Middle Childhood: The Years From Six to Twelve*. Washington (DC): National Research Council (US) Panel to Review the Status of Basic Research on School-Age Children; National Academies Press.

Conelea CA, Carter AC and Freeman JB (2014) Sensory over-responsivity in a sample of children seeking treatment for anxiety. *Journal of Developmental and Behavioral Pediatrics* 35(8): 510–521. DOI: https://doi.org/10.1097/DBP.0000000000000092.

Copeland WE, Keeler G, Angold A, et al. (2007) Traumatic events and posttraumatic stress in childhood. *Archives of General Psychiatry* 64(5): 577–584. DOI: https://doi.org/10.1001/archpsyc.64.5.577.

Cortes AM, Saltzman KM, Weems CF, et al. (2005) Development of anxiety disorders in a traumatized pediatric population: A preliminary longitudinal evaluation. *Child Abuse & Neglect* 29(8): 905–914. DOI: https://doi.org/10.1016/J.CHIABU.2004.12.010.

Cosbey J, Johnston SS and Dunn ML (2010) Sensory processing disorders and social participation. *American Journal of Occupational Therapy* 64(3): 462–473. DOI: 10.5014/ajot.2010.09076.

Creswell J (2014) *Qualitative, Quantitative, and Mixed Methods Approaches*. *Research design*. 4th ed. Thousand Oaks: Sage Publications Inc.

Cross D, Fani N, Powers A, et al. (2017) Neurobiological Development in the Context of Childhood Trauma. *Clinical Psychology: Science and Practice* 24(2): 111–124. DOI: https://doi.org/10.1111/cpsp.12198.

Da Silva K (2011) *The Sensory Treatment Approach in Dealing with Trauma in Children: Does it Work?.* Providence College. Available at: http://digitalcommons.providence.edu/socialwrk_students/76.

Dobson KS and Dozois DJA (2010) Historical and philosophical bases of the cognitive-behavioral therapies. In: Dobson K (ed.) *Handbook of Cognitive-Behavioral Therapies*. New York: Guilford Press, pp. 3–38.

Dowdy R, Estes J, Linkugel M, et al. (2020) Trauma, Sensory Processing, and the Impact of Occupational Therapy on Youth Behavior in Juvenile Corrections. *Occupational Therapy in Mental Health* 36(4): 373–393. DOI: https://doi.org/10.1080/0164212X.2020.1823930

Duncan DF (1996) Growing up under the gun: Children and adolescents coping with violent neighborhoods. *Journal of Primary Prevention*. DOI: https://doi.org/10.1007/BF02411740.

Dunn W (1997) The Impact of Sensory Processing abilities on the daily lives of young children and their families: A conceptual Model. *Infants and Young Children* 9(4): 23–35. DOI: 10.1097/00001163-199704000-00005.

Dunn W (1999) *Sensory Profile*. San Antonio: The Psychological Cooperation.

Dunn W (2001) The sensations of everyday life: Empirical, theoretical, and pragmatic considerations. *American Journal of Occupational Therapy* 55(6): 608–620. DOI: https://doi.org/10.5014/ajot.55.6.608.

Dunn W (2014a) *Sensory Profile-2, Overview Presentation*. New York: Psimas Learning. Pearson.

Dunn W (2014b) *Sensory Profile^{TM}2*. San Antonio, TX: Pearson.

Dwyer J, Jackson A, McKenzie R, et al. (2010) Emotional PAIN relief for traumatised young people: Description of a tool for providing 'first aid plus'. *International Journal of Child and Family Welfare (Leuven)* 13(1–2): 81–89.

Engel-Yeger B and Dunn W (2011) The relationship between sensory processing difficulties and anxiety level of healthy adults. *British Journal of Occupational Therapy* 74(5): 210–216. DOI: https://doi.org/10.4276/030802211X13046730116407.

Engel-Yeger B, Palgy-Levin D and Lev-Wiesel R (2013) The Sensory Profile of People With Post-Traumatic Stress Symptoms. *Occupational Therapy in Mental Health* 29(3): 266–278. DOI: https://doi.org/10.1080/0164212X.2013.819466.

Ferguson L (2004) External validity, generalizability, and knowledge utilization. *Journal of Nursing Scholarship* 36(1): 16–22. DOI: https://doi.org/10.1111/j.1547-5069.2004.04006.x.

Finn H, Warner E, Price M, et al. (2018) The Boy Who Was Hit in the Face: Somatic Regulation and Processing of Preverbal Complex Trauma. *Journal of Child and Adolescent Trauma* 11(3): 277–288. DOI: https://doi.org/10.1007/s40653-017-0165-9.

Foa E., Keane T., Friedman M., et al. (2010) *Effective Treatments for PTSD: Practice Guidelines from The .* International Society for Traumatic Stress Studies. Guilford Press.

Fraser K, MacKenzie D and Versnel J (2017) Complex Trauma in Children and Youth: A Scoping Review of Sensory-Based Interventions. *Occupational Therapy in Mental Health* 33(3): 199–216. DOI: https://doi.org/10.1080/0164212X.2016.1265475.

Fraser K, MacKenzie D and Versnel J (2019) What is the Current State of Occupational Therapy Practice with Children and Adolescents with Complex Trauma? *Occupational Therapy in Mental Health* 35(4): 317–338. DOI: https://doi.org/10.1080/0164212X.2019.1652132.

Gialamas A, Mittinty MN, Sawyer MG, et al. (2014) Child care quality and children's cognitive and socio-emotional development: an Australian longitudinal study. *Early Child Development and Care* 184(7): 977–997. DOI: https://doi.org/10.1080/03004430.2013.847835.

Gorman K and Kohl K (2016) The Role of Sensory Integration in Recovery Oriented Trauma Informed Care. In: *13th Annual International Human Trafficking and Social Justice Conference*, 2016. University of Toledo.

Grayson J, Childress A, Baker W, et al. (2012) Evidence – based treatments for Childhood Trauma. *Virginia Child Protection Newsletter: Vol 95*. Available at: https://cacnc.org/wp-content/uploads/2016/06/Evidence-based-trauma-informed-models.pdf

Green S and Ben-Sasson A (2010) Anxiety disorders and sensory over-responsivity in children with autism spectrum disorders: is there a causal relationship? *Journal of Autism and Developmental Disorders* 40(12): 1495–1504. DOI: https://doi.org/10.1007/S10803-010-1007-X.

Gregorowski C and Seedat S (2013) Addressing childhood trauma in a developmental context. *Journal of Child and Adolescent Mental Health* 25(2): 105–118. DOI: https://doi.org/10.2989/17280583.2013.795154.

Guba EG (1990) *The Paradigm Dialog*. New York: Sage Publications Inc.

Harmon, E. (2020). Sensory Approach to Self-Regulation for Adolescent Survivors of Sex Trafficking: An Occupational Therapist's Perspective. [Doctoral project, University of St Augustine for Health Sciences]. SOAR @ USA: Student Capstone Projects Collection. https://doi.org/10.46409/sr.FVVV9088

Herold B, Stanley A, Oltrogge K, et al. (2016) Post-Traumatic Stress Disorder, Sensory Integration, and Aquatic Therapy: A Scoping Review. *Occupational Therapy in Mental Health* 32(4): 392–399. DOI: https://doi.org/10.1080/0164212X.2016.1166355.

Houle S (2015) An Introduction to the Fundamentals of Randomized Controlled Trials in Pharmacy Research. *The Canadian Journal of Hospital Pharmacy* 68(1): 28. DOI: https://doi.org/10.4212/CJHP.V68I1.1422.

Howard ARH, Lynch AK, Call CD, et al. (2020) Sensory processing in children with a history of maltreatment: an occupational therapy perspective. *Vulnerable Children and Youth Studies* 15(1): 60–67. DOI: https://doi.org/10.1080/17450128.2019.1687963.

Hsiao C, Fry D, Ward CL, et al. (2018) Violence against children in South Africa: The cost of inaction to society and the economy. *BMJ Global Health* 3(1). DOI: https://doi.org/10.1136/bmjgh-2017-000573.

Jamieson L, Sambu W and Mathews S (2017) Out of harm's way? Tracking child abuse cases through the child protection system in five selected sites in South Africa. Available at: https://open.uct.ac.za/bitstream/handle/11427/25155/Child Abuse Tracking Study Report.pdf?sequence=1&isAllowed=y.

Joseph, R.Y., Casteleijn, D., van der Linde, J. *et al.,* Sensory Modulation Dysfunction in Child Victims of Trauma: a Scoping Review. *Journ Child Adol Trauma* **14,** 455–470 (2021). https://doi.org/10.1007/s40653-020-00333-x

Kaiser EM, Gillette CS and Spinazzola J (2010) A controlled pilot-outcome study of sensory integration (SI) in the treatment of complex adaptation to traumatic stress. *Journal of Aggression, Maltreatment and Trauma* 19(7): 699–720. DOI: https://doi.org/10.1080/10926771.2010.515162.

Keller MB, Lavori PW, Wunder J, et al. (1992) Chronic Course of Anxiety Disorders in Children and Adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry* 31(4). Elsevier: 595–599. DOI: 10.1097/00004583-199207000-00003.

Khodabakhsh S (2016) The relationship between sensory processnig patterns and anxiety among international students. *JuKu: Jurnal Kurikulum & Pengajaran Asia Pasifik,* 4(4): 53–60.

Khuzwayo J, Meintjes B and Merk U (2011) Integrating African Meaning Systems and Systemic Thinking – The Sinani Approach of Working with Conflict Communities. In: Körppen D, Ropers N, and Giessmann H (eds) *The Non-Linearity of Peace Processes: Theory and Practice of Systemic Conflict Transformation*. Leverkusen-Opladen: Verlag Barbara Budrich Publishers.

Kielhofner G (2008) *Model of Human Occupation: Theory and Application.* Fourth. Philadelphia: Lippincott, Williams and Wilkins.

Kiresuk TJ, Smith A and Cardillo JE (2014) *Goal Attainment Scaling: Applications, Theory, and Measurement*. Los Angeles: . Psychology Press.

Klain EJ (2014) Understanding Trauma and its Impact on Child Clients. *ABA Child Law Practice* 33(9): 181–186.

Koomar J (2009) Trauma- and Attachment-Informed Sensory Integration Assessment and Intervention. *American Association of Occupational Therapsts Special Interest Section Quarterly* 32(4): 1–4.

Kramer J, Bowyer P, Kielhofner G, et al. (2009) Examining rater behavior on a revised version of the Short Child Occupational Profle (SCOPE). *OTJR Occupation, Participation and Health* 29(2): 88–96. DOI: https://doi.org/10.3928/15394492-20090301-03.

Kramer P and Hinojosa J (2010) *Frames of Reference for Pediatric Occupational Therapy*. 3rd Ed. Wolters Kluwer, Lippincott Williams & Wilkins.

Kraybill OG (2015) *Experiential Training to Address Secondary Traumatic Stress in Aid Personnel*. Lesley University.

Kuhn TE (1962) *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

Lally P, Van Jaarsveld CHM, Potts HWW, et al. (2010) How are habits formed: Modelling habit formation in the real world. *European Journal of Social Psychology* 40(6): 998–1009. DOI: https://doi.org/10.1002/EJSP.674.

Lane S (2002) Sensory modulation. In: Bundy A, Lane S, and Murray E (eds) *Sensory Integration: Theory and Practice*. Philadelphia: F. A. Davis.

LeBel J and Champagne T (2010) Integrating sensory and trauma informed interventions: part 2. *American Association of Occupational Therapsts Mental Health Special Interest Quarterly* 33(2): 1–4.

LeBel J, Champagne T, Stromberg N, et al. (2010) Integrating sensory and trauma-informed interventions: part 1. *American Association of Occupational Therapsts Mental Health Special Interest Section Quarterly* 33(1): 1-4.

Lincoln YS and Guba EG (1985) *Naturalistic Inquiry*. Thousand Oaks: Sage Publications Inc.

Little L, Dean E and Tomchek S (2018) Sensory processing patterns in autism, attention deficit hyperactivity disorder, and typical development. *Physical & Occupational Therapy in Pediatrics* 38(3): 243–254. DOI: https://doi.org/10.1080/01942638.2017.1390809.

Little LM, Dean E, Tomchek SD, et al. (2017) Classifying sensory profiles of children in the general population. *Child: Care, Health and Development* 43(1): 81–88. DOI: https://doi.org/10.1111/cch.12391.

Lupien SJ, Ouellet-Morin I, Herba CM, et al. (2016) From vulnerability to neurotoxicity: A developmental approach to the effects of stress on the brain and behavior. In: Spengler D and Binder E (eds) *Epigenetics and Neuroendocrinology*. Berlin: Springer International Publishing, pp. 3–48.

MacCobb S Mac, Fitzgerald B, Lanigan-O'Keeffe C, et al. (2014) Students with social, emotional, and behavioral difficulties: The Alert Program® trial in post-primary schools. *Journal of Occupational Therapy, Schools, and Early Intervention* 7(2): 106–119. DOI: https://doi.org/10.1080/19411243.2014.930606.

Martini R, Cramm H, Egan M, et al. (2016) Scoping Review of Self-Regulation: What Are Occupational Therapists Talking About? *American Journal of Occupational Therapy* 70(6): 7006290010p1. DOI: https://doi.org/10.5014/ajot.2016.020362.

Mathews S (2019) Conflict leaves children traumatised, anxious – for life. Available at: https://www.news.uct.ac.za/article/-2019-08-26-conflict-leaves-children-traumatised-anxious-for-life.

May-Benson TA and Koomar JA (2010) Systematic Review of the Research Evidence Examining the Effectiveness of Interventions Using a Sensory Integrative Approach for Children. *American Journal of Occupational Therapy* 64(3): 403-414. DOI: https://doi.org/10.5014/ajot.2010.09071.

May-Benson TA and Teasdale A (2020) Safe Place: Clinical Utility and Feasibility of a Multi-Disciplinary Intervention for Children with Sensory Processing Disorder and Complex Trauma – a Feasibility Study. *Journal of Child and Adolescent Trauma* 13(2): 207–216. DOI: https://doi.org/10.1007/s40653-019-00281-1.

McIntosh DN, Miller LJ, Shyu V, et al. (1999) Sensory-modulation disruption, electrodermal responses, and functional behaviors. *Developmental Medicine and Child Neurology* 41(9): 608–615. DOI: https://doi.org/10.1017/S0012162299001267.

McLaughlin KA, Sheridan MA and Lambert HK (2014) Childhood adversity and neural development: Deprivation and threat as distinct dimensions of early experience. *Neuroscience and Biobehavioral Reviews*. DOI: https://doi.org/10.1016/j.neubiorev.2014.10.012.

Meng XL, Rosenthal R and Rubin DB (1992) Comparing correlated correlation coefficients. *Psychological Bulletin* 111(1): 172–175. DOI: https://doi.org/10.1037/0033-2909.111.1.172.

Miller L., Reisman J, McIntosh D., et al. (2001) *The Ecological Model of Sensory Modulation: Performance of Children with Fragile X Syndrome, Autism, ADHD, and SMD. Sensory Integration and Developmental Disabilities*. San Antonio: Therapy Skill Builders.

Miller L, Wilbarger J, Stackhouse T, et al. (2002) Use of clinical reasoning in occupational therapy: The STEP-SI model of treatment of sensory modulation dysfunction. In: Bundy A, Lane S, and Murray E (eds) *Sensory Integration: Theory and Practice*. Philadelphia: F.A. Davis, pp. 435–451.

Miller LJ, Coll JR and Schoen SA (2007) A randomized controlled pilot study of the effectiveness of occupational therapy for children with sensory modulation disorder. *American Journal of Occupational Therapy* 61(2): 228–238. DOI: https://doi.org/10.5014/ajot.61.2.228.

Miller LJ, Anzalone ME, Lane SJ, et al. (2007) Concept Evolution in Sensory Integration: A Proposed Nosology for Diagnosis. *The American Journal of Occupational Therapy* 61(2): 135–140. DOI: 10.5014/ajot.61.2.135.

Miller LJ, Schoen SA, James K, et al. (2007) Lessons learned: A pilot study on occupational therapy effectiveness for children with sensory modulation disorder. *American Journal of Occupational Therapy* 61(2): 161–169. DOI: https://doi.org/10.5014/ajot.61.2.161.

Miller LJ, Schoen SA, Mulligan S, et al. (2017) Identification of Sensory Processing and Integration Symptom Clusters : A Preliminary Study. *Occupational therapy international*: Article ID 2876080. DOI: https://doi.org/10.1155/2017/2876080.

Mueller-Pfeiffer C, Schick M, Schulte-Vels T, et al. (2013) Atypical visual processing in posttraumatic stress disorder. *NeuroImage: Clinical* 3(2013): 531–538. DOI: https://doi.org/10.1016/j.nicl.2013.08.009.

Muris P, Schmidt H, Engelbrecht P, et al. (2002) DSM-IV-Defined Anxiety Disorder Symptoms in South African Children. *Journal of the American Academy of Child and Adolescent Psychiatry* 41(11): 1360–1368. DOI: https://doi.org/10.1097/00004583-200211000-00018.

Murray LK, Skavenski S, Michalopoulos LM, et al. (2014) Counselor and Client Perspectives of Trauma-Focused Cognitive Behavioral Therapy for Children in Zambia: A Qualitative Study. *Journal of Clinical Child and Adolescent Psychology* 43(6): 902–914. DOI: https://doi.org/10.1080/15374416.2013.859079.

Myford C and Wolfe E (2004) Detecting and measuring rater effects using many-facet Rasch measurement: Part I. In: Smith E and Smith R (eds) *Introduction to Rasch Measurement*. JAM Press, pp. 460–517.

Nauta MH, Scholing A, Emmelkamp PMG, et al. (2003) Cognitive-behavioral therapy for children with anxiety disorders in a clinical setting: No additional effect of a cognitive parent training. *Journal of the American Academy of Child and Adolescent Psychiatry* 42(11): 1270–1278. DOI: https://doi.org/10.1097/01.chi.0000085752.71002.93.

Neal JA, Edelmann RJ and Glachan M (2002) Behavioural inhibition and symptoms of anxiety and depression: Is there a specific relationship with social phobia? *British Journal of Clinical Psychology* 41(3): 361–374.

Nijenhuis ERS, Spinhoven P, Van Dyck R, et al. (1998) Degree of somatoform and psychological dissociation in dissociative disorder is correlated with reported trauma. *Journal of Traumatic Stress* 11(4): 711–730. DOI: https://doi.org/10.1023/A:1024493332751.

Nunnaily JC (1978) *Psychometrtc Theory*. New York: McGraw-Hill.

Ogden P and Fisher J (2015) *Sensorimotor Psychotherapy: Interventions for Trauma and Attachment*. New York: WW Norton & Company.

Ogden P, Pain C and Fisher J (2006) A Sensorimotor Approach to the Treatment of Trauma and Dissociation. *Psychiatric Clinics* 29(1): 263–279. DOI: https://doi.org/10.1016/j.psc.2005.10.012.

Parham L, Miller-Kuhaneck H, Ecker C, et al. (2007) *SPM Sensory Processing Measure*. Los Angeles: Western Psychological Services.

Parham L, Ecker C, Kuhaneck H, et al. (2021) *Sensory Processing Measure 2*. Los Angeles: Western Psychological Services.

Parham LD and Mailloux Z (2010) Sensory integration. In: Case-Smith J and O'Brien J (eds) *Occupational Therapy for Children*. 6th ed. Maryland Heights: Mosby, pp. 325–372.

Paul O (2019) Perceptions of Family Relationships and Post-Traumatic Stress Symptoms of Children Exposed to Domestic Violence. *Journal of Family Violence* 34(4): 331–343. DOI: https://doi.org/10.1007/S10896-018-00033-Z.

Pechtel P and Pizzagalli DA (2011) Effects of early life stress on cognitive and affective function: An integrated review of human literature. *Psychopharmacology* 214(1): 55–70. DOI: https://doi.org/10.1007/s00213-010-2009-2.

Perry BD (2006) Applying Principles of Neurodevelopment to Clinical Work with Maltreated and Traumatized Children: The Neurosequential Model of Therapeutics. In: Webb N (ed.) *Social Work Practice with Children and Families. Working with Traumatized Youth in Child Welfare*. The Guilford Press, pp. 27–52.

Petrenchik T and Weiss D (2015) Occupational therapy's role in mental health promotion, prevention, & intervention with children and youth childhood trauma. Retrieved from. Available at: http://www.aota.org//media/corporate/files/practice/children/schoolmhtoolkit/childhoodtrauma.pdf (accessed 14 March 2020).

Piaget J (1957) *Construction of Reality in the Child.* London: Routledge & Kegan Paul.

Pollock N (2009) Sensory integration: A review of the current state of the evidence. *Occupational Therapy Now* 11(5): 6–10. Available at: www.caot.ca (accessed 7 August 2020).

Republic of South Africa (1996) Constitution of the Republic of South Africa, 1996 - Chapter 2: Bill of Rights. Available at: https://www.gov.za/documents/constitution/chapter-2-bill-rights?gclid=Cj0KCQjws-

Republic of South Africa (2005) Children's Act, 2005 (Act No.38 of 2005). Available at: https://www.justice.gov.za/legislation/acts/2005-038 childrensact.pdf.

Robinson C and Brown AM (2016) Considering sensory processing issues in trauma affected children: The physical environment in children's residential homes. *Scottish Journal of Residential Child Care* 15(1): 6–18.

Royeen C and Lane S (1991) Tactile processing and sensory defensiveness. Philadelphia: FA Davis. In: Fisher A, Murray E, and Bundy A (eds) *Sensory Integration Theory and Practice*. Philadelphia: FA Davis, pp. 108–133.

Sakson-Obada O (2010) Changes in sensing, the basic function of body ego, as a result of trauma. In: Widera - Wysoczańska A and Kuczyńska A (eds) *Interpersonal Trauma and Its Consequences in Adulthood*. Cambridge: Cambridge Scholar Pubulications, pp. 139-152.

Salls J and Bucey J (2003) Self-regulation strategies for middle school students. *OT Practice* 8(5): 11–16.

Scaer RC (2001) The neurophysiology of dissociation and chronic disease. *Applied Psychophysiology Biofeedback* 26(1): 73–91. DOI: https://doi.org/10.1023/A:1009571806136.

Scanlan JN and Novak T (2015) Sensory approaches in mental health: A scoping review. *Australian Occupational Therapy Journal* 62(5). DOI: https://doi.org/10.1111/1440-1630.12224.

Schaaf R and Mailloux Z (2015) *Clinician's Guide for Implementing Ayres Sensory Integration: Promoting Participation for Children with Autism*. Bethesda: AOTA Press, The American Occupational Therapy Association, Incorporated.

Schmidt E, Sagester G, Simon L, et al. (2020) Sensory Toolkit. Available at: https://nisonger.osu.edu/wp-content/uploads/2020/03/Sensory-Toolkit-Final-LS-002.pdf.

Schneider SJ, Grilli SF and Schneider JR (2013) Evidence-based treatments for traumatized children and adolescents. *Current Psychiatry Reports* 15(1). DOI: https://doi.org/10.1007/s11920-012-0332-5.

Schoen SA, Miller LJ and Sullivan JC (2014) Measurement in Sensory Modulation: the Sensory Processing Scale Assessment. *The American journal of occupational therapy : official publication of the American Occupational Therapy Association* 68(5): 522–530. DOI: https://doi.org/10.5014/ajot.2014.012377.

Schoen SA, Miller LJ and Flanagan J (2018) A Retrospective Pre-Post Treatment Study of Occupational Therapy Intervention for Children with Sensory Processing Challenges. *The Open Journal of Occupational Therapy* 6(1). DOI: https://doi.org/10.15453/2168-6408.1367.

Schoonover J (2002) Teaching social skills. In: Swinth Y and Hanft B (eds) *School-Based Practice: Moving beyond 1:1 Service Delivery.*, pp. 18–19.

Sears AR;, Apodaca J, Sanders H, et al. (2016) Sensory Processing Deficits in Children That Have Experienced Trauma or Neglect Recommended Citation. *Occupational Therapy*. Albuquerque: Poster presented at the University of New Mexico Occupational Therapy Research Poster Day, April 20th. DOI: https://doi.org/10.5014/ajot.51.7.500.

Sensory Integration Global Network (SIGN) (2021). Available at: https://www.siglobalnetwork.org/resources.

Shonkoff JP, Garner AS, Siegel BS, et al. (2012) The lifelong effects of early childhood adversity and toxic stress. *Pediatrics* 129(1). DOI: https://doi.org/10.1542/peds.2011-2663.

Shrestha AK, Özlü-Erkilic Z, Popow C, et al. (2019) Transcultural differences of psychologically traumatised children and adolescents. *Neuropsychiatrie* 33(2): 61–71. DOI: https://doi.org/10.1007/s40211-019-0300-y.

Slattery MJ, Grieve AJ, Ames ME, et al. (2013) Neurocognitive function and state cognitive stress appraisal predict cortisol reactivity to an acute psychosocial stressor in adolescents. *Psychoneuroendocrinology* 38(8): 1318–1327. DOI: https://doi.org/10.1016/j.psyneuen.2012.11.017.

Smith-Roley S (2006) Sensory Integration Theory Revisited. In: Schaaf R and Smith-Roley S (eds) *Sensory Integration: Applying Clinical Reasoning to Practice with Diverse Populations*. Austin: PRO-ED Inc, pp. 1–14.

Smith Roley S, Blanche EI and Schaaf RC (2001) *Understanding the Nature of Sensory Integration with Diverse Populations*. PRO-ED Inc. Available at: https://www.proedinc.com/Products/12570/understanding-the-nature-of-sensory-integration-with-diverse-populations.aspx (accessed 1 July 2021).

Spence SH (1997) Structure of anxiety symptoms among children: a confirmatory factor-analytic study. *Journal of Abnormal Psychology* 106(2): 280–297.

Spence SH (1999) *Spence Children's anxiety scale- Parent version*. *SCAS*. Available at: https://www.scaswebsite.com/portfolio/scas-parent-download-scale/.

Spence SH, Barrett PM and Turner CM (2003) Psychometric properties of the Spence Children's Anxiety Scale with young adolescents. *Journal of Anxiety Disorders* 17(6): 605–625. DOI: https://doi.org/10.1016/S0887-6185(02)00236-0.

Spieth PM, Kubasch AS, Penzlin AI, et al. (2016) Randomized controlled trials – a matter of design. *Neuropsychiatric Disease and Treatment* (12): 1341–1349. DOI: https://doi.org/10.2147/NDT.S101938.

Spinhoven P, Penninx BW, Hickendorff M, et al. (2014) Childhood Trauma Questionnaire: factor structure, measurement invariance, and validity across emotional disorders. *Psychological Assessment* 26(3): 717–729. DOI: https://doi.org/10.1037/pas0000002.

StatsSA (2021) Mid-year population estimates 2021. Available at: http://www.statssa.gov.za/publications/P0302/P03022021.pdf (accessed 20 December 2021).

Stein MB, Hanna C, Koverola C, et al. (1997) Structural brain changes in PTSD. Does trauma alter neuroanatomy? In: *Annals of the New York Academy of Sciences*, 1997, pp. 76–82. DOI: https://doi.org/10.1111/j.1749-6632.1997.tb48270.x.

Steinberg AM, Brymer MJ, Kim S, et al. (2013) Psychometric Properties of the UCLA PTSD Reaction Index: Part I. *Journal of Traumatic Stress* 26(1): 1–9. DOI: https://doi.org/10.1002/jts.21780.

Stevenson, L. & White B (2015) The Short Child Occupational Profile (SCOPE). Available at: https://www.google.com/search?biw=1366&bih=613&q=The+Short+Child+Occupational+Profile+%28SCOPE%29&oq= (accessed 23 March 2017).

Tauby M (2016) *Sensory Modulation Deficits and Anxiety Symptoms in Children Receiving Occupational Therapy*. University of the Witwatersrand. Available at: http://wiredspace.wits.ac.za/jspui/bitstream/10539/21181/1/M Tauby MSc Research Report.pdf.

Taylor O (2019) *Evaluation and Update of Trauma-Focussed Cognitive Behavioural Therapy with Sensory Approaches for the Treatment of Post-Traumatic Stress Disorder in Maltreated Children*. Auckland University of Technology. Available at: https://openrepository.aut.ac.nz/bitstream/handle/10292/13827/Olivia Taylor FINAL thesis 2020.pdf?sequence=1.

Teicher MH, Andersen SL, Polcari A, et al. (2002) Developmental neurobiology of childhood stress and trauma. *Psychiatric Clinics of North America* 25(2): 397–426. DOI: https://doi.org/10.1016/S0193-953X(01)00003-X.

The Joanna Briggs Institute (2015) Reviewers' Manual. DOI: https://doi.org/10.1017/CBO9781107415324.004.

TherapyWorks Inc (2021) The Alert Program. Available at: https://www.alertprogram.com/.

UBS Optimus Foundation (2016) The Optimus Study on Child Abuse, Violence and Neglect in South Africa. Available at: https://resourcecentre.savethechildren.net/node/9942/pdf/optimus_study_south_africa_2015.pdf.

Van der Kolk B (2014) *The Body Keeps the Score: Mind, Brain and Body in the Transformation of Trauma.* London: Penguin.

Van der Kolk BA (2003) The neurobiology of childhood trauma and abuse. *Child and Adolescent Psychiatric Clinics of North America* 12(2): 293–317. DOI: https://doi.org/10.1016/S1056-4993(03)00003-8.

Van der Kolk BA and Fisler RE (1994) Childhood abuse and neglect and loss of self-regulation. - PsycNET. *Bulletin of the Menninger Clinic* 58(2): 145–162. Available at: https://psycnet.apa.org/record/1994-37692-001 (accessed 9 May 2021).

Virginia Child Protection Newsletter (2012) Evidence-Based Treatments for Childhood Trauma. Available at: https://cacnc.org/wp-content/uploads/2016/06/Evidence-based-trauma-informed-models.pdf.

Viviano A (2001) *The Incidence of Caregiver Reported Sensory Processing Disorders in Children Who Are Experiencing Traumatic Stress Reaction*. *Master's Theses*. Western Michigan University. Available at: https://scholarworks.wmich.edu/masters_theses/4692 (accessed 11 October 2020).

Wallis K, Sutton D and Bassett S (2018) Sensory Modulation for People with Anxiety in a Community Mental Health Setting. *Occupational Therapy in Mental Health* 34(2): 122–137. DOI: https://doi.org/10.1080/0164212X.2017.1363681.

Wan Yunus F, Liu KPY, Bissett M, et al. (2015) Sensory-Based Intervention for Children with Behavioral Problems: A Systematic Review. *Journal of Autism and Developmental Disorders* 45(11): 3565–3579. DOI: https://doi.org/10.1007/s10803-015-2503-9.

Ward CL, Artz L, Leoschut L, et al. (2018) Sexual violence against children in South Africa: a nationally representative cross-sectional study of prevalence and correlates. *The Lancet Global Health* 6(4): e460–e468. DOI: https://doi.org/10.1016/S2214-109X(18)30060-3.

Warner E, Koomar J and Westcott A (2009) Arousal Regulation in Traumatized Children, Sensorimotor Interventions. In: *International Trauma Conference*, 2009. Available at: url: www. traumacenter. org/announcements/TConf. 09_SMART_Handouts. pdf.

Warner E, Koomar J, Lary B, et al. (2013) Can the Body Change the Score? Application of Sensory Modulation Principles in the Treatment of Traumatized Adolescents in Residential Settings. *Journal of Family Violence* 28(7): 729–738. DOI: https://doi.org/10.1007/s10896-013-9535-8.

Warner E, Spinazzola J, Westcott A, et al. (2014) The Body Can Change the Score: Empirical Support for Somatic Regulation in the Treatment of Traumatized Adolescents. *Journal of Child and Adolescent Trauma* 7(4): 237–246. DOI: https://doi.org/10.1007/s40653-014-0030-z.

Watling R and Hauer S (2015) Effectiveness of Ayres Sensory Integration® and Sensory-Based Interventions for People With Autism Spectrum Disorder: A Systematic Review. *American Journal of Occupational Therapy* 69(5): 6905180030p1-6905180030p12. DOI: https://doi.org/10.5014/AJOT.2015.018051.

Watling R, Koenig K, Schaaf R, et al. (2011) *Occupational Therapy Practice Guidelines for Children and Adolescents with Challenges in Sensory Processing and Sensory Integration*. Bethesda: AOTA Press, The American Occupational Therapy Association, Incorporated.

Wellock LM (1973) *Sensory Integration and Learning Disabilities*. *Physical Therapy*. Los Angeles, C.A: Western Psychological Services. DOI: https://doi.org/10.1093/ptj/53.12.1351.

Whiting CC (2018) Trauma and the role of the school-based occupational therapist. *Journal of Occupational Therapy, Schools, and Early Intervention* 11(3): 291–301. DOI: https://doi.org/10.1080/19411243.2018.1438327.

Williams M and Shellenberger S (1996) *“How Does Your Engine Run?”® A Leader’s Guide to the Alert Program® for Self-Regulation*. .Albuquerque, NM: TherapyWorks, Inc.

Williams M and Shellenberger S (2006) *Test Drive: Introducing the Alert Program® through Song*. 1st Editio. Albuquerque, NM: TherapyWorks, Inc.

Williams M and Shellenberger S (2008a) *Alert: Go Fish!* Albuquerque, NM: TherapyWorks, Inc.

Williams M and Shellenberger S (2008b) *Alert Bingo.* Albuquerque, NM: TherapyWorks, Inc.

Williams M and Shellenberger S (2014) Alert Program® Online Course.

Williams M, Shellenberger S and McEven M (2020) The Alert Program® for Self Regulation. In: Bundy AC and Lane SJ (eds) *Sensory Integration Theory and Practice*. Third edit. Philadelphia: F.A. Davis Company, pp. 432–437.

Woodard CR, Goodwin MS, Zelazo PR, et al. (2012) A comparison of autonomic, behavioral, and parent-report measures of sensory sensitivity in young children with autism. *Research in Autism Spectrum Disorders* 6(3): 1234–1246. DOI: https://doi.org/10.1016/j.rasd.2012.03.012.

World Health Organisation (2017) Strategies to end the use of seclusion, restraint and other coercive practices: WHO quality rights training to act, unite and empower for mental health. Available at: http://apps.who.int/iris/handle/10665/25480.

World Health Organisation (2020) Child maltreatment. Available at: https://www.who.int/news-room/fact-sheets/detail/child-maltreatment.

Yochman A and Pat-Horenczyk R (2020) Sensory Modulation in Children Exposed to Continuous Traumatic Stress. *Journal of Child and Adolescent Trauma* 13(1): 93–102. DOI: https://doi.org/10.1007/s40653-019-00254-4.

Yochman A, Parush S and Ornoy A (2004) Responses of preschool children with and without ADHD to sensory events in daily life. *American Journal of Occupational Therapy* 58(3): 294–302. DOI: https://doi.org/10.5014/ajot.58.3.294.

Zaba M, Kirmeier T, Ionescu IA, et al. (2015) Identification and characterization of HPA-axis reactivity endophenotypes in a cohort of female PTSD patients. *Psychoneuroendocrinology* 55: 102–115. DOI: https://doi.org/10.1016/j.psyneuen.2015.02.005.

APPENDICES

APPENDIX A: SENATE PLAGIARISM POLICY

University of the Witwatersrand, Johannesburg

S2003/351B Replacing S2002/2038 and S2002/2039

Plagiarism Policy

Section One: Context of policy and procedures

1. PREAMBLE

Senate has approved the following policy on plagiarism. A set of procedures for the implementation of the policy is appended along with examples, and a suggested format for use by schools for a statement that student work has been unaided except where explicitly stated otherwise.

Effectively the documents attempt to answer the following broad questions and concerns:

- What is plagiarism and is it different from copying/cheating?
- What position should be taken on plagiarism – should it be handled as an offence or a developmental issue or a combination of these?
- What approach should be used for managing plagiarism at Wits University?

2. OVERVIEW

Plagiarism is an issue of general concern that requires a standard University response that is sensitive to differences between academic disciplines and that provides sufficient developmental focus to ensure that students are given adequate opportunity for induction into the conventions of the academic community.

This policy proposes that:

- All academic staff should ensure that students are inducted into the values and practises of their discipline with respect to the conventions associated with acknowledging the work of others.
- All schools are responsible for ensuring that adequate information, and opportunities to assimilate the information, are provided to new students.
- Plagiarism in all its forms should be dealt with developmentally first, at school and individual academic level but that it is important that repeated or serious plagiarism be handled as a disciplinary offence.
- A structured approach to plagiarism offers the best protection for the student and the best protection for the rights and thoughts of others.

- All students should be required to sign a declaration that the work they have submitted is their own unaided work and acknowledging that plagiarism is unacceptable in academe.[1]

3. PLAGIARISM

The use of the ideas of others without appropriate acknowledgement is an ongoing concern within the academic enterprise. The extent of the debate about plagiarism is as varied as the practices involved. Some incidents clearly involve deliberate dishonesty (such as the purchase or inappropriate use of material off the internet) and require a particular disciplinary management process. Other incidents reflect the lack of understanding of the need to attribute source (as a result of poor schooling or poor induction to tertiary study) and require attention to the teaching and learning practises of the University. Others are less clear and are politically harder to manage (such as copying from classmates with their consent or off the internet) – there are serious disputes about what constitutes plagiarism and what are simply the inappropriate attempts of an academic elite to claim ownership of knowledge over which they have no right. This is particularly pertinent when plagiarism involves the use of secondary sources – especially those that deal with areas of academic knowledge that have become increasingly part of what is commonly known and understood (for instance it is acceptable practise in psychology to refer to the id without referencing Freud or in physics to make use of Newtonian concepts without referencing Newton). The line between plagiarism and rote learning and reproduction of concepts, ideas or thoughts of others is not always a clear one.

This policy proposal focuses on plagiarism as the "failure to acknowledge the ideas of another" or "presentation of the ideas of another as one's own" and should be read to cover intentional and unintentional failure to acknowledge the ideas of others. The School of Economic and Business Sciences uses the following definition:

> Plagiarism refers to the copying of passages in the written work of other people (e.g., authors of books or articles, other students) without acknowledgement. An essay or other assignment that is substantially copied from one or more sources, with little or no original contribution from the student submitting it, is plagiarised and represents a dishonest effort.

Plagiarism does thus not incorporate poor or incomplete referencing – these are issues of convention (each referencing style requires very different amount of information from the user) and they are

[1] Schools or faculties can best decide when to get such a signed acknowledgement from their students.

discipline related. Academic schools will need to manage inadequate referencing by the rules of fair administrative procedure – the expectations need to be made clear to students in written form in a document to which all students have access (such as a course outline or rule book) and the penalties for not conforming should also be stipulated (and enforced). With respect to the management of referencing individual schools and faculties will need to satisfy themselves that students have enough information (and training) to take on the conventions set out. If this is done then the schools will be in a stronger position to impose penalties (usually related to deduction of marks or refusal to mark work until it is properly referenced). Penalties are often on a continuum depending on the extent to which the referencing does not conform to requirements.

Clearly the year of study of a student is particularly pertinent in this regard and postgraduate students who do not reference adequately should be handled with less leniency. Again, this should be based on the certainty that all students (especially those who are new to Wits) are given enough information to enable them to comply.

The secondary school experience of the majority of students would not have adequately equipped them with an understanding of what plagiarism is and why it is considered problematic. Even those students who have been exposed to referencing conventions are rarely exposed to the more subtle use of unattributed ideas.

Clearly the process of inducting a student into academic conventions (such as giving credit for the use of the ideas of others) is the responsibility of the academic staff members who are required to make known to the student the conventions of referencing. In addition, academic staff are expected to make clear to students why the use of unattributed material is unacceptable from a collegial academic perspective – academic teachers have to model and instil both correct practise and an understanding of the issues of ownership of ideas and the ethics associated with acknowledging the work of others. The under preparedness of students (both in the conventions and also in issues of language) for academe conducted in English further complicates the ability of students to make sense of what is plagiarism, and it is thus absolutely vital that each academic in each discipline takes full responsibility for engaging students in the discourse of their discipline. Without this engagement the conventions may or may not be adopted but their relevance and value will definitely not be appreciated and thus they are unlikely to be transferred to other elements of academic writing.

There is concurrence that Wits has an educative developmental responsibility to induct students into these conventions and their underlying principles. There is however less consensus on how much effort and time should be involved in this induction and at which point it is reasonable to expect a student to have taken on board the necessary practices. Deciding on the point at which the student is accountable is important and this decision underpins the possibility of any disciplinary response to plagiarism.

Intent is central to the debate. It is argued by some that once the students have been inducted (about half of their first year) any plagiarism in unacceptable and is an offence. Intent is no longer an issue as long as the student has been given time, information and practise opportunities with feedback. Others argue that some students – because of their educational backgrounds will take much longer to incorporate the values that mitigate against plagiarism and thus that intent to "steal" the work of others has to be proved for any incident of plagiarism to be considered an offence.

This point of view would in a sense be the *status quo* because current management of plagiarism, using the definition of misconduct from the Rules for Student Discipline, would suggest intent as a defining point. The "gap" between these positions appears to be whether claimed ignorance of the rules of academic writing (and therefore possible lack of intent) constitutes the dividing line between an offence and a bad habit.

Irrespective of the personal or discipline position on the continuum, the management of plagiarism within the University is a common faculty concern and this is an attempt to develop a policy which could be used for the management of the perceived increasing incidence of plagiarism.

This policy and procedure proposes that:

> A school based committee (which could be a committee of one) considers allegations of plagiarism brought to its attention by academics within the school. The committee is tasked with ensuring that appropriate developmental opportunities are offered to students and that penalties have a developmental element. Their greatest sanction would be awarding a student 0% for a piece of work. For any plagiarism incident in which the school committee felt that there may have been intent to use the work of another without giving appropriate recognition the matter would be referred to the student disciplinary committee through the normal channels. School committees would keep records that would enable the school and faculty to track the kind of incidents reported and this would assist in ensuring the appropriate kind of developmental teaching within the school.

4. CURRENT WITS POLICY (PRIOR TO THIS POLICY)

Plagiarism (intentional failure to acknowledge the ideas of another) is currently handled under the misconduct rule in the Rules for Student Discipline. The definition of misconduct appears in Rule 18 of the Rules for Student Discipline and states as follows:

"Misconduct comprises behaviour within or without the precincts of the University, without just excuse, which

1) constitutes a breach of any statute, regulation, or rule of the University; or
2) constitutes a failure or refusal to comply with any punishment or order imposed under these rules; or
3) constitutes a failure or refusal to obey a lawful order; or
4) constitutes conduct that tends to bring the University or any part of it or a member of its staff or a student or any part of its student body into contempt or disrepute; or
5) interferes with the governance and proper administration of the University; or
6) interferes with the conditions necessary for teaching learning and research."

Items 1), 4), 5) and 6) cover failure to acknowledge the work of another.

5. WHAT OTHERS ARE DOING

Many South African Universities have policies in place, most have taken a more structured approach to plagiarism recently and many now require students to submit a declaration with all written work that it is their own work (a practice we have at Wits). The range of approaches is significant, and it is thus difficult to take guidance from them[2].

Some universities use the ordinary student disciplinary committees to handle plagiarism while others have set up committees that deal only with plagiarism. The problems associated with having a special committee include the management of an additional structure plus the risk of different standards of fairness/ administrative justice being applied to students. Clearly, keeping within the existing system once the matter is handled as a disciplinary one makes sense, but it does not address the real difficulties currently being experienced as a result of the time scale for completion of enquiries through the current system. In the case of plagiarism, matters need to be handled quickly so that the next academic work of

[2] The proposed system for Wits has emerged from a range of discussions. The idea of a committee focused on handling incidents of plagiarism occurs in the Rhodes University policy, but this is a central University committee.

the student can reasonably be expected to be free of plagiarised content or so that fair decisions can be made about examinations and re-registration without undue delays.

SECTION TWO: SENATE POLICY ON PLAGIARISM

1. Plagiarism

Plagiarism is the "failure to acknowledge the ideas or writing of another" or "presentation of the ideas or writing of another as one's own" and should be read to cover intentional and unintentional failure to acknowledge the ideas of others. In this context "others" means any other person including a student, academic, professional, published author or other resource such as the internet. The University of the Witwatersrand, Johannesburg believes that failing to acknowledge the use of ideas of others constitutes an important breach of the values and conventions of the academic enterprise.

2. Academic staff and school responsibility

Academic staff, especially those that work with first year students, are responsible for a process of induction into their disciplines. This includes an induction into what constitutes acceptable use of the ideas of other people.

Schools should engage in a developmental process with their students that at least includes making explicit information available to students in first lectures and tutorials, publishing requirements with respect to referencing conventions, providing opportunities for students to practise the conventions, providing limited opportunities for students to resubmit work if the conventions are not followed. It is the responsibility of the school to ensure that there is as little ambiguity as possible within the above process and that members of the school staff adhere to the same level of expectations with respect to all of the above.

The aims of this process are to ensure that:

- Students understand the concept of plagiarism – by explaining what it is and by outlining what kinds of practises constitute plagiarism in the discipline concerned.
- Students know what conventions to use when using material from other people, books, journals, or the internet.
- Students are provided with training (with structured feedback) on the use of these conventions within the context of real assignments for the discipline.
- Students sign an appropriate declaration (see appendix) to be submitted with all written work or to be submitted annually after registration for each discipline.

3. Management of suspected cases of plagiarism in the first instance

In all instances of dealing with plagiarism it is the responsibility of the individual academic to initially assess the seriousness of the infringement – this could be done in consultation with others. Action is dependent on the seriousness – first, minor infringements should be managed developmentally while serious or repeat offences should be handled with more gravity. In all instances, a record of the infringement and of the action taken should be kept within the school and forwarded to the student registry. This will ensure that students who have been given appropriate developmental opportunities are held accountable for future infringements. Wits recognises that plagiarism is a serious threat to academic quality but that many students initially commit plagiarism as they do not have the information or skills they need to negotiate the academic context.

4. Levels of infringements

Level One: Minor, first time

A Level One infringement is an infringement of pre-published academic conventions that involves the unacknowledged or inaccurately acknowledged use of the ideas and/or writing of others.

These infringements are minor and are first offences and are considered to have been unintentional. The staff member concerned, who may impose a penalty of up to 100% of the mark for the work in question and may require the student to resubmit the work concerned, handles these infringements. Should the student wish to appeal the penalty a written account of the penalty should be given to the appropriate committee but if the student is willing to accept the penalty no records are required.

Level Two: repeated minor or first time major offences that may not have been intentional

This level refers to repeated offences of a minor nature, or to first time, major offences. These are handled in the first instance by a School Plagiarism Committee (SPC), provided that they deem the offence not to be such that it might suggest a penalty more severe than the loss of a DP, and requires that records be kept of the decision and offence. These decisions are subject to appeal to the Dean who may refer the matter back to the SPC or to the University central disciplinary process.

Level Three: repeated offences and/or major offences that are possibly intentional or are serious enough to suggest collusion or deliberate dishonesty

These are serious offences, which the SPC has deemed as requiring consideration by a University disciplinary committee. These are major offences and/or repeat offences that indicate that the penalties imposed by the SPC have not had the intended effect of curbing the behaviour. All plagiarism at postgraduate level (except for the initial assignments, usually in the first quarter, of any taught postgraduate programme) is considered to occur at Level Three.

5. School Plagiarism Committee.

5.1. Rationale for committee

A school based plagiarism committee will provide the disciplinary (subject) experts to assess offences and to allow students fair and consistent administrative process. It is also argued that while this "escalates" the seriousness with which these matters are handled it avoids flooding the central disciplinary structures with relatively minor cases and protects individual academics from making subjective decisions. As the limit of the penalty that this committee will be able to impose is refusing a student permission to write the examination for a subject and as the decision will be subject to usual appeals a school based committee could act in the best interests of the students and academe. The school committee may refer the matter to a central disciplinary committee if in its judgement there appears to be or have been the *intent* to commit plagiarism. Thus a full disciplinary process (with the possibility of a formal outcome being recorded against a student's disciplinary history) would only be conducted by the normal university disciplinary structures.

5.2. Membership of committee

Normally, this is a committee of at least three academics and one student chaired by a senior academic (senior lecturer or above). This committee considers reported infringements (reactive role) and scrutinises the publication of conventions within the school to ensure clarity (proactive role). Periods of service on the committee should not exceed three years and should be staggered to ensure continuity. The membership of these committees should be reported on an annual basis to the faculty board. Where it is considered more appropriate, a school may have a "committee of one" where one senior academic is delegated by the school executive structure to monitor the implementation of the plagiarism policy.

5.3. Brief of committee

The brief of the committee is to:

- Note the nature of minor infringements and penalties imposed by academic staff members and refer patterns to the Head of School and individual academic staff members for attention. This information could be of value to education development staff.
- Monitor that accurate records are kept as needed.
- Consider appeals against the decisions of individual staff members.
- Consider whether or not to hear a particular infringement themselves or refer the matter on immediately to the University process
- In reaching this determination the committee may request to see the student file to ascertain if there are other similar decisions recorded with respect to the student.

6. Procedure for School Plagiarism Committees and academic staff

6.1. A staff member who is of the opinion that a plagiarism offence at Level One has been committed, should manage the situation themselves by ensuring that a developmental approach is taken which can include requiring resubmission of the work and/or penalties of up to 100% of the mark. If the student accepts the penalty the matter ends there. (Guidelines as to the extent of the loss of marks must be published by Schools and be made available to the students).

6.2. If a student wishes to appeal the penalty imposed by an individual staff member he or she may do so by referring the matter to the *SPC*.

6.3. If the staff member is of the opinion that the offence is a repetition of a minor infringement, or that the infringement is major he or she should refer the matter to the SPC.

6.4. If it can be established that the infringement, although major, was unintentional (Level Two), the SPC can impose a penalty of loss of marks up to a maximum of 100%, plus refuse the student permission to write the examination or equivalent (loss of DP) and record the offence and penalty on the student record. Similarly, evidence of repeated minor offences could be handled with the same penalty. The record of any student appearing before an SPC should be consulted as a prior record of unintentional major and/or repeated plagiarism will enable the determination that the infringement in the instance before the SPC is not unintentional. It would be essential that the record of earlier infringements was accurate and detailed.

6.5. If it is suspected that the offence is a Level Three offence (serious, or repeated or clearly intentional), the case shall immediately be referred to the appropriate University processes.

6.6. In all cases falling into Level Two (and appeals against Level One decisions) the student concerned must be asked if he/she wishes to appear before the School Committee, and shall be provided with written reasons for any sanctions imposed on them. If the committee considers the offence to be a Level Three offence they may refer the matter to the University committee, do not have to ask the student if he/she wishes to appear before them but must provide the reason for referring the matter to the University committee to the student in writing.

6.7. If after hearing an appeal by a student against the penalty imposed by a staff member, the School Committee is satisfied that an offence has in fact not been committed, the Committee shall withdraw the penalty and advise the staff member who laid the complaint accordingly. The decision of the committee with respect to these Level One offences is final.

6.8. In the handling of Level Two offences a student may request that a University committee handle the matter in the first instance and not by the school. Students must be informed of this right and must waive it in writing if they choose to do so. A school committee is only empowered to penalise students up to 100% of their marks, require resubmission of the work, remove the DP for that course and record the penalty and offence at central level OR refer the matter to a University Committee.

6.9. Appeals against the decisions of the SPC are made to the University committee. Decisions of the University committee on these appeals are final.

6.10. Suspected Level Three offences must be referred to the University committee.

7. Managing serious plagiarism incidents centrally

Serious incidents are referred to the existing disciplinary structures that function in terms of the procedures laid down in The Rules for Student Discipline with particular reference to sections 7 and 8. The penalties that can be imposed will be in line with section 6.5 of The Rules.

A student shall have the right to appeal to the Appeals Committee of the University (Section 8 of The Rules).

8. Publication of information

The Student Handbook and the General Rules Book should in future include general information about the nature of plagiarism and about the University's policy with respect to plagiarism and should indicate that plagiarism is considered a serious offence. Individual schools are responsible for ensuring that students fully understand the nature of legitimate academic practice in the disciplines concerned as these vary. The schools and individual academics must manage plagiarism consistently – it is the responsibility of academic leaders to ensure that information is available, that academic staff understand the consequences of an inconsistent management of the issue and that appropriate developmental strategies are in place for first year students.

APPENDIX B: PUBLISHED JOURNAL ARTICLE

Sensory Modulation Dysfunction in Child Victims of Trauma: a Scoping Review

Title
Sensory Modulation Dysfunction in Child Victims of Trauma: a Scoping Review

Journal
Journal of Child & Adolescent Trauma, 14, 455-470 (2021)

DOI
10.1007/s40653-020-00333-x

This article is available as 'Online First':
http://link.springer.com/article/10.1007/s40653-020-00333-x



APPENDIX C: PUBLISHED JOURNAL ARTICLE

Sensory Modulation Dysfunction in Child Victims of Trauma from four residential care sites in Southern Gauteng, South Africa

Title	Sensory Modulation Dysfunction in Child Victims of Trauma from four residential care sites in Southern Gauteng, South Africa.
Journal	South African Journal of Occupational Therapy, Volume 52, Number 2, August 2022
DOI	DOI: http:/dx.doi.org/10.17159/2310-3833/2022/vol52n2a6

APPENDIX D: CHILD SENSORY PROFILE™

Description	CSP-2
Name	Child Sensory Profile-2
Purpose	**1.** Evaluates sensory processing in children **2.** Helps identify the effect of sensory processing in functional participation in a child's home school and community
Developed by	Winnie Dunn, Phd, OTR, FAOTA, Department Chair and Professor, University of Kansas Medical Centre
Date developed	1999 revised in 2014
Age Band	3 years to 14.11 years
Tools & Material	Scoring sheets
Administration	Parent questionnaire. Paper-pencil or On-line Q-Global Manual Scoring. The questionnaire will be explained in detail to the CYCW who will check the box that best describes the child.
Standardised	Yes
Psychometrics	Test-Retest Reliability: Caregiver: .83-97, School = .66-93 Inter-rater reliability: Caregiver: Mostly .70s and .80s, Teacher: mostly .70. 80s and 90s Content, concurrent, construct validity intact. (Dunn 2014)
Ratings and Scoring	Based on observations, parents/CYCW complete a 5-point Likert Scale ranging from "almost always" to "almost never". Sensory profile scores are analysed on the bell curve. "Typical Performance"/Just like the Majority of Others (1SD below or above the mean), Less than Others or More than Others (2 SD above or below the mean), Much Less than Others or Much More than Others (more than 2 SD above or below the mean) "Raw scores are based on cut scores, percentile ranges and descriptive categories according to the following areas of assessment.
Areas of Assessment	1.Sensory Systems: Auditory, Visual, Touch, Movement, Body Position, Oral 2. Behaviour Scores: Behavioural, Conduct, Social Emotional, Attention 3. Sensory Pattern scores: Seeking/Seeker, Avoiding/Avoider, Sensitivity/Sensor, Registration/Bystander
Expected duration	15-20 minutes manually
Permission required	Administered by an Occupational Therapist
Cost of Assessment	R 7,895.00 SP™2 (Play and Schoolroom, Johannesburg)
	R 520.00 Q-Global Subscription for one year

CHILD

CHILD SENSORY PROFILE™ 2

Winnie Dunn, PhD, OTR, FAOTA

Caregiver Questionnaire

3:0 to 14:11 years

FOR OFFICE USE ONLY			
Calculation of Child's Age			
	Year	Month	Day
Test Date			
Birth Date			
Age			

Child's First Name: _____ Child's Middle Name: _____

Child's Last Name: _____ ID Number: _____

Child's Preferred Name (if different from above): _____

Gender: ☐ Male ☐ Female Birth Date: _____/_____/_____ Test Date: _____/_____/_____

Examiner/Service Provider's Name: _____

Examiner/Service Provider's Profession: _____

Completed by/Caregiver's Name: _____

Caregiver's Relationship to Child: _____

Name of School/Daycare Center: _____

School Grade/Level: _____

In what order was your child born in relation to siblings (for example, 1st child, 3rd child, etc.)?
☐ Only Child ☐ 1st ☐ 2nd ☐ 3rd ☐ 4th ☐ 5th ☐ Other_____

Have there been more than three children between the ages of birth through 18 years living in your household during the past 12 months? ☐ Yes ☐ No

INSTRUCTIONS

The pages that follow contain statements that describe how children may act. Please read each phrase and select the option that best describes how often your child shows these behaviors. *Please mark one option for every statement.*

Use these guidelines to mark your responses:

When presented with the opportunity, my child...

Almost Always	responds in this manner **Almost Always** (90% or more of the time).
Frequently	responds in this manner **Frequently** (75% of the time).
Half the Time	responds in this manner **Half the Time** (50% of the time).
Occasionally	responds in this manner **Occasionally** (25% of the time).
Almost Never	responds in this manner **Almost Never** (10% or less of the time).
Does Not Apply	If you are unable to answer because you have not observed the behavior or believe that it does not apply to your child, please check **Does Not Apply.**

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Product Number 0158700058

APPENDIX E: SHORT CHILD OCCUPATIONAL PERFORMANCE EVALUATION

Description	SCOPE
Name	Short Child Occupational Profile Version 2.2, 2008
Purpose	Measures Occupational Participation The SCOPE helps describe an individual child's occupational participation by assessing factors that represent the MOHO (Model of Human Occupation) concepts of skills: volition, habituation, and the environment, regardless of child's symptoms, diagnosis, age, or the treatment setting to support occupation-focused intervention. The Scope is a simple and quick assessment that captures a child's strengths and challenges according to their developmental stage. This assessment helps gather information to share with the child's treatment team and caregivers.
Developed by	Paediatric Occupational Therapists Patricia L. Bowyer, Jessica Kramer, Annie Ploszaj, Melissa Ross, Orit Schwartz, Gary Kielhofner, Kathleen Kramer; University of Illinois Chicago, based on Kielhofner's MOHO (1980)
Date developed	2008
Age Band	Birth to 21 years
Tools & Material	Scoring sheets
Administration	Observation, interviews, chart reviews. Individual or group administration. For the purpose of this study, CYCWs were seen in a group. Research assistants read and explained each question; CYCW will tick the relevant box.
Standardised	Not standardised
Psychometrics	Established Reliability. MFRM stats: excellent observer: practitioner separation index 0.83, internal consistency: item separation index 0.99, client separation index 0.95. Established Construct Validity: Confirmed by MFRM analysis Convergent/ Discrimination Validity: (Bowyer et al., 2007) MnSq = 1.0 is ideal; MnSq > 1.4 with ZStd > indicates misfit. (Kramer et al., 2009) 5.1% of raters had MnSq values > 1.4 with ZStd > 2.0. Test- retest reliability enables documentation of progress over time
Ratings and Scoring	Consists of 25-items organised into six sections i.e. volition, habituation, communication & interaction skills, process skills, motor skills and participation in their environment. Item-level score uses a letter rating scale of four ordered categories (FAIR). • F = facilitates • A = allows • I = inhibits • R= restricts participation The rating "F" is assigned value of 4, "A" is 3, "I" is 2, and "R" is 1. Score the numbers for each section. Obtain a total overall rating. These scores are not measures or standardised scores but allow one to compare sections and describe the direction of change during the re-evaluation.
Areas of Assessment	Activities of Daily Living; Behaviour; Cognition; Communication; Coordination; Developmental; Dexterity; Eating; Functional Mobility; General Health; Infant & Child Development; Language; Occupational Performance; Personality; Reasoning and Problem Solving; Seating; Self-Efficacy; Social Relationships; Social Support; Strength; Stress and Coping; Touch; Upper Extremity Function; Vestibular; Vision & Perception
Expected duration	25 minutes
Permission required	No permission required. Read training manual.
Cost of Assessment	$40 (R520.00) from the MOHO website http://www.cade.uic.edu/moho/productDetails.aspx? aid=9

Volition				Habituation				Communication/ Interaction Skills				Process Skills				Motor Skills				Environment				
Exploration	Enjoyment	Preferences	Response to challenge	Daily activities	Response to transitions	Routine	Roles	Non-verbal communication	Verbal/Vocal expression	Conversation	Relationships	Understands & uses objects	Orientation to environment	Makes decisions	Problem solving	Posture & mobility	Coordination	Strength	Energy/endurance	Physical space	Physical resources	Social groups	Occupational Demands	Family routine
F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

F	**Facilitates**	Facilitates participation in occupation.
A	**Allows**	Allows participation in occupation.
I	**Inhibits**	Inhibits participation in occupation.
R	**Restricts**	Restricts participation in occupation.

APPENDIX F: SPENCE CHILD ANXIETY SCALE

Description	SCAS - Parent Version
Name	Spence Children's Anxiety Scale - Parent Version
Purpose	A screening tool to assess the severity of anxiety symptoms that are broadly in line with the dimensions of anxiety disorder proposed by DSM-IV (1994) 4thed.
Developed by	Dr Susan H Spence and Professor Ron Rape
Date developed	1999
Age Band	SCAS: 6 -14.11 years for purpose of this study
Tools & Material	Scoring sheets or on-line scoring
Administration	Directions for test explained in detail to the CYCW. Parent can also complete scoring sheets or automatically online.
Standardised	Yes
Psychometrics	Reliability: internal consistency (reliability) of the total scale was extremely high (Cronbach alpha = .93), analyses showed a 6-month test- retest reliability co-efficient of .60 for the total score. Validity: the convergent and divergent validity of SCAS-P was supported by significant correlations with an internalising subscale to a greater extent than with an externalising subscale. Congruent validity was supported by significant correlations between father and mother reports (r = .60-.71) and child and parent reports (r = .25-.42). Significant differences between community and clinical samples supported the discriminate validity. www.scaswebsite.com
Ratings and Scoring	The parent rates the child on a 4 Point Likert Scale from "Never" to "Always." Each response is scored from 0 to 3. A total score is obtained. Scores are rescaled so that the T-scores have a mean of 50 and a SD of 10. A T-score of 10 above the mean of 50 represents a value of 1 SD above the mean and is indicative of elevated levels of anxiety. This is not a diagnostic instrument and a clinical interview needs to confirm the findings. On the parent-reported SCAS for boys and girls ages 6-11, a total score of 31.4 and above or 33 and above suggests an anxiety disorder, respectively. For boys and girls ages 12-18, a total score of 30.1 and above or 32.2 and above suggests an anxiety disorder, respectively.
Areas of Assessment	Scale assesses six domains of anxiety which includes generalised anxiety, panic/agoraphobia, social phobia, separation anxiety, obsessive compulsive disorder and physical injury fears.
Expected duration	10 minutes
Permission required	Score sheets freely accessible from internet www.scaswebsite.com
Cost of Assessment	No cost



NovoPsych

Spence Children's Anxiety Scale - Parent (SCAS-Parent)

Instructions:

Below is a list of items that describe children. For each item please tap the response that best describes your child. Please answer all the items.

		Never	Sometime	Often	Always
1	My child worries about things	0	1	2	3
2	My child is scared of the dark	0	1	2	3
3	When my child has a problem, s[he] complains of having a funny feeling in his / her stomach	0	1	2	3
4	My child complains of feeling afraid	0	1	2	3
5	My child would feel afraid of being on his/her own at home	0	1	2	3
6	My child is scared when s[he] has to take a test	0	1	2	3
7	My child is afraid when (s)he has to use public toilets or bathrooms	0	1	2	3
8	My child worries about being away from us / me	0	1	2	3
9	My child feels afraid that [s]he will make a fool of him/herself in front of people	0	1	2	3
10	My child worries that (s)he will do badly at school	0	1	2	3
11	My child worries that something awful will happen to someone in our family	0	1	2	3
12	My child complains of suddenly feeling as if (s)he can't breathe when there is no reason for this	0	1	2	3
13	My child has to keep checking that (s)he has done things right (like the switch is off, or the door is locked)	0	1	2	3
14	My child is scared if (s)he has to sleep on his/her own	0	1	2	3
15	My child has trouble going to school in the mornings because (s)he feels nervous or afraid	0	1	2	3
16	My child is scared of dogs	0	1	2	3

APPENDIX G: ALERT PROGRAM® NINE WEEKLY SESSIONS

All activities, games and songs listed below were explained in the Alert Program® Online Course (AlertProgram.com. https://www.alertprogram.com/need-continuing-education-units/?doing_wp_cron=1619131122.0342929363250732421875) completed by the principal researcher (Appendix N)
Please note: when reading this programme plan the role of the CYCW was inserted so that the programme can be replicated by other practitioners, however the presence of CYCWs throughout all four research sites was inconsistent for the duration of the nine sessions.

Stage One
Identifying Engine Speeds

SESSION ONE
Mile Marker 1 (30 minutes) Students learn the engine words

The principal researcher said: "If your body is like a car engine, sometimes it runs on low, sometimes it runs on high or sometimes it runs just right".
Demonstrated words associated with high gear e.g. overexcited, out of control, hyperactive.
Demonstrated words associated with low speed e.g. couch potato, sluggish, droopy
Demonstrated words associated with just right speed e.g., easy to learn, easy to play, get along with others.

Photographs of people & POO, TIGGER, EEOW in 3 engine speeds

- Guess the Engine Speeds GAME

Show enlarged pictures of people representing different engine speeds

The principal researcher started by telling a story about a child in a high alert state as it was easier for kids to guess. "Look at this girl, she seems to be kind of wild and hyped up. It's hard to listen and hard to play with her friends when she is like this". Her engine is in …gear. "Look at this child, she is droopy and not in a "just right" gear, her engine is in… gear.
(Encouraged children by asking "Is he in a low gear or high gear?").
The principal researcher said "Look at this boy, he is feeling great, it's easy for him to talk and easy to play with friends. He is paying attention and it's easy for him to listen. He is not overexcited or droopy he is in a …gear".
(Encouraged children to use the words – just right)

- Engine Group Collages: (subgroups for easier communication)

Scissors, glue, 1x A3 paper, kokis, photocopied pictures of different engine speeds

Group activity where each child gets a chance to choose where the picture goes:
High Engine Speed, Low Engine Speed or Just Right



Rowena Joseph, 2019, Engine Group Collages

- Just Right Song. (Williams and Shellenberger, 2006) Basic Version – Acting out Engine speeds with Song
  This song teaches children quickly what it looks like and feels like to act out high, low or just right engine speeds. It also helps them self-regulate to get a movement break and use breathing for singing. Children would benefit from this movement break to help them stay just right for listening and learning.

Mile Marker 2 (30 minutes) Adults label their own engines

The principal researcher spoke about her own engine level from the time she got up in the morning, "Getting up in the morning was difficult for me because my engine looked like this (demonstrated a droopy posture) when I first woke up. Because I woke up late I started rushing around (demonstrated rushing around in high gear). Once I've had a warm relaxing shower, my engine began to get to just right where it was easy for me to get dressed and eat my breakfast. I then had a cup of tea and my engine felt just right and ready to drive to work. While in the car, I started feeling droopy and it started to be hard to concentrate on driving. I was in low gear. But when I got to work, and walked quickly to come inside, I felt just right to do my work."

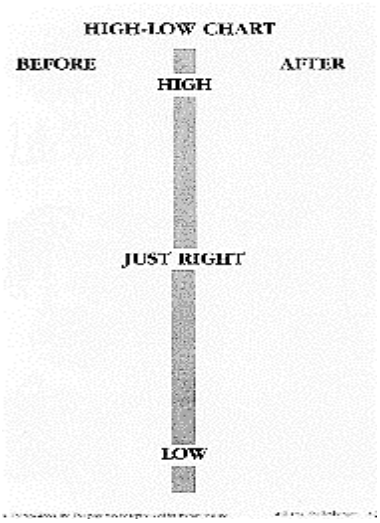
- Alert: GO FISH GAME (Williams and Shellenberger, 2008a) to identify engine speeds.
  (The principal researcher spoke about the pictures and encouraged discussions about high, low, and just right). Children sat cross-legged on the floor in a circle while playing the game (divided into subgroups for easier communication). After the game children were encouraged to choose a picture and act out engine speeds.
  Summarise session using large pictures of three different types of engines speeds

SESSION TWO

Recap Mile Marker 2

Mile Marker 3 (30 minutes) Students develop awareness of the feel of their own engine speeds, using the adult's labels as guides

- Chart the children, principal researcher and CYCW's engine levels on the High Low chart (Williams and Shellenberger,1996, p. A-2, 2014) as follows;
  The principal researcher first placed her name on the chart. Then, placed the CYCW's names on the chart according to their engine levels communicated to the principal researcher. Thereafter the children's engine level was suggested by the principal researcher or the CYCW saying; "looks to me like your engine is here."



High-Low Chart (Before/After): Williams and Shellenberger (1996, p. A-2, 2014)

High-low chart and a koki pen to plot on the BEFORE COLUMN

- Obstacle Course Activity with Engine Speed laminated cards X5
  - cloth tunnel - through tunnel
  - large bean bag – crawl under or over
  - 3. scooter board - across room
  - therapy balls - bounce up and down 10 times
  - Blow cotton balls using a straw across a track – deep breathing
  - Three boxes column HIGH, LOW and JUST RIGHT with a STOP SIGN on each,
  - Alert: GO FISH (Williams and Shellenberger, 2008a) laminated cards.

  At the stop sign the child identified the engine speed of pictures and put them in the right box guided by the CYCW (high, low or just right box).
  After five rounds of obstacle course the group was brought together
  Steam roll balls over kids – heavy work and deep pressure for calming.
- Plot on the AFTER COLUMN on hight low chart.
  As a group the principal researcher and the CYCW charted engine levels again by first putting in where each persons engine levels where as adults, then pointing to where the children appear to be without asking them questions about where their engine is. It must be noted that children may not be ready at this stage to plot on their own.

Mile Marker 4 (30 Minutes) Students learn to identify and label levels for themselves

- Making an engine speedometer (divide into subgroups for easier communication).

white paper plates pre-cut, scissors, brass fasteners, kokis, colour pencils, glue, pictures of high, low and just right engine speeds



Rowena Joseph, Speedometer shows Engine Speeds, 2019

- Just Right Song (Williams and Shellenberger, 2006)
- Charted engine speeds using the speedometer, with the principal researcher starting first then the CYCW in the room showing their engine level on their own speedometers. Thereafter younger children were assisted who were hesitant or seemed confused to chart themselves. Older children were able to identify their engine speeds in this session with a little help and discussion from the principle researcher.
- Group discussion time. The principal researcher helped the children to understand that it is normal for everyone to fluctuate or change in their levels of alertness and just right is not a correct answer or a response that would please an adult.

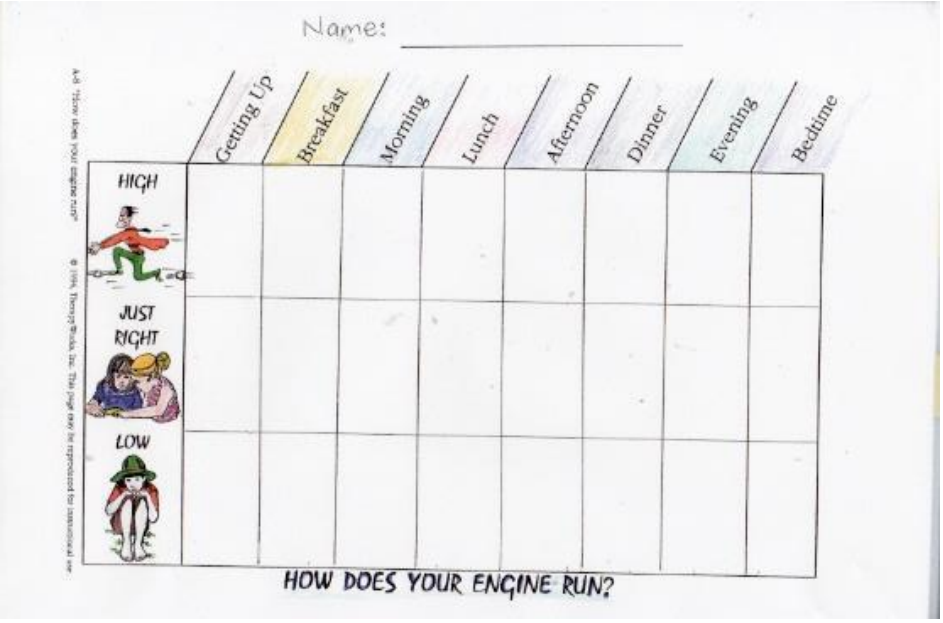
SESSION THREE

Mile Marker 5 Students label levels for themselves outside therapy sessions

- Chart engine levels (The principal researcher and CYCW must do this too and guide any child who may seem hesitant or confused)
- Use high-low chart and names to plot on the BEFORE COLOUMN
- Obstacle Course (30 minutes)
- Puzzle pieces were used at the end of the obstacle course so children pause and place one puzzle piece into the puzzle form before going around the obstacle course again to be sure the children's engine levels do not escalate and they have a period of focus at the end of each round of the obstacle course X 5

- Chart engine levels (the principal researcher must do this and guide any child who may seem hesitant or confused)
- Plot on the AFTER COLOUMN of the High – Chart
- How does your engine run? (15 Min) (subgroups for easier communication)

Copies of how does your engine run (A-8) from Leaders Guide, pencils



How does your engine run? (Williams and Shellenberger, 1994, 2014)

The principal researcher explained the session to the children and indicated that everyone was going to think about their engines when they are at school, when they are in their rooms, while eating in the dining hall and playing outside. As a group everyone was encouraged to chart their engine levels. Emphasise to the CYCW how important it is for them as adults to talk about themselves when they are in high, low, or just right, throughout their week and to not ask many questions but give information and teach the children by talking about their engine levels without judgment that one is level is better than another e.g. “if you want to do your homework, it’ might be harder to do when you are in high or low, it may be easiest for us to do what we want to do or need to do when we are in a just right gear”.

- Just Right Song- Basic Level (Williams and Shellenberger, 2006)
- OR SHAKE Game (Williams and Shellenberger, 2014) (15 min)

The principal researcher explained that in next weeks session different methods to change engine levels was going to demonstrated. She explained that if our engine was too high (show picture) OR too low (show picture), we will not able to do what we want to do or what we supposed to be doing.
Chart engine levels using the speedometer (the principal researcher and the CYCW must do this too and guide any child who may seem hesitant or confused)

The principal researcher emphasised to the CYCW how important it is for them as adults to talk about themselves when they are in a high, low or just right place throughout their week and to not ask questions.

Stage Two
Experimenting with Methods to Change Engine Speeds

SESSION FOUR

Mile Marker 6: Leaders introduce sensory motor methods to change engine levels

- Chart with engine speedometer (30minutes)
  Children were asked to chart on a high-low chart or with their engine speedometers. The principal researcher ensured that the CYCW and helpers were also charting.

  The principal researcher said, "In this session we are going to experiment with different things that will help to change our engine speed. It's like putting fuel into your car engine so it can work properly. So if our engine is running too high or too low we can do some things to help us feel "just right" so that we can talk happily with others, play and learn well". (Children don't need to know their own sensory motor preferences they just need to experience it).

- Five Ways song (Williams and Shellenberger, 2006)
- Engine Tune-Ups: Tools for the Body

  The principal researcher introduced six different ways to move, one at a time. The principal researcher indicated to the children that when their engines are too high or too low we need to move to stay just right or to change gears. Show pictures and encourage own ideas on 6 types of movements. Kids demonstrated:
  Tug o War with Towels 10 X front and back
  - Bouncing on balls 10X up and down
  - Stand and Twirl 10 X circular movements
  - Walking on all fours 5X upside down
  - Jump into large bean bag 10 X Crash and Bump
  - Heavy Work to muscles: Isometrics: Praying hands 5X, Palm pushes in a straight line 5X, Arm and Wrist interlocked in a line leaning towards each side 5X,
  - Pushing on walls 5X,
  - Push a War with balls back to back front and back movements 10 X

- Chart with engine speedometer
  The principal researcher asked the children to chart on a high-low chart or with their engine speedometers. The CYCW and principal researcher also chartered their engine levels.
  The principal researcher ensured that all children are in a just right alert level for listening and learning in this session. If not they were allowed to continue with few minutes of movement before they returned to the group,

- Engine Tune-Ups: Tools for the Mouth (30 minutes) (divide into subgroups for easier communication)
  The principal researcher then gave the children an example of what it means to keep a just right engine level e.g. "When I am studying for a test I need to be chewing on something really hard crunchy (like chewing gum or popcorn), otherwise my engine will go into low gear and it will be hard for me to study or I might even fall asleep. All people use different things in their mouths to keep their engines running at a just right level so they can be more alert to listen and learn, or playing and listening with friends it's always easier when we are in a just right engine level".

Engine Tune Ups: Tools for the Mouth (Williams and Shellenberger, 1996, p.4-10), paper cups with straws, blowing bubbles, blowing whistles, blowing cotton balls, carrot crunch/bite/chew.

Explain each word on the grid.
Children try out each item one at a time then one child at a time decides in which category the tool for the mouth fits in: Blow, Suck, Crunch, Bite or Chew, Put an x on the grid in the right column. At this stage we only introduce the items that can change engine levels. Children don't need to make a specific choice.

- Chart again using the speedometers

SESSION FIVE

Mile Marker 6 continued.(30min) Leaders introduce sensory motor methods to change engine levels

- (Oral motor input was made available from previous session. Move n' sit cushions and balls were also available as seating options). These self-regulation strategies were offered to any child who was not just right for listening and learning anytime in the session.
- The principal researcher and children in the room chartered their engines using the speedometers.
- Obstacle Course Activity (stop signs were placed at the end of each round of the obstacle course, the children needed to choose a picture and place it in the correct box (move, mouth, touch, listen, look)
-

Pictures of 5 sensory motor categories and a blank bingo card with the 5 categories labelled.

The principal research ensured that the obstacle course was set up so that the child must stop at the stop sign, pick a picture and decide which column it goes in (The pictures and sensory motor categories were used, the Alert Bingo game (Williams and Shellenberger, 2008b) was not played).
Add an extra challenge to the obstacle course using colour cones to monuver the scooter board around and jump into two large beanbags after bouncing on a ball, for heavier work.

- Heavy Work to muscles: Isometrics
  - Pushing hands together 5X
  - Palm pushes in a straight line 5X
  - Arm and Wrist interlocked in a line leaning towards each side 5X
  - Pushing on walls 5X
  - Push a War: with balls back to back, foward and back movements 10 X

- Chart engines using speedometers

Any child who is not in a just right alert level after the obstacle course is offered additional support with oral motor input or the move n' sit cushion or sitting on a ball. The principal researcher and CYCW gave children positive feedback by saying something like, "Wow, looks like everyone is in a just right engine speed. This will make it easy for us to listen and learn together".

- Engine Tune-Ups for the Hands: (30min)

The principal researcher explained to the children that they are going to learn how touching different objects can assist to change their engine levels. In this session we are going to make an image of ourselves with plasticine, which is heavy work for our fingers but helps our engines stay just right, while you talk to others or play a game with others or do your homework. Demonstrate how to make an image of yourself.

Have plasticine and other tactile samples e.g. squish balls made with flour and balloons, kinaesthetic sand, gel balls, pipe cleaners.

Children experiment with other inputs after they have made their plasticine figure.

- Chart engines using the speedometers

- Five Ways song (Williams and Shellenberger, 2006)

SESSION SIX

Mile Marker 6 continued (30min) Leaders introduce sensory motor methods to change engine levels

(Have oral motor, tactile, move n' sit cushions and balls available as seating options). These were offered to any child who not in the just right state for listening and learning at anytime in the session)

- Chart engines using the speedometers.
- Obstacle Course Activity (have stop signs were children need to stop, choose a picture, and place it in the correct column move, mouth, touch, listen, look)

Pictures of 5 sensory motor categories and a blank bingo card with the 5 categories labelled.

The principal research ensured that the obstacle course was set up so that the child must stop at the stop sign, pick a picture, and decide which column it goes in (The pictures and sensory motor categories were used, the Alert Bingo game was not played).
Add an extra challenge to the obstacle course using colour cones to maneuverer the scooter board around and jump into two large bean bags after bouncing on a ball, for heavier work.

- Heavy Work to muscles: Isometrics
- Pushing hands together 5X
- Palm pushes in a straight line 5X
- Arm and Wrist interlocked in a line leaning towards each side 5X
- Pushing on walls 5X
- Push a War: with balls back to back, forward and back movements 10 X

- Chart engines using speedometers:
  Support any child who is not in a just right alert level after the obstacle course so everyone is ready for learning. Praise children when they are all in just right by saying something like, "Wow, looks like everyone is in a just right engine speed. that will make it easy for us to listen and learn together".

- Engine Tune-up for Eyes: (30minutes)
  The principal researcher describes her engine speed after a long day at work e.g. "My engine is on high and when I get home from work because I have been rushing around the whole day, so I watch a bit of TV (Look category), it lower my engine. After I have had a shower (Touch category) and eaten (Mouth category) my engine feels better and more ready to talk to my family and play with my child. Some people like to work on an untidy desk (Look category) but I cannot and loose my concentration easily. I like my desk cleared and my office neat when I work".
  Visual inputs were available for children to experiment with e.g. glitter tubes, colourful beads to string together, colourful laminated pictures, crayons and koki to colour in.

  - Chart engine speed
  - Five Ways song (Williams and Shellenberger, 2006)

SESSION SEVEN

Mile Marker 6 continued (30 minutes) Leaders introduce sensory motor methods to change engine levels

(Have oral motor, tactile input, visual input move n' sit cushions and balls available as seating options). These were offered to any child who was not just right for listening and learning.

- Chart Engine levels
  - Tug of War with Towels 20 X front and back
  - Bouncing on balls 20 X up and down
  - Stand and Twirl 10 X circular movements
  - Walking on all fours 5 upside down
  - Jump into large bean bag 5 X Crash and Bump
  - Heavy Work to muscles: Isometrics
  - Pushing hands together 5X
  - Palm pushes in a straight line 5X
  - Arm and Wrist interlocked in a line leaning towards each side 5X
  - Pushing on walls 5X
  - Push a War: with balls back to back, forward and back movements 10 X

- Chart Engine levels

- Engine Tune Up for Ears (30 minutes)
  The principal researcher explained to the children how sound affects us. Loud fast beats or noise usually alerts us and increases our engine speed. Soft beats are calming and usually help us to work in the just right place. The principal researcher plays music that is loud and rhythmical or music that is slow and calming. Have a few percussion instruments for children to experiment with as well as CDs with different rhythms of music.

CD player and music CDS, Percussion instruments

- Chart Engine levels

Alert Bingo Game (Williams & Shellenberger, 2008b)

The principal researcher encouraged the children to make one or two choices as to which pictures on the Alert Bingo Game (Williams & Shellenberger, 2008) they can identify with that helps them to change their engine levels.

The principal researcher and the CYCW started first by pointing to something they use and talking about when they use it (to wake up in the morning, at work, to help fall asleep at night et. Children need adult modelling first before they can do this, especially young children).

Mile Marker 7: Leaders identify sensory motor preferences and sensory hypersensitivities

(Have oral motor, tactile input, visual input, auditory input, move n' sit cushions and balls available as seating options)

Child participants were given the engine tune up activities or self-regulation activities to experiment with during this session.

- 5 column activity (Williams & Shellenberger, 2014) with the CYCW present in the session to reinforce five ways to change of engine levels that the Alert Program® explains as Mouth, Move, Touch, Look and Listen.
  The CYCW and principal researcher discussed sensory motor preferences for children after having encouraged the CYCW to observe what the children were learning in each session and reporting on their observations. Due to the limitations discussed in Chapter Eight, the CYCW were lacked confidence in their responses, as they were not always present for entire duration of the session.

  Due to financial limitations of the principal researcher, it was not possible to provide each of the four centres with the engine-tune up items. The principal researcher also found in the

course of the study that the management and head of the CYCW were not keen to provide financial support in purchasing items that would be needed for self-regulation outside of the therapy session. This was mainly due to their already restricted budgets. The principal researcher however emphasised the movement activities and heavy work activities which can be used throughout the day as “brain breaks” for self-regulation. These activities will entail no cost and no materials will be required.

SESSION EIGHT

Mile Marker 8: Students begin experimenting with using choosing strategies

- Chart Engine levels
  - Obstacle course with picture cards to fit into the sensory categories boxes that were labelled, Mouth, Move, Touch, Look, Listen. Set up boxes at the end of the route of obstacle course. Child makes 5 choices (one choice on each round of the obstacle course).
  - Heavy bounces on ball 20 X, jump into beanbags, push their bodies through cloth tunnel, Blow bubbles in a cup of mild sunlight liquid to make a volcano.

5 boxes labelled Mouth, Move, Touch, Look, listen with picture cards. Have each child’s name laid out with the choices they made next to them.

- Chart Engine Levels

  The principal researcher facilitated the discussion with the children to discuss their choices and preferences to change their engine speeds. The session was summarised by reminding the children of the choices they made that could help them get to the just right state.

Stage Three Regulating Engine Speeds

Mile Marker 9: Student choose strategies independently

The principal researcher explained to the children that they were going to learn about the things that they like to use to help their engines change speeds if it is running too high or too low.

Put out the 5 boxes with pictures of Mouth, Move, Listen, Touch, Look (Williams & Shellenberger, 1996, 2014). Large pictures of the body, hands, eyes and ears and mouth taken from Williams & Shellenberger (1996, 2014), colour pencils, crayons and blank paper. Pin up a large picture of the mouth.

In turn each child decides which picture shows what they would use to change their engine speeds. CYCW assists by sticking the picture on the Mouth chart. Appendix X are also examples of activities, objects or strategies to change engine levels. The principal researcher did the same with body, hand eyes and ears. Each child was encouraged to think and share their own ideas of what they can do to change their engine speeds. When their options of what to do are not available in pictures, it was drawn by the principal researcher or the CYCW on the chart.

- Chart Engine Level

SESSION NINE
Recap on mile marker 9 from previous session
Mile marker 10, 11, 12

Students use strategies independently outside the therapy sessions (could not be evaluated accurately)
Students learn to change engine levels when options are limited (could not evaluated accurately)
Students continue receiving support

- Just Right Song (Williams and Shellenberger, 2006)
- Five ways song (Williams and Shellenberger, 2006)
- Do 5 coloumn activity (Alert Program® Online Course, AlertProgram.com) (Williams and Shellenberger, 2014) with pictures. Each child was seen individually and chose the self-regulation strategies they wanted to use when their engines are high or low and they are struggling to get things done. The principal researcher and the CYCW assisted child participants according to what is available and relevant to their environment from the activities listed in Appendix W.
  The principal researcher facilitated a discussion on a few problem solving cards (Williams and Shellenberger, 1996, 2014). The wording on the cards were adapted to ensure that it was relevant for the children at the centres within their unique environments

  A guideline for the use of sensory strategies outside the therapy room was given to the Senior CYCW together with a bag of cost-effective objects and ideas (Appendix W) together with the 5-column activity completed by child participants. The principal researcher provided her email address and cell number for easier communication. The principal researcher reminded the CYCWs to use the knowledge gained from their orientation session to the Alert Program® to support the child participants who attended the sessions. CYCWs were reminded to be observant of what self regulation strategies would help a specific child. For some children, crawling through the tunnel maybe be a trigger, for others giving or receiving a hug maybe all that they need.

  CYCW who were present at this session were reminded to be detectives and watch out for children's engine levels. This would enable them to assist the child with self-regulation options that are cost effective and available at the centre, to get a child's engine in the Just Right place. Many of the self-regulation strategies list in Appendix W are simple and cost effective.
  The principal debriefed the children and encouraged them to continue ask for what their bodies need, when their engines are too high or too low.

- Just Right Song and Five ways song (Williams and Shellenberger, 2006)

APPENDIX H: WITS LIBRARIAN CREDENTIALS

From: Kedibone Moagi <kedibone.moagi@wits.ac.za>

Date: Tue, 30 Jul 2019 09:13:40 +0000

To: Rowena Joseph <rowenaot@telkomsa.net>

Cc: Rowena Joseph <rowenaj.ot@gmail.com>

Subject: RE: your credentials

Good Morning

My name is Kedibone Moagi . I am the Librarian at the University of Witwatersrand.

My participation on the scoping review

1. Selecting databases, selecting terms, testing the database, running the search, refining the search using the advanced search
2. Guiding in terms of using the BOOLEN OPERATORS (AND, OR , NOT)
3. Databases searched: Cochrane, Pubmed, CINAHL, SCOPUS AND GREY LITERATURE DATABASE which is PROQUEST
4. Retrospectively evaluating different search strategies
5. Exporting the references into a reference management tools and CSV Files

BIS-Bachelor of Information Science

Honours in Education Specialising in Information Technology

Currently doing Masters in Education

Regards

Kedibone Moagi

APPENDIX I: INFORMATION SHEET AND INFORMED ASSENT BY CHILD

Hi child's name),

My name is Rowena. _____(

I would need to ask (name of childcare worker) and (name of social worker) some questions about things you enjoy and some things you do not like. Is it ok if they tell me some information about you and fill in forms about you?

The forms completed will tell us if you need to part of an activity programme. If you are chosen to take part in the activity programme you will need to see me for about nine times in a group with your friends. The programme will in no way harm you as it includes fun activities.

If you are unhappy during the programme your social worker will be informed.

If you would like to be a part of this programme, you would need to place your name on this form or your thumbprint. Your social worker and childcare worker at this centre will not say or do anything bad to you should you decide not to take part.

Informed Assent by Child

I _____ would like to take part in the activity programme at the (Mary Moodley Centre or Igugulethu or Epworth or Kidshaven) Centre.

Child's Name or thumb print: _____Date_____

Social Worker's Signature: _____Date: _____

Rowena Joseph | Occupational Therapist and Play Therapist | 24 hr contact no. 0835980989

Mary Moodley Child and Youth Centre: Ms Mathilda Morolong: 011964 8701/ 0828209028

Igugulethu Centre: R. Labuschagne: 0119164120

Epworth Children's Village: Mikayla Upiter 0118275732

Kidshaven: Moira Simpson: 011 421 4222

APPENDIX J: INFORMATION SHEET AND INFORMED CONSENT BY CHILDCARE WORKER/ SOCIAL WORKER

Dear Childcare Worker /Social Worker,

Good day to you. My name is Rowena Joseph. I am an Occupational Therapist and Play Therapist working in Private Practice in the Benoni area. I would like to invite you to participate in this research study together with the children that you care for. Following ethical clearance from the Department of Occupational Therapy at the University of Witwatersrand, I will be conducting a sensory-based intervention programme at the Mary Moodley Child and Youth Centre in Apex, Igugulethu Child and Youth Centre in Boksburg, Epworth Children's Village in Germiston and Kidshaven in Benoni.

The study is aimed at testing the effectiveness of this programme in CVT. For the purpose of this study children will be actively participating in nine sessions of therapy. The goal is to enable them to practically understand the way their bodies function, their sensory motor preferences and sensory hypersensitivities, how to use sensory motor activities to change behaviours and learn to use strategies outside the therapy room to facilitate and change in their own behaviours. Your assistance is required prior to this intervention programme and after the intervention programme. If you give consent to be a part of this research study, you would need to complete a Child Sensory Profile™2 (CSP™2) to determine if the child that you take care off, would benefit from the planned intervention. If it is found from the CSP™2 that the child is not in need of intervention you will be informed in writing or verbally. Should this questionnaire indicate that the child would benefit from the planned intervention you would be contacted within a week to attend a group session. At this group session you would be required to complete two questionnaires. One questionnaire is an assessment of the child's anxiety and the other an assessment of the child's participation in daily activities. This session should take approximately 1 hour. Thereafter, there will be a random selection of children for participation in the treatment programme. An independent professional who is a qualified occupational therapist and not part of the research study, will randomise the participants. The randomisation of the participants to either the control or intervention group will be done using a computerised system which will place child participants in an intervention group and a control group.

Thereafter you will be informed about the nine week intervention for the child participants who are part of the group. The intervention programme will in no way harm the child. However, if a

child experiences any psychological stress they will be referred directly to the Social Work Supervisor. If the child has not been selected to be a part of the intervention, they will continue with the social work programmes at the centre. Following the intervention, you would need to attend a final group session to complete the posttest assessments using the two questionnaires that assessed anxiety and the child's participation in daily activities. All information collected in the questionnaires will be kept in confidence with only the researcher and social worker in charge of the child, having access to the information. Feedback on the outcome of the study will be made available to the management at the centre and social workers. If you agree to be a part of the research study and you are willing and available to attend the group sessions to complete the required questionnaires, you would need to sign this consent form. There will be no adverse or negative consequences towards any professional or staff at the centres should you decline to participate at any time.

Informed Consent Child and Youth Care Workers

I _____ hereby consent/do not consent to participate in this study.

Social Worker's Signature/Childcare Worker: _____Date: _____

Witness: _____ Date: _____

Rowena Joseph | Occupational Therapist and Play Therapist | 24 hr contact: 0835980989

Mary Moodley Child and Youth Centre: Ms Mathilda Morolong: 011964 8701/ 0828209028

Igugulethu Centre: R. Labuschagne: 0119164120

Epworth Children's Village: Mikayla Upiter 0118275732

Kidshaven: Moira Simpson: 011 421 4222

APPENDIX K: ORIENTATION OF CHILD AND YOUTH CARE WORKERS AND SOCIAL WORKERS TO THE RESEARCH STUDY

What is Occupational Therapy?

STATEMENT ON OCCUPATIONAL THERAPY

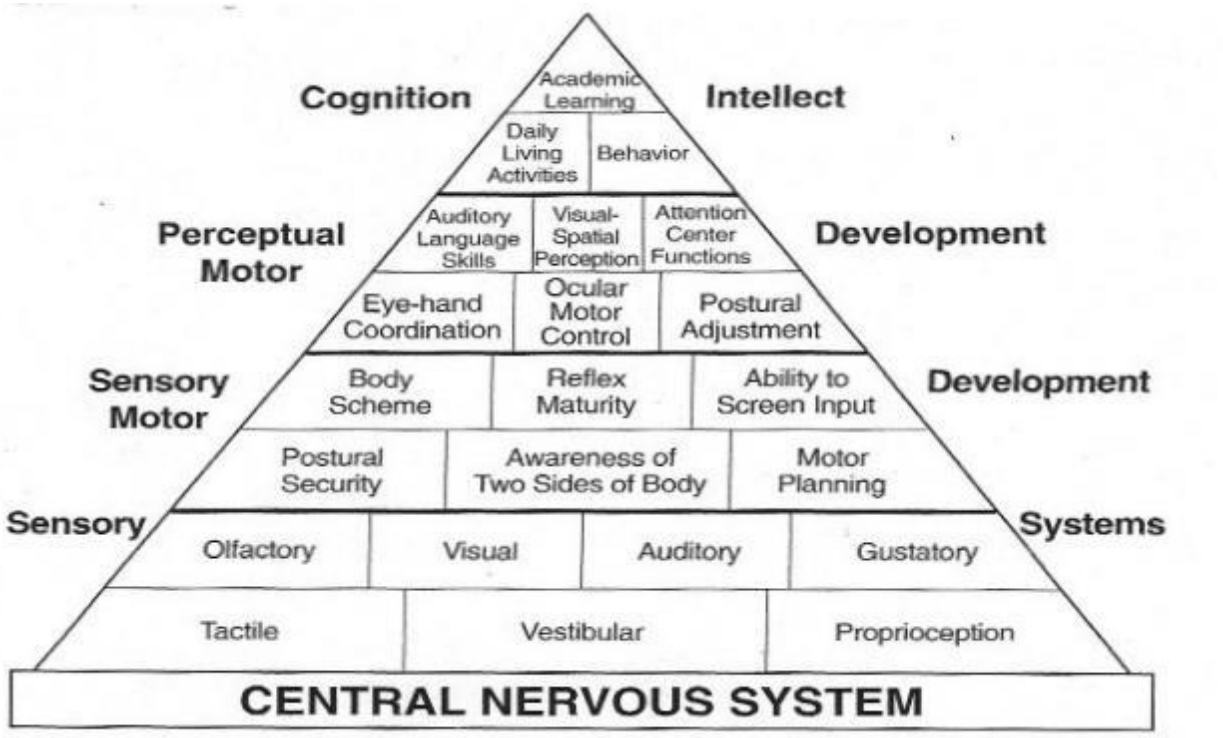
Occupational therapy is a client-centred health profession concerned with promoting health and well being through occupation. The primary goal of occupational therapy is to enable people to participate in the activities of everyday life. Occupational therapists achieve this outcome by working with people and communities to enhance their ability to engage in the occupations they want to, need to, or are expected to do, or by modifying the occupation or the environment to better support their occupational engagement.

Occupational therapists have a broad education in the medical, social behavioural, psychological, psychosocial, and occupational sciences which equips them with the attitudes, skills and knowledge to work collaboratively with people, individually or in groups or communities. Occupational therapists can work with all people, including those who have an impairment of body structure or function owing to a health condition, or who are restricted in their participation or who are socially excluded owing to their membership of social or cultural minority groups.

Occupational therapists believe that participation can be supported or restricted by the physical, affective or cognitive abilities of the individual, the characteristics of the occupation, or the physical, social, cultural, attitudinal and legislative environments. Therefore, occupational therapy practice is focused on enabling individuals to change aspects of their person, the occupation, the environment, or some combination of these to enhance occupational participation.

Occupational therapy is practiced in a wide range of public, private and voluntary sector settings, such as, the person's home environment; schools; workplaces; health centres;

supported accommodation; housing for seniors; rehabilitation centres; hospitals; and forensic services. Clients are actively involved in the occupational therapy process. The outcomes are client-driven and diverse and measured in terms of participation, satisfaction derived from occupational participation and / or improvement in occupational performance. The majority of countries regulate occupational therapy as a health profession and require specific university level education. *Council 2010* WFOT Statement on Occupational Therapy



Pyramid of Learning (William and Shellenberger, 1996,2014) with permission © Taylor and Trott 1991

Ayres Sensory Integration ® In 1989 Jean Ayres defined Sensory Integration (SI) as follows:

"Sensory Integration is 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. The spatial and temporal aspects of inputs from different sensory modalities are interpreted, associated, and unified. Sensory integration is

information processing… The brain must select, enhance, inhibit, compare and associate the sensory information in a flexible, constantly changing pattern, in other words the brain must integrate it."

SI theory is intended to explain mild to moderate difficulties in learning and behaviour.

More specifically, those difficulties related to motor incoordination and poor sensory processing that cannot be attributed to obvious central nervous system (CNS) damage or abnormalities. Of note are the praxis disorders, i.e., bilateral integration and sequencing dysfunction and somatodyspraxia. "Dyspraxia is defined as difficulty in planning and carrying out skilled, non-habitual acts in the correct sequence…Praxis is knowing what to do and how to do it and doing it." Ayres 1972

Sensory integrative disorders also include postural movement disorders, postural – ocular movement disorders and sensory modulation disorders.

Diagnosis

An occupational therapist trained in Ayres Sensory Integration ® accredited by SAISI would be able to make a diagnosis of a SI dysfunction

To make a diagnosis of SI dysfunction, there needs to be evidence of a deficit in processing of vestibular,

proprioceptive or tactile sensory inputs. These deficits must not be a result of either peripheral or central nervous system dysfunction.

The use of various standardised and non-standardised assessments, checklists and clinical observations are used in collaboration with collateral information. Currently, "The Sensory Integration and Praxis Test (SIPT)" is the golden standard for testing internationally. As occupational therapists it is important that all information obtained during testing is confirmed with evidence obtained from the child's functional abilities at home and at school.

What could a SI dysfunction include?

Difficulties experienced in Sensory Integration dysfunction may include:• Clumsy behaviour; child may trip / fall often, bump into things etc…• Postural control may be poor.• Sensory defensiveness, i.e. fussy dressers (only cotton, seams turned out), fussy feeders, uneasy on jungle gyms/avoid swings, unsettled in noisy environments (e.g. parties/ shopping malls), etc.• Sensory dormancy (often resulting in seeking behaviours), i.e. constantly moving, fidgeting, touching, making noises, crashing into things, not hearing when being called (despite normal hearing), incomplete work in class due to "daydreaming", etc.• Difficulties co-ordinating the two sides of the body and/or crossing the body midline, as seen when swimming, riding a bicycle, eating with a knife and fork.• Difficulties planning, sequencing and executing novel (new) movement patterns. Takes longer than average to learn new tasks such as riding a bicycle. Speech and language development may be affected.• Poor self-care.• Difficulties developing and sustaining relationships and poor social skills.• Difficulty with focus and attention. Difficulties in SI dysfunction are classified in two areas:1. SI dysfunction of modulation2. SI dysfunction of discrimination. It is important to always keep differential diagnoses in mind, i.e., emotional issues, Attention Deficit /Hyperactivity Disorders, Hemispheric dysfunction, Autistic Spectrum Disorder, Cerebral Palsy, Down's Syndrome, hearing and visual impairments.

What is Sensory Modulation?

Sensory modulation refers to the ability of the nervous system to regulate, organise and prioritise incoming sensory information, inhibiting or suppressing irrelevant information and prioritising and helping the child to focus on relevant information. A child with a well-modulated nervous system adapts effectively to changes in the environment and is able to maintain a level of arousal and attention appropriate to the task at hand. The child is able to block out irrelevant information, attend to relevant information and respond appropriately and adaptively. This enables the child to engage in a meaningful manner in activities of daily life.eg in the classroom environment, a child is able to ignore the background noise of children talking, feet

scuffling the floor, bells ringing, enabling him/her to attend to the teacher's voice to listen to the instructions and execute the task required.

What is Sensory Discrimination?

Sensory discrimination is the interpretation of sensory input within the central nervous system to make sense of what is perceived, forming perceptions, and allowing for response to sensory input. E.g., hearing a noise (registering), interpreting it is your name being called, resulting in responding by either turning your head towards the stimulus or verbally answering to the call.

Evaluation

Evaluation in SI is an on-going process. Continued discussion with caregivers, teachers etc. is vital. A combination of the following is used to gather data:

- Interviews with parents, caregivers, teachers •
- Sensory history questionnaires, standardised questionnaires, i.e. The Sensory Profile by W. Dunn, The Touch Inventory for Pre-schoolers (TIP), Sensory Processing Measure Home (by Parham and Ecker), Sensory Processing Measure School (by Kuhaneck, Henry and Glennon) as well as non-standardised questionnaires, i.e., checklist for tactile defensive behaviour, sensory motor history.
- Observations in natural settings, i.e., home / school / playground.
- Clinical observations and formal observations during standardised testing.
- Formal assessment / Standardised testing, i.e. The Sensory Integration and Praxis Tests (SIPT), Millers Assessment for Pre-schoolers (MAP), the Test of Sensory Function in Infants (TSFI) and DeGangi-Berk Test of Sensory Integration.
- Continued observation during therapy and continued interaction with parents is of the utmost importance.

Treatment

"The central principle in sensory integration therapy is providing planned and controlled sensory input with the objective of eliciting a related adaptive response in order to enhance the organization of brain mechanisms" (Ayres 1972). An adaptive response is defined as a purposeful, goal directed behaviour which suggests that the child can master the demands of the environment. Adaptive behaviour promotes sensory integration, but is also dependent on sensory integration. Observation of adaptive responses also provides an indication of the degree of sensory integration that is taking place during an activity. It is the role of the therapist to adjust activities

so as to provide “the just right challenge” for the child. Ayres (1972) believed that the young brain is naturally malleable and by providing and controlling the sensory input the brain is capable of change.

Thus, it is assumed that enhanced nervous system function is possible through the provision of controlled tactile, vestibular and proprioceptive sensory inputs (in Fisher, Murray & Bundy, 1991).It is believed that sensory integration in a typically developing child occurs in a developmental sequence. SI theory hypothesises that by systematically providing therapeutic sensory motor experiences, aimed at facilitating typical neuro-motor development, we can enhance brain function and thus enable more typical developmental sequences. This rationale is based in the concept of neuroplasticity, the capacity of the nervous system to adapt in response to the provision of enhanced sensory inputs (Bundy and Murray 2002). Jacobs and Schneider (2001) in Curtis and Decell Newman (2004) stated that enriched sensory experiences may facilitate the formation and development of neural connections. Sensory integration is believed to encourage neural plasticity when a child actively engages in enriched sensory-motor experiences.

When a child responds to his environment in an adaptive and creative way, he is able to learn and have fun. This ‘fun’ and ability to learn, relies on intact sensory integration. Occupational therapists use purposeful activities, specialised equipment and sound clinical reasoning to create opportunities for enhanced sensory integration in therapy. Once the child is processing and organising sensory information more effectively, he will find it easier to interact positively with his peers, play creatively and achieve success in all of his occupational performance areas at home and at school.

APPENDIX L: BACKGROUND INFORMATION FOR CHILD AND YOUTH CARE WORKERS/SOCIAL Workers

Rowena Y. Joseph

B. Occupational Therapy (UKZN) M.Diac.(UNISA)
PR. NO. 6614477 HPCSA 0T 18457

Occupational Therapist

Research Topic: Exploring the effect of a sensory-based intervention on occupational participation and anxiety in child victims of trauma within the South African Context

Compiled by: Rowena Joseph. Principal Investigator. PhD candidate. University of Witwatersrand. RowenaOT@telkomsa.net

Ethics Clearance no: M180136

Background details of Childcare Worker/ Social Worker

Name of Centre:_____
Date:_____
Full name: _____
Age: _____
Medical background:

_____
_____
_____

Current state of health:_____
Standard of Education:

_____
Highest qualification:

_____
Certificates & Diplomas received and Training courses attended:

_____
_____
_____
_____

Period of service at centre:_____
Contact numbers: Landline: _____**Cellphone:** _____
(will be confidential and only used for the duration of the research)

Number of children under your care:_____

OCCUPATIONAL THERAPIST

☎ 0114256448

0880114256448

0835980989

APPENDIX M: ETHICAL CLEARANCE CERTIFICATE

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Mrs Rowena Joseph et al

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M180136

NAME: (Principal Investigator)	Mrs Rowena Joseph et al
DEPARTMENT:	Occupational Therapy Mary Moodley Child and Youth Care Centre Igugulethu Centre
PROJECT TITLE:	Exploring the Effect of Sensory Modulation Intervention on Occupational Participation in Child Victims of Trauma within the South African Context
DATE CONSIDERED:	26/01/2018
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Prof Daleen Casteleijn
APPROVED BY:	Professor CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	13/03/2018

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 on the 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 **January** and will therefore be due in the month of **January** 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

APPENDIX N: LETTER OF APPROVAL UNIVERSITY OF WITWATERSRAND

UNIVERSITY OF THE
WITWATERSRAND
JOHANNESBURG

Private Bag 3 Wits 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Mrs Sandra Benn
E-mail: sandra.benn@wits.ac.za

31 October 2017
Person No: 1287823
PAG

Mrs RY Joseph
10 Aquarius Avenue
Morehill
Benoni
1501
South Africa

Dear Mrs Joseph

Doctor of Philosophy: Approval of Title

We have pleasure in advising that your proposal entitled *Exploring the effect of sensory modulation intervention on occupational participation in child victims of trauma within the South African context* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

APPENDIX O: PERMISSION LETTERS RESIDENTIAL CENTRES AND GAUTENG DEPARTMENT OF SOCIAL DEVELOPMENT

epworth **THERAPY & ASSESSMENT CENTRE**



21.09.2018

To Whom it May Concern

Re: Confirmation of Permission to Conduct Research

This hereby serves to confirm that Rowena Joseph has been granted permission by the management of the Epworth Children's Village to conduct her P.H.D research at Epworth and to undertake data collection with child care workers employed at the Epworth Children's Village.

If you have any queries please feel free to contact us.

Yours Sincerely

R.A. Hill

Practice Manager

EPWORTH CHILDREN'S HOME AND EPWORTH THERAPY & ASSESSMENT CENTRE
Physical Address - 47 9th Avenue, Extension 1, Lambton, Germiston, 1401 **Postal Address -** PO Box 1613, Germiston, 1400
Telephone - (011) 827 5732/5860 **Cell** – 079 966 9417 **Facsimile -** (011) 827 5734 **Email** robyn@epworthvillage.org.za
Website www.epworthvillage.org.za
EPWORTH HOME REGISTRATION INFORMATION
Company Number 1920/006372/08 **NPO Registration Number** 020/236 **PBO Number** 18/11/13/38 **Tax Number** 9196/102/843
Epworth is a level 2 Black Economic Empowerment

GAUTENG PROVINCE
SOCIAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

Igugulethu Centre

Enquiries: Ms. R. Labuschagne
Tel. No.: (011) 916-4120
Fax: (011) 917-3406
7th November 2017

TO : Ms Rowena Joseph

DATE : 7th November 2017

SUBJECT : Request for permission to use Igugulethu Centre for research studies

Dear Madam,

This is to inform you that your request to conduct research studies at our Centre has being granted by the Centre Management.

You are given permission to:

- Interview the child and youth care workers with regards to the child/ren selected to obtain data;
- You can have occupational therapy sessions with the child/ren concerned;
- As access to files of the children is confidential the internal social workers can brief you on alleged trauma of child.

Regards

MRS D.R. LABUSCHAGNE
SOCIAL WORK SUPERVISOR

121 Cason Road
BOKSBURG NORTH
1461

P.O Box 5205
BOKSBURG
1461

Telephone number: (011) 916 4120 Facsimile number: (011) 917 -3406
Cell phone 0823341912

GAUTENG PROVINCE
SOCIAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

Enquiries: Dr. Sello Mokoena
Tel: (011) 3557949
File no.: 2/9/78

MS ROWENA JOSEPH

Dear Ms Rowena Joseph

RE: APPLICATION TO CONDUCT RESEARCH IN THE GAUTENG DEPARTMENT OF SOCIAL DEVELOPMENT

Thank you for your application to conduct research within the Gauteng Department of Social Development.

Your application on the research on **"Exploring the Effect of Sensory Modulation Intervention on Occupational Participation in Child Victims of Trauma"** has been considered and approved for support by the Department as it was found to be beneficial to the Department's vision and mission. The approval is subject to the Department's terms and conditions as endorsed on the 23rd of November 2017. In order for the department to learn and draw from the findings and recommendations of your study, please note that you are requested to provide the department with a copy of your dissertation/thesis once your study has been completed.

May I take this opportunity to wish you well on the journey you are about to embark on.

We look forward to a value adding research and a fruitful co-operation.

With thanks

Ms A HARTMANN
Deputy Director General: Support Services
Date: 4/12/2017.

APPENDIX P: BACKGROUND INFORMATION FORM ON CHILD PARTICIPANTS

Background Information of Child (6 – 14.11 years)

(The background details of each child will being used for the sole purposes of research and will not be shared with any professional outside of the Child and Youth Centres)

Compiled by: **Rowena Joseph. Occupational Therapist. Principal Investigator. PhD candidate. University of Witwatersrand. 0835980989/0114256448.**

RowenaOT@telkomsa.net. Ethics Clearance no. M18013

Name of Centre:_____

Particulars of Child:

Name of Child: _____

Date of Birth: _____

Chronological Age: _____

Unique Numerical Research code: _____

Language of communication: English ___ Afrikaans ___ other_____

Name of Social Worker: _____ contact number: _____

Name of Childcare Worker: _____contact number: _____

Parent Details:

Parents/ Guardians	Name	Surname	Age	Standard of Education	Occupation
Father Biological					
Mother Biological					
Stepfather					
Stepmother					
Foster Father					
Foster Mother					
Other: explain					

married	separated	remarried	divorced	never married	Customary/Tribal

Siblings (if known):

Brother/Sister/Stepbrothers/stepsister	Male or female	Age	Grade	Medical /developmental problems

Birth History (if known):

General health of mother: _____

Was pregnancy full term yes/no: give a reason if no: _____

Complication during pregnancy: _____

Complication during and after birth: _____

Birth weight: _____

Apgar Score: _____

Unusual conditions surrounding birth: _____

Medical History: (tick relevant box)

	Allergies		Chicken pox		Colds/Influenza
	Asthma		Dizziness		Sinusitis
	Croup		Enchephalitis		Draining Ear
	Ear infections		High Fevers		German Measles
	Headaches		Measles		Grommets
	Mastoiditis		Pneumonia		Meningitis
	Mumps		Tinnitis(ringing in ear)		Seizures
	Tonsilitis		Heart Disease		Diabetes
	Psychiatric condition (specify):				

General Health of child:

Has the child been diagnosed with any syndromes/conditions: _____?

Has the child had any of the following: MRI /CT scans/ECG/EEG: what were the results: _____

Has the child undergone any major surgery: _____

Has the child had any major accidents: _____

Has the child has previous therapies: _____

(Speech/ Occupational Therapy Audiologist /Remedial / Physiotherapy/ Psychologist/ Play Therapy)

Soiling or bedwetting (describe): _____

Has eyesight been tested: _____ Does the child use spectacles: _____

Has hearing been tested: _____Does the child use hearing aids: _____

1

Medication: _____

Educational History:

Name of school: _____

Grade: _____

Mainstream/remedial/ Special School: _____

Teachers Name: _____

Teachers contact number: _____

Has the child repeated a grade: _____

Are there any academic concerns /learning disability (list): _____

Are there any behavior and social problems at school (list): _____

Please provide any additional information on the child that maybe helpful in a holistic evaluation of this child: _____

History of Trauma:

Environmental stressors surrounding child in the home/community e.g. poverty, alcohol, drugs, overcrowding, neglect:

_____

_____

Type/s of Trauma experienced by the child: _____

When was the last incident: _____

How long was the child exposed to this trauma? _____

Where did it take place: _____

Who was responsible for inflicting the trauma on the child e.g. parent, family member, community member, and environmental circumstances:

Reaction of child to trauma OR what have been the effects of the trauma experience on the child:

Changes of emotional patterns	
Changes of eating patterns	
Changes of bladder and bowel patterns	
Changes of general behavior since trauma	
Other changes	
Daydreaming /aggressive behaviour	
Other:	

Name of person completing this form: _____

Position held at centre: _____

Date: _____

I _____have completed the form to my full knowledge and have included all pertinent information required. I acknowledge that all the above information is confidential and will not be disclosed to any party outside of the _____Child and Youth Centre.

APPENDIX Q: CSP™2 ONE PAGE INSTRUCTION SHEET FOR CHILD AND YOUTH CARE WORKERS



Winnie Dunn, Phd,OTR, FAOTA

Caregiver Questionnaire 3:0 to 14.11 years

- The CYCW will receive a Child Sensory Profile Scoring Sheet – hard copy (select a CYCW who knows the child the best).
- The social worker will receive the Child Sensory Profile-2 by email.
- The social worker must complete an online form at the same time that the CYCW completes the scoring sheet with a pencil. This must be done together in one room.
- Fill in the cover page details. Type in the details of the child on the first page & write in the child's name on the scoring sheet.
- Think about each child separately and individually.
- As the social worker clicks on a response on the google drive format the CYCW ticks on the scoring sheet the most accurate description of the individual child.
- No scoring is required. Just click & tick the most relevant box.

***See instructions below for description of each response*.**

INSTRUCTIONS: on each page you will read a statement that describes how children may act. Please read each phrase and select the option that best describes how often, the child that you care for, shows these behaviours. Please mark one option for every statement.
Use these guidelines to mark your responses:
When presented with the opportunity my child.....
Almost always responds in this manner ALMOST ALWAYS (90% or more of the time)
Frequently responds in this manner frequently (75% of the time)
Half the Time responds in this manner HALF the TIME (50% of the time)
Occasionally responds in this manner OCCASIONALLY (25% of the time)
Almost never responds in this manner ALMOST NEVER (10% of the time)
Does not apply if you are unable to answer because you have not observed the behaviour or believe that it does not apply to your child, tick DOES NOT APPLY, (however for the purposes of this study every effort must be made to tick one of the responses above)

1. Fill in brief comments for each section. The comment on the scoring sheet must match the comment on the google drive format.
2. 10. Scroll down with your mouse to move down the page on your computer.
3. 11. Click next button after you are absolutely sure you have answered
4. every question in a section.
5. 12. Submit the form once completed.
6. Fill in another child's form

Please note:

1. Complete a minimum of 2 children's forms per day.
2. Each form would take you approximately 15-20minutes to complete = 30-40 minutes per day.
3. For any questions/ enquiries. I can be reached at any time of the day or after hours on my cell phone or email. 0835980989/ rowenaj.ot@gmail.com

APPENDIX R: RESEARCH ASSISTANTS LETTER OF PARTICIPATION

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: Elizabeth.Mathlole@wits.ac.za

12 November 2021

To whom it may concern,

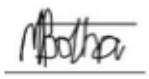
RE: PARTICIPATION IN PHD RESEARCH PROJECT – DATA COLLECTOR

This is to certify that I, Marica Botha, acted as a data collector for the PhD study titled: *"Exploring the effectiveness of a sensory -based intervention on occupational participation and anxiety in child victims of trauma within the South African context."*, by Rowena Y. Joseph.

I collected data over the period of February, April, and May of 2019.

If you have any further questions, you are welcome to contact me.

Kind Regards



Marica Botha

Lecturer (Paediatric)
Occupational Therapy Department
School of Therapeutic Sciences
University of the Witwatersrand
marica.botha@wits.ac.za
0117173713

Occupational Therapist

Nondumiso Bikitsha

BSc. OT (UCT), Pr no.: 0575054,

Contact details
Cell no.: 072 600 5618
Phone no.: (011) 420 0835
Email address: NIBikitshaOT@gmail.com

Physical address
141 Newlands avenue,
Western Extension,
Benoni, 1501

To Whom It May Concern:

Re: Exploring the effect of sensory modulation intervention on occupation in child victims of trauma within the South African context

This letter serves to confirm that I participated as a research assistant in the pre-test administration and scoring of the SCOPE and Spence anxiety scales. This was undertaken over a total time of 4 hours on the following dates:

5 June 10:00 – 12:00

6 June 10:00 – 12:00

Please feel free to contact me if there are any inquiries.

Kind regards
Nondumiso I. Bikitsha
BSc O.T

OCCUPATIONAL THERAPIST CINDY S. PADIACHY

PR NO. 6614418 HPCSA – OT0023493 OTASA – 6301

BSC OCCUPATIONAL THERAPY – WITS

MECI – U.P.



PHYSICAL ADDRESS 141 NEWLANDS AVENUE, BENONI, 1501

CONTACT (OFFICE) 011 420-0835 / (CELL) 072 395 2420 / CINDY.PADIACHY@GMAIL.COM

2018/12/05

To Whom It May Concern:

Re: Exploring the effect of sensory modulation intervention on occupation in child victims of trauma within the South African context.

This letter serves to confirm that I participated as a research assistant in the pre-test administration and scoring of the SCOPE and Spence anxiety scales. This was undertaken over a total time of 4 hours and 45 minutes on the following dates:

4/06/2018

8/06/2018

11/06/2018

This also serves to confirm that I am in possession of the pre-test score sheets and will hold these documents for the researcher until it is required.

Please feel free to contact me if there is any enquiry further?

Cindy S. Padiachy – BSc O.T., M.E.C.I.

APPENDIX S: TRAINING OF RESEARCH ASSISTANTS ON SCOPE AND SCAS

Programme Outline

SCOPE (Short Child Occupational Performance Evaluation) & SCAS (Spence Child Anxiety Scales)

1. INTRODUCTION
   Overview of research study and the use of the SCOPE and SCAS
2. BACKGROUND TO SCOPE and SCAS
   Manuals sent to research assistance in advance of today's session to read.
3. ADMINISTRATION
4. SCORING

1. INTRODUCTION: Overview of research study and the use of the SCOPE and the SCAS/SCAS-P

Administration of Phase 3 of Study

Topic: Exploring the effect of a sensory-based intervention on occupational participation and anxiety in child victims of trauma within the South African context.

Research Sites:

1. Igugulethu Child and Youth Centre, Boksburg
2. Mary Moodley Child and Youth Centre, Benoni

The Igugulethu Centre is situated in an industrial area. I have travelled there several times since last year without difficulty. You just need to be vigilant as you pass a taxi rank. The Mary Moodley Centre is situated just past the Dubai Centre in Benoni. It is a quieter residential area. As with any other area you just need to be vigilant. Both these centres have very good security for your vehicles so while you are there you do not need to be concerned about the safety of your car.

Outcome Measures:

The SCOPE (Short Child Occupational Performance Evaluation) and the SCAS (Spence Child Anxiety Scale/Spence Child Anxiety Scale -Preschool) will be administered to the Child And Youth Care Workers (CYCWs) in consultation with the social workers in charge of a particular child. Administration per child could take 20-30 min. As there is more than one child care worker taking care of the child, an attempt will be made to ensure that the child care worker that is most familiar with the child completes the assessment on that child. The aim is to complete these 2 questionnaires within the month January 2019 as the childcare workers are not available once children are on holiday at these centres.

In the month of May 2018, I will be meeting with the social workers and childcare workers in each centre to tutor them on these two scales and how they must be answered. As a research assistant your role would be to

- ensure the outcome measures are completed in each shift of child care workers,
- ensure all the children allocated to this phase of the study have been assessed (a list will be finalised and handed to you),
- keep a log sheet for yourself of the hours spent administrating and scoring the assessments.

NB:(instructions to share with CYCW & Social workers). Answer questions as accurately as possible on the children you know the best. These assessments will be readministered at the end of the year, after the intervention and compared, to determine the change in the child's performance. The research assistant is only there to ensure that the assessments are completed accurately. They will not assist in answering the questions. Should you have difficulty understanding a question you may consult with the research assistant.

Child and Youth Care Workers schedules:

Both these sites operate with 4 teams of childcare workers. The shifts change every 2 days. The childcare workers are available in the mornings from 9am to 1-pm to complete the questionnaires.

The duration of your work at the centre will depend on how fast or slow the CYCW complete the forms and the number of forms that can be completed in a morning. I can estimate a period of 2 -2.5 weeks just in case there are CYCW absent or away for some reason you would need to come in when they are available.

The shifts work as follows:

Monday shift 1

Wednesday shift 2

Friday shift 3

Monday shift 4

Compensation for Hours

Your assistance is sincerely appreciated. I am still awaiting a reply from my applications for funding (Rosemary Crouch fund and SAISI). Please remember that these assessments will be re-administered after the period of intervention. CPD points will be allocated for the training time on the administration and scoring of tests.

1 . BACKGROUND OF SCOPE (Refer to Chapter 1 and Chapter 2 of Assessment Manual)

- Introduction
- Purpose of the SCOPE
- 4 Aspects of Model of Human Occupation assessed in the SCOPE
- MOHO concepts in simple language

2. ADMINISTRATION (Refer to Chapter 3 of Assessment Manual)

- How would information be gathered.
- Purpose of the Ratings
- Using the FAIR Rating Scale
- Administration Rating Flowchart
-

3. SCORING (refer to Chapter 4 of Assessment Manual)

- Obtaining sum of rating totals
- Obtaining section rating
- Obtaining overall rating total

-

4. PRACTICAL

Think about one child that you know very well. Answer each of the 25 questions making reference to this particular child. Score each section, then the section totals and finally obtain an overall rating total.

5. BACKGROUND ON SCAS

(Refer to Website https://www.scaswebsite.com/1_4_.html)

6. ADMINISTRATION

Discuss and explain the attached instructions

4. SCORING

Discuss and explain according to the scoring sheets attached for the SCAS and SCAS-P.

5. PRACTICAL

Choose either the SCAS or the SCAS-P. Think of a child that you know well. Complete the questionnaire according to the instructions given.

Score the items according to the instructions given for each area of anxiety then obtain a total score.

APPENDIX T: RESEARCH ASSISTANTS GUIDELINES FOR ADMINISTRATION OF SCOPE AND SCAS

1. Morning Sessions: 9am - 12:30

2. Items you will be given for Administration

- Spence Anxiety Scales for Children with scoring sheets
- SCOPE with a scoring sheet
- Pens (give out if needed and take back for next session)
- List of children's names that needs to be completed over the sessions you are at the centre
- Log sheet to record date, CYCW present, which children each assessed and any comments and challenges you may have experienced.
- Consent for CCW, should there be any CYCW present who has not completed a consent form. NB!! NB!!

3. Guidelines for Administration of Outcome Measures

- Enquire who is the team leader for each session you are there, she/he would be the person to keep contact with.
- CYCW must complete the questionnaires on children they know best.

  At least 1-3 children per CYCW.
- Record on you log sheet each CYCWs name, the children they

  completed & your comments
- Emphasise that they need to think about the child in the present, as

  they see them now.

- Emphasise the accuracy, honesty, and objectivity of their responses
- YOU WILL NEED TO fill in date of birth on each score sheet as CYCW will not have access to this.
- You would need to motivate and encourage during the evaluation with the CYCW

4. Guidelines for Scoring Tests

- Each Anxiety Scale needs to be scored on the sheet attached
- Each SCOPE needs to be scored on the sheet attached
- The accuracy of the scoring is priority
- Once the intervention is done, by the 2nd/3rd week in April, you would be required to use the SPENCE and SCOPE on the posttest.

Rowena Joseph/ 083 5980989 / rowenaj.ot@gmail.com

APPENDIX U: ORIENTATION TO THE ALERT PROGRAM® FOR CHILD AND YOUTH CARE WORKERS

Need:

Sensory strategies (see Sensory-Motor Checklist for Adutls) (Williams and Shellenberger, 1996, 2014)

Alert: Go Fish GAME (Williams and Shellenberger, 2006a)

Just right song (CD player and CD) (Williams and Shellenberger,2006)

Items from the Sensory Preference Checklist

Key Concepts

Occupational Therapy – Sensory Integration

“Play is the work of children. Through play, children learn about themselves and the world around them. When all that they see, hear, and feel makes sense of them, a process of sensory integration occurs.”

Sensory Integration and the Child (J.A.Ayres)

SI is the organisation of sensation for use. Our senses give us information about the physical conditions of our body and the environment around us. Sensations flow into the brain like streams flowing into a lake. Countless bits of sensory information enter our brain at every moment, not only from our eyes and ears but also from every place in our bodies. We also have a special sense that detects the pull of gravity and the movements of our body.

Analogy of a computer: To write a letter, information is typed into a computer (input). The computer processes the information, and a hard copy of the work (printed piece of paper) can be produced (output). When an error is detected in the letter, one possibility is that the information was typed incorrectly (input). If no error is found there, one might conclude that the cause of the error was in the internal processing of the computer.

Proper processing of the senses is required to develop the end products of concentration, organisation, self-esteem, self-control, confidence, academic learning, abstract reasoning and the specialisation of the body and brain.

(Figure 1-1: Williams and Shellenberger, 1996, 2014)

(Figure 1-3: Williams and Shellenberger, 1996, 2014)

Engine Levels & Arousal states

Arousal refers to how alert one feels in order to behave and perform tasks in a manner suitable to the situation.

We can describe our body like an engine of a car; sometimes it runs in high gear, sometimes in low gear and sometimes just right.

(Figure 1-5 : Williams and Shellenberger, 1996, 2014, pp.1-8,1-9)

(Samples of Engines in High, Low and Just Right: Williams and Shellenberger, 1996, 2014, pp. A-4, A-5,A-6)

High alert states: Hyped up, loud, angry, tantrum, hyperactivity, disorganised state, difficulty sitting at a desk or dining room table, unfocused, revved up, hard to follow rules.

Low alert states: lethargic, withdrawn, slouching in chair, droopy, propping chin on hands at desk/dining table, spacing out, low energy when standing, slow to move, hard to learn and follow rules.

Just Right alert states: ready to work or play, focused and attentive, sits easily in a chair in an upright position at desk/dining room table, ready to listen and learn. If standing, would be relaxed yet ready to move if needed.

During each session both adults and child participants would be required to chart their engine levels. (Sample of a High-Low Engine Chart: Williams and Shellenberger, 1996, 2014, p. A-3)

Go Fish Game (Williams and Shellenberger, 2008a) **demonstrates high alert, low alert and just right alert states.**

Protective Responses

This is seen in children who are sensory defensive i.e., their protective senses are over activated.

When sensory defensiveness is present, major, or minor sensory events create different levels of stress and anxiety. Intervention is possible when we understand how certain kinds of events either disrupt the child or contributes to the recovery of the child from disturbing events. Below is a diagram of 4 types of individuals all responding to small irritations OR large disturbances in their daily routines. Individuals who are not sensory defensive recover from these irritations or disturbances while others never return to the optimal or just right state of recovery.

Individuals may respond with a:

Flight response – run away or avoid the situation

Fright response – expressions of intense fear or crying or says “I Can’t”

Fight – saying “No” or hit out or want to engage in a fight.

Figure 1-6: Patterns of change in arousal in response to environmental events

(Williams and Shellenberger, 1996, 2014, p.1-9)

Proprioception / Hard Work

There are connections in the brain that affect how alert we feel. Talking to yourself and trying to convince yourself (top-down approach) not to react with a Flight, Fright or Fight response in a stressful situation is not an efficient way to calm or self-regulate your body. Instead, a more efficient way is to engage the back part of your brain (the cerebellum). If we do this, we send a message to the centre of your brain which would help the body obtain an optimal arousal state or a just right engine level. One of the

ways to do this is by engaging the body in heavy work using muscles and joints. We call this a bottom-up approach because the brain receives input from the body.

This type of heavy work would include pushing, pulling games, lifting, or carrying heavy objects, wrestling, playing football, moving furniture, biking, hoeing, tug-of-war. You may also push hands together, standing and pushing against a desk, stretching, doing chair push ups, using theraputty, moulding clay, laying under heavy quilts or pillows, chewing gum, eating crunching foods, blowing on a straw. These inputs can be used to produce a calming and an alerting state. It can be used when engines are too high and two low. Unlike other sensory inputs, proprioceptive inputs rarely overload the system.

Isometric Exercises – demonstration

Push against wall with hands, back, shoulders.

Pull hands apart

Push hands together

Hands behind head and push head back

Push head down with 2 hands placed on the top of the head.

Play tug of war

Breathe in and out

Chair push ups

Legs on outside of chair and pull in

Legs on inside of chair and push out

Sit at the edge of the chair and move out and downwards while supporting with both hands

Sensorimotor Preferences

Using the sensory motor checklist for adults you would be able to understand and recognise your own sensorimotor preferences. Place an arrow pointing up next to those items that seem to alert you and an arrow pointing down.

Sensory-Motor Preference Checklist (for Adults): (Williams and Shellenberger, 1996, 2014, p. A95)

Detective Work

All adults involved in a child's life need to be detectives. They need to watch out for what things alerts the child (makes their engine run on high), what causes a child to feel unenergetic and sad/down (makes their engine run low) and what maintains a child in the just right place where they are ready to respond appropriately to the situation.

8. Final Activity: To illustrate the sensory strategies we use to keep ourselves alert.

What did you do in your morning routine to get you up and get you ready to come to work?

Using the 5 Column Activity, CYCW plot what keep themselves alert according to Mouth, Move, Listen, Touch, and look sensory inputs. (Williams and Shellenberger, 1996, 2014)

END: Just Right Song (Williams and Shellenberger, 2006)

Thank you for participating in this session.

I look forward to your participation in the 9 sessions we are going to be doing with the children. It is very important that CYCWs are present at each session to observe and learn how to guide the child's choice of self- regulations strategies.

Rowena Joseph
Occupational Therapist

APPENDIX V: TIMETABLES OF ALERT PROGRAM® THERAPY SESSIONS

Intervention Attendance Register - Epworth Children's Village

Time: 3-4pm

Day: Friday

Date of Session				15/2/19	22/2/19	1/3/19	8/3/19	15/3/19	20/3/19	28/3/19	5/4/19	12/4/19
Session no.				1	2	3	4	5	6	7	8	9
No.	Name	Age	Male/Friday									
21	BG	13	F	✓	absent	✓	✓	✓	✓	✓	✓	✓
19	DM	9	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	NM	11	M	✓	✓	✓	✓	✓	✓	✓	under discipline	✓
2	GM	10	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
Groups for focused table top activites and gross motor activities												
13	KM	6	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	NT	7	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	FN	7	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	SP	8	M	✓	✓	✓	✓	✓	✓	✓	✓	✓

Intervention Attendance Register - Mary Moodley Child and Youth Centre

Time: 5:30pm -6:30pm (Friday)

Day: Friday

Date of Session				15/2/19	22/2/19	1/3/19	8/3/19	15/3/19	22/3/19	29/3/19	5/4/19	12/4/19
Session no.				1	2	3	4	5	6	7	8	9
No.	Name	Age	M/F									
40	BM	11	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
35	CS	12	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
36	LM	14	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	SM	13	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	NM	10	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
49	SN	10	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
41	SK	10	M									
Groups for focused table top activites and gross motor activities												
29	SM	9	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
27	MP	7	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	TG	7	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
31	ZN	7	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	HP	8	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
24	KS	6	F	✓	✓	✓	✓	✓	✓	✓	✓	✓

Intervention Attendance Register - Igugulethu Child and Youth Centre

Time: 10am-11am

Day: Saturday

Date of Session				16/2/18	23/2/19	1/3/19	9/3/19	16/3/19	23/3/19	30/5/19	6/4/19	13/4/19
Session no.				1	2	3	4	5	6	7	8	9
No.	Name	Age	M/F									

Intervention Attendance Register - Kidshaven Group 1

Time: 3pm

Day: Friday

Date of Session				23/8/19	30/8/19	5/9/19	13/9/19	20/09/19	27/9/19	4/10/19	11/10/19	18/10/19
Session no:				1	2	3	4	5	6	7	8	9
No.	Name	Age	Male/Friday									
79	RM	9	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
83	RN	10	F	✓	✓	✓	absent	✓	✓	✓	✓	✓
88	MN	8	F	✓	✓	✓	✓	✓	✓	✓	✓	absent
93	JM	7	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
115	PB	7	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
118	BS	8	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
122	LA	10	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
97	DL	10	M	✓	✓	✓	✓	✓	✓	✓	✓	✓

Intervention Attendance Register - Kidshaven Group 2

Time: 4pm

Day: Friday

Date of Session				23/8/19	30/8/19	5/9/19	13/9/19	20/09/19	27/9/19	4/10/19	11/10/19	18/10/19
Session no: 1-9				1	2	3	4	5	6	7	8	9
No.	Name	Age	Male/Female									
87	NH	13	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
89	DN	14	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
117	SM	14	M	✓	absent	absent	✓	✓	✓	✓	✓	✓
111	NW	14	M	✓	absent	absent	✓	✓	✓	✓	✓	✓
103	MS	14	M	✓	absent	absent	✓	✓	✓	✓	✓	✓
78	MB	14	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
84	LZ	12	F	✓	✓	unwell	✓	✓	✓	✓	✓	✓

Intervention Attendance Register - Kidshaven Group 3

Time: 5pm

Day: Friday

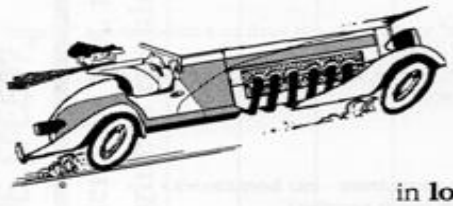
Date of Session				23/8/19	30/8/19	5/9/19	13/9/19	20/09/19	27/9/19	4/10/19	11/10/19	18/10/19
Session no:				1	2	3	4	5	6	7	8	9
No.	Name	Age	Male/ Female									
75	PM	11	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
76	FM	11	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
81	SK	12	F	✓	✓	✓	✓	✓	✓	✓	✓	✓
116	LT	13	M	✓	✓	absent	absent	✓	✓	✓	✓	✓
112	CS	12	M	✓	✓	absent	✓	absent	✓	✓	✓	✓
104	IS	12	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
98	BB	12	M	✓	✓		✓		✓	✓	✓	✓
107	TP	10	M	✓	✓	✓	✓	✓	✓	✓	✓	✓
110	EB	10	M	✓	✓	✓	✓		✓	✓	✓	✓

APPENDIX W: GUIDELINE ON SELF-REGULATION STRATEGIES FOR CHILD AND YOUTH CARE WORKERS

CHANGING HOW ALERT YOU FEEL

If your body is like a car engine, sometimes you may feel like your engine is running in

high speed,



in **low speed**,



or **"just right"**.



When your engine is in high speed, you may find it difficult to pay attention, to sit quietly in your seat, or get your work completed. When your engine is in low speed, you also may find it hard to concentrate, you may "daydream" easily, or feel like a "couch potato." When you are in the "just right" place, it's usually easier to pay attention, to get your work done, and to have fun.



If you want to change your engine speed from high or low to get into the "just right" feeling, you may want to try the following:

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CHANGING HOW ALERT YOU FEEL

1. PUT SOMETHING IN YOUR MOUTH:

- eat hard candy (sugarless if you want)
- eat crunchy food: pretzels, popcorn, nuts, apples
- eat chewy food: gum (1 or more pieces), raisins, bagels, chunks of cheese
- eat sour food: pickles, sour candy
- eat sweet food: fruit or candy
- drink from a straw: use an "exercise bottle" to drink liquids such as a milkshake, a "Slurpie" (partially thaw a frozen drink), or other drinks
- try a combination such as trail mix (crunchy, chewy, sweet), Starburst (chewy, sweet, and tart), or chips dipped into salsa (crunchy and spicy)
- use green rubber tubing
- take slow deep breaths

2. MOVE: (try moving before you need to concentrate - ex: homework)

- do isometrics (push arms on a wall or push hands together)
- walk quickly (in school or take the dog for a walk)
- run up and down steps
- do an errand for a teacher
- shake head quickly
- roll neck slowly in circular motion
- jump up and down or try to jump to touch a door frame
- play sports - basketball, swimming, baseball, frisbee, etc.
- do aerobics with a group or at home to music
- dance
- use a therapy ball

3. TOUCH:

- try holding and "fidgeting" with a Koosh Ball, paper clips, rubber bands, straw, jewelry, or clay
- rub gently or vigorously on your skin or clothing
- take a cool shower or warm bath
- wash your face with a cold or hot wash cloth
- pet or play with an animal
- hold or lean up against stuffed animal or large pillows

4. LOOK:

- put bright lights on in room if you are in low speed
- dim the lights if you are in high speed
- clear off the table you are working on if it distracts you
- watch fish in an aquarium
- read a book or look at magazine

5. LISTEN:

- listen to classical type music (even, slow beat)
- listen to hard rock type music (loud bass, uneven beat)
- use a personal cassette player if the music bothers someone else
- avoid loud, noisy places if you are in high speed or if it bothers you when you are trying to concentrate

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APPENDIX X: ALERT PROGRAM® CERTIFICATE OF COMPLETION



Alert Program® Online Course
Certificate of Completion

presented by

Mary Sue Williams, OTR/L & Sherry Shellenberger, OTR/L

Rowena Joseph

has completed the online course on

February 1, 2019

20 Contact Hours (2.0 AOTA CEUs or 25 NBCOT PDUs)

This is a Certificate of Completion and does not imply certification in the use of the Alert Program®. TherapyWorks, Inc. does not offer a certification for the proper use of the Alert Program®. This Certificate of Completion indicates a score of 70% or better on the post-test.

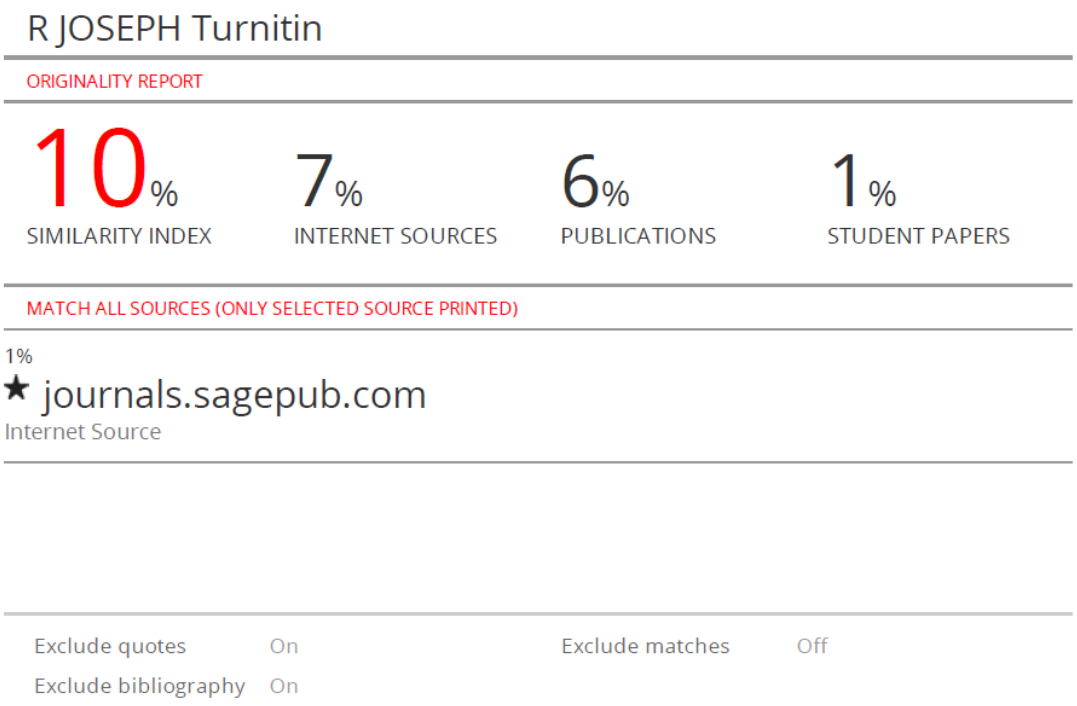
The American Occupational Therapy Association, Inc. APPROVED PROVIDER PROGRAM

AOTA Classification Category 2: Occupational Therapy Process Intervention
AOTA APP # 4832

Sherry Shellenberger, OTR/L

TherapyWorks, Inc. PO Box 92316 Albuquerque, NM 87199 877-897-3478 www.AlertProgram.com

APPENDIX Y: TURNITIN PLAGIARISM REPORT



R JOSEPH Turnitin

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