THE COMPARATIVE EFFECT OF A PAIRED VERSUS A SMALL GROUP GROSS MOTOR INTERVENTION ON THE MOTOR CAPABILITIES OF SELECTED CHILDREN PRE-IDENTIFIED WITH CHILDHOOD APRAXIA OF SPEECH

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SUMMARY

Children with Childhood Apraxia of Speech (CAS) do not only have isolated speech and sound delays but teachers and parents often report motor co-ordination difficulties. The latter often leads to the child with CAS being clumsy. Although teachers and parents have reported motor co-ordination difficulties, research investigating the gross motor capabilities of children with CAS does not seem to exist. Not a single study could be found that investigated the effect of a gross motor intervention programme on children with CAS.

The main aim of the current study was to investigate the effect of a paired versus a small group gross motor intervention programme on selected pre-school children, pre-identified with CAS. Purposive sampling was used and consisted of participants (N=20), ranging between the ages of three and seven years. All the participants were from a primary school in the Bellville area in the Western Cape Province, South Africa.

The participants were randomly divided into paired groups and a small group by an external third party. Both the paired groups and the small group were evaluated at baseline-, pre- and post-test with the Movement Assessment Battery for Children 2nd Edition (MABC-2), and the Test of Gross Motor Development 2nd Edition (TGMD-2). The evaluations took two weeks to complete and were conducted in two 45 minute sessions per week. The 12-week intervention programme was also presented twice a week, with each session lasting 45 minutes.

The researcher compared the results of the paired groups to the small group and concluded that the specific intervention programmes did not benefit either of the groups more than the other. Both the paired groups and the small group significantly improved their overall scores for the MABC-2 and the TGMD-2 after the 12-week intervention programme. Therefore, it could be speculated that the specific 12-week gross motor intervention programmes influenced the gross motor capabilities of the children pre-identified with CAS.

OPSOMMING

Kinders met Apraksie van Spraak (AvS) het nie net geïsoleerde spraak en klank vertragings nie, maar onderwysers en ouers rapporteer dikwels motoriese koördinasie probleme. Laasgenoemde lei dikwels tot lompheid by die kind met AvS. Alhoewel onderwysers en ouers motoriese koördinasie probleme gerapporteer het, blyk dit dat navorsing oor die groot motoriese vermoëns van kinders met AvS nie bestaan nie. Nie ’n enkele studie wat die effek van ’n groot motoriese intervensieprogramme op kinders met AvS ondersoek, kon gevind word nie.

Die hoofdoel van die huidige studie was om die effek van ‘n gepaarde- teenoor ‘n kleingroep groot motoriese intervensieprogram op geselekteerde voorskoolse kinders, wat vooraf met AvS geïdentifideer is, te ondersoek. Doelgerigte steekproefneming was gebruik en het uit deelnemers (N=20) tussen die ouderdom van drie en sewe jaar bestaan. Al die deelnemers was leerders van 'n laerskool in die Bellville omgewing in die Wes-Kaap Provinsie, Suid-Afrika.

Die deelnemers is lukraak in gepaarde groepe en die kleingroep deur 'n eksterne derde party ingedeel. Beide die groepe was by die basislyn-, pre- en na-toets met die “Movement Assessment Battery for Children 2nd Edition (MABC-2)”, en die “Test of Gross Motor Development 2nd Edition (TGMD-2)” geassesseer. Die assesserings is in 45-minuut sessies, twee keer per week aangebied en het twee weke geneem om te voltooi. Die 12-week intervensieprogram is ook twee keer per week aangebied en elke sessie het 45 minute geduur.

Die navorser het die resultate van die gepaarde groepe met die kleingroep vergelyk en tot die gevolgtrekking gekom dat die spesifieke intervensieprogramme nie een van die groepe meer bevoordeel het as die ander nie. Beide die gepaarde- en kleingroep het hul algehele telling vir die MABC-2 en die TGMD-2 aansienlik ná die 12-week intervensieprogram verbeter. Daarom kan die navorser teoretiseer dat die spesifieke 12-week groot motoriese intervensieprogramme die groot motoriese vermoëns van hierdie deelnemers, wat vooraf met AvS geïdentifiseer is, beïnvloed het.

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“Children are the world’s most valuable resource and its best hope for the future.”
– John F. Kennedy

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LIST OF ABBREVIATIONS

CAS	Childhood Apraxia of Speech
SLI	Speech Language Impairment
DCD	Developmental Coordination Disorder
FMS	Fundamental Movement Skills
GMS	Gross Motor Skills
EF	Executive Functioning
DLPFC	Dorsolateral Prefrontal Cortex
ADHD	Attention Hyperactivity Disorder
ASD	Autism Spectrum Disorder
DAS	Developmental Apraxia of Speech
DVD	Developmental Verbal Apraxia
ASHA	American Speech-Language-Hearing Association
SSDs	Speech Sound Disorders
MSD	Motor Sound Disorder
DST	Dynamic Systems Theory
CNS	Central Nervous Systems
CER	Comparative Effectiveness Research
MABC-2	Movement Assessment Battery for Children 2nd Edition
TGMD-2	Test of Gross Motor Development 2nd Edition
AB	Age Band
GMQ	Gross Motor Quotient

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CHAPTER ONE
INTRODUCTION

BACKGROUND

Childhood Apraxia of Speech (CAS) is a developmental disorder that is characterized by the inability to plan or programme an appropriate motor command specifically related to speech (Murray *et al*., 2014:486). Research concludes that parents and teachers often report co-occurring motor co-ordination difficulties that result in clumsiness (Tükel *et al*., 2015:1).

Gross motor function is pivotal to a child's development and refers to the functioning of large muscle groups to produce co-ordinated, fluid movement. In a neuro-typical child, experiences and maturation positively impact the neuromuscular and musculoskeletal systems, which in turn develop and refine the child's gross and fine motor skills (Utley & Astill, 2006:65). Although gross motor capabilities of children diagnosed with Developmental Coordination Disorder (DCD) has been researched extensively, research on gross motor capabilities of children with CAS is lacking (Wang *et al*., 2012:78). Furthermore, although DCD is co-morbid to Speech Sound Disorders (SSD), the gross motor capabilities of children diagnosed with CAS are under-researched (Gaines & Missiuna, 2006:325).

The current study aims to investigate the effect of a paired versus a small group gross motor intervention on selected preschool children, pre-identified with CAS. The specific gross motor intervention programmes were created by a Kinderkineticist.

KINDERKINETICS

Kinderkinetics is a professional field which aims to improve the gross motor skills of children (0 to 13 years old) through the stimulation, refinement and promotion of physical activity. The word can be broken up into two main components: 1) 'Kinder', which refers to the appropriate age range; and 2) 'kinesis', which refers to movement. Various children's gross motor skills are enhanced through Kinderkinetics with scientifically based individualized intervention programmes. Physical activity is utilized in a fun way to attend to the movement needs of children (Pienaar, 2009:52).

Pienaar (2009:54) describes four main reasons why physical activity needs to be promoted in children. Physical activity:

1. promotes the growth of the muscular skeletal and cardiovascular systems;
2. maintains a healthy energy balance (healthy weight);
3. prevents risk factors, such as high blood pressure and abnormal lipid profiles; and
4. increases social interaction and mental health.

A study conducted by Van Biljon and Longhurst (2011:448) on neuro-typical pre-school children's gross motor skills found that an eight-week Kinderkinetics programme significantly improved the gross motor skills of the children. They found that natural maturation was not a sufficient explanation for motor development and that complex motor skills need to be acquired (Van Biljon & Longhurst, 2011:448).

METHODOLOGY

Children pre-identified with CAS (N=20) were assessed at baseline-, pre- and post-test with the Movement Assessment Battery for Children 2nd Edition (MABC-2) and the Test of Gross Motor Development 2nd Edition (TGMD-2). The participants were randomly divided into two groups (paired- or small group). The paired group consisted of five paired participants (n=10) and the small group comprised of 10 participants (n=10). The 12-week intervention programme took place at the selected school and consisted of two 45-minute sessions per week.

Problem statement

During the literature review process (Chapter 2) it became evident that the gross motor capabilities of children, pre-identified with CAS, was under-researched. The current study, therefore, aimed to investigate the comparative effect of a paired- versus a small group gross motor intervention programme on selected pre-school children, pre-identified with CAS.

Research design

The current study followed a quasi-experimental design, made use of purposive sampling based on the characteristics of the population and no control groups were selected. Therefore, the influence on the uncontrollable variables could not be controlled (Joubert *et al*., 2016:274). The study was also based on a comparative effectiveness research design (CER) as there were only experimental groups and the CER design permits no control group. The aim of the study was to evaluate the effectiveness of the gross motor programme (Marko & Weil, 2012:425).

Ethical considerations

The proposal of the current study was approved by Stellenbosch University's Research Ethics Committee (SU-HSD-004463). The Western Cape Educational Department, as well as the principal from the selected school provided written permission to conduct the study at the selected school. Each child completed an assent form with the help of the teacher and each parent or legal guardian completed a consent form. The parent or legal guardian was encouraged to ask any questions. The contact details of the main researcher were available on the consent form.

RESULTS

A mixed model repeated ANOVA was used with a 95% confidence level. There were significant improvements in both the paired- ($p \leq 0.001$) and the small groups ($p \leq 0.001$) in the total motor proficiency of the MABC-2. There were also significant improvements in both the paired- ($p \leq 0.001$) and the small groups ($p \leq 0.001$) in the overall gross motor quotient (GMQ) of the TGMD-2. After the intervention programmes, there were no significant difference ($p \leq 0.48$) between the paired- or small groups according to the GMQ of the TGMD-2. There was, however, a difference after the intervention between the paired and the small groups regarding the total motor proficiency of the MABC-2. This difference was not statistically significant ($p \leq 0.07$), although it was close to the significance level of 5%.

DISCUSSION

The results of this study support the null hypothesis that the outcome of the gross motor intervention would be the same for both the paired- and the small groups.

Both groups displayed a statistically significant improvement in their gross motor capabilities after the 12-week gross motor programmes. This study highlights the critical need for further research in the gross motor capabilities and how gross motor interventions can improve the quality of movement of children, pre-identified with CAS.

MOTIVATION

It was evident that children diagnosed with CAS have difficulties with gross motor skills. A simple task such as hopping and running seemed uncoordinated. These coordination difficulties should have a negative impact on their daily functioning and completing daily tasks. This raised a concern and is the main motivation behind this study.

Research lacks studies conducted on CAS children's gross motor skills performance. No single gross motor intervention programme was identified. The need for research in this field was very clear as these children need early intervention. The significance of this study will help parents, early childhood developers, speech therapists and other professionals to be aware that children diagnosed with CAS might have difficulties with the planning and programming of gross motor coordination tasks.

The motivation behind this study is to help these children by understanding their movement demands and creating awareness about their gross motor difficulties.

KEYWORDS: Childhood Apraxia of speech (CAS); motor co-ordination difficulties; developmental coordination disorder (DCD); speech language disorders (SLI); gross motor capabilities; MABC-2; TGMD-2.

CHAPTER TWO
LITERATURE REVIEW

INTRODUCTION

Childhood Apraxia of Speech (CAS) is a well-known developmental disorder of speech, which is characterized by the inability to plan an appropriate motor command (Murray *et al*., 2014:486). Children diagnosed with CAS have speech irregularities because of the inability of the brain to co-ordinate the function of the pharynx, mandible and tongue (Pema, 2015:46). A recent study by Tükel *et al*. (2015:1) stated that parents and teachers often report concurrent overall motor co-ordination difficulties in children with CAS, resulting in clumsiness.

MOTOR DEVELOPMENT, GROSS MOTOR SKILLS AND FUNDAMENTAL MOVEMENT SKILLS

Motor development can be defined as the progressive transformation of movement throughout an individual's life. Motor development is perceived throughout one's lifespan but is prominent in infants, young children and adolescents. These periods are characterized by the vast growth and maturation of the nervous system, which is needed to perform gross and fine motor skills (Van Biljon & Longhurst, 2011:441-442).

Fundamental movement skills (FMS) are developed in early childhood and are the basis for further gross motor skill development (Yu *et al*., 2016:134). FMS also result in better health outcomes, lower body mass index and improved cardiorespiratory fitness (Van Capelle *et al*., 2017:1). Early childhood has been identified as vital to acquiring and developing FMS. FMS are learnt, practised and re-enforced over time (Van Capelle *et al*., 2017:2), as demonstrated by the influence of experience and maturation on both the neuromuscular and musculoskeletal systems of the developing child (Kolesky, 2017:1). To execute specialized gross motor skills, a strong FMS foundation must exist (Yu *et al*., 2016:135).

FMS can be sub-divided into three main categories: 1) object manipulation; 2) locomotor skills; and 3) stability skills (Rudd *et al*., 2015:2). Object manipulation skills requires a child to manipulate or control (by using either their hands or feet), a given implement/object (balls, bats and racquets) (Van Capelle *et al*., 2017:2).

Examples of object manipulation skills include: catching; throwing; rolling; dribbling; hitting; and kicking a ball (Visscher *et al*., 2010:256). Locomotor skills are required to move one's body from a certain point to another, which may be in any direction (Van Capelle *et al*., 2017:2). Locomotor skills include: crawling; walking; running; jumping; hopping; galloping; leaping; sliding; and skipping (Visscher *et al*., 2010:256). Stability skills are the ability to sense a shift in the relationship of the body parts as well as to alter these body parts to the changes to effectively balance. Examples of stability skills include: body rolling; bending; and twsiting (Rudd *et al*., 2015:2).

An additional key component of successful movement is the collective functioning of gross motor skills (GMS). GMS are the accumulation of FMS. The collective functioning of GMS can further be explained as the building up of certain GMS to execute movement patterns effectively (Platvoet *et al*., 2018:2). Gross motor function is pivotal to a child's development and refers to the functioning of large muscle groups to produce co-ordinated, fluid movement. In a neuro-typical child, experiences and maturation positively impact the neuromuscular and musculoskeletal systems, which in turn develop and refine the child's gross and fine motor skills (Utley & Astill, 2006:65). Further development of GMS is critical in order to perform more complex sequenced movement patterns (Van Capelle *et al*., 2017:2). However, GMS are not automatically acquired in children and require practise from a young age (Van Biljon & Longhurst, 2011:448). For any successful movement, planning and programming is needed. Without successful planning and programming of the movement, execution is difficult or impossible (Van Capelle *et al*., 2017:2).

MOTOR ABILITIES, SKILLS AND LEARNING

The terms motor abilities, motor skills and motor learning are often not clearly understood and it is sometimes difficult to distinguish between these three concepts. Infants are born with motor abilities; these abilities are genetic traits and determine to which degree the child would perform motor skills (Coker, 2009:15). The difficult part is to apply, correctly plan and program these abilities to become a motor skill (Van Biljon & Longhurst, 2011:441-442).

To acquire a motor skill, a four criteria model can be used: 1) it is always goal-oriented; 2) movements from the body/limbs are needed to achieve the goal; 3) the above mentioned movements are voluntary; and 4) the skill must be practiced in order to be learned (Coker, 2009:5). Motor skills need to be learnt in order to be maintained throughout one's lifetime. However, not all motor skills are easy to learn or acquire because some motor skills are very complex (Van Biljon & Longhurst, 2011:441-442). To define the term motor learning is quite apparent; it is the permanent change in a child's capabilities to perform/refine a motor skill due to the practice of the specific skill (Coker, 2009:4).

EXECUTIVE FUNCTIONING AND MOTOR SKILLS

Executive functioning (EF) is evident in infancy and continues throughout a normal lifespan (Leonard *et al*., 2015:202). EF is an overall term used to describe the complex cognitive processes used to perform difficult goal-directed tasks, such as specific motor tasks or tasks that require a high level of motor planning (Piek *et al*., 2003:1064). Planning is an important component of goal-directed movement, as complex movement requires organization, strategy and efficiency (Pennequin *et al*., 2010:108).

EF is an integration between several aspects (Piek *et al*., 2003:1066; Henry *et al*., 2012:37; Leonard *et al*., 2015:202). These aspects include:

- strategically planning an action;
- "switching" - being flexible and switching between tasks and thoughts;
- inhibiting certain inappropriate or specific responses; and
- "working memory" - storing information whilst processing information from another task.

Research has shown a distinct relationship between EF and motor co-ordination and skills. This link between motor and cognitive development and functioning is because of spatial and temporal similarities (Schurink *et al*., 2011:727). The area of the brain required for executing motor tasks, called the right dorsolateral prefrontal cortex (DLPFC), is closely related to the cerebellum, which allows motor co-ordination (Leonard *et al*., 2015:202).

There is evidence that EF has been closely associated with a number of neurodevelopmental disorders, such as developmental coordination disorder (DCD), attention hyperactivity disorder (ADHD), autism spectrum disorder (ASD) and specific language impairment (SLI) (Leonard *et al*., 2015:202). EF is closely related to language as language development and speech has crucial role in cognitive self-guidance process. For instance, external vocalized speech helps a child to regulate thoughts and behaviour. This external vocalized speech turns into internal speech, which is a tool for self-guidance. This phenomenon has found to have a negative impact on the problem solving skills of the children (Kuusisto *et* al., 2016:128).

Schurink *et al*. (2011:727) suggests that further longitudinal studies and clinical trials should be implemented to further understand the relationship between motor performance and EF, as well as to investigate the effect that a motor-based intervention will have on these children's EF.

GROSS MOTOR DEVIATIONS

Children with gross motor deviations have distinct motor characteristics, such as delayed motor milestone development, reflexes that are not integrated and laterality difficulties, all which require remediation and rehabilitation. They also have poor co-ordination, spatial- and body awareness and balance (Pienaar, 2014:116,120). Early identification of children with gross motor deviations are critical (Kolesky, 2017:7). Some gross motor deviations include apraxia and dyspraxia (Pienaar, 2014:118), the definitions of which are unclear. According to Vaivre-Douret *et al*. (2011:615) dyspraxia can be defined as "the failure to have ever acquired the ability to perform age-appropriate complex motor actions". Pienaar (2014:118) defines dyspraxia as the inability to plan and execute motor tasks, usually known as poor motor planning. Vaivre-Douret *et al*. (2011:615) defines apraxia as "an acquired disorder that leads to the loss in the ability to accomplish previously learned skills". Pienaar (2014:118), however, explains apraxia as a movement that has been planned but not executed.

The terms evolved over the years and has been used in different contexts as demonstrated in Table 2.1.

TABLE 2.1: **ALTERED TERMS FOR DYSPRAXIA AND APRAXIA**

Author and Year	**Name**	**Definition**
Ajuriaguerra & Stambak (1969)	Child dyspraxia with reference to constructional apraxia of adults	This was defined as the body integration interfering with spatial organization.
Ayres *et al*. (1972) Gubbay *et al*. (1979)	Developmental apraxia and agnosia	This was known to be the clumsy child.
Ayares *et al*. (1972)	Sensory integrative dysfunction	Fails to perform motor tasks at the expected level.
Adams (1983) Densckla (1984) Cermak (1985)	Developmental dyspraxia	Fails to perform motor tasks at the expected level.
Adams (1983)	Clumsy child syndrome	Fails to perform motor tasks at the expected level.
De Lange *et al*. (1984-1985)	Dyspraxia	This disorder is a developmental disorder and shows impairments in learning or performing motor tasks that are not from habitual nature. This is typically identified in children. This can be further explained as not ever having had the ability to execute the motor task.
Orton (1937) De Lange *et al*. (1984-1985)	Apraxia	This disorder is an acquired disorder. This can further explained as the loss of previously learned motor tasks.
Laszlo *et al*. (1988)	Perceptual motor dysfunction	Fails to perform motor tasks at the expected level.
Polatajko *et al*. (1995)	Developmental Coordination Disorder (DCD)	Collection of conditions where clumsiness and developmental dyspraxia are present.
Kadesjo (1999)	Disorder of attention and motor perception	Fails to perform motor tasks at the expected level.
Miyahara & Register (2000)	Physical awkwardness	Fails to perform motor tasks at the expected level.
Gibbs *et al*. (2006)	Minimal brain dysfunction	Fails to perform motor tasks at the expected level.

Adapted from Vaivre-Douret *et al*. (2011:615) and Morton (2015:2).

Speech and language deviations

Dyspraxia and apraxia are not only limited to motor functioning, but also associated with speech and language difficulties. Apraxia on its own is a very diverse disorder and can further be divided into eight sub-types: ideomotor apraxia; ideational/conceptual apraxia; buccofacial/orofacial apraxia; constructional apraxia; gait apraxia; limb-kinetic apraxia; oculomotor apraxia; and apraxia of speech (Pema, 2015:47). An example of such a disorder is Childhood Apraxia of Speech (CAS), formerly known as Developmental Apraxia of Speech (DAS) (Murray *et al*., 2014:486), or Developmental Verbal Dyspraxia (DVD) (Pema, 2015:46). In 2007, the American Speech-Language-Hearing Association (ASHA) adapted the term CAS (Souza *et al*., 2009:76).

Children diagnosed with CAS shows signs of impaired consistency and accuracy of speech movements in the absence of any neuromuscular deficits (Gubiani *et al*., 2015:611). CAS falls under the umbrella term, speech sound disorders (SSDs) (Tükel *et al*., 2015:1). In Figure 2.1, SSDs are classified into three main groups, namely: 1) Speech Delay; 2) Speech Errors; and 3) Motor Speech Disorders (MSD). MSD can be further classified into three main categories, namely: 1) dysarthria; 2) apraxia of speech; and 3) MSD not otherwise specified (Maas *et al*., 2014:197).

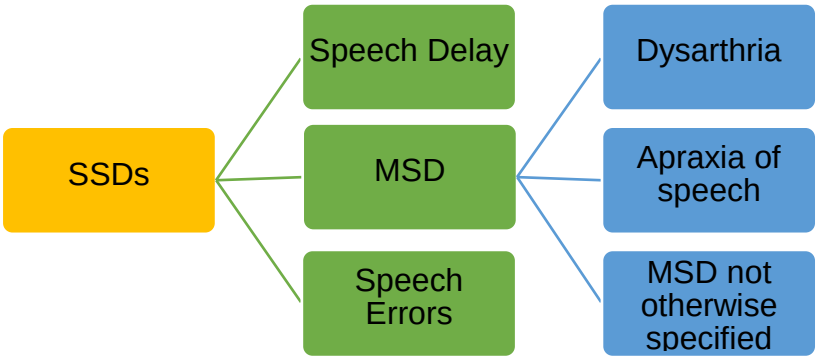

FIGURE 2.1: **SPEECH SOUND DISORDERS CLASSIFICATION**

CAS, however, has three distinct characteristics which distinguish it from other speech/language disorders, i.e.: 1) unpredictable vowel and constant errors in repeated words; 2) lengthened co-articulation transition between sounds and syllables; and 3) inappropriate prosody (Pema, 2015:48). MSD, is specifically associated with motor planning and programming difficulties (Maas *et al*., 2014:197).

Developmental Co-ordination Disorder (DCD) is another clear example of a motor deviation with a prevalence of 10% (Gibbs *et al*., 2006:535). DCD is chronic and a predominantly permanent neuro-motor impairment (Debrabant *et al*., 2016:21). This gross motor deviation negatively affects the performance of fine and gross motor skills and motor co-ordination (Prunty *et al*., 2013:2927). DCD is often co-morbid to disorders, such as Attention Deficit Hyperactivity Disorder (ADHD) and other learning disorders (Hemmati *et al*., 2008:5). In the literature, DCD is sometimes considered to be synonymous with dyspraxia (Gibbs *et al*., 2006:534). The American Psychiatric Association considers a diagnosis of DCD only when the following is presented: 1) motor coordination daily activities is considerably lower as expected for age; 2) above mentioned motor difficulties interfere with daily activities and academic success; 3) coordination difficulties are not due to medical conditions; and 4) if mental retardation is diagnosed, the motor difficulties is in excess (Gibbs *et al*., 2006:535).

RELATIONSHIP BETWEEN MOTOR SKILLS AND SPEECH

During early childhood it is evident that children acquire motor and language skills at a rapid pace. This acquisition of skills is not just due to development but also due to the environment. Certain gross motor skills develop prior to communication skills. Thus, it has been debated that “object placement” is a precondition for developing language. Paradoxically, delayed communication has also been found to be a risk factor for motor difficulties later in life. Some studies have shown that half of pre-school children suffering from language delays develop motor delays and difficulties later in life (Wang *et al*., 2012:77).

In the available literature it is evident that there is a clear relationship between motor and speech domains of higher cortical learning (Visscher *et al*., 2010:254). Developmental delays in one domain often correlates with developmental delays in another. These findings can easily be validated from a neuropsychological perspective (Wang *et al*., 2012:78). The main structures of the brain causing problems in both the motor and speech domains are the basal ganglia and the cerebellum. These structures play a critical role in the fluency and co-ordination of movements, and damage to these structures may affect the control and execution of motor and speech movements (Visscher *et al*., 2010:254). Furthermore, children

with developmental speech and language disorder (CAS) may have basal ganglia and cerebellum dysfunction, which explains why these children struggle to execute fluid and co-ordinated movements (Visscher *et al*., 2010:254).

Wang *et al*. (2012:78) reports three main findings between motor skills and speech:

1. a relationship between communication and motor skills;
2. communication and motor skills are to some degree stable over time; and
3. the one skill predicts the other.

Wang *et al*. (2012:78) reports on his three main findings and suggests that there is a strong association between motor and communication skills in children. They also concludes that literature lacks in-depth simultaneous research in all three of the above-mentioned associations.

Communication and motor skill delays have been shown to predict psychopathological problems later in life, therefore, the urgent need to better understand the relationship between communication and motor skills (Wang *et al*., 2012:77).

CAS CHARACTERISTICS

CAS has a suggested incidence rate of 3 to 5% in children (Maas *et al*., 2014:197), which is 3 to 4 times more common in boys than girls (Tükel *et al*., 2014:1). Even though CAS is more prevalent in boys, girls have a more severe presentation of CAS (Souza *et al*., 2009:76). Some studies suggest that 40 to 90% of children diagnosed with speech/language disorders show signs of general motor co-ordination and manual dexterity difficulties (Gaines & Missiuna, 2006:326; Teverovsky *et al*., 2009:100).

Teverovsky *et al*., (2009:99) reported that CAS is often accompanied by impairment in far greater domains than just speech and language. Four functional problems in children with CAS have been identified by Teverovsky *et al*. (2009:99):

1. cognitive and learning problems;
2. social communication difficulties;
3. behavioural dysregulation; and

4. other oral motor problems.

According to Souza *et al*. (2009:77-78), CAS can be identified by the following five characteristics during a child's development:

1. during the pre-verbal period, a CAS baby might seem quiet. They do not engage in any voice playing;
2. in children with CAS, the period for first word emission can vary from 19 months to 4 years. The average age for a CAS child to combine words might only happen between the age of 33 months and 7 years;
3. a child diagnosed with CAS shows no structural abnormalities or paralysis. They have normal hearing, use their face to show expressions, make non-verbal sounds and use words on their own;
4. as stated before, children diagnosed with CAS rarely only have difficulties in the motor programming of words. They often have difficulties or delays in language development (also presented in written language); and
5. the diversity of the characteristics of children diagnosed with CAS might be the reason that CAS is often misdiagnosed or under diagnosed.

Two characteristics of CAS where there is consensus, is that its onset is during early childhood and that it takes a long time to normalize (Souza *et al*., 2009:78). Children diagnosed with CAS were also found to have co-existing medical conditions such as hypotonia and sensory integration disorders. Some children were also diagnosed with developmental or mental health disorders, such as ASD and ADHD (Teverovsky *et al*., 2009:99).

The above-mentioned medical, developmental and functional co-existing difficulties stress the fact that these children have to undergo a comprehensive evaluation by a multidisciplinary team of clinicians and that a multidisciplinary team of therapists are needed to implement the interventions (Teverovsky *et al*., 2009:100).

CAUSE OF CAS AND DIAGNOSIS

As with most other neurological and behavioural disorders, the cause for CAS is still widely unknown. There is some evidence that genetics might play a key role. The FOXP2 gene is expressed in the cortex, basal ganglia, thalamus and cerebellum,

which are all areas associated with sensory and motor processing (Souza *et al*., 2009:78).

There is no formal gold-standard test yet to diagnose CAS. Differential diagnosis of CAS is an ongoing problem and leads to difficulties when trying to isolate specific diagnostic criteria (Tükel *et al*., 2015:2). Researchers, however, have found that combined methods should be used when diagnosing a child with CAS. An example is to use clinical assessments (by observing the child) and formal evaluations (with protocols which are proven to be valid and reliable) (Gubiani *et al*., 2015:614).

Some developmental speech/language disorders might be detected at a very early age but many mild to moderate developmental speech/language disorders can only be reliably diagnosed by the age of five years (Gaines & Missiuna, 2006:329). A study found that there is a core motor deficit in manual motor planning and co-ordination problems seen in DCD and CAS (Tükel *et al*., 2015:2). Careful observation of motor co-ordination may, therefore, assist the diagnosis of CAS in children.

Therefore, a specific researcher describe CAS to occur in three specific settings (Pema, 2015:50):

1. neurological impairment: when CAS is caused by infection, illness, injury or abnormality at birth or during the pregnancy;
2. complex neurodevelopmental disorder: that can be secondary to a genetic, metabolic or mitochondrial disorder and is then known as CAS; and
3. associated disorder: CAS might occur in disorders such as autism, fragile X, galactosemia, epilepsy and chromosome translocations.

CAS AND DCD

Specific language impairment (SLI) is a developmental disorder diagnosed in children. It is debatable whether children's diagnosis with SLI is isolated to only having difficulties in the speech and language domain, or whether it is part of a broader spectrum of delay (gross motor delay) (Flapper *et al*., 2013:756). An example of such a developmental disorder, specifically in the motor domain is DCD.

DCD is known to be a co-morbidity of speech/language learning disabilities (Gaines & Missiuna, 2006:325).

Flapper *et al*. (2013:760) used the MABC-2 to measure the gross motor proficiency of children diagnosed with SLI and DCD. They found that 66% of the subjects had motor problems as they scored in the lowest 5th percentile of the MABC-2. They also screened the children diagnosed with SLI for possible DCD by using the Developmental Co-ordination Disorder Questionnaire (DCDQ). These researchers found that 32.3% of children diagnosed with SLI were at risk for DCD according to the DCDQ. The co-morbidity of DCD was found throughout the spectrum of SLI and the conclusion was made that children diagnosed with SLI do not only struggle in a single domain, but that they might struggle in the motor developmental domain as well. It is, therefore, suggested that children with any speech or language disorder be screened for DCD (Flapper *et al*., 2013:761).

Four main explanations for the co-morbidity of DCD and SLI have been identified and includes the following (Gaines & Missiuna, 2006:326):

1. problems with generalization and praxis;
2. cerebellar deficits;
3. inter-hemispheric deficits; and
4. atypical brain development.

McCormack *et al*. (2011:1328) researched the association between communication impairments and children's activity and participation. They concluded that children with a communication disorder have slower progression in reading, writing and overall school achievement. These children also reported more bullying, poor peer relations and less enjoyment of school activities. Therefore, these children exclude themselves from participating in activities (inside- and outside the classroom). Not only is this reported by the parents and the teachers but by the children themselves (McCormack *et al*., 2011:1328). Children with SLI are acutely aware that they are different to their peers and might affect their body image and self-esteem. Interventions should, therefore, focus on physical therapy, the environment, as well as their self-esteem (McCormack *et al*., 2011:1336).

MOVEMENT PATTERNS OF CHILDREN DIAGNOSED WITH DCD

Due to poorly-refined motor skills, children diagnosed with DCD co-ordinate their actions differently and have less advanced movement patterns (Utley & Astill, 2006:79). DCD can be diagnosed in a child as early as five years old (Wilson *et al*., 2009:185). Some studies classify the movements of children diagnosed with DCD as slower, with poor accuracy, less precise and less consistency (Farhat *et al*., 2016:11). It was also found that neuro-typical children have stable movement patterns, whereas children with DCD have unstable movement patterns (Utley & Astill, 2006:76). This instability of movement patterns may constrain children with DCD to perform more complex co-ordination patterns such as planning and executing complex motor tasks (Utley & Astill, 2006:79).

Fong *et al*. (2011:2615) investigated the Classification of Functioning, Disabilities and Health (ICF) model and concluded that there are many factors that contribute to the participation level of individuals, including physiologic impairments, such as motor deficits. Children diagnosed with DCD have been found to have a tendency to evade physical activity or completely withdraw themselves from physical activity (Yu *et al*., 2015:46). Not only was the participation level of DCD children lower, but the intensity at which these activities were performed were much lower as to their neuro-typical peers. This may be better explained by the fact that DCD children's movement patterns are not efficient, and therefore, expend more energy and fatigue quicker (Fong *et al*., 2011:2620).

INTERVENTIONS

Gross motor intervention programmes and research thereof for children with speech and language disorders, more specifically CAS, is lacking. High quality intervention trials are required to determine which interventions are most effective at improving gross motor skills of children with gross motor disorders (Lucas *et al.* 2016:206).

A variety of intervention programmes have been identified by researchers that improve the motor co-ordination of children diagnosed with DCD. However, it is important to stress that DCD in correlation with CAS is a diverse disorder (Brenner, 2008:9). To find one specific intervention programme, is near impossible because no child with a developmental disorder exhibits the same difficulties in motor co-

ordination. This emphasizes the crucial need for intervention programmes (Chia *et al*., 2012:268).

Early intervention

Speech and language disorders are notoriously very difficult to treat. Not only are these disorders difficult to rehabilitate but in general the therapy takes long (Souza *et al*., 2009:79).

There is a considerable amount of evidence to show that children with co-ordination disorders do not 'mature out of' their poor execution of motor skills. It is shown that the motor difficulties that children with co-ordination disorders experience, can persist into adolescence (Yu *et al*., 2016:135). It has also been found that the motor skills delay in children with developmental speech and language disorders have not disappeared and that these children have not 'caught up' to their neuro-typical peers by the age of nine. This provides and stress the opportunity for early intervention (Visscher *et al*., 2010:257). Interventions should, therefore, focus on the prevention of physical activity withdrawal and poor motor abilities (Fong *et al*., 2011:2621).

Movement difficulties and delays should be identified in the early developmental phase so that early intervention can take place to minimize and correct these difficulties and delays (Fannin, 2015:41). Early intervention is a critical part of a child's journey to improve their motor co-ordination and active daily functioning so that a healthy lifestyle can be maintained throughout their lifetime (Utley & Astill, 2006:80). It has also been suggested that early and more frequent interventions leads to larger developmental benefits (Fannin, 2015:41). It is, therefore, necessary to take into account intervention length and frequency because continuous practise of skills will reinforce the neurological pathways so that the skill will become involuntary (Fannin, 2015:41).

Markgraaff (2010:29) emphasizes that creating an intervention programme for children with developmental delay is challenging as each child is unique. This researcher also describes seven "building blocks" of motor function and stresses the fact that each intervention should consist of these seven blocks (Markgraaff, 2010:29):

1. muscle tone;
2. muscle strength;
3. gross motor skills;
4. fine motor skills;
5. motor planning;
6. sequencing and speed of movements; and
7. sensory integration.

Frequency and duration of interventions

There is no gold-standard regarding the frequency and duration of intervention programmes (Van Capelle *et al*., 2017:7). A specific study found a significant intervention effect when studying the number of sessions per week. They found that who received the intervention once a week had more improvement in their motor development than those children who only received the intervention every three or four weeks. This emphasize the importance of continuous interventions (Fannin, 2015:41).

Markgraaff (2010:30) reports that a 5 week intervention programme with two sessions per week (30 minutes each) is not sufficient for significant improvements of motor proficiency in children diagnosed with DCD. It has been found, however, that a 30-minute intervention session four to five times a week has a significant effect on children's FMS (Van Capelle *et al*., 2017:7). The duration of intervention programmes vary from six weeks to 12 weeks (Kolesky, 2017:20). Another study also support these findings that a six- to 12 week motor skills intervention can change a gross motor delayed child to a gross motor competent child (Brian & Taunton, 2018:223).

Intervention therapies should be specific to the skill that needs improvement and should encourage regular fun physical activity (Lucas *et al*., 2016:194). Two main strategies to be used is paired and small group interventions. Both these intervention strategies have their own set of pro's and con's. Research lacks a comparison between the above mentioned intervention strategies.

Paired gross motor programme

A paucity of research exists for paired gross motor skill programmes for children diagnosed with CAS or related motor co-ordination disorders such as DCD. It has also been suggested that CAS should be seen as a spectrum and that children differ in their developmental delay, providing evidence for a paired intervention programme to improve motor functioning and co-ordination (Markgraaf, 2010:29).

Individual interventions seem to be used more frequently in practice by speech- and occupational therapists because it is seen to produce more benefits. Individual programmes benefit the child because it is more specialized, created according to their specific developmental needs and eliminates the possibility of misunderstanding. The limitation of this type of intervention is that it does not allow social participation or even inter-peer competition. However, a paired intervention has the benefit of an individualized more specialized intervention with the advantages of inter-peer competition (Fannin, 2015:42).

Small group gross motor programme

Group intervention programmes may also be effective as they provide a social component and decreases the anxiety that the child might feel (Fannin, 2015:42). Children in a group setting will not have the feelings of isolation, compared to children in an individual programme. Group interventions have been found to have a competitive aspect which increases performance. Conversely, if it is not well-organized and the presenter cannot control the large amount of children, the intervention will not be beneficial and the focus will merely be on the ability to win. An inexperienced presenter might also have difficulties monitoring all of the children at the same time (Kolesky, 2017:23). It has been suggested that group therapy is more sufficient, effective and favourable (Morton, 2015:11).

Specific intervention methods

The main goal of an intervention method is for the child to reach their optimal movement potential but at the same time minimize their movement difficulties or delays (Markgraaff, 2010:32). Therefore, early interventions are critical (Utley & Astill, 2006:80). It is, however, important to keep in mind that movement disorders are very heterogeneous and that no child is the same. No single intervention method can be used as a gold-standard. Conversely, without intervention the child will

continue to exhibit motor skills difficulties and delays (Markgraaff, 2010:32).

According to literature, there are three main methods to intervention: 1) process-oriented/bottom-up; 2) product-oriented/top-down; and 3) integrated. Each method of intervention are further sub-divided (Pienaar, 2014:218).

1. Process-oriented method/Bottom-up approach (Peters & Wright, 1999:204):
   A. sensory integration intervention method;
   B. perceptual-motor intervention method; and
   C. kinaesthetic intervention method.

2. Product-oriented method/Top-down approach (Miller *et al*., 2001:186):
   A. cognitive-motor intervention method;
   B. cognitive-strategies based intervention method; and
   C. task specific intervention method.

3. Integrated method (Pienaar, 2014:226):
   a. an integration of the above mentioned methods.

The process-oriented method mainly focuses on the intervention of the underlying sensory systems. This method does so by the transfer of sensory information that is interpreted and organized by the central nervous system, to form a movement pattern (Peters & Wright, 1999:204). The belief in this intervention method is that if the underlying processes improve, it will improve the performance of skills that rely on these processes (Markgraaff, 2010:32). The process-oriented method can further be divided into different approaches (Pienaar, 2014:218-221):

1. sensory integration intervention approach;
2. perceptual-motor intervention approach; and
3. kinaesthetic intervention approach.

The product-oriented method focuses on problem-solving skills. Underpinning this intervention method is acquiring specific common skills, using and altering these skills to execute more complex movement patterns (Markgraaff, 2010:32). This method ensures that motor skills are acquired through the interaction of many

internal and external systems of the child (Miller *et al*., 2001:186). The product-oriented approach aims to choose the correct strategy for the execution of a movement pattern, which is directly aimed at the dynamic system approach of motor learning and control (Markgraaff, 2010:32).

The product-oriented method can further be divided into different approaches (Pienaar, 2014:223-225):

1. cognitive-motor intervention approach;
2. cognitive-strategies based intervention approach; and
3. task-specific intervention approach.

Barnhart *et al*., (2003:727) explains five reasons why the product-oriented approach may be more successful:

1. This method includes both spatial and motor learning sequences, as well as utilizing the working memory of the child (storing information whilst processing information from another task).
2. The neuronal group selection theory (modern motor development theory). Motor skills appear as a result of:
    - try-and-fail exploration of nerve groups;
    - selecting the specific neurons in each group;
    - repetition of synaptic firing in and between the nerve groups; and
    - sensory experiences.
3. This method provides sufficient motor exercising for neural connections to be established and strengthened.
4. The problem-solving nature of this method allows the child to receive feedback and identify the correct movement pattern.
5. This method allows the basal ganglia and cerebellum to encode motor patterns after long term exercise.

The integrated approach is a combination of both the process-oriented and the product-oriented method. It is most often seen in a multi-disciplinary team (Pienaar, 2014:226).

SUMMARY

In this chapter the researcher identified a gap between research and practise when classifying children with an apraxia disorder and using the correct diagnostic term. Many parents and teachers indicated that children diagnosed with CAS show signs of overall gross motor impairments. Research also indicated that CAS has other co-morbid disorders such as DCD, ADHD and other learning disorders. Furthermore, many types of intervention methods have been promoted, but a consensus were reached about the benefit of early intervention.

CHAPTER THREE
METHODOLOGY

INTRODUCTION

Children with Childhood Apraxia of Speech (CAS) have a speech-motor impairment. These children struggle to articulate movements in a co-ordinated, precise and consistent manner by using their mouths and air stream. Parents and clinicians often report body co-ordination problems in children with CAS, which leads to clumsiness (Tükel *et al*., 2015:1). Research of body co-ordination in children with CAS revealed Developmental Co-ordination Disorder (DCD) to be a co-morbid disorder to CAS because of similar body co-ordination impairments (Gaines & Missiuna, 2006:325). The main area of concern, however, is that motor problems and body co-ordination impairments are under-diagnosed and under-researched in children with CAS (Tükel *et al*., 2015:1). The current study investigated the gross motor capabilities of children pre-identified with CAS, as well as the effect of a gross motor intervention (implemented in paired- and small groups), on these capabilities.

PROBLEM STATEMENT

The literature review documented in Chapter 2 clearly indicates that the gross motor capabilities of children pre-identified with CAS are under-researched. The proposed study aimed to investigate the gross motor capabilities and the comparative effect of a paired- versus a small group gross motor intervention on selected pre-school children, pre-identified with CAS.

Hypotheses

Null hypothesis (H_0):

- The outcomes of the gross motor intervention will be the same when the programme is implemented in paired- or small groups.

Research hypothesis (H_1):

- The outcomes of the gross motor intervention will not be the same when the programme is implemented in paired- or small groups. The programme will have a larger effect when it is presented in paired groups.

MAIN AIM AND OBJECTIVES

Main aim

To compare paired groups to a small group gross motor intervention on the gross motor capabilities of selected pre-school children, pre-identified with CAS's.

Objective 1

To evaluate the children's gross motor capabilities.
To asses: manual dexterity; aiming and catching; balance (static and dynamic); locomotor; and object manipulation skills of the selected children.

Objective 2

To compare the effect of a paired groups versus a small group's gross motor intervention on the gross motor capabilities of the selected children.
To compare the effects of paired groups versus a small group intervention.

VARIABLES

Dependent variable:

- Gross motor capabilities

Independent variable:

- Small group intervention
- Paired intervention

Confounding variable:

- Environment
- Evaluators
- Researchers (implementing intervention)

RESEARCH DESIGN

Basic research can be divided into two main categories: 1) empirical; and 2) non-empirical. Empirical research is conducted on real-life issues, whereas non-empirical research is conducted on theories, concepts or statistics (Joubert *et al*., 2016:26). The current study followed the format of empirical research because the effects of a gross motor intervention on children, pre-identified with CAS, was investigated.

Research can further be divided into quantitative and qualitative research. Quantitative research allows the researcher to systematically quantify a certain aspect, such as movement. Qualitative research, on the other hand, does not focus on numbers but the reasons and beliefs around a certain focus area (Donley, 2012:17, 39). The current study is classified as a quantitative study because the gross motor capabilities studied could be measured and quantified.

In the literature many definitions have been used for different study designs by multiple disciplines. Rockers *et al*. (2015:512) reviewed literature and summarized the three-class taxonomy of study designs: 1) experimental; 2) quasi-experimental; and 3) non-experimental. The current study followed a quasi-experimental design because the selected participants were not assigned randomly. No control groups were selected, and therefore, the influence on the uncontrollable variables could not be controlled (Joubert *et al*., 2016:274). The quasi-experimental design evaluates the impact of a certain intervention programme on a target population (Grimshaw *et al*., 200:11) and to strengthen the design, the participants were randomly divided into the experimental groups (paired groups and a small group) (Rockers *et al*., 2015:513).

The current study did not follow a specific blinding testing procedure. A double-blind randomized study prevents researchers from being biased and treating participants differently because they do not know to which group the participants belonged to. This protects the study against the Hawthorne effect - the tendency of the participants to act differently if they think they are being singled out (Donley, 2012:19). In the current study, the assessors were blind but the researchers implementing the intervention were able to conclude whether they presented to a group or a pair. Due to the nature of the intervention groups, the participants were also able determine in which intervention group they were participating in. However, the main researcher were blind before data processing. This might lead the testing procedure more to a single-blinded study.

Furthermore, the current study was also based on a comparative effectiveness research design (CER), which focuses mainly on medicine as science. CER is a term that is most commonly used to describe the gathering of data to produce a

comparison between evidence regarding the benefits and harms of alternative approaches to prevent, diagnose, treat and monitor a clinical condition. It is also used to improve the delivery of care and ultimately improve quality of life. The implementation of the CER process has seven steps explained in Table 3.1 (Marko & Weil, 2012:425).

TABLE 3.1: **CER'S 7 PROPOSED STEPS AND THE IMPLEMENTATION THEREOF IN THE CURRENT STUDY**

CER PROPOSED STEPS	IMPLEMENTATION IN CURRENT STUDY
Identifying new interventions.	The current study was a novel study. It is also one of the first studies that compares a paired and a small group intervention to each other.
Review and generate literature.	The current study reviewed literature about the movement patterns of children with CAS in Chapter 2 which was very vague. During the literature review no studies could be found comparing a small group intervention to a paired intervention.
Identify gaps between research and practice.	The current study identified the gaps in diagnosis, movement patterns and specific types of interventions in Chapter 2.
Encourage and produce new scientific evidence.	A specific gross motor intervention was designed and implemented in a small group and in pairs.
Train and develop researchers.	Researchers evaluating and implementing the paired and small group intervention were trained by the main researcher.
Educate others about research findings.	The main researcher will publish the findings in accredited, scientific journals.
Share findings with others.	The knowledge and findings will be shared with the population group and the parents/teachers of the population group.

Adapted from Hastings-Tolsma *et al*. (2013:685).

Participants

The participants were pre-school (3 to 7 years old) learners from a selected government school in the Bellville area in the Western Cape Province, South Africa, which caters for children pre-identified with CAS by Speech-therapists.

This study followed a non-probability sampling method as the participants represented only a small portion of the population. More specifically, purposive sampling was used because the participants (N=20) were selected based on their characteristics as well as the objective of the study. This made the environment a controlled variable because all the participants were from the same school.

The sample (N=20) included boys (n=18) and girls (n=2), which implied a male:female ratio of 9:1. Tükel *et al*. (2015:1) alleged that CAS is 3 to 4 times more likely to be diagnosed in boys than girls. The participants in the current study were all in the fundamental movement phase between the ages of 3 and 7 years (pre-school). The fundamental movement phase is characterized by basic movements that has not yet been refined (Yu *et al*., 2016:134). Participants from diverse socio-economic, as well as different cultural groups, were included.

Each participant received a number and the participants were dived according to their numbers to keep their names anonymous. After the pre-test, the participants were divided randomly into the 2 different groups by an external 3rd party (Prof Martin Kidd - Director of the Centre for Statistical Consultation at the Stellenbosch University). Prof Martin Kidd used the “rand” function in Microsoft Excel to give each participant a random number. He then used these random numbers to allocate the two different groups. The paired group were further divided into pairs by the main researcher according to their numbers. Therefore, there were 5 paired groups (n=10) and one small group (n=10). The 5 paired groups received the paired and the small group received the small group gross motor intervention. Not all children participated in this study as strict inclusion and exclusion criteria were set. If the child failed to comply with these criteria, he or she was excluded from this study.

TABLE 3.2: **PARTICIPANTS**

CATEGORY	PARTICIPANTS (N)
Small group	10
Paired groups	10
Male	18
Female	2
3 years < x ≥ 4 years	1
4 years < x ≥ 5 years	4
5 years < x ≥ 6 years	6
6 years < x ≥ 7 years	9

Inclusion criteria

These criteria specified that the participant:

- attended the selected pre-school;
- was between the ages of 3 and 7 years; and
- was pre-identified with CAS.

Exclusion criteria

These criteria stated that the participant would be excluded if:

- consent and/or assent forms were incomplete;
- parents or they refused to partake;
- they were ill and it affected their gross motor skills; and
- a participant missed more than 5 sessions of the intervention – 80% compliance was accepted.

Location

The intervention, as well as the assessments, were conducted at the selected school. The assessments and intervention took place outside. This was weather-dependant. In case of bad weather, the intervention and assessments were conducted indoors.

Data sources and collection

Primary data were collected directly from the participants. Standardized assessments (MABC-2 and TGMD-2) were used at 3 testing stages: 1) baseline-;

2) pre-; and 3) post-tests. The baseline tests were used as a control to eliminate the possibility of the effect of natural maturation, as well as other therapies received during the intervention period. Between the pre- and post-test, the improvements could solely be described to the effect of the gross motor intervention.

The researchers (presenting the intervention) and the assessors (collecting the data from the participants), were Kinderkinetics Honours students and was randomly assigned by the main researcher. The same assessors collected the data from the same child during all 3 testing opportunities. These Kinderkinetics Honours students were trained during their Honours year to utilise the MABC-2 and the TGMD-2. However, the main researcher (a registered Kinderkineticist [SAPIK number: 01/015/03/1516/005]) recapitulated the information with the students before the study commenced to refresh their memories. The assessors did not have any input in the intervention and were not present at the time of the intervention. The same researchers presented the sessions to the same children. The assessors (collecting the data from the participants), and the researchers (presenting the intervention), were not the same people. The researchers presenting the intervention programme were absent during the 3 testing opportunities. The single-blind testing procedure and the fact that the assessors evaluated the same participant for all the testing opportunities minimized the possibility to be biased.

The participants were assessed at baseline with the MABC-2 and the TGMD-2 over a 2-week period. Thereafter, they received a “rest period” of 10 weeks. After the school holiday, the pre-test commenced. This “rest period” was almost the same length of the intervention. The baseline assessment and “rest period” was to eliminate the possibility that any improvement found after the intervention was due to maturation, and to see if the effect of the gross motor capabilities were solely due to the intervention. The paired groups and the small group gross motor intervention programme was planned and designed by the main researcher. The 12-week intervention programme consisted of 2 sessions per week with a duration of 45 minutes each.

ASSESSMENT TOOLS

The Movement Assessment Battery for Children 2nd Edition (MABC-2) and the Test of Gross Motor Development 2nd Edition (TGMD-2) was used to assess the children's gross motor capabilities.

Movement Assessment Battery for Children 2nd Edition (MABC-2)

The MABC-2 is a standardized test that is often used as a research tool. The MABC-2 identifies and describes motor function impairments in children aged 3- to 16-years-old. The MABC-2 has frequently been used by practitioners to diagnose children with DCD according to the criteria of the DSM-5 (Henderson *et al*., 2007:50).

The MABC-2 is a valid and reliable test. Both the intra-rater reliability and the test-retest reliability scores exceeds the acceptable 0.95 (Henderson *et al*., 2007:132-135). According to Henderson *et al*. (2007:142-144), the MABC-2 was found to be valid on 3 types of validity:

1. content validity (does the test include the content to evaluate the certain trait or function);
2. criterion-related validity (comparing the test to a specific criterion); and
3. face validity (perceptions whether the test measures a certain criterion).

This test is fairly easy to administer and takes approximately 20 to 40 minutes per child. This test cannot be administered in groups and each child has to be evaluated individually. The protocol of the MABC-2 states that each skill must be demonstrated once, practiced once and performed twice. MABC-2 is divided into 3 age bands (ABs): AB 1 [3 to 6 years], AB 2 [7 to 10 years] and AB 3 [11 to 16 years], and therefore, the chronological age of the child needs to be calculated before testing commences (Henderson *et al*., 2007:50). Chronological age can be calculated with a simple equation: chronological age = test date – date of birth (Pienaar, 2014:54).

TABLE 3.3: **CHRONOLOGICAL AGE EXAMPLE**

	Year	Month	Day
Testing date	2019	10	28
Birth date	2012	07	08
Chronological age	07	03	20

Adated from Pienaar (2014:54).

Specific test items

The total motor proficiency for the MABC-2 is the sum of the 3 main components: 1) manual-dexterity; 2) aiming; and 3) catching and balance. The total motor proficiency is used to identify and describe motor function impairments in children (Table 3.3).

The test includes 3 main components (Henderson *et al*., 2007:50):

1. manual dexterity: a fine-motor component which observes speed, coordination and hand-eye coordination in children;
2. aiming and catching: a gross motor component which observes receiving and aiming skills of children by using a small ball or bean bag; and
3. balance: a gross motor component which observes both static- and dynamic balance in children.

These 3 components consist of 8 different skills. Each age band has their own skills.

TABLE 3.4: **MABC-2 COMPONENTS AND SKILLS**

MANUAL DEXTERITY	AIMING AND CATCHING	BALANCE
Skill 1 AB 1: posting coins AB 2: placing pegs AB 3: turning pegs	**Skill 4** AB 1: catching a bean bag AB 2: catching with 2 hands AB 3: catching with 1 hand	**Skill 6** AB 1: 1-leg balance AB 2: 1-board balance AB 3: 2-board balance
Skill 2 AB 1: threading beads AB 2: threading lace AB 3: triangle bolts and nuts	**Skill 5** AB 1- AB 2: throwing a bean bag onto a mat AB 3: throwing at a wall target	**Skill 7** AB 1: walking heels raised AB 2: walking heel-to-toe forwards AB 3: walking toe-to-heel backwards
Skill 3 AB 1 – AB 3: drawing trial		**Skill 8** AB 1: jumping onto mats AB 2: hopping on mats AB 3: zig-zag hopping

Adapted from Henderson *et al*. (2007:50).

Scoring

When a child refuses to complete a skill, an “R” for refusal is given. If a child fails to complete a skill, an “F” for fail is given. When a child performs the task inappropriately an “I” is given. Furthermore, all skills are scored quantitatively (raw score), with either the amount or the number of seconds used to complete the task. These raw scores are converted to standard scores for each component and added to calculate a total test score. From these scores, percentile ranks can be derived (Henderson *et al*., 2007:80). The interpretation of the total scores is based on a ‘traffic light system’ summarised in Table 3.4 below (Henderson *et al*., 2007:50).

TABLE 3.5: **DESCRIPTIVE SCORING: MABC-2 TRAFFIC LIGHT SYSTEM**

ZONE	PERCENTILE	DESCRIPTION
Green zone	Above the 16th percentile	Performance is in a normal range
Amber zone	Between the 6th and 15th percentile	Performance is in an ‘at risk’ range
Red zone	At or below the 15th percentile	Definite motor impairment

Adapted from Henderson *et al*. (2007:50).

Test of Gross Motor Development 2nd Edition (TGMD-2)

The TGMD-2 is a valid and reliable test that assesses children's gross motor abilities in the early developmental period (3-to-10years-old). The reliability coefficient is high and above 0.80 for the Gross Motor Quotient (GMQ), locomotor and object control. The magnitude of the coefficient advocates little test error (Ulrich, 2000:32). The TGMD-2 is valid throughout the 3 types of validity: content descriptions; criterion-related; and construct (Ulrich, 2000:40).

The TGMD is widely used as a research tool to assess children's gross motor development. The test is easy to administer and only takes 15 to 20 minutes to complete (Ulrich, 2000:3, 5, 8). The test is administered by demonstrating once, 1 practise trial, an additional demonstration and 2 formal trials (Ulrich, 2000:9).

Specific test items

The GMQ is the overall score for the 2 main subtests of the TGMD-2 and evaluates the children's gross motor abilities (Ulrich, 2000:3).

The TGMD-2 is divided into 2 main subtests (Ulrich, 2000:3):

1. locomotor: a combination of locomotion (moving in space) actions and observes the fluidity and coordination of these movements in children; and
2. object control: a combination of skills that observes efficiency when handling a bat or a ball.

These 2 subtests collectively consist of 12 skills that are individually evaluated.

TABLE 3.6: **TGMD-2 SUBTESTS AND SKILLS**

LOCOMOTOR	**OBJECT MANIPULATION**
Run	Striking a stationary ball
Gallop	Stationary dribble
Hop	Catching a ball
Leap	Kicking a ball
Horizontal jump	Overhand throw
Slide	Underhand roll

Adapted from Ulrich (2000:3).

Scoring

For each skill, 0 or 1 is given. Zero is given when the child cannot complete the task or the skill performed by the child does not imitate the correct movement. One is given when the child completes the skill in a manner that correctly imitates the correct movement. The raw scores from each skill is added to form a raw score for each of the main subtests (locomotor and object control). The sum of the raw scores for each main subtest is added to form a GMQ. This GMQ is the most valuable result of the TGMD-2. The interpretation of the GMQ is descriptive. Table 3.6 contains the descriptive interpretation of the GMQ.

The chronological age should also be calculated as the scoring is derived according to the chronological age (Table 3.2).

TABLE 3.7: **DESCRIPTIVE INTERPRETATION OF THE GMQ**

SUM OF RAW SCORES	DESCRIPTION
> 130	Very superior
121-130	Superior
111-120	Above average
90-110	Average
80-89	Below average
70-79	Poor
<70	Very poor

Adapted from Ulrich (2000:15).

INTERVENTION PROGRAMME

It is evident that gross motor skills are complex and not achieved by just practising a skill. Many other factors play a key role in achieving optimal gross motor functioning. The planning and execution of complex motor tasks can be explained by the Dynamic Systems Theory (DST). The DST simply suggests that a movement pattern is influenced by the individual, the task and the environment (Coker, 2009:65). These 3 influences interact with each another to create a spontaneous movement known as a motor skill (Colombo-Gougovito, 2017:141). The DST also suggests that motor skills are not simply developed in stages but that motor skills

development are the result of many systems co-operatively working in order to establish motor patterns (Utley & Astill, 2006:66).

The DST theory is based on the principle that sensory feedback is analysed by the central nervous system (CNS) after which an appropriate motor-plan is carefully selected. The appropriate motor-plan is selected according to the current experience, internal and external environmental factors and previous experiences (Brenner, 2008:9). The interaction of the constraints to form a spontaneous movement pattern is seen as self-organizing. Self-organizing is the ability of the body to find a stable movement pattern when there is an influence of a constraint. It is important to note that this stable pattern is not the compulsory pattern, and therefore, the body needs to self-organize the stable movement patterns and select one (Colombo-Gougovito, 2017:143).

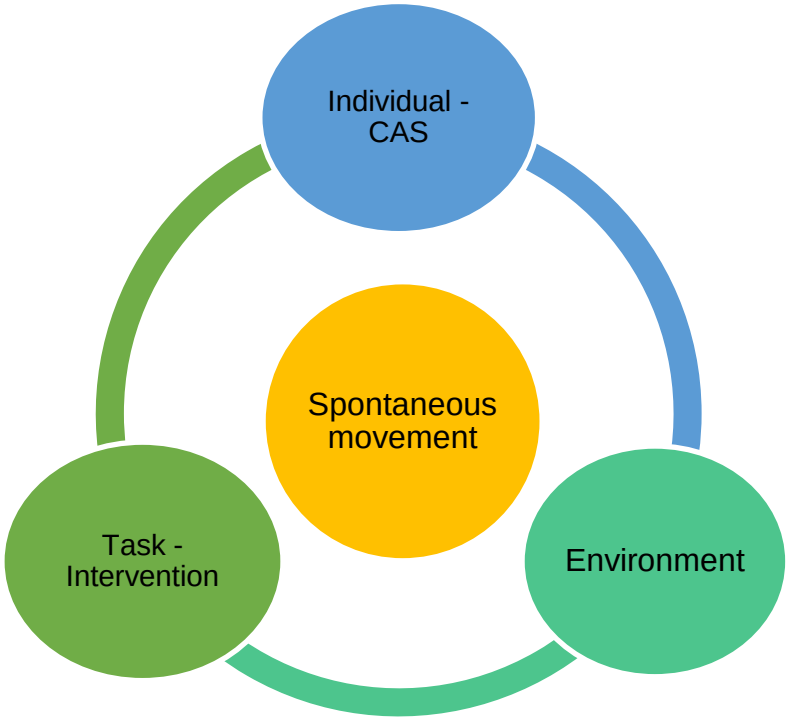

FIGURE 3.1: **DYNAMIC SYSTEMS THEORY**

The individual constraints (Figure 3.1) makes the person unique and are predominantly physical and structural (weight, height, etcetera), but can also be functional (motivation, attention, etcetera). The environment as a constraint (Figure 3.1) is considered as everything externally influencing the person (indoor, outdoors, etcetera). It is important to note that the environment can also be referred to as social (peer and parent attitudes and support). When looking into the task as a

constraint, this includes everything that has an influence on the task such as: movement goals; direction of movement; as well as equipment (Colombo-Gougovito, 2017:142).

Both the paired groups and the small group's gross motor intervention programmes for the current study were based on the Dynamic Systems Theory (DST). The DST was selected due to the understanding that children with apraxia struggle with motor planning (Murray *et al*., 2014:486). In this case the DST allows the child to select their own motor plan to execute a movement by referring to the task, their environment and their individual constraint.

When integrating the current study into the DST, the neuro-developmental delay, in this case the (CAS), is an individual constraint influencing the child's movement. As the 3 constraints influence each other, the other 2 constraints could be manipulated to create an appropriate motor movement. Therefore, the activities (tasks constraints) in the intervention were broken down to very simple movement patterns in order to compensate for the individual constraint. The difficulty of the activities (tasks constraints) gradually progressed.

The integrated method of intervention was used in this study in both intervention groups. The reason being that the children will gain from both the process- and the product-oriented approaches. By using the integrated approach, the underlying systems will be stimulated and the focus will not only be on the end-product, namely the gross motor skills.

Process-oriented method selected:

The process-oriented method mainly focuses on the intervention of the underlying sensory systems, such as the kinaesthetic system.
The kinaesthetic intervention method (using the perception of one's body parts, movement and weight to learn a new skill), uses the 5 principles of the proprioceptive system (Cheatum & Hammond, 2000:188):

A. contraction and stretching of muscles;
B. compression and pulling on joints;
C. tonic contraction of muscles around the joints;

D. increasing the weight on the muscles during execution; and
E. increasing the duration of in which the movement is executed.

Product-oriented methods selected*:*

The product-oriented method mainly focus on problem-solving skills.

According to the cognitive-motor intervention method there is a clear interaction between the children's understanding of the movement and the execution of the movement. This type of problem solving can be divided into 3 components (Miller *et al*., 2001:186; Barnhart *et al*., 2003:727):

A. planning the motor movement;
B. executing the motor movement; and
C. evaluating the motor movement.

For example, the researcher showed the children a picture of a movement. The children had to plan how they were going to imitate the movement and correctly execute the movement. After they had done it once, they had to think about how they executed the movement and try to improve the movement the second time around.

The task-specific intervention method include learning processes that focus on specific gross motor skills. This intervention method focus on the repetition of a specific gross motor skill that enhance motor learning sequences, such as (Barnhart *et al*., 2003:727; Pienaar, 2014:225):

A. locomotor skills;
B. object control skills;
C. manual dexterity skills;
D. aiming and catching skills; and
E. balancing skills

Hypothesis statement

If the integrated intervention method is used, then the gross motor capabilities of children pre-identified with CAS will improve because the process-oriented method focus on stimulating the underlying sensory systems and the product-oriented method focus on the problem solving skills.

Programme outline

The programmes were created each week according to the outline in Table 3.7. One programme for the pairs and one programme for the small group. The same programme were presented for 45 minutes, twice a week.

The programme consisted of more or less the same warm-up and cool-down throughout the intervention. This ensured that the participants followed a routine and that they knew where the beginning and the end of the programme was. As the participants were very young, this also helped with the discipline and organisation of the participants. The warm-up consisted of a lot of aerobic activities to prepare the participants' bodies for the activities that were to follow. The cool-down consisted of passive movements to gradually calm the participants down.

Four activities were created with a main focus but also underlying focusses. Each activity had a progression. The participants were allowed to progress according to the discretion of the main researcher after receiving feedback from the researchers implementing the intervention programme. After each week, the main researcher reflected on the programme. If the participants, as a group, mastered the activity, a new activity was created. If the participants, as a group, did not master the activity, the activity was repeated the following week. The difficulty of the programmes progressed during the intervention period.

Table 3.7 explains the outline of the 12-week gross motor intervention and the types of activities that were selected to be part of the intervention.

TABLE 3.8: **OUTLINE OF INTERVENTION PROGRAMME**

ACTIVITY	**MAIN FOCUS**	**UNDERLYING FOCUSSES**
Warm-up	Locomotion	Motor planning Balance Spatial awareness Bilateral coordination Reaction time
Activity 1	Aiming and catching	Motor planning Proprioception Hand-eye coordination Spatial awareness
Activity 2	Balance – dynamic and static	Motor planning Proprioception Muscle tone Hand-eye coordination Spatial awareness Locomotion
Activity 3	Object control – kicking and bouncing	Motor planning Spatial awareness Hand-eye coordination Foot-eye coordination Locomotion
Activity 4	Object control – rolling and overhand throw	Motor planning Proprioception Hand-eye coordination Spatial awareness Visual motor integration
Cool-down	Fine motor – manual dexterity	Motor planning Finger strength Tactile stimulation Hand-eye coordination Spatial awareness

Ethical clearance and considerations

The Research Ethics Committee of Stellenbosch University approved the research protocol (SU-HSD-004463). Before the study commenced, each child completed an assent form with the help of the teacher and each parent or legal guardian collected

and completed a consent form which were handed out by the teacher (Addendum D and C). The consent form had the contact details of the main researcher and the parent or legal guardian were encouraged to contact the main researcher if they had questions. The principal from the selected school, as well as the Western Cape Educational Department provided written permission to conduct the study (addendum F).

All data collected was handled confidentially. Each child was given a number ranging from 1 to 20 and these numbers were used on all documents. Data was stored on the researcher, supervisor and statistician's password-protected computers and on an external hard drive. This was stored in a safe at the researcher's home. Only the researcher had access to this safe.

Throughout the entire project, the children were under constant supervision. There was a qualified Kinderkineticist with the children at any given time. The Kinderkineticist, researchers and evaluators were police-cleared and had a Level 1 paediatric first aid qualification. The journey to become a Kinderkineticist consists of a 3-year Sport Science undergraduate degree and 1 year of post-graduate studies.

The essence of being a Kinderkineticist is being able to correct, develop and sustain gross motor skills and physical development of children. Kinderkinetics is a professional field, which aims to improve the gross motor skills of children (0- to 13-years-old) through the stimulation, refinement and promotion of physical movement. The word can be broken up into two main components. 'Kinder' refers to the appropriate age range and 'kinesis' refers to movement. Various children's gross motor skills are enhanced through Kinderkinetics with scientifically-based individualized programmes (Pienaar, 2009). Physical activity is utilized in a fun way to attend to the movement needs of children.

Kinderkineticists are movement specialists, trained to use the TGMD-2. The TGMD-2 states that it can be used by Kinesiologists, General and Special Educators, Psychologists and Physical Therapists. Kinderkineticists are also qualified in using the MABC-2 because the MABC-2 states that it is specifically designed to assist professionals responsible for helping children with movement difficulties.

STATISTICAL ANALYSIS

Data analysis and interpretation:

The results were analysed by Prof Martin Kidd - Director of the Centre for Statistical Consultation at the Stellenbosch University. Mixed model repeated measures ANOVA was used to test for differences in the effects of the two interventions. The participants were entered into the model as a random effect, together with treatment (program) and time (pre- and post-test) as fixed effects. The main focus was to investigate treatment*time interaction effects. For summary statistics means, standard deviations and 95% confidence intervals was reported. A 5% significance level ($p<0.05$) was used as a guideline for significant results.

SUMMARY

In this chapter the researcher explained the types of research designs and which specific research design was selected for the current study. An outline of the study was highlighted and the methods were explained in depth. The baseline-, pre- and post-tests, as well as the intervention were discussed. The ethical considerations regarding the study were also discussed, as well as permission to conduct research from different departments.

CHAPTER FOUR
RESULTS

INTRODUCTION

The current study investigated whether there were any changes over time in the gross motor capabilities of children, pre-identified with CAS, when divided into a small group- or a paired intervention by using mixed model repeated measures ANOVA. Thus, this study investigated whether a 12-week gross motor intervention programme had the largest effect when the participants were split into paired groups or a small group.

After presenting the methodological procedures discussed in Chapter 3, the demographics of the participants, as well as the results will be discussed in this chapter. Two standardized tests, as well as each test's individual components, will be discussed:

1. MABC-2 (total score - total motor proficiency, manual dexterity, aiming and catching and balance).
2. TGMD-2 (total scores - GMQ, locomotor and object manipulation).

Movement Assessment Battery for Children 2nd Edition (MABC-2)

The MABC-2 identifies and describes motor function impairments in children aged 3- to 16-years-old. The total motor proficiency is the total summary of the MABC-2 and consists of: 1) manual dexterity; 2) aiming; and 3) catching and balance (Henderson *et al*., 2007:50).

Test of Gross Motor Development 2nd Edition (TGMD-2)

The TGMD is widely used as a research tool to assess children's gross motor development in the early development period (3- to 10-years old). The GMQ for the TGMD consists of locomotion and object control (Ulrich, 2000:3, 5, 8).

Two pre-school classes (N=20) from the selected school for children pre-identified with CAS participated in the study. All the participants participated in the 3 testing opportunities and all the participants completed the required amount of intervention sessions.

The participants consisted of boys (n=18) and girls (n=2), with a ratio of boys to girls being 9:1. Due to the small sample size and the use of one school, the gender ratio could not be evenly distributed. The overall age range of the participants was between 3 and 7 years. The participants were randomly divided by an external 3rd party into the 2 groups: paired groups and a small group. The mean age for the paired groups was 6.5 years with a standard deviation of 0.71. The mean age for the small group was 5.8 years with a standard deviation of 1.03.

PAIRED GROUPS VERSUS THE SMALL GROUP

There were very few significant differences between the paired groups and the small group at any given testing opportunity, in both the MABC-2 and the TGMD-2 ($p>0.05$). However, there was a significant difference between the paired groups and the small group in the balance subtest ($p\leq0.02$) of the MABC-2 at the post-test, as well as in the locomotor subtest ($p\leq0.05$) of the TGMD-2 at pre-test. The p-value at the post-test for the total motor proficiency ($p\leq0.07$) and manual dexterity ($p\leq0.09$) subtests was very close to the significance level of 5%. These results indicate that in most of the subtests there were no significant difference between the paired groups and the small group's gross motor capabilities (Table 4.1).

TABLE 4.1: **COMPARING THE PAIRED GROUPS TO THE SMALL GROUP (MABC-2 AND TGMD-2)**

Period	Mean pairs	Mean Small group	Mean difference	Standard errors	p
	MABC-2: Total motor proficiency				
Baseline-test	6.40	5.00	1.40	1.28	0.28
Pre-test	6.40	5.20	1.20	1.28	0.35
Post-test	10.30	7.90	2.40	1.28	0.07
	MABC-2: Manual dexterity				
Baseline-test	5.30	4.50	0.80	1.48	0.59
Pre-test	5.60	5.20	0.40	1.48	0.79
Post-test	9.40	6.80	2.60	1.48	0.09
	MABC-2: Aiming and catching				
Baseline-test	8.70	6.90	1.80	1.20	0.14
Pre-test	8.80	7.00	1.80	1.20	0.14
Post-test	10.70	9.90	0.80	1.20	0.51
	MABC-2: Balance				
Baseline-test	8.20	7.10	1.10	1.23	0.38
Pre-test	8.10	7.60	0.50	1.23	0.69
Post-test	10.80	7.80	3.00	1.23	0.02
	TGMD-2: GMQ				
Baseline-test	86.20	80.80	5.4	5.43	0.33
Pre-test	86.20	78.10	8.10	5.43	0.14
Post-test	106.00	102.10	3.90	5.43	0.48
	TGMD-2: Locomotor				
Baseline-test	8.20	6.30	1.90	1.20	0.12
Pre-test	8.80	6.30	2.50	1.20	0.05
Post-test	10.80	10.60	0.20	1.20	0.87
	TGMD-2: Object control				
Baseline-test	7.20	7.30	-0.10	0.95	0.92
Pre-test	6.60	6.40	0.20	0.95	0.83
Post-test	11.10	10.00	1.10	0.95	0.25

COMPARING BASELINE- TO PRE-TEST RESULTS

The comparison between baseline- and pre-test results were used to eliminate the possible effect of natural maturation and other therapies received by the children. The period between the baseline- and pre-test was more or less the same duration as the intervention period. In the period between the baseline- and pre-test, no intervention took place.

Throughout all the subtests of the MABC-2 and TGMD-2, there were no significant difference ($p>0.05$) in the results from the baseline- to pre-test (Table 4.2). The gross motor capabilities remained the same over a 12-week period of not receiving any intervention. These results indicate that natural maturity or other therapies received did not have an effect on the gross motor capabilities of the participants and that any effect was possibly due to the gross motor intervention (Table 4.2).

TABLE 4.2: **COMPARING BASELINE- TO PRE-TESTING RESULTS (MABC-2 AND TGMD-2)**

Group	Baseline test Mean ± SD	Pre-test Mean ± SD	Baseline-to Pre-test Mean difference	Baseline-to Pre-test Standard error	Baseline-to Pre-test p
	MABC-2: Total motor proficiency				
Paired	6.40 ± 3.53	6.40 ± 1.58	0.00	0.78	1.00
Small group	5.00 ± 2.16	5.20 ± 2.04	-0.20	0.78	0.80
	MABC-2: Manual dexterity				
Paired	5.30 ± 3.68	5.60 ± 3.03	-0.30	0.91	0.74
Small group	4.50 ± 2.76	5.20 ± 2.70	-0.70	0.91	0.44
	MABC-2: Aiming and catching				
Paired	8.70 ± 3.27	8.80 ± 2.04	-0.10	1.00	0.92
Small group	6.90 ± 2.38	7.00 ± 2.45	-0.10	1.00	0.92
	MABC-2: Balance				
Paired	8.20 ± 2.15	8.10 ± 1.66	0.10	0.88	0.91
Small group	7.10 ± 1.60	7.60 ± 3.06	-0.50	0.88	0.57
	TGMD-2: GMQ				
Paired	86.20 ± 12.43	86.20 ± 12.90	0.00	3.40	1.00
Small group	80.80 ± 10.70	78.10 ± 9.17	2.70	3.40	0.43
	TGMD-2: Locomotor				
Paired	8.20 ± 2.53	8.80 ± 1.69	-0.60	0.90	0.51
Small group	6.30 ± 2.50	6.30 ± 2.63	0.00	0.90	1.00
	TGMD-2: Object control				
Paired	7.20 ± 2.20	6.60 ± 2.91	0.60	0.56	0.29
Small group	7.30 ± 1.70	6.40 ± 1.51	0.90	0.56	0.11

PAIRED GROUPS RESULTS

After the 12-week gross motor intervention, the paired groups improved significantly in almost all the components of both the MABC-2 and TGMD-2. They significantly improved in total motor proficiency (p≤0.001), manual dexterity (p≤0.001), balance (p≤0.001), GMQ (p≤0.001), locomotor skills (p≤0.03) and object control skills (p≤0.001) (Table 4.3).

The paired groups did not show a significant improvement in aiming and catching (p≤0.06) (Table 4.3).

TABLE 4.3: **PAIRED GROUPS PRE- TO POST-TEST RESULTS (MABC-2 AND TGMD-2)**

Subtest	Pre-test Mean ± SD	Post-test Mean ± SD	Pre- to Post-test Mean difference	Pre- to Post-test Standard error	Pre- to Post-test p
	MABC-2				
Total motor proficiency	6.40 ± 1.58	10.30 ± 4.03	-3.90	0.78	0.00
Manual dexterity	5.60 ± 3.03	9.40 ± 4.17	-3.80	0.91	0.00
Aiming and catching	8.80 ± 2.04	10.70 ± 3.23	-1.90	1.00	0.06
Balance	8.10 ± 1.66	10.80 ± 3.49	-2.70	0.88	0.00
	TGMD-2				
GMQ	86.20 ± 12.90	106.00 ± 13.11	-19.80	3.40	0.00
Locomotor	8.80 ± 1.69	10.80 ± 3.33	-2.00	0.90	0.03
Object control	6.60 ± 2.91	11.10 ± 1.85	-4.50	0.56	0.00

SMALL GROUP RESULTS

After the 12-week gross motor intervention, the small group improved significantly in almost all the components of both the MABC-2 and TGMD-2. They significantly improved in their total motor proficiency (p≤0.001), aiming and catching (p≤0.01), GMQ (p≤0.001), locomotor skills (p≤0.001) and object control skills (p≤0.001) (Table 4.4).

The small group did not show a significant improvement in their manual dexterity (p≤0.09). The group also did not show a significant improvement in their balance (p≤0.82) (Table 4.4).

TABLE 4.4: **SMALL GROUP PRE- TO POST-TEST RESULTS (MABC-2 AND TGMD-2)**

Subtest	Pre-test Mean ± SD	Post-test Mean ± SD	Pre- to Post-test Mean difference	Pre- to Post-test Standard error	Pre- to Post-test p
	MABC-2				
Total motor proficiency	5.20 ± 2.04	7.90 ± 2.96	-2.70	0.78	0.00
Manual dexterity	5.20 ± 2.70	6.80 ± 3.29	-1.60	0.91	0.09
Aiming and catching	7.00 ± 2.45	9.90 ± 2.56	-2.90	1.00	0.01
Balance	7.60 ± 3.06	7.80 ± 3.77	-0.20	0.88	0.82
	TGMD-2				
GMQ	78.10 ± 9.17	102.10 ± 13.93	-24.00	3.40	0.00
Locomotor	6.30 ± 2.63	10.60 ± 3.17	-4.30	0.90	0.00
Object control	6.40 ± 1.51	10.00 ± 2.21	-3.60	0.56	0.00

The alphabet letters have been placed on the figures for the convenience of the reader. The main aim of the letters was to indicate a significant difference. A significant difference was indicated by a difference in letters. If 2 points plotted had the same letter, there was no significant difference. If 2 plotted points had no letter in common, a significant difference was indicated (Figure 4.1 – Figure 4.4).

MOVEMENT ASSESSMENT BATTERY FOR CHILDREN 2ND EDITION (MABC-2)

Total motor proficiency

Figure 4.1 illustrates the total motor proficiency scores for the MABC-2. No statistically significant difference could be found between the paired groups and the small group's baseline- to pre-test results. However, a statistically significant difference was found in both the paired groups ($p \leq 0.001$) and the small group's ($p \leq 0.001$) pre- to post-test results. No statistically significant difference was depicted when comparing the paired groups to the small group at baseline-, pre- or post-test (Figure 4.1).

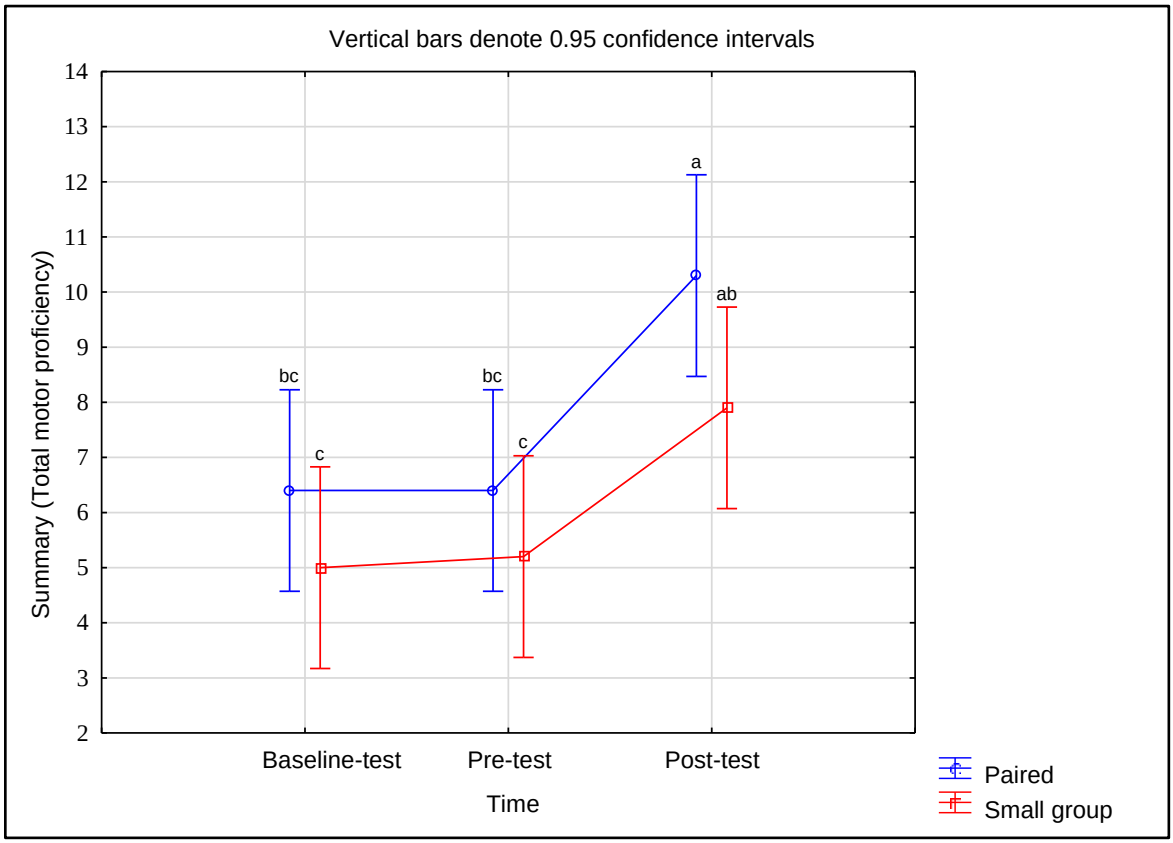

FIGURE 4.1: **TOTAL MOTOR PROFICIENCY FOR THE PAIRED GROUPS AND THE SMALL GROUP (MABC-2)**

Manual dexterity

Figure 4.2 illustrates the manual dexterity scores for the MABC-2. No statistically significant difference was found between the paired groups and the small group's baseline- to pre-test results. In the small groups pre- to post-test results, no statistically significant difference was found. However, there was a statistically significant difference ($p \leq 0.001$) in the paired groups' pre- to post-test results. No statistically significant difference was found when comparing the results of the paired groups to the small group at baseline-, pre- or post-test (Figure 4.2).

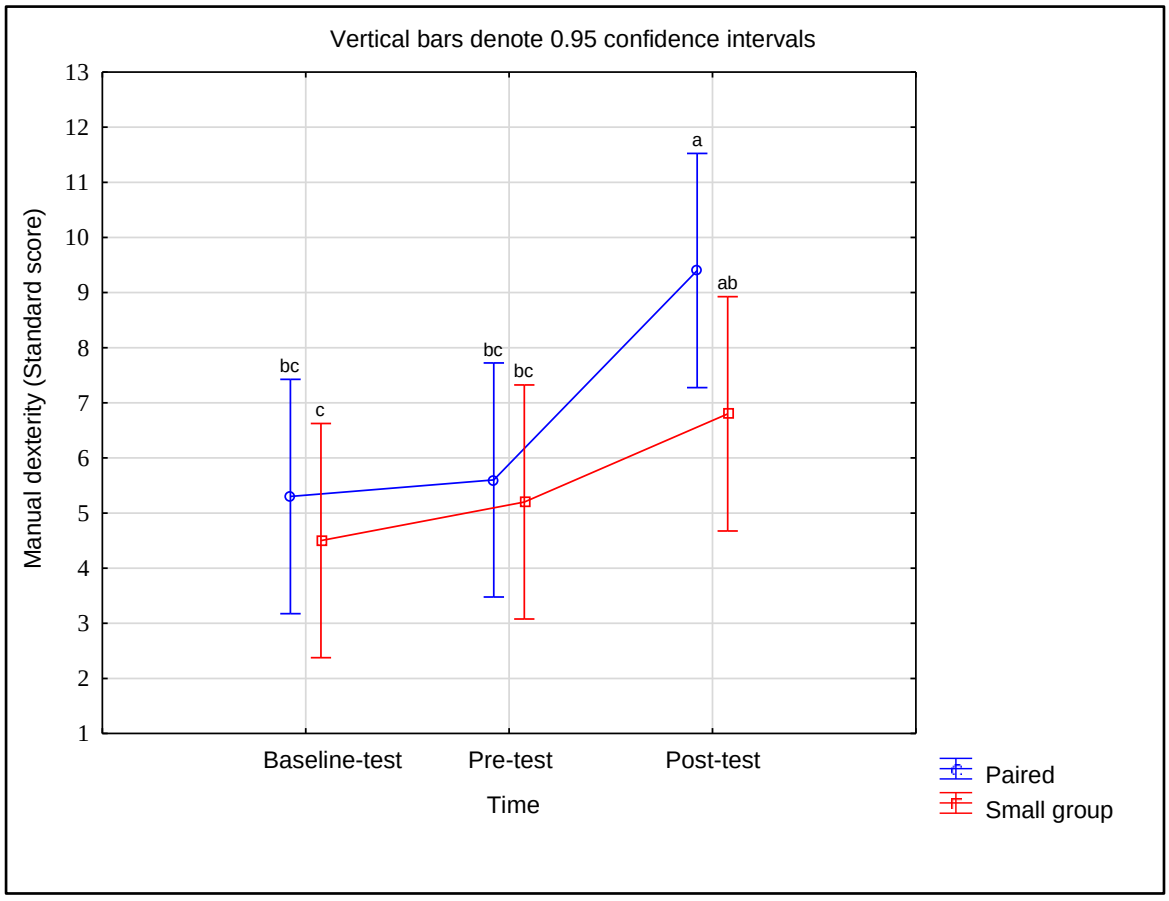

FIGURE 4.2: **MANUAL DEXTERITY FOR THE PAIRED GROUPS AND THE SMALL GROUP (MABC-2)**

Aiming and catching

Figure 4.3 illustrates the aiming and catching scores for the MABC-2. No statistically significant difference was found between the paired groups and the small group's baseline- to pre-test results. In the paired groups' pre- to post-test results, no statistically significant difference was found. However, there was a statistically significant difference ($p \leq 0.01$) in the small group's pre- to post-test results. No statistically significant difference was found when comparing the paired groups to the small group at baseline-, pre- or post-test (Figure 4.3).

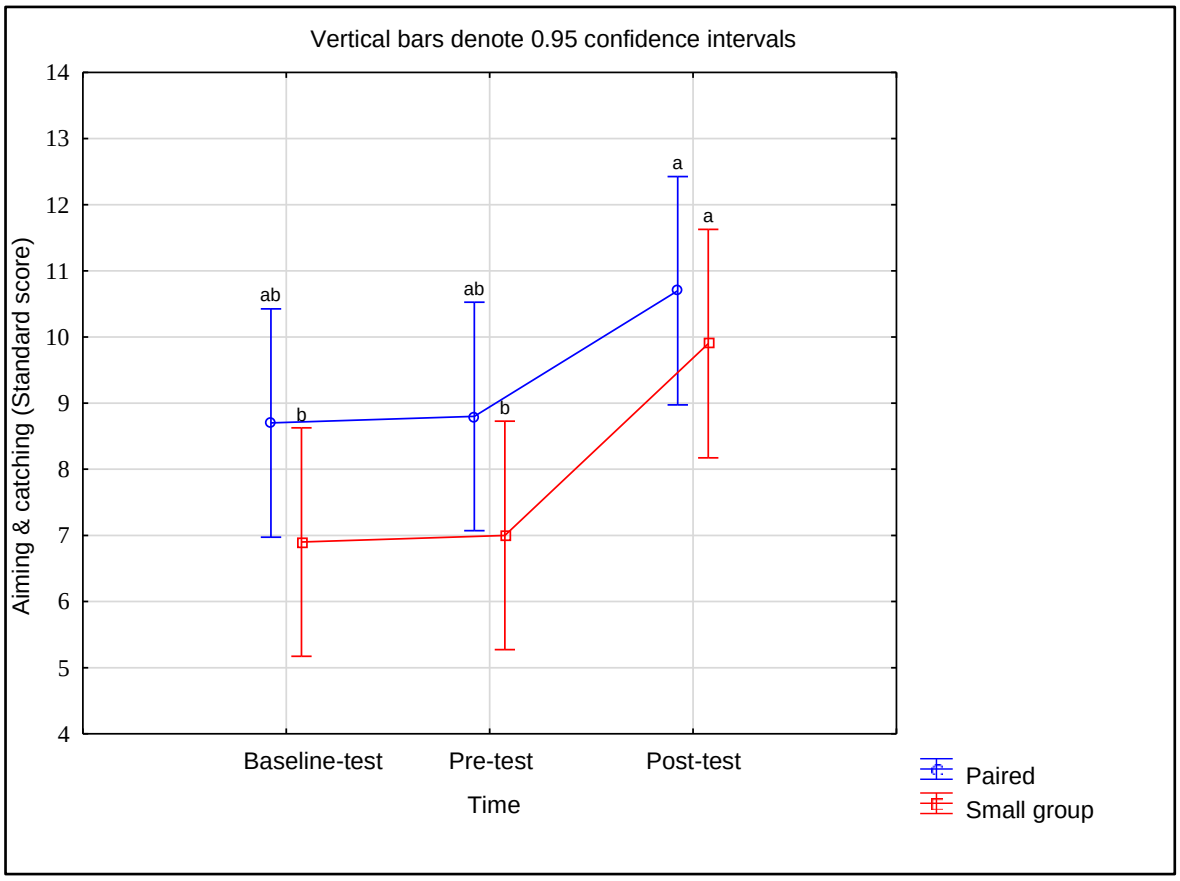

FIGURE 4.3: **AIMING AND CATCHING FOR THE PAIRED GROUPS AND THE SMALL GROUP (MABC-2)**

Balance

Figure 4.4 illustrates the balance scores for the MABC-2. No statistically significant difference was found between the paired groups and the small group's baseline- to pre-test results. The small groups pre- to post-test results also indicated no statistically significant difference. However, there was a statistically significant difference ($p \leq 0.001$) in the paired groups pre- to post-test results. No statistically significant difference when comparing the paired groups to the small group at baseline- or pre-test was found. However, a statistically significant difference was found when comparing the small group to the paired groups at the post-test (Figure 4.4).

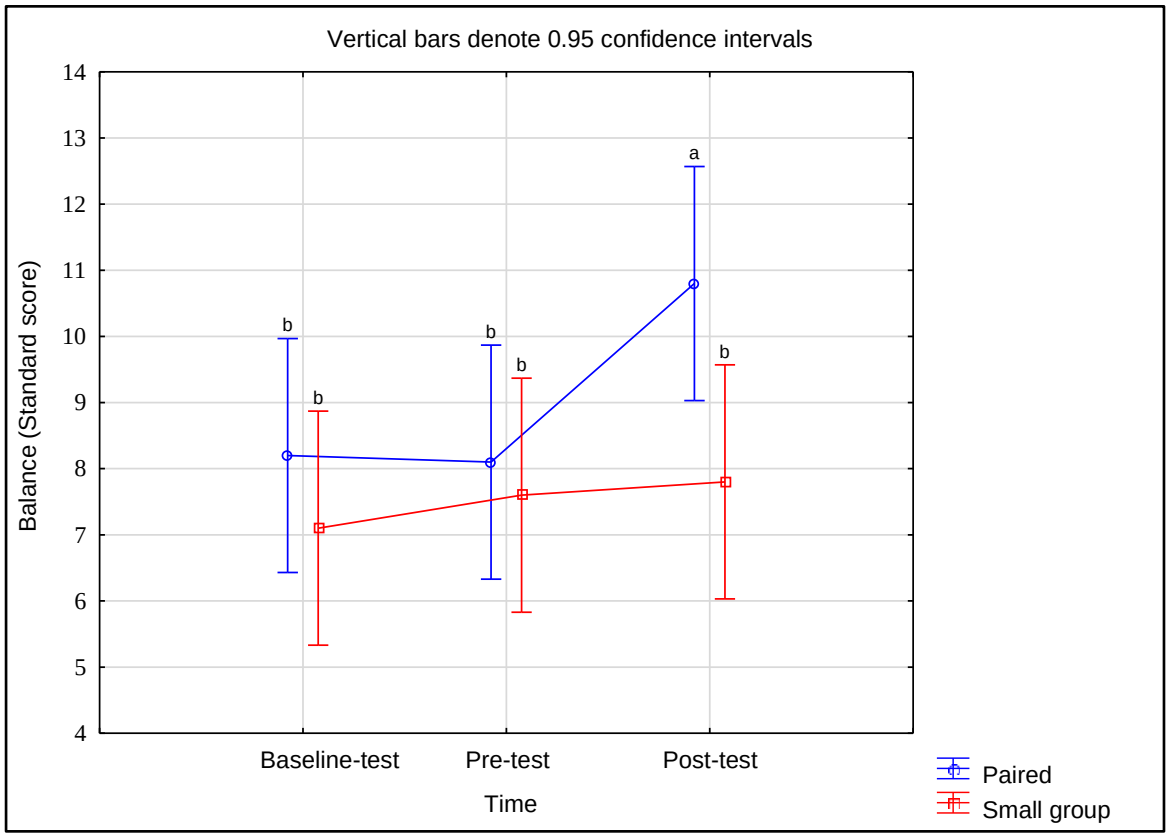

FIGURE 4.4: **COMPARING BALANCE FOR THE PAIRED GROUPS AND THE SMALL GROUP AT THE POST-TEST (MABC-2)**

The alphabet letters have been placed on the figures for the convenience of the reader. The main aim of the letters was to indicate a significant difference. A significant difference was indicated by a difference in letters. If 2 points plotted had the same letter, there was no significant difference. If 2 plotted points had no letter in common, a significant difference was indicated (Figure 4.5 – Figure 4.7).

TEST OF GROSS MOTOR DEVELOPMENT 2ND EDITION (TGMD-2)

Gross Motor Quotient (GMQ)

Figure 4.5 illustrates the GMQ scores for the TGMD-2. No statistically significant difference was found between the paired groups and the small group's baseline- to pre-test results. However, a statistically significant difference was found in both the paired groups ($p \leq 0.001$) and the small group's ($p \leq 0.001$) pre- to post-test results. In comparing the results of the paired groups and the small group at baseline-, pre- and post-test, no statistically significant difference was observed (Figure 4.5).

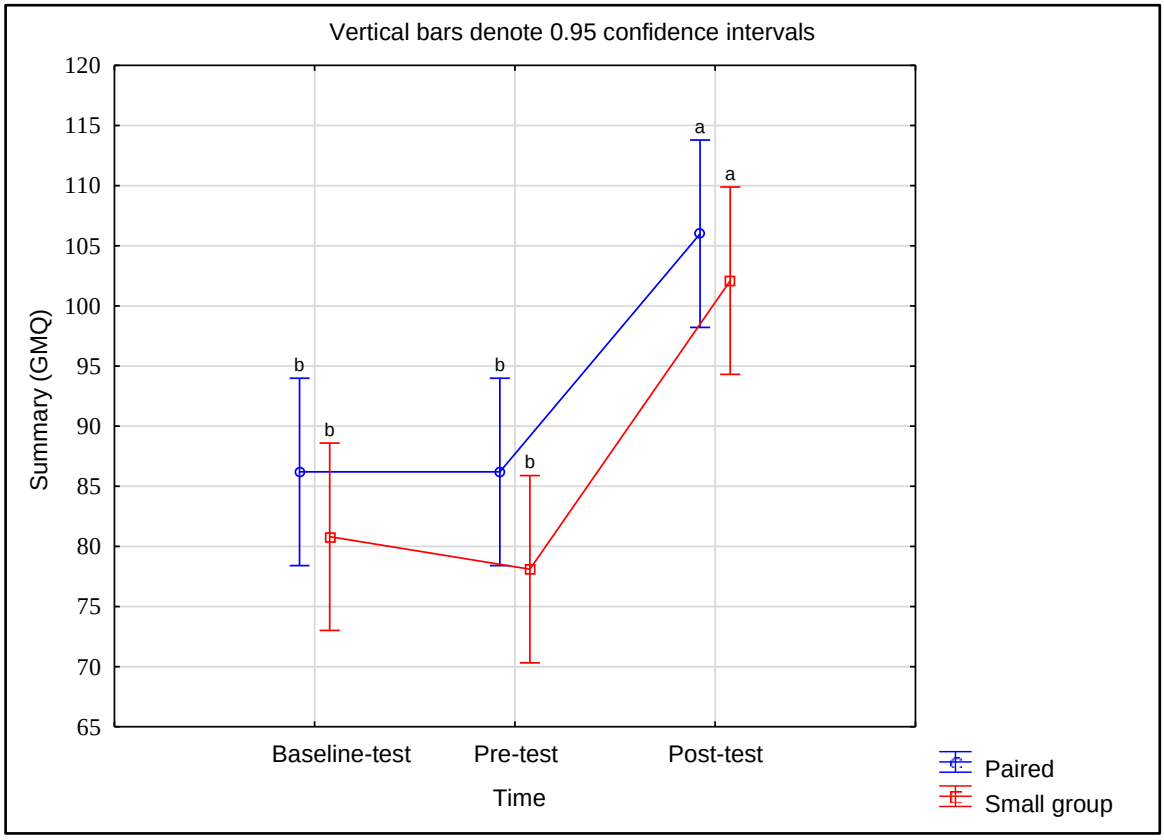

FIGURE 4.5: **GMQ FOR THE PAIRED GROUPS AND THE SMALL GROUP (TGMD-2)**

Locomotor

Figure 4.6 illustrates the locomotor scores for the TGMD-2.No statistically significant difference could be found between the paired groups and the small group's baseline- to pre-test results. However, a statistically significant difference was found in both the paired groups ($p \leq 0.03$) and the small group ($p \leq 0.001$) pre- to post-test. No statistically significant difference was revealed when comparing the paired groups to the small group at baseline- or post-test. However, a statistically significant difference was found when comparing the small group to the paired groups at the pre-test (Figure 4.6).

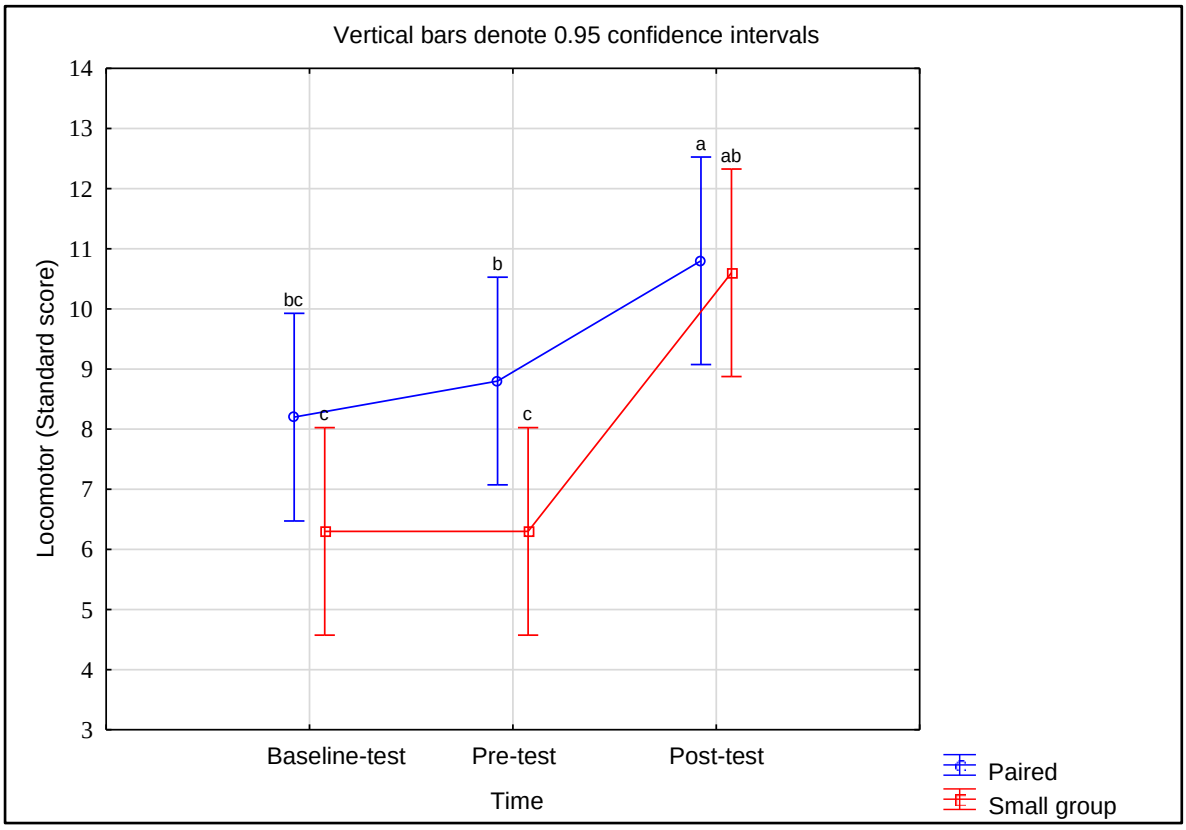

FIGURE 4.6: **LOCOMOTOR SCORES FOR THE PAIRED GROUPS AND THE SMALL GROUP (TGMD-2)**

Object control

Figure 4.7 illustrates the object control scores for the TGMD-2. No statistically significant difference could be found between the paired groups and the small group's baseline- to pre-test results. However, a statistically significant difference was found in both the paired groups ($p \leq 0.001$) and the small group's ($p \leq 0.001$) pre- to post-test results. No statistically significant difference was found when comparing the paired groups to the small group at baseline-, pre- or post-test (Figure 4.7).

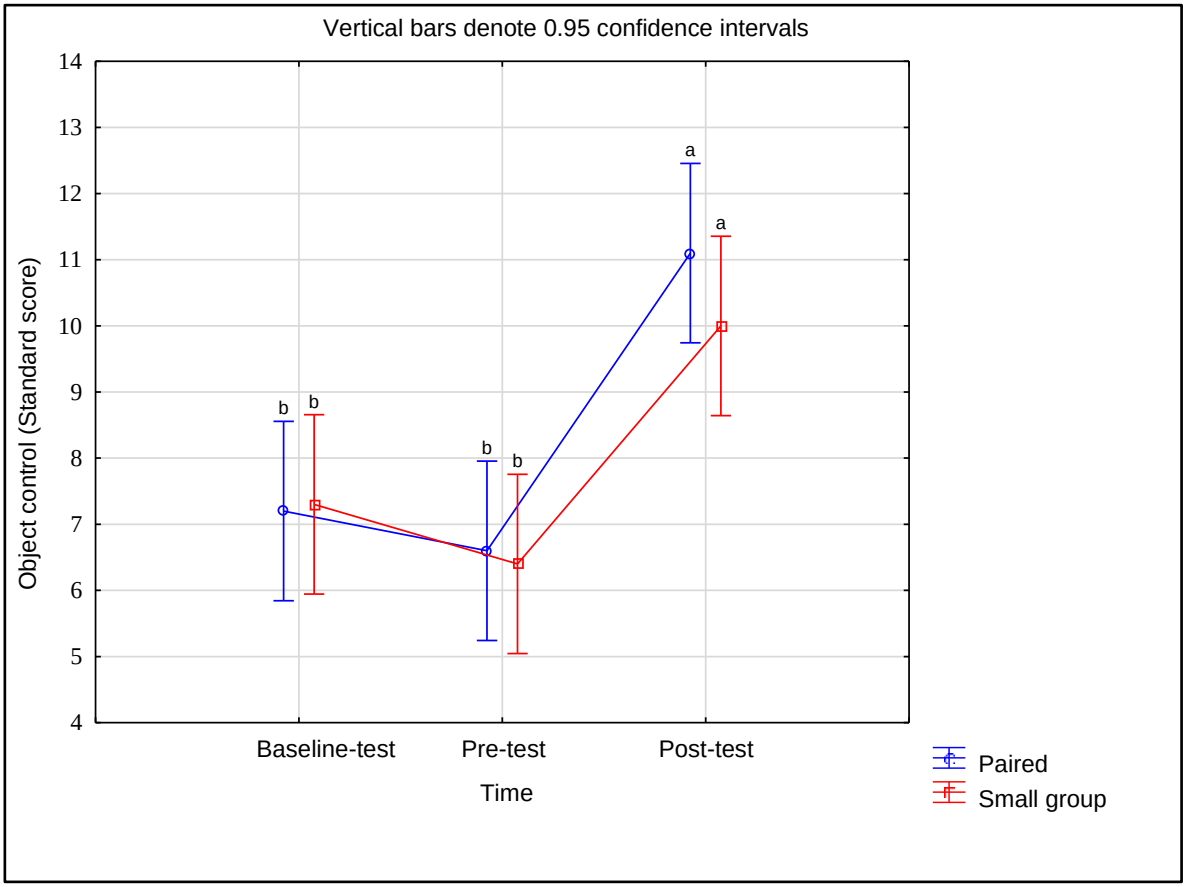

FIGURE 4.7: **OBJECT CONTROL SCORES FOR THE PAIRED GROUPS AND THE SMALL GROUP (TGMD-2)**

DESCRIPTIVE RESULTS

MABC-2

After the 12-week intervention period, an increase could be seen in the green zone. Both the red- and amber-zone decreased after the 12-week intervention (Figure 4.8).

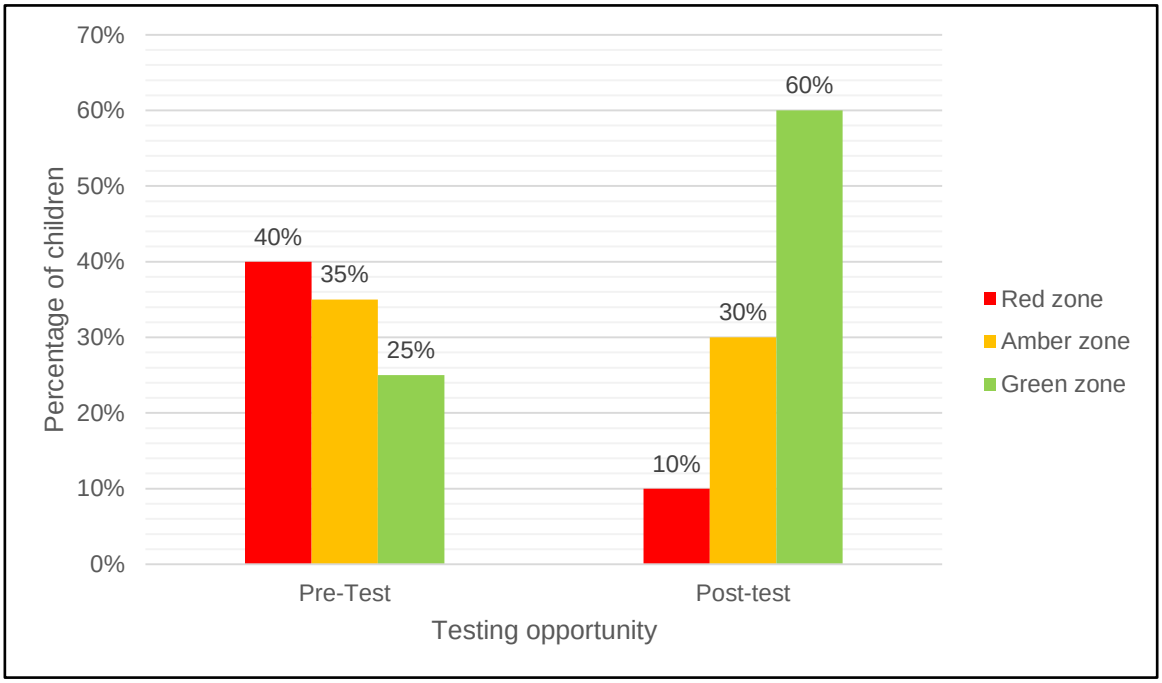

FIGURE 4.8: **DESCRIPTIVE RESULTS FROM PRE- TO POST-TEST FOR THE MABC-2**

TGMD-2

After the 12-week intervention period, an increase could be seen in the average-, above average- and very superior range. On the other hand, the very poor-, poor- and the below average range deceased after the 12-week intervention (Figure 4.9).

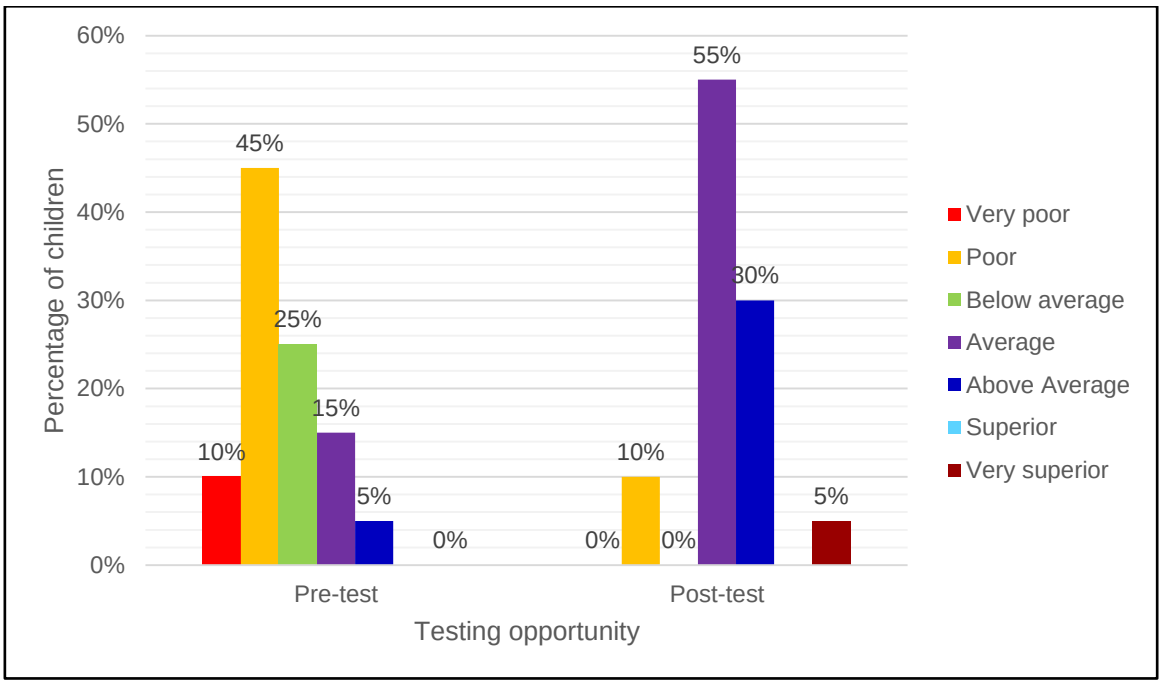

FIGURE 4.9: **DESCRIPTIVE RESULTS FROM PRE- TO POST TEST FOR THE TGMD-2**

SUMMARY

There was no significant difference between the paired groups and the small group during the baseline- and pre-test. However, significant improvements in the overall scores for both the MABC-2 and the TGMD-2 were found when both the paired groups and the small group were assessed at the post-test.

CHAPTER FIVE
DISCUSSION

INTRODUCTION

The purpose of this study was to describe the effect of a 12-week gross motor intervention on selected pre-school children, pre-identified with CAS. According to the knowledge of the main researcher, this was the first study of its kind. No other studies could be found using similar interventions for children with CAS, however, studies using gross motor interventions for children with DCD were found. Previous research indicated that DCD is co-morbid to CAS (Gaines & Missiuna, 2006:325), and therefore, the current study's findings were compared to those of children diagnosed with DCD.

PAIRED GROUPS VERSUS THE SMALL GROUP

This comparison was the main aim of the study and was made at the post-test. This comparison between the paired groups and the small group was to determine whether the paired groups or the small group benefitted more from the specific 12-week intervention.

The current study showed mixed results when comparing the paired groups to the small group at the post-test for the different MABC-2 components. A statistical significant difference was found, specifically in balance skills, between the paired groups and the small group (Table 4.1). The paired groups significantly improved, whereas the small group did not significantly improve in balance skills. Therefore, the specific gross motor intervention benefited the balancing skills of participants in paired groups more than those in the small group. This might be due to the participants receiving more individual attention and feedback in the paired groups than in the small group. It might also be due to less distractions of other participants in the group. On the contrary, there were no statistically significant differences found in the: total motor proficiency; manual dexterity; and aiming and catching skills. It could be speculated that no significant differences occurred at post-testing between the paired groups and the small group because of the similar outline of the intervention. Therefore, it could also be speculated that the specific gross motor intervention has the same benefits presented in a pair as to in small group.

The TGMD-2 found no mixed results like the MABC-2. There was no significant difference at the post-test when comparing the paired groups to the small group in any subtest: GMQ; locomotor; and object control (Table 4.1). The TGMD-2 results found that the 12-week intervention did not benefit the paired groups more than the small group. It could be speculated that these findings are because of the similar structure of the specific gross motor intervention.

COMPARING BASELINE- TO PRE-TEST RESULTS

Baseline-testing was used to eliminate the possible effect that natural maturation and other therapies could have had on the participants during the 12-week intervention (Brenner, 2008:37). When comparing baseline- to pre-test results, there were no significant differences (Table 4.2). This could indicate that natural maturation and other therapies did not have a significant effect on the participants' gross motor capabilities.

PAIRED GROUPS AND THE SMALL GROUP

After the 12-week intervention, significant improvements were seen in the paired groups' total motor proficiency, manual dexterity, balance, GMQ, locomotor- and object control skills. However, no significant improvements were found in aiming and catching skills (Table 4.3). Significant improvements were found in the small group's total motor proficiency, aiming and catching, GMQ, locomotor- and object control skills after the 12-week intervention. However, no significant improvements were found in manual dexterity and balance (Table 4.4).

Overall the paired groups performed better than the small group in the MABC-2 and the TGMD-2 at almost all the testing-opportunities (baseline-, pre- and post-test) for all the different sub components. This is the unfortunate output of the randomized division of the subject into the groups. It can be speculated that the slightly smaller mean age of the small group might have had a slight effect, but most of this was contracted by the standard scores using the age-related norms.

It is important to note that research lacks studies conducted on paired groups. The literature also has a paucity of studies comparing a paired intervention to a small group intervention.

Movement Assessment Battery for Children 2nd Edition (MABC-2)

Total motor proficiency

Both the paired groups (Table 4.3) and the small group (Table 4.4) showed significant improvements, respectively, from pre- to post-test. It can be speculated that a 12-week gross motor intervention programme could benefit children, pre-identified with CAS and improve gross motor proficiency. This overall significant improvement might be due to the intervention methods selected. By using the process-oriented and product-oriented method, the aim was not just on the underlying systems but also on the end goal of the planned movement.

A study conducted on children aged 7 to 8 years, diagnosed with DCD, investigated the effect of a 10-week group physical activity programme by using the MABC-2 as an assessment tool (Peters & Wright, 1999:210). These researchers found similar significant improvements in the total score, which is similar to the results found in the current study. Another study, with a similar intervention to the current study, found similar results. The intervention focused on perceptual skills, proprioception and sensory aspects for children diagnosed with DCD. Their participants were between the age of 5- and 8 years old, similar to the current study's age range. The study also used the task-specific method. This sessions for the intervention was also 45 minutes and presented twice a week for eight weeks (Pienaar & Lennox, 2006:72). The specific study also found a significant improvement in the total motor proficiency of children diagnosed with DCD after the eight week intervention (Pienaar & Lennox, 2006:75).

Manual dexterity

The paired groups showed a significant improvement in manual dexterity from pre- to post-test (Table 4.3). Although not significant, the small group also showed an improvement (Table 4.2). The p-value for manual dexterity in the small group was, however, very close to the significance level of 5%. These results suggest that a 12-week gross motor intervention was beneficial to children, pre-identified with CAS and could improve their manual dexterity. The results also indicated that manual dexterity improved more when participants worked in pairs. It can be speculated that more individual attention and feedback could be given to participants when working in a paired group than in a small group. The meaningful improvements might be due to intervention and specifically how the fine motor activities was implemented at the

end of the lesson. This component made use of the product-oriented method, especially the cognitive-motor method, as the children had to plan, execute and evaluate the movements carefully.

Peters and Wright (1999:210) investigated the effect of a 10-week group physical activity programme on children aged 7 to 8 years diagnosed with DCD. The MABC-2 was used as an assessment tool. These researchers found a significant improvement in manual dexterity (Peters & Wright, 1999:210). Another 10-week group gross motor intervention programme investigated the effect of two different group interventions on children diagnosed with DCD (Cacola *et al*., 2016:175,176). Contrary to the study of Peters and Wright (1999:210), Cacola *et al*. (2016:175,176) found no significant improvements in the manual dexterity of children diagnosed with DCD subsequent to these interventions. Farhat *et al*. (2016:17) investigated the effect of an 8-week motor skills training programme on the gross motor skills of children diagnosed with DCD. They found that manual dexterity of the participants improved significantly (Farhat *et al*., 2016:17). Pienaar & Lennox (2006:75) investigated a similar 8-week motor intervention on children diagnosed with DCD. They also found a significant improvement in manual dexterity, but contrary to the current study their participants were in a group. Only the paired groups in the current study showed significant improvements.

Aiming and catching

The small group showed significant improvements from pre- to post-test during the 12-week intervention in aiming and catching (Table 4.3). The paired groups also showed an improvement but it was not statistically significant (Table 4.4) even though the p-value was extremely close to the significance level of 5%. These results indicate that a 12-week gross motor intervention could benefit children, pre-identified with CAS and improve their aiming and catching skills. It also indicated that aiming and catching skills can improve regardless of working in paired groups or a small group. It can be speculated that the aiming and catching skills of the small group significantly improved over those of the paired groups, because there were more competition between the participants in the bigger group. For instance, if participant one knows he can catch better than participant two, then why try to work harder?

The study of Peters and Wright (1999:210), mentioned earlier, also found a significant improvement in the aiming and catching skills of children aged 7 to 8 years, diagnosed with DCD (Peters & Wright, 1999:210). However, the study of Cacola *et al*. (2016:175,176) found no significant improvements in the aiming and catching results of children diagnosed with DCD (Cacola *et al*., 2016:175,176). Farhat *et al*. (2016:17), on the other hand, found similar improvements in aiming and catching as in the current study. Significant improvements were found in the aiming and catching skills of children with DCD, who participated in an 8-week motor skills training programme (Farhat *et al*., 2016:17). Maharaj and Lallie (2016:5) investigated an 8-week physiotherapy gross motor programme on children diagnosed with DCD and found significant improvements in aiming and catching skills. Pienaar & Lennox (2006:75) investigated a comparable 8-week motor intervention on children diagnosed with DCD. They found no significant improvement in aiming and catching skills which is similar results to the current study's paired groups. Therefore, Pienaar & Lennox (2006:75) found contrary results to the current study's small group results of a significant improvement.

Balance

The paired groups displayed a statistically significant improvement in balance from pre- to post-test (Table 4.3). The small group also presented a slight improvement although not statistically significant (Table 4.4), indicating that a 12-week gross motor intervention could benefit children, pre-identified with CAS and improve balance. However, it was also found that balance could improve significantly more when working in paired groups compared to working in a small group. Again it can be speculated that the reason might be because of the individual attention and feedback given to participants when working in paired groups than in a small group. It could also be contributed to less distractions from other participants in a paired situation than in a small group. It might also be due to the fact that the participants in the group tried to do the activities very fast (competition between participants) and did not focus on the quality of the movement. This is where the ratio of presenter and participants play a big role.

The current study confirms similar results of studies performed on children diagnosed with DCD. Peters and Wright (1999:210), Cacola *et al*. (2016:175,176), Farhat *et al*. (2016:17) and Maharaj and Lallie (2016:5) found similar significant

improvements in balance. When analysing the results of Pienaar & Lennox *et al*. (2006:75), similar significant improvements were reported as the current study's paired groups. These results are contrary to the no significant improvement of the small group. Pienaar & Lennox (2006:75) investigated an equivalent 8-week motor intervention on children diagnosed with DCD. They found a significant improvement in balance skills which is similar results to the current study's paired groups. Therefore, Pienaar & Lennox (2006:75) found contrary results to the current study's small group results of no significant improvement.

Test of Gross Motor Development 2nd Edition (TGMD-2)

Gross Motor Quotient

Both the paired groups (Table 4.3) and the small group (Table 4.4), respectively, showed significant improvements from pre- to post-test. These results showed that a 12-week gross motor intervention was beneficial for children, pre-identified with CAS, which could improve their gross motor skills capabilities. This overall significant improvement might be due to the intervention methods selected. By using the process-oriented and product-oriented method, the aim was not just on the underlying systems but also on the end goal of the planned movement.

A study conducted by Burns *et al*. (2017:1127), investigated a 12-week gross motor programme on school-aged children between the ages of 5 to 12 years diagnosed with DCD. They concluded that the overall scores for the TGMD-2 (GMQ) significantly improved in children diagnosed with DCD. Another study, with a similar intervention to the current study, found similar results. The intervention focused on perceptual skills, proprioception and sensory aspects for children diagnosed with DCD. Their participants were between the age of 5- and 8 years old, similar to the current study's age range. The study also used the task-specific method. This sessions for the intervention was also 45 minutes and presented twice a week for eight weeks (Pienaar & Lennox, 2006:72). The specific study also found a significant improvement in gross motor quotient of children diagnosed with DCD after the eight week intervention (Pienaar & Lennox, 2006:75).

Locomotor

From pre- to post-test both the paired groups (Table 4.3) and the small group (Table 4.4) showed a significant improvement in locomotor skills, indicating that a 12-week

gross motor intervention was beneficial for children, pre-identified with CAS. The results also indicated that the paired groups and the small group benefitted from the intervention programme. It can be speculated that these meaningful results can be contributed to the nature of the task-specific intervention method that was selected for the intervention, as the children had a specific task to focus on with minor distractions.

Yu *et al*. (2016:142) found significant improvements in locomotor skills among children diagnosed with DCD who participated in a 6-week fundamental movement skills programme. The TGMD-2 was used as an assessment tool. The current study found similar results irrespective of the paired groups or the small group. They found no significant improvement in aiming and catching skills which is similar results to the current study's paired groups. Pienaar & Lennox (2006:75) investigated a comparable 8-week motor intervention on children diagnosed with DCD. The reported on contrary results as the current study. Pienaar & Lennox (2006:75) found that the locomotor skills of DCD children did not significantly improve after the 8-week motor intervention.

Object control

Both the paired groups (Table 4.3) and the small group (Table 4.4), respectively, showed significant improvements from pre- to post-test. These results indicated that a 12-week gross motor intervention can be beneficial to children, pre-identified with CAS and improve their object control skills whether presented in paired groups or a small group. It can be speculated that the kinaesthetic intervention method encouraged the children to use the perception of their body parts, movement and weight to learn a new skill. Also the principals of proprioception might have stimulated the proprioceptive receptors in order to improve overall proprioception.

The study of Yu *et al*. (2016:142) also found significant improvement in object control skills. Pienaar & Lennox (2006:75) investigated a similar 8-week motor intervention on children diagnosed with DCD. As like in the current study, they also found a significant improvement in object control skills of children diagnosed with DCD after an 8-week motor intervention programme.

DESCRIPTIVE RESULTS

MABC-2

After the pre-test of the MABC-2, eight children were in the red zone, which means that they had definite motor impairments. Seven children were in the amber zone, which labelled them as “at risk” of having motor impairments. Only five out of the 20 children were in the green zone, which is seen as the “normal” zone. The pre-test results found that 15 out of the 20 children were “at risk” or had definite motor impairments (Figure 4.1).

After the post-test only two children were classified in the red zone and six were in the amber zone. More than half of the children (n=12) were categorized in the “normal” zone (Figure 4.1).

Therefore, the red zone decreased by six children, the amber zone by one and the green zone increased by seven children. After the 12-week gross motor intervention, only eight out of the 20 children were “at risk” or had definite motor impairments (Figure 4.1).

TGMD-2

After the pre-test, 16 out of the 20 children were classified as very poor (n=2), poor (n=9) or below average (n=5). Only four children were classified as average (n=3), above average (n=1), superior (n=0) or very superior (n=0). This indicated a definite impairment in the fundamental gross motor skills of the children, pre-identified with CAS (Figure 4.2).

After the post-test, only two children were classified as very poor (n=0), poor (n=2) or below average (n=0). The rest of the participants (n=18) were classified as average (n=11), above average (n=6), superior (n=0) or very superior (n=1) (Figure 4.2).

Therefore, the very poor, poor and below average categories decreased by 14 children and logically, the average, above average, superior and very superior categories increased by the same number. After the 12-week intervention, 18 out of

the 20 children were categorized as average, above average, superior or very superior (Figure 4.2).

SUMMARY

To summarise, the MABC-2 and the TGMD-2 found definite motor impairments in most of the children, pre-identified with CAS. Both the paired groups and the small group significantly improved in the overall scores of the MABC-2 and the TGMD-2 after the 12-week gross motor intervention. This result concludes that neither the paired groups nor the small group had significantly more improvement over the other. This improvement excludes the likelihood of a possible effect of other therapies received or natural maturation, because the participants did not improve significantly from the baseline- to the pre-test. However, the participants significantly improved from the pre- to post-test. Through these findings it is evident that children pre-identified with CAS do struggle with gross motor skills and that the specific gross motor programme, developed by a registered Kinderkineticist, could enhance the gross motor capabilities of children pre-identified with CAS. These interventions will be beneficial to the children in paired groups or in a small group.

CHAPTER SIX
LIMITATIONS, RECOMMENDATIONS AND CONCLUSIONS

INTRODUCTION

Limitations and recommendations are critical to any study because it is a guideline for improving future research. Conclusions are made about possible highlights of the current study and what the reader needs to focus on and understand about the current study.

LIMITATIONS

The current study can be classified as original because it was the first research conducted in South Africa on children, pre-identified with CAS. However, as with all research certain limitations are always part and parcel of the process. The following limitations relate to the current study.

Research

- Because this study was a novel study, to our knowledge it was the first of a kind research conducted on children pre-identified with CAS. The findings that were discussed, could not be accurately compared to the findings of other studies (conducted in the same method – paired groups versus a small group).

Participants and sample

- The children were pre-identified with CAS and lacked a detailed clinical history and presentation.
- The sample size (N=20) was very small, and therefore, the researcher could not make general assumptions about the rest of the population of children, pre-identified with CAS or the gross motor programmes for these children.
- Due to CAS being more diagnosed in boys rather than girls, the sample size (N=20) consisted of only 2 girls.
- After the randomized selection of participants, both girls were in the same group.
- No control group was used in this study, however, a base-line test opportunity was created before the pre-test to eliminate natural maturation or other therapies received that could influence the intervention.

Assessments

- The limited space that was available for presenting the programme contributed to some distractions. The paired groups and the small group were in close proximity to each other and all the children could see each other.

Intervention

- The intervention took place outside on the school grounds. There were six different groups (five paired groups and one small group), which restricted the available space. When it rained all the groups had to move indoors. Some paired groups had to share a classroom and the classrooms were very small.
- The 12-week intervention was interrupted by one week, because of school holiday.
- The paired groups consisted of 5 researchers that presented the programme to the participants. Although the same researcher presented the programme to the same paired group throughout the intervention, the delivery of the programmes could have been different.

RECOMMENDATIONS

The following recommendations should be taken into consideration by future researchers.

Research

- Because CAS is a speech disorder, it is recommended that future research should collaborate with a speech therapist to assess the children's speech at baseline, pre- and post-test. In doing so, the speech patterns could also be reported on and not only the gross motor skills.

Participants and sample

- A larger sample size is definitely recommended as the current study's sample size was very small (N=20).
- More girls need to be included to ensure a better gender ratio so that gender differences can also be evaluated.
- More schools need to be included from different socio-economic environments so that a larger sample of the population can be represented.

- It is strongly suggested to use a control group for both the paired groups and the small group to strengthen the conclusion that other therapies received and natural maturation did not have an effect during the intervention period.

Assessments

- Because the space for assessment in the current study was small, it is recommended to have a large space outdoors or indoors. This will help to keep the participants far apart, so that distractions can be eliminated and the participants can pay full attention to the task when being evaluated.

Intervention

- It is recommended to have a larger space indoors as well as outdoors to present the intervention programme.
- It is highly recommended that the same researcher present the programme to the different paired groups to ensure that the delivery of the intervention is consistent.

CONLUSIONS

This section will be discussed according to the main aim and objectives.

Main aim

The main aim of the study was to describe the comparative effect of paired groups versus a small group gross motor intervention on selected pre-school children, pre-identified with CAS. The study found that the 12-week gross motor skills intervention programme could improve the gross motor capabilities of children, pre-identified with CAS and that the intervention benefitted both the paired groups, as well as the small group.

Objective 1

The first objective of the study was to evaluate the children's gross motor capabilities. The study found that 15 of the 20 children were "at risk" or had definite motor impairments according to the results of the MABC-2. The study also found that 16 of the 20 children were classified under the below average, poor and very poor categories for the TGMD-2. Therefore, this study concluded that children with CAS have poor gross motor capabilities.

Objective 2

The second objective of the study was to investigate the value of paired groups versus a small group gross motor intervention on the selected children. The study revealed that a 12-week gross motor intervention could be beneficial for children, pre-identified with CAS and could improve their gross motor capabilities. However, the study found no clear statistically significant difference between the paired groups and the small group and it could be concluded that the specific gross motor intervention benefitted both the paired groups and the small group equally.

SUMMARY

It is highly recommended that the current study is performed on a larger sample size to confirm and strengthen the conclusions on a larger CAS population. The current study found deficits in the gross motor skills of children pre-identified with CAS, a domain which was never researched in the CAS population. The study also found significant improvements in the gross motor capabilities of children, pre-identified with CAS. The current study's intervention will give children pre-identified with CAS and the CAS population the opportunity to enhance their gross motor capabilities and ultimately increase active daily functioning. It is anticipated that these novel findings will guide future research and interventions.

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ADDENDUMS

ADDENDUM A

Outline of MABC-2

Age band 1 (3 to 6 years):

Component 1: Manual dexterity

Activity 1- Posting coins

- Task: The participant holds a box with one hand and the other hand on the mat. The participant have to pick up a coin with one hand and drop them in the slot in the box.
- Practise trial: 1 attempt with each hand; formal trials: 2 attempts for each hand.

Activity 2- Threading beads

- Task: The participant has to place both hands on a mat. The participant have to pick up the lace and thread the beads one at a time.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 3- Drawing trial

- Task: The participant has to start at the bicycle and continuously draw a line following the trail without crossing the boundaries.
- Practise trial: Participant completes half of the trail; formal trials: 2 attempts.

Component 2: Aiming and catching

Activity 1- Catching bean bag.

- Task: Examiner throws a bean bag to the participant over a short distance. The participant has to catch the bean bag with both hands.
- Practise trial: 5 attempts; formal trials: 10 attempts.

Activity 2- Throwing bean bag onto mat

- Task: The participant stands on a mat that is a distance away from another mat and has to throw a bean bag onto that the other mat.
- Practise trial: 5 attempts; formal trials: 10 attempts.

Component 3: Balance

Activity 1- 1-leg balance

- Task: The participant will attempt to stand on 1 leg on a mat. Both feet are tested.
- Practice trial: 1 practise trial for each leg; formal trials: 2 attempts for each leg.

Activity 2- Walking heels raised

- Task: The participants has to walk on their toes on a line without stepping off the line.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 3- Jumping on mats

- Task: The participant has to jump on 5 mats consecutively with both feet at the same time.
- Practise trial: 1 attempt; formal trial: 2 attempts.

Age band 2 (7 to 10 years):

Component 1: Manual dexterity

Activity 1- Placing pegs

- Task: The participant holds a box with one hand with the other hand on the mat. The participant has to pick up pegs with one hand and place them in the box. Both hands are tested.
- Practise trial: 1 attempt with each hand; formal trials: 2 attempts for each hand.

Activity 2- Threading lace

- Task: The participant has to place both hands on a mat. The participant has to pick up the lace and thread it through the holes in the paper back and forth.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 3- Drawing trial

- Task: The participant has to start at the bicycle and continuously draw a line following the trail without crossing the boundaries.
- Practise trial: Participant completes half of the trail; formal trials: 2 attempts.

Component 2: Aiming and catching

Activity 1- Catching with 2 hands

- Task: The participant has to throw the ball to the wall and catch the ball after it bounced once.
- Practise trial: 5 attempts; formal trials: 10 attempts.

Activity 2- Throwing bean bag onto mat

- Task: The participant has to stand on a mat that is a distance away from another mat with a circle and throw a bean bag into the orange circle in the other mat.
- Practise trial: 5 attempts; formal trials: 10 attempts.

Component 3: Balance

Activity 1- 1-board balance

- Task: The participant will attempt to stand on 1 leg on a board. Both feet are tested.
- Practice trial: 1 practise trial for each leg; formal trials: 2 attempts for each leg.

Activity 2- Walking heel-to-toe

- Task: Participant has to walk with his or her heels touching his or her toes on a line without stepping off the line.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 3- Hopping on mats

- Task: The participant has to hop on one leg on 5 mats consecutively. Both legs are tested.
- Practise trial: 1 attempt for each leg; formal trial: 2 attempts for each leg.

ADDENDUM B

Outline of TGMD-2

Subtest 1: Locomotor

Activity 1- Run

- Task: The participant has to run over a distance.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 2- Gallop

- Task: The participant has to gallop with a 3 beat gait over a distance.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 3- Hop

- Task: The participant has to hop on 1 leg over a distance. The participant then has to swop feet and for the remaining distance hop on the other leg.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 4- Leap

- Task: The participant has to run and leap (take off foot and landing foot have to be opposite over a cone).
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 5- Horizontal jump

- Task: The participant has to jump, as far as they can, with two feet at the same time and land on both feet at the same time.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 6- Slide

- Task: The participant has to slide over a distance.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Subtest 2: Object manipulation

Activity 1- Striking a stationary ball

- Task: The participant has to hit a ball from a large traffic cone with a baseball bat.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 2- Stationary dribble

- Task: The participant has to dribble the basketball 4 consecutive times with the dominant hand and then catch the ball with both hands.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 3- Catching a ball

- Task: The examiner will throw a ball to the participant. The participant has to catch the ball with two hands.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 4- Kicking a ball

- Task: The soccer ball will be placed on a bean bag. The participant has to run up to the ball and kick the ball with their dominant foot.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 5- Overhand throw

- Task: The participant has to throw a tennis ball overhand, with their dominant hand, to the wall over a distance.
- Practise trial: 1 attempt; formal trials: 2 attempts.

Activity 6- Underhand roll

- Task: The participant has to roll the tennis ball on the floor, with their dominant hand, to the wall over a distance.
- Practise trial: 1 attempt; formal trials: 2 attempts.

ADDENDUM C

Consent form

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CONSENT TO PARTICIPATE IN RESEARCH

Parent/Legal Guardian/Legal Representative

THE EFFECT OF A PAIRED VERSUS A SMALL GROUP GROSS MOTOR INTERVENTION ON SELECTED CHILDREN PRE-IDENTIFIED WITH CHILDHOOD APRAXIA OF SPEECH

Heike Nolte, BSc Masters student, from the Department of Sport Science at Stellenbosch University kindly requests that you allow your child to voluntary participate in a research study. Your child was selected to be a possible participant because he/she is enrolled in the selected school that will participate in this study. The results will contribute to a Master's degree (Kinderkinetics) and a research paper.

1. PURPOSE OF THE STUDY

The purpose of this study is to evaluate the gross motor skills and motor proficiency of the selected children. Furthermore, this study will investigate whether a paired or a small group motor intervention will have the better effect in improving the gross motor functioning children.

2. PROCEDURES

Your child is a learner from the participating school and is between the ages of three and six years old. If you allow your child to participate in this study, he/she would participate in the following activities:

Movement Assessment Battery for Children 2nd Edition (MABC-2):

The MABC-2 is a standardised test that is often used as a research tool. The MABC-2 identifies and describes motor function impairments in children aged 3-to 16yearsold and is divided into 3 age bands (Abs): AB 1 (3 to 6 years), AB 2 (7 to 10 years) and AB 3 (11 to 16 years). The duration of the test varies. It takes about 20

to 40 minutes to administer. The test consists of three main areas: manual dexterity, aiming and catching and balance. Under these areas are 8 different skills for each age band (Henderson *et al*., 2007):

- Posting coins, placing pegs and turning pegs
- Threading beads, threading lace and triangle bolts and nuts
- Drawing trial
- Catching a bean bag, catching with two hands and catching with one hand
- Throwing a bean bag onto a mat and throwing at a wall target
- One-leg balance, one-board balance and two-board balance
- Walking heels raised, walking heel-to-toe forwards and walking toe-to-heel backwards
- Jumping onto mats, hopping on mats and zig-zag hopping

Test of Gross Motor Development 2nd Edition (TGMD-2)

The TGMD-2 is a valid and reliable test that evaluates children's gross motor abilities in the early development period (3- to 10-years-old). The TGMD is widely used as a research tool to assess children's gross motor development. The test is easy to administer and only takes 15 to 20 minutes to complete. The TGMD-2 is divided into two main subtests: locomotor and object control. These two groups have 12 skills that are individually evaluated (Ulrich, 2000):

- Run
- Gallop
- Hop
- Leap
- Horizontal jump
- Slide
- Striking a stationary ball
- Stationary dribble
- Catching a ball
- Kicking a ball
- Overhead throw
- Underhand roll

Testing procedures

Your child will be evaluated by researchers who are “Kinderkinetici-in training”, currently enrolled in an Honours degree at Stellenbosch University. Your child will perform the above-mentioned tasks with the help of the researchers according to the MABC-2 and TGMD-2 manual. The assessments will take up to 30 minutes each and will be done before and after the intervention period. Both assessments will take place at the school your child is enrolled in.

Intervention procedures

After the assessments, your child will partake in an intervention programme. This programme will either be performed in paired groups or in a small group setting. The paired groups and the small group gross motor intervention programme will be planned by a registered Kinderkineticist (01/015/03/1516/005). Kinderkineticists use movement to develop a child holistically through stimulating specific gross motor skills. These sessions will be 45 minutes long and will take place twice a week at the school. The paired group’s gross motor programmes will be developed according to each child’s needs as determined by the MABC-2 and TGMD-2. The small group’s gross motor intervention programme will be developed according to the group’s needs as determined by the MABC-2 and TGMD-2.

3. POTENTIAL RISKS AND DISCOMFORTS

There are no risks envisaged during the assessments or intervention period of this study. Your child may at any time ask to withdraw from the assessment or sessions. Your child will also be excluded from the assessment or sessions if he/she is ill and cannot participate. If your child fatigues or feel ill during the assessment, he/she may stop and continue the evaluation on another day. The safety of your child is our number one priority and the needs of the child will be placed above any assessment protocol. Discomfort and any risks will be eliminated by hands on interaction with the child at all times. In case of an injury, the school’s protocol will be followed.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

The results will be beneficial to society by providing a better understanding of motor development and deficits that children might have. The study will also create awareness as to which type of intervention protocol has the best results in improving the motor skills of children.

5. PAYMENT FOR PARTICIPATION

The participants will not receive any payment for participation.

6. CONFIDENTIALITY

Any information that is obtained in this study and that can be identified with you or your child will remain confidential and will be disclosed only with your permission or as requested by law. Confidentiality will be maintained by storing all data on a computer with a password on it. The password will only be known by this study's researchers.

7. PARTICIPATION AND WITHDRAWAL

It is your choice if you want your child to participate in this study or not. You can, at any moment, withdraw your child from the study and there will be no negative consequences or discrimination. Your child will also give accent to partake in the study and may also refuse to participate.

The registered Kinderkineticist may at any time withdraw your child if the following circumstances arise:

- When the child is sick or injured and cannot perform the necessary tasks or activities.
- When the child continuously refuses to take part in the sessions.
- If the child does not attend at least 8 sessions.
- If the child has gone through a traumatic episode, identified by the parent/guardian/teacher.

8. IDENTIFICATION OF INVESTIGATORS

Please feel free to ask any questions regarding the research or procedures.

Research personal:	Heike Nolte	083 320 8998
Study Leader:	Dr. Eileen Africa	021 808 4591

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw for your child to participate at any time and discontinue participation without penalty. They are not waving any legal claims, rights or remedies because of their participation in this research study. If you/they have questions regarding their rights as a research subject, contact Ms Malène Fouchè [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was obtained from the school, the legal representative,___ _____, and the study personal (Heike Nolte) contact details were made available to me. I received the information in English and I am in command of this language or it satisfactorily translated to me. I was given the opportunity to ask questions via telephone and these questions were answered to my satisfaction.

I hereby consent voluntary that my child may participate in this study. I have been given a copy of this form.

_____

Name of the Subject/Participant

_____

Name of the Legal Representative

_____ _____

Signature of the Legal Representative **Date**

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to

_____ . This information was in English.

[Name of Legal Representative].

_____ _____

Signature of Investigator **Date**

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INGELIGTE TOESTEMMING OM AAN NAVROSING DEEL TE NEEM

Ouer/Voog/Regsverteenwoordiger

DIE EFFEK VAN 'N GEPAARDE VERSUS 'N KLEIN GROEP GROOT MOTORIESE INTERVENSIE OP GESELEKTEERDE KINDERS WAT VOORAF GEÏNDENTIFISEER IS MET KINDER APRAKSIE VAN SPRAAK

Heike Nolte, BSc Meesters student, aan die Departement Sportwetenskap, Stellenbosch Universiteit, versoek vriendelik dat u, u kind toelaat om vrywillig aan 'n navorsingstudie deel te neem. U kind is geselekteer om 'n moontlike deelnemer te wees omdat hy/sy ingeskryf is in die skool wat aan die studie deelneem. Die resultate gaan bydrae tot 'n Meestersgraad (Kinderkinetika) en 'n navorsingsartikel.

0. DOEL VAN DIE STUDIE

Die doel van hierdie studie is om kinders se groot motoriese vaardighede en motoriese effektiwiteit te assesseer. Verder gaan die studie poog om te bepaal of 'n gepaarde of 'n kleingroep motoriese intervensie 'n beter effek sal hê om kinders se groot motoriese funksionering te verbeter.

1. PROSEDURES

U kind is 'n leerder aan die skool wat deelneem aan die studie en is tussen die ouderdom van drie en ses jaar oud. As u, u kind toelaat om aan die studie deel te neem, sal hy/sy aan die volgende aktiwiteite deelneem:

"Movement Assessment Battery for Children 2nd Edition (MABC-2)"

Die MABC-2 is 'n wetenskaplike toets wat gereeld vir navorsingsdoeleindes gebruik word. Die MABC-2 identifiseer en beskryf motoriese vaardigheidsprobleme in kinders tussen die ouderdom van 3 en 16 jaar oud. Die duur van die toets varieer. Dit neem tussen 20 tot 40 minute om die toets af te handel. Die toets bestaan uit drie hoof areas: handvaardighede, mik en vang en balans. Onder hierdie drie areas is 8 verskillende vaardighede:

- Munt plasing, pennetjie plasing en omdraai van pennetjies
- Ryg krale, ryg veter en maak boute en moere vas

- Tekeninge
- Vang ŉ boontjie sakkie, vang met twee hande en vang met een hand
- Gooi ŉ boontjie sakkie op ŉ mat en teen ŉ teiken op die muur
- Een-been balans, een-bord balans en twee-bord balans
- Loop op tone, loop hak-toon vorentoe en loop hak-toon agtertoe
- Spring op matte, hop op matte en hop zig-zag

"Test of Gross Motor Development 2nd Edition (TGMD-2)"

Die TGMD-2 is ŉ geldig en betroubare toets wat kinders, in die vroeë ontwikkelings periode (3 tot 10 jaar oud), se groot motoriese vermoëns, evalueer. Die toets is maklik om te administreer en neem 15 tot 20 minute om af te handel. Die TGMD-2 word verdeel tussen twee hoof subtoetse: lokomotories en voorwerp manipulasie. Hierdie twee groepe het 12 vaardighede wat individueel geëvalueer word:

- Hardloop
- Galop
- Hop
- Spring
- Horisontaal spring
- Gly
- Slaan ŉ stilstaande bal
- Dribbel stilstaande
- Vang ŉ bal
- Skop ŉ bal
- Gooi oorhoofs
- Onderarm rol

Toets prosedures

U kind gaan deur ŉ Kinderkinetikus en "Kinderkinetici-in opleiding" geëvalueer word. U kind gaan aan bogenoemde aktiwiteite volgens die MABC-2 en TGMD protokol met die hulp van die navorsers, deelneem. Die assesserings gaan tot 30 minute neem om te voltooi en gaan voor en na die intervensie periode uitgevoer word. Albei assesserings gaan gedurende skoolure plaasvind.

Intervensie prosedures

Na die assessering gaan u kind aan die intervensieprogram deelneem. Hierdie program gaan of gepaarde groepe of in ‘n klein groep aangebied word. Die gepaarde groepe en die klein roep groot motoriese intervensieprogramme gaan deur ’n geregistreerde Kinderkinetikus (01/015/03/1516/005) beplan en opgestel word. ’n Kinderkinetikus gebruik beweging om ’n kind holisties te ontwikkel deur die stimulering van spesifieke groot motoriese vaardighede. Hierdie sessies gaan 45 minute lank wees en sal twee keer per week gedurende skooltyd plaasvind. Die gepaarde groepe se groot motoriese program gaan opgestel word volgens elke kind se behoeftes soos bepaal deur die MABC-2 en TGMD-2. Die klein groep groot motoriese intervensieprogram gaan volgens die groep se behoeftes soos bepaal deur die MABC-2 en TGMD-2. opgestel word

2. POTENSIELE RISIKO’S EN ONGEMAKLIKHEDE

Daar is geen risiko’s tydens die assessering en intervensie periode van hierdie studie nie. U kind mag enige tyd vra om nie verder aan die assessering deel te neem nie, indien hy/sy ongemaklik voel. U kind gaan ook verskoon word van die assessrings of sessies indien hy/sy siek voel en nie kan deelneem nie. As u kind vermoeid of siek voel gedurende die assessering, mag u kind stop en op ’n volgende geleentheid aangaan. Die veiligheid van u kind is nommer een prioriteit en die behoeftes van u kind sal bo enige assesseringsprotokol gestel word. Ongemaklikheid en enige risiko’s gaan uitgeskakel word deur direkte interaksie met u kind te alle tye te hê. In die geval van enige besering, sal die skool se protokol gevolg word.

3. POTENSIELE VOORDELE VIR DEELNEMERS EN/OF DIE SAMELEWING

Die resultate van hierdie studie gaan die samelewing bevoordeel deur ’n beter begrip oor die motoriese ontwikkeling en tekorte van kinders te ontwikkel. Hierdie studie gaan ook bewustheid skep oor watter tipe intervensie protokol die beste is om die groot motoriese vaardighede van kinders te verbeter.

2. BETALING VIR DIE DEELNEMERS

Die deelnemers gaan nie betaling ontvang vir hul deelname nie.

3. VERTROULIKHEID

Enige informasie wat ingesamel word in hierdie studie en wat ’n verband hou met u kind gaan vertroulik bly. Hierdie informasie sal slegs bekend gemaak word met u

toestemming of soos versoek deur die wet. Vertroulikheid sal gehandhaaf word deur al die informasie op ’n rekenaar met ’n wagwoord te stoor. Die wagwoord sal net bekend wees aan hierdie studie se navorsers.

4. DEELNAME EN ONTTREKKING

Dit is u keuse of u, u kind wil toelaat om aan die studie deel te neem of nie. U kan op enige oomblik u kind van die studie onttrek en daar sal geen negatiewe gevolge of diskriminasie wees nie. U kind gaan ook toestemming gee om deel te neem aan die studie en mag weier om deel te neem.

Die geregistreerde Kinderkinetikus mag op enige oomblik die kind onttrek indien die volgende omstandighede ontstaan:

- Wanneer die kind siek of beseer is en nie kan deelneem aan die nodige aktiwiteite nie.
- Wanneer die kind aanhoudend weier om deel te neem aan die sessies.
- As die kind meer as 8 sessies mis.
- As die kind deur ’n traumatiese episode gaan wat deur die ouer/voog/regsverteenwoordiger geïdentifiseer word.

5. IDENTIFIKASIE VAN DIE NAVORSERS

Asseblief voel vry om enige vrae te vra oor die navorsing of prosedures.

Navorsingspersoneel:	Heike Nolte	083 320 8998
Studieleier:	Dr. Eileen Africa	021 808 4591

6. REGTE VAN DIE NAVORSINGS DEELNEMERS

U mag u kind enige tyd onttrek vanaf die studie sonder enige straf. Indien u/hulle vrae het aangaande die regte as ’n deelnemer aan navorsing, kontak Mev Malène Fouchè [mfouche@sun.ac.za; 021 808 4622] by die Afdeling van Navorsing Ontwikkeling.

HANDTEKENING VAN OUER/VOOG/REGSVERTEENWOORDIGER

Die bogenoemde informasie is ontvangd eur die skool, _____, en die studie personeel (Heike Nolte) se kontak besonderhede was beskikbaar. Ek het die inligting in Afrikaans ontvang en ek is bevoeg in die taal. Ek is die geleentheid gegee om telefonies vrae te vra en hierdie vrae is duidelik beantwoord.

Hiermee gee ek vrywillig toestemming dat my kind mag deelneem aan hierdie studie. Ek het ‘n kopie van die vorm ontvang.

_____

Naam van deelnemer

_____

Naam van ouer/voog/regsverteenwoordiger

_____ _____

Handtekening van ouer/voog/regsverteenwoordiger **Datum**

HANDTEKENING VAN NAVORSER

Ek verklaar dat ek die informasie in die dokument verduidelik het aan

_____ . Hierdie informasie was in Afrikaans.

[Naam van ouer/voog/regsverteenwoordiger]

_____ _____

Handtekening van navorser **Datum**

ADDENDUM D

Assent form

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INFORMATION AND PERMISSION SHEET FOR PARTICIPANTS

THE EFFECT OF A PAIRED VERSUS A SMALL GROUP GROSS MOTOR INTERVENTION ON SELECTED CHILDREN PRE-IDENTIFIED WITH CHILDHOOD APRAXIA OF SPEECH

Researchers: **Heike Nolte** **083 320 8998**

Study Leader: **Dr Eileen Africa** **021 808 4591**

WHO WILL PLAY WITH YOU?

Heike Nolte

Yes ☐

No ☐

WHAT IS RESEARCH?

Research helps us to get information about children, how they move and how the play. We do this by looking at children while they are doing activities.

WHAT IS THIS RESEARCH ABOUT?

This study will help people to understand which type of activities are better to improve children's movement. Either performing the activities alone or in a group.

WHY ARE WE ASKING YOU TO PARTICIPATE?

You are in the school that we are using for the study.

You are between the ages of three and six.

WHAT ARE YOU GOING TO DO?

You will play the following types of games with the researcher:

Ball games

Balancing games

Running games

Drawing games

CAN ANYTHING GO WRONG?

Nothing can go wrong.

When you feel sick, you can sit out on the day.

You can tell anyone about the games you play with us.

WHAT GOOD THINGS CAN HAPPEN TO YOU?

You will have so much fun.

WILL ANYONE KNOW YOU ARE PLAYING WITH US?

This is our secret. We will tell nobody. You may tell anybody if you want to.

WHAT HAPPENS IF YOU WANT TO STOP?

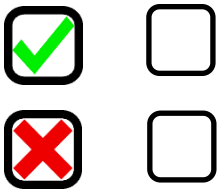
You may stop at any time. Noting will happen.

IF YOU WANT TO TALK TO SOMEONE:

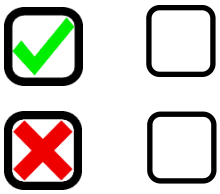
Please ask mom/dad/teacher to phone if you are sad about playing with us:

Mrs Malène Fouchè [mfouche@sun.ac.za; 021 808 4622]

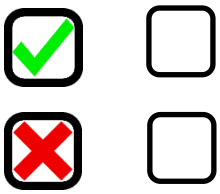
DO YOU UNDERSTAND EVERYTHING?



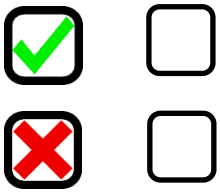
DO YOU HAVE QUESTIONS?



DO YOU KNOW YOU CAN STOP ANY TIME?



DO YOU WANT TO PLAY WITH US?



_____ _____

Your name **Date**

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INFORMASIE EN TOESTEMMINGSBRIEF VIR DEELNEMERS

DIE EFFEK VAN 'N GEPAARDE VERSUS 'N KLEIN GROEP GROOT MOTORIESE INTERVENSIE OP GESELEKTEERDE KINDERS WAT VOORAF GEÏNDENTIFISEER IS MET KINDER APRAKSIE VAN SPRAAK

Navorser:	**Heike Nolte**	**083 320 8998**
Studieleier:	**Dr Eileen Africa**	**021 808 4591**

WIE GAAN MET JOU SPEEL?

Heike Nolte

Ja ☐

Nee ☐

WAT IS NAVORSING?

Navorsing help ons om informasie oor kinders, hoe hulle beweeg en speel, te kry. Ons doen dit deur te kyk na hoe kinders aktiwiteite doen.

WAAROOR GAAN HIERDIE NAVORSING?

Hierdie studie gaan mense help om te verstaan watter tipe aktiwiteite kinders moet doen om hulle beweging te verbeter; alleen of in 'n groep.

HOEKOM VRA ONS JOU OM DEEL TE NEEM?

Jy is in die skool wat ons gebruik vir hierdie studie.

Jy is tussen die ouderdom van 3 en 6 jaar oud.

WAT GAAN JY DOEN?

Jy gaan die volgende tipe speletjies saam met Heike speel:

Bal speletjies

Balans speletjies

Hardloop speletjies

Teken speletjies

KAN ENIGE IETS VERKEERD GAAN?

Niks kan verkeerd gaan nie.

As jy siek voel, kan jy uitsit op die dag.

Jy kan vir enige iemand vertel watter speletjies ons speel.

WATTER GOEIE GOED KAN MET JOU GEBEUR?

Jy gaan dit so baie geniet en lekker speel.

GAAN ENIGE IEMAND WEET JY SPEEL SAAM MET ONS?

Dit is ons geheim. Ons gaan vir niemand vertel nie. Jy mag vir enige iemand vertel as jy wil.

WAT GEBEUR AS JY WIL STOP?

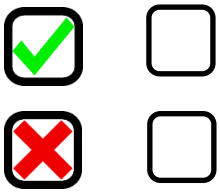
Jy mag enige tyd ophou. Niks gaan met jou gebeur nie, maar ons gaan jou mis!

AS JY MET IEMAND WIL PRAAT:

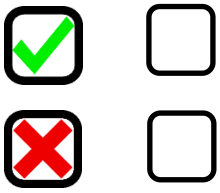
Vra asseblief vir mamma/papa/juffrou om te bel as jy hartseer voel omdat jy saam met ons speel:

Mev Malène Fouchè [mfouche@sun.ac.za; 021 808 4622]

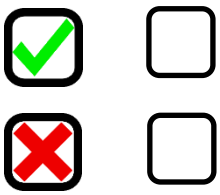
VERSTAAN JY ALLES?



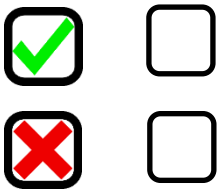
HET JY ENIGE VRAE?



WEET JY DAT JY ENIGE TYD KAN STOP?



WIL JY SAAM MET ONS SPEEL?



_____ _____

Jou naam **Datum**

ADDENDUM E

Research Ethics Committee: Human Research Approval

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Approved with Stipulations

New Application
08-May-2017
Africa, Eileen EK

Proposal #: SU-HSD-004463

Title: COMPARING AN INDIVIDUALIZED AND A GROUP GROSS MOTOR SKILLS INTERVENTION ON SELECTED CHILDREN DIAGNOSED WITH CHILDHOOD APRAXIA OF SPEECH

Dear Dr. Eileen Africa,

Your **New Application** received on **05-Apr-2017**, was reviewed by the Research Ethics Committee: Human Research (Humanities) via Committee Review procedures on **26-Apr-2017**.

Please note the following information about your approved research proposal:
Proposal Approval Period: **26-Apr-2017** -**25-Apr-2018**

Present Committee Members:
Fouche, Magdalena MG
Lambrechts, Derica D
De Klerk, Jeremias JJ
Hall, Susan SLC
Beukes, Winston WA
Graham, Clarissa CJ
Nell, Theodore TA
Prozesky, Heidi HE
Rawlings, Douglas DE
Brand, Alwer? A
Mariri, Tendai T

National Health Research Ethics Committee (NHREC) registration number REC-050411-032.

We wish you the best as you conduct your research.

If you have any questions or need further help, please contact the REC office at 218089183.

Included Documents:
DESC Report
REC: Humanities New Application

Sincerely,

Clarissa Graham
REC Coordinator
Research Ethics Committee: Human Research (Humanities)

ADDENDUM F

Western Cape education Department Approval

wced.wcape.gov.za

REFERENCE: 20170324 –9416
ENQUIRIES: Dr A T Wyngaard

Ms Heike Nolte
Department of Sport Science
Suidwalweg
Stellenbosch University
Stellenbosch
7600

Dear Ms Heike Nolte

RESEARCH PROPOSAL: **COMPARING AN INDIVIDUALIZED AND A GROUP GROSS MOTOR SKILLS INTERVENTION ON SELECTED CHILDREN DIAGNOSED WITH CHILDHOOD APRAXIA OF SPEECH**

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **18 April 2017 till 29 September 2017**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

    The Director: Research Services
    Western Cape Education Department
    Private Bag X9114
    CAPE TOWN
    8000

We wish you success in your research.

Kind regards.
Signed: Dr Audrey T Wyngaard
Directorate: Research
DATE: 24 March 2017

ADDENDUM G

Language editing

I, Prof Karel J. van Deventer, hereby declare that the technical and language editing of the M thesis entitled, *The effect of a paired versus a small group gross motor intervention on selected children pre-identified with childhood apraxia of speech*, was undertaken by me.

Yours faithfully

Prof Karel J. van Deventer

ADDENDUM H

Intervention programmes

EQUIPMENT LIST:

Speaker	Small cones	Ropes	Washing pegs and
Pipe cleaners	Drying racks	Elastic bands	Stilts
Insolation tape	Bean bags	Plastic rocks	Blue foam blocks
Whistle	Yellow balls	Soccer ball	Basket ball
Hula hoops	Circles	Small netballs	Swimming rings
Beach balls	Tactile feet	Tennis rackets	Lily pads
Large cones	Medium cones	Beacons	Twister mats
Shapes	Pictures	Buttons	Tennis balls
Colour mats	Hula stands	Baseball bat	Cricket bat
Pegs and peg board	Locomotion pictures	Balloons	Big beads
Stickers and cards	Elastica	Finger fun	Bean bag launcher
Fishing game	Bosu ball	Large building block	Pole
Ladder	Net bat		

PRESENTER 1 – SMALL GROUP (CHILD 1 to 10)

Focus: Manual dexterity, aiming & catching, balance, locomotion and object control

All the activities will mainly focus on motor planning. Coordination will also be included in each activity: bilateral coordination, unilateral coordination, ipsilateral coordination and contralateral coordination.

As the children were very young, the warm-up and cool-down stayed the same from week 1 to 7 and then from week 8 to 12. This ensured that the children stuck to a routine and helped with the organization and discipline of the children.

Warm-up: Locomotion (week 1 to 7)

Plan A: Split the group into two smaller groups, one group has to sit in a circle and the other group can perform the required actions. Remember to change the groups after a certain amount of time.

Plan B: Split the children into four rows. Give each row an action to perform with the cones to the music. When the music stops, the children have to freeze.

- The children have to move to the music while performing different animal actions.
- As the music stops, the children have to freeze as they are.
- After the music stops, a different locomotion action will be used to move to the music.
- The student will change the different locomotion actions.
- All the children need to perform every action in this warm-up to insure stimulation in all locomotion aspects.

Animal actions to be used:

- Run like a cheetah as fast as you can.
- Gallop like a horse.
- Slide like a crab to the side (to both sides).
- Hop like a bunny (two legs together hops).
- Jump like a frog (bend down and jump as far as they can).

Progression for this activity:

Animal actions:

- Skip like when you are picking flowers.
- Hop like a flamingo (hop on one leg).
- Leap like a ballerina (let them leap over small cones).

Underlying focusses and reasoning:

As the children are very young they are so excited when they get to the sessions. To have structure the sessions will all start with the same locomotion actions to create a start to the sessions. In this way the children will know that the session is about to start.

The underlying focusses to this activity:

1. Motor planning - stop and start to the music.
2. Reaction time - stop and start to the music.
3. Bilateral coordination - animal actions.
4. Spatial awareness - leaping and jumping over distances.
5. Static balance - freezing to the music.

Cool-down: Manual dexterity (week 1 to 7)

- The children will line up in three rows.
- The children will roll to the end.
- At the end of the rolling there will be an activity to complete.

Activities to be completed:

1. Pipe cleaners will be weaved through a drying tray.

2. Washing pegs will be clipped onto a card with the amount of required washing pegs.
3. Three elastic bands will be placed over a small cone.

Underlying focusses and reasoning:

Same as for the warm-up the children are so excited when they do the sessions. To have structure the sessions will all end with fine motor activities to create an end to the sessions. In this way the children will know that the session is about to end.

The underlying focusses to this activity:

1. Motor planning - different rows and different actions.
2. Proprioception – rolling.
3. Number recognition - number cards and washing pegs.
4. Finger strength – elastic bands and washing pegs.
5. Tactile stimulation - pipe cleaners.
6. Hand-eye coordination - all the fine motor activities.
7. Spatial awareness - weaving through the drying racks (top and bottom).
8. Perceptual motor integration - throwing and catching the bean bag with cones.

Warm-up: Locomotion (week 8 to 12)

Plan A: Split the group into two smaller groups, one group has to sit in a circle and the other group can perform the required actions. Remember to change the groups after a certain amount of time.

- The student will show different pictures to the children.
- The children have to copy the different animal pictures.
- The student will change the different animal action pictures.
- All the children need to perform every action in this warm-up to insure stimulation in all locomotion aspects.

Animal actions to be used:

- Run like a cheetah as fast as you can.
- Gallop like a horse.
- Slide like a crab to the side (to both sides).
- Hop like a bunny (two legs together hops).
- Jump like a frog (bend down and jump as far as they can).

Progression for this activity:

Animal actions:

- Skip like when you are picking flowers.
- Hop like a flamingo (hop on one leg).
- Leap like a ballerina (set out small cones and they have to leap over them).
- Jump like a frog (mark out an area with two ropes and they have to jump from the one rope over the other – increase distance).

Underlying focusses and reasoning:

As the children are very young they are so excited when they get to the sessions. To have structure the sessions will all start with the same locomotion actions to create a start to the sessions. In this way the children will know that the session is about to start.

The underlying focusses to this activity:

1. Motor planning - look at the picture and simulate the movement.
2. Muscle endurance and strength - all the actions.
3. Bilateral coordination - animal actions.
4. Spatial awareness - leaping and jumping over distances.

Cool-down: Manual dexterity (week 8 to 12)

- Divide the children into two rows.
- Give every child a button.
- Give the child in front a tennis ball with a hole in it.
- The children have to squeeze it open and put the button in it.
- They then have to pass it on to the next child in line.

Underlying focusses and reasoning:

The opening of the tennis ball will strengthen their fingers to increase their fine motor ability. The small buttons will also increase their fine motor ability.

The underlying focusses to this activity:

1. Motor planning - opening the ball and putting the button in.
2. Hand-eye coordination - working with hands.
3. Fine motor coordination - small buttons.
4. Finger strength - squeezing the tennis ball.
5. Tactile stimulation - tennis ball.

WEEK 1

Activity 1: Static balance

- 5 Rocks, 5 blue foam blocks, mats will be placed in a big circle.
- The children will hop with two legs in the circle.
- All the children will complete this activity at the same time.
- When the whistle is blown by the student the children have to stop.
- If they are on a rock they have to stand on one leg.
- Keep them in this position for 5 seconds.
- Remember to change the direction of the moving circle.
- Ensure that the children balance on each leg.
- Try to let the all the children stand on one leg.

Progression for this activity:

- The children on the floor and on the rocks, have to stand on one leg.
- Increase the standing on one leg to 10 seconds, 15 seconds, 20 seconds and 30 seconds.
- Stop the hopping and let them walk with bean bags on their heads.

Underlying focusses and reasoning:

The reason for selecting the blocks and the foam blocks is to change between a stable and an unstable surface. In this way the child has to understand that when jumping on a foam block they need to contract more muscles than on the stable block.

The underlying focusses to this activity:

1. Motor planning - jumping on the different surfaces, stop, start and balancing the bean bag on the head.
2. Reaction time - stop and start to the whistle.
3. Tactile stimulation - tactile surfaces on the rocks.
4. Spatial awareness - jumping onto the next block that is a distance away.
5. Proprioception - standing on one leg on the foam blocks (ankles).
6. Vestibular stimulation - foam blocks.

Activity 2: Dynamic balance

- The children will line up in 3 rows.
- A distance of 5m will be marked out with a cone.
- Each line will receive stilts (the bucket stilts).

- The children have to walk on the stilts to the cone, around the cone and all the way back to the row.

Progression for this activity:

- Different ways to move to the cone:
- Walk zig-zag through cones – not allowed to touch the cones.
- Walk on a straight line – make a line with insolation tape.
- Walk on the line with a bean bag on the head.
- Walk heel-to-toe on the line.

Underlying focusses and reasoning:

The children will use the buckets to walk in different ways. The elevated buckets increase the instability off walking in different ways. Walking on the buckets takes a lot of motor planning.

The underlying focusses to this activity:

1. Motor planning - walking on the buckets.
2. Proprioception - in the ankles.
3. Bilateral coordination - hands and feet that need to walk together on the stilts.
4. Spatial awareness - walking through cones.
5. Muscle strength - core muscles and posture.

Activity 3: Object control – underarm rolling, overhand throwing, bouncing, kicking

- The children will be divided into 4 rows.
- The first row will roll the ball through a hula hoop (on the floor - 3-5m away).
- The second row will throw the ball through a raised hula hoop (3-5m away).
- The third row will bounce (dribble) the ball continuously from one side to the other.
- The fourth row will kick a ball through the hula hoop (on the floor).

Progression for this activity:

- Make a big square by marking it off with 4 medium cones.
- Each side of the square will be a different action.
- Combine the four lines into a square so that the square forms an obstacle course.

Underlying focusses and reasoning:

Combining more than one aspect and focus into an activity help the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line).
2. Active memory - remembering what do at every line.
3. Hand-eye coordination - rolling the ball through the hula hoop and dribbling.
4. Foot-eye coordination - kicking the ball through the hula hoop.
5. Spatial awareness - throwing ball into raised hula hoop and kicking/rolling into the hula hoop.
6. Bilateral coordination - bouncing and rolling.

Activity 4: Catching, aiming, throwing and striking

- Make three lines.
- In front of the line about 1.5m away place a small circle (small shapes in center) on the floor.

- In a tree, hang 2 bean bags on a rope. Place two baseball bats under them on the floor.
- The child has to throw a bean bag in the circle.
- They then have to run to the circle, pick up the bean bag.
- The child then has to throw the bean bag up in the air and catch the bean bag (1 time).
- Focus on catching the bean bag and not trapping it.
- Focus on throwing the bean bag inside the circle.
- After catching the bean bag they have to run to the bean bags in the tree and hit the bean bag once like a piñata.

Progression for this activity:

- Place the circle 2m away.
- Throw and catch the bean bag 5 times.
- Pair up the children.
- Give each child a small cone and one bean bag between the pair.
- They have to throw and catch the bean bags by using the cones.
- They can throw the bean bag with their hands**.**

Underlying focusses and reasoning:

Combining more than one aspect and focus into an activity help the children to plan their actions and movements. The progression with the cones: the children throwing to each other makes the throwing unpredictable. Using the cones make the contact surface smaller.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line).
2. Colour recognition - aiming shapes.
3. Shape recognition - aiming shapes.
4. Hand-eye coordination - aiming and catching as well as hitting the objects from the tree.
5. Spatial awareness - hitting the hanging object and aiming.

WEEK 2

Activity 1: Static balance

- 5 rocks, 5 blue foam blocks, mats will be placed in a big circle.
- The children will hop with two legs in the circle.
- All the children will complete this activity at the same time.
- When the whistle is blown by the student, the children have to stop.
- If they are on a rock they have to stand on one leg.
- Keep them in this position for 5 seconds.
- Remember to change the direction of the moving circle.
- Ensure that the children balance on each leg.
- Try to let the all the children stand on one leg.

Progression for this activity:

- The children on the floor and on the rocks, have to stand on one leg.

- Increase the standing on one leg to 10 seconds, 15 seconds, 20 seconds and 30 seconds.
- Stop the hopping and let them walk with bean bags on their heads.

Underlying focusses and reasoning:

The reason for selecting the blocks and foam blocks is to change between a stable and an unstable surface. In this way the child has to understand that when jumping on a foam block they need to contract more muscles than on the stable block.

The underlying focusses to this activity:

1. Motor planning - jumping on the different surfaces, stop, start and balancing the bean bag on the head.
2. Reaction time - stop and start to the whistle.
3. Tactile stimulation - tactile surfaces on the rocks.
4. Spatial awareness - jumping onto the next block that is a distance away.
5. Proprioception - standing on one leg on the foam blocks (ankles).
6. Vestibular stimulation - foam blocks.
7. Dynamic balance - hopping on the blocks.

Activity 2: Dynamic balance

- The children will line up in 3 rows.
- A distance of 5m will be marked out with a cone.
- Each line will receive stilts (the bucket stilts).
- The children have to walk on the stilts to the cone, around the cone and all the way back to the row.

Progression for this activity:

- Different ways to move to the cone:
- Walk zig-zag through cones – not allowed to touch the cones.
- Walk on a straight line – make a line with insolation tape.
- Walk heel on the line with a bean bag on the head.

Underlying focusses and reasoning:

The children will use the buckets to walk in different ways. The elevated buckets increase the instability of walking in different ways. Walking on the buckets takes a lot of motor planning.

The underlying focusses to this activity:

1. Motor planning - walking on the buckets.
2. Proprioception - in the ankles.
3. Bilateral coordination - hands and feet that need to walk together on the stilts.
4. Spatial awareness - walking through cones.
5. Muscle strength - core muscles and posture.

Activity 3: Object control – underarm rolling, bouncing, aiming and kicking

- The children will be divided into 4 rows.
- Place the four twister mats about 3 to 5 m away.
- Place baskets, on their sides, about 2m away from the mats.
- The child has to dribble the ball to the mat by only using their feet.
- At the mat, they have to bounce the ball with two hands on each colour dot, and catch the ball again.
- They then have to roll the ball into the basket.
- The child has to run and collect their own ball and go back to the line.

Progression for this activity:

- Dribble the ball around and through a line of cones.

- The student will give the child a colour. The child has to bounce the ball consecutively with one hand 3 x times on that colour. After the third time, the child can catch the ball with both hands.
- Place a ball on a beacon and the child have to try to roll the ball into the ball on the beacon.

Underlying focusses and reasoning:
Combining more than on aspect and focus into an activity help the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line).
2. Colour recognition - twister mats.
3. Hand-eye coordination - bouncing and catching
4. Foot-eye coordination - dribbling the ball with their feet and kicking into the basket.
5. Spatial awareness - dribbling between cones.
6. Bilateral coordination - bouncing, rolling and dribbling.

Activity 4: Catching, aiming, throwing and striking

- Make three lines.
- In front of the line about 1.5m away place a small circle (small shapes in centre) on the floor.
- In a tree, hang 2 bean bags on a rope. Place two baseball bats under them on the floor.
- The child has to throw a bean bag in the circle.
- They then have to run to the circle, pick up the bean bag.
- The child then has to throw the bean bag up in the air and catch the bean bag (1 time).
- Focus on catching the bean bag and not trapping it.
- Focus on throwing the bean bag inside the circle.
- After catching the bean bag they have to run to the bean bags in the tree and hit the bean bag once like a piñata.

Progression for this activity:

- Place the circle 2m away.
- Throw and catch the bean bag 5 times.
- Pair up the children.
- Give each child a small cone and one bean bag between the pair.
- They have to throw and catch the bean bags by using the cones.
- They can throw the bean bag with their hands.

Underlying focusses and reasoning:
Combining more than on aspect and focus into an activity help the children to plan their actions and movements. The progression with the cones: the children throwing to each other makes the throwing unpredictable. Using the cones makes the contact surface smaller.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line).
2. Colour recognition - aiming shapes.
3. Shape recognition - aiming shapes
4. Hand-eye coordination - aiming and catching as well as hitting the objects from the tree.
5. Spatial awareness - hitting the hanging object and aiming.
6. Perceptual motor integration - throwing and catching the bean bag with cones.

WEEK 3

Activity 1: Static balance

- 5 Rocks, 5 blue foam blocks, mats will be placed in a big circle.
- The children will hop with two legs in the circle.
- All the children will complete this activity at the same time.
- When the whistle is blown by the student, the children have to stop where they are.
- If they are on a rock they have to stand on one leg.
- Keep them in this position for 5 seconds.
- Remember to change the direction of the moving circle.
- Ensure that the children balance on each leg.
- Try to let the all the children stand on one leg.

Progression for this activity:

- The children on the floor and on the rocks, have to stand on one leg.
- Increase the standing on one leg to 10 seconds, 15 seconds, 20 seconds and 30 seconds.

Underlying focusses and reasoning:

The reason for selecting the blocks and foam blocks is to change between a stable and an unstable surface. In this way the child has to understand that when jumping on a foam block they need to contract more muscles than on the stable block.

The underlying focusses to this activity:

1. Motor planning - jumping on the different surfaces, stop, start and balancing the bean bag on the head.
2. Reaction time - stop and start to the whistle.
3. Tactile stimulation - tactile surfaces on the rocks.
4. Spatial awareness - jumping onto the next block that is a distance away.

Activity 2: Dynamic balance

- The children will line up in 3 rows.
- A distance of 5m will be marked out with a cone.
- Each line will receive stilts (the bucket stilts).
- The children have to walk on the stilts to the cone, around the cone and all the way back to the row.

Progression for this activity:

- Different ways to move to the cone:
- Walk zig-zag through cones – not allowed to touch the cones.
- Walk on a straight line – make a line with insolation tape.
- Walk heel on the line with a bean bag on the head.
- Walk heel-to-toe on the line.

Underlying focusses and reasoning:

The children will use the buckets to walk in different ways. The elevated buckets increase the instability of walking in different ways. Walking on the buckets takes a lot of motor planning.

The underlying focusses to this activity:

1. Motor planning - walking on the buckets.
2. Proprioception - in the ankles.
3. Bilateral coordination - hands and feet that need to walk together on the stilts.
4. Spatial awareness - walking through cones.
5. Muscle strength - core muscles and posture.

Activity 3: Object control – underarm rolling, bouncing, aiming and kicking

- The children will be divided into 4 rows.
- Place the four twister mats about 3 to 5 m away.

- Place baskets, on their sides, about 2m away from the mats.
- The child has to dribble the ball to the mat by only using their feet.
- At the mat, they have to bounce the ball with two hands on every colour dot and catch the ball again.
- They then have to roll the ball into the basket.
- The child has to run and collect their own ball and go back to the line.

Progression for this activity:

- Dribble the ball around and through a line of cones.
- The student will give the child a colour. The child has to bounce the ball consecutively with one hand 3 x times on that colour. After the third time, the child can catch the ball with both hands.
- Place a ball on a beacon and the child has to try to roll the ball into the ball on the beacon.

Underlying focusses and reasoning:

Combining more than on aspect and focus into an activity help the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line).
2. Colour recognition - twister mats.
3. Hand-eye coordination - bouncing and catching.
4. Foot-eye coordination - dribbling the ball with their feet and kicking into the basket.
5. Spatial awareness - dribbling between cones.

Activity 4: Catching, aiming, throwing and striking

- Make three lines.
- In front of the line about 1.5m away place the Lily pads on the floor.
- In a tree, hang 2 bean bags on a rope. Place two baseball bats under them on the floor.
- The child has to throw a Lily pad – the student has to give them a number.
- They then have to run to the Lily pad, pick up the bean bag.
- The child then has to throw the bean bag up in the air and catch the bean bag (5 times).
- Focus on catching the bean bag and not trapping it.
- Focus on throwing the bean bag inside the circle.
- After catching the bean bag they have to run to the bean bags in the tree and hit the bean bag once like a piñata.

Progression for this activity:

- Scatter the Lily pads further away.
- Place the bean bag launchers behind the Lily pads.
- The child has to step and catch the bean bag.
- Give each child a small cone and one bean bag between the pair.
- They have to throw and catch the bean bag with the cone.

Underlying focusses and reasoning:

Combining more than on aspect and focus into an activity help the children to plan their actions and movements. The progression with the cones: the children throwing to each other makes the throwing unpredictable. Using the cones makes the contact surface smaller.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line) and bean bag launchers.
2. Hand-eye coordination - aiming and catching as well as hitting the objects from the tree.
3. Spatial awareness - hitting the hanging object and aiming.
4. Perceptual motor integration - throwing and catching the bean bag with cones.

WEEK 4

Activity 1: Static and dynamic balance

- Place all the bean bags on the floor.
- Play music to the children.
- The children have to run around to the music.
- When the music stops, the children have to run to a bean bag and stand with one foot on the bean bag.

Progression for this activity:

- The student has to give a command as to which leg to stand on (left and right).
- Increase the standing on one leg to 10 seconds, 15 seconds, 20 seconds and 30 seconds.

Underlying focusses and reasoning:

Balancing on bean bags make the balancing surface very small. The children completing the activity together also makes it more difficult as they need to try to avoid each other. The music creates a fun environment.

The underlying focusses to this activity:

1. Motor planning - stop and start to the music.
2. Reaction time - stop and start to the music.
3. Bilateral coordination - animal actions.
4. Spatial awareness - stepping on the next bean bag a distance away and not bumping into the other children.
5. Laterality - standing on left or right foot.

Activity 2: Object control – rolling and kicking

- Divide the children into two rows.
- The one line will do the kicking and the other line will do the rolling.
- Place a beach ball on a cone, about two meters away, in front of both lines.
- The children have to kick and roll the ball off the cone with a yellow ball.

Progression for this activity:

- Use smaller balls like the netball balls.
- Increase the distance.

Underlying focusses and reasoning:

The reason why another ball is selected to be aimed at, is because children like to bump things over. This way they can bump the ball off the cone. The aiming at the ball is a way smaller contact area than a hula hoop.

The underlying focusses to this activity:

1. Motor planning - remembering the difference between the two lines (using hands and feet).
2. Hand-eye coordination – rolling.
3. Foot-eye coordination – kicking.
4. Spatial awareness - distance to the other ball.

Activity 3: Object control – bouncing and hitting

- The children have to be in two lines.
- In front of each line a row of five hula hoops will be placed on the floor.
- The children have to bounce and catch the yellow ball in each hula hoop while walking.
- At the end, they have to hit a swimming ring that is connected to a rope in a tree, with a baseball bat.

Progression for this activity:

- Bounce the ball in each hula hoop without catching it.
- Bounce the ball with one hand only, without catching it.

Underlying focusses and reasoning:

Adding more than one action to an activity increases the stress on motor planning. The walking whilst bouncing makes the brain focus on two different actions.

The underlying focusses to this activity:

1. Motor planning - walking and bouncing.
2. Hand-eye coordination – bounce, catch and hit the hoop.
3. Bilateral coordination - bounce and catch.
4. Spatial awareness - stepping in the next hula hoop.
5. Foot-eye coordination - stepping into the correct hula hoop.

Activity 4: Catching, aiming, throwing and striking

- Make three rows.
- In front of the line, about 1.5m away, place the Lily pads on the floor.
- In a tree, hang 2 bean bags on a rope. Place two baseball bats under them on the floor.
- The child has to throw a Lily pad – the student has to give them a number.
- They then have to run to the Lily pad, pick up the bean bag.
- The child then has to throw the bean bag up in the air and catch the bean bag (5 times).
- Focus on catching the bean bag and not trapping it.
- Focus on throwing the bean bag inside the circle.
- After catching the bean bag they have to run to the bean bags in the tree and hit the bean bag once like a piñata.

Progression for this activity:

- Scatter the Lily pads further away.

- Place the bean bag launchers behind the Lily pads.
- The child has to step and catch the bean bag.
- Give every child a small cone and one bean bag between the pair.
- They have to throw and catch the bean bags by using the cones.

Underlying focusses and reasoning:

Combining more than one aspect and focus into an activity help the children to plan their actions and movements. The progression with the cones: the children throwing to each other, make the throwing unpredictable. Using the cones make the contact surface smaller.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line) and bean bag launchers.
2. Hand-eye coordination - aiming and catching as well as hitting the objects from the tree.
3. Spatial awareness - hitting the hanging object and aiming
4. Perceptual motor integration - throwing and catching the bean bag with cones.
5. Number recognition - throwing the lily pads on the correct number.

WEEK 5

Activity 1: Static and dynamic balance

- Place all the bean bags on the floor.
- Play music to the children.
- The children have to run around to the music.
- When the music stops, the children have to run to a bean bag and stand with one foot on the bean bag.

Progression for this activity:

- The student has to give a command as to which leg to stand on (left and right).
- Increase the standing on one leg to 10 seconds, 15 seconds, 20 seconds and 30 seconds.

Underlying focusses and reasoning:

Balancing on bean bags makes the balancing surface very small. The children completing the activity together also makes it more difficult as they need to try to avoid each other. The music creates a fun environment.

The underlying focusses to this activity:

1. Motor planning - stop and start to the music.
2. Reaction time - stop and start to the music.
3. Bilateral coordination - animal actions.
4. Spatial awareness - stepping on the next bean bag a distance away and not bumping into the other children.
5. Laterality - standing on left or right foot.

Activity 2: Object control – rolling and kicking

- Divide the children into two rows.
- The one line will do the kicking and the other line will do the rolling.
- Place beach ball on a cone about two meters away in front of both lines.
- The children have to kick and roll the ball off the cone with a yellow ball.

Progression for this activity:

- Use smaller balls like the netball balls.
- Increase the distance.

Underlying focusses and reasoning:

The reason why another ball is selected to be aimed at, is because children like to bump things over. This way they can bump the ball off the cone. The aiming at the ball is a way smaller contact area than a hula hoop.

The underlying focusses to this activity:

1. Motor planning - remembering the difference between the two lines (using hands and feet).
2. Hand-eye coordination – rolling.
3. Foot-eye coordination – kicking.
4. Spatial awareness - distance to the other ball.

Activity 3: Object control – bouncing and hitting

- The children have to be in two lines.
- In front of each line a row of five hula hoops will be placed on the floor.
- The children have to bounce and catch the yellow ball in each hula hoop while walking.
- At the end, they have to hit a swimming ring that is connected to a rope in a tree, with a baseball bat.

Progression for this activity:

- Bounce the ball in each hula hoop without catching it.
- Bounce the ball with one hand only without catching it.

Underlying focusses and reasoning:

Adding more than one action to an activity increases the stress on motor planning. The walking whilst bouncing makes the brain focus on two different actions.

The underlying focusses to this activity:

1. Motor planning - walking and bouncing.
2. Hand-eye coordination – bounce, catch and hit the hoop.
3. Bilateral coordination - bounce and catch.
4. Spatial awareness - stepping into the next hula hoop.
5. Foot-eye coordination - stepping into the correct hula hoop.

Activity 4: Catching, aiming, throwing and striking

- Make three lines.
- In front of the line about 1.5m away place the Lily pads on the floor.
- In a tree, hang 2 bean bags on a rope. Place two baseball bats under them on the floor.
- The child has to throw a Lily pad – the student has to give them a number.
- They then have to run to the Lily pad, pick up the bean bag.
- The child then has to throw the bean bag up in the air and catch the bean bag (5 times).
- Focus on catching the bean bag and not trapping it.
- Focus on throwing the bean bag inside the circle.
- After catching the bean bag they have to run to the bean bags in the tree and hit the bean bag once like a piñata.

Progression for this activity:

- Scatter the Lily pads further away.
- Place the bean bag launchers behind the Lily pads.
- The child has to step and catch the bean bag.
- Pair up the children.
- Give every child a small cone and one bean bag between the pair.
- They have to throw and catch the bean bags by using the cones.
- They can throw the bean bag with their hands.

Underlying focusses and reasoning:

Combining more than on aspect and focus into an activity help the children to plan their actions and movements. The progression with the cones: the children throwing to each other makes the throwing unpredictable. Using the cones make the contact surface smaller.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line) and bean bag launchers.
2. Hand-eye coordination - aiming and catching as well as hitting the objects from the tree.
3. Spatial awareness - hitting the hanging object and aiming.
4. Perceptual motor integration - throwing and catching the bean bag with cones.
5. Number recognition - throwing the lily pads on the correct number.

WEEK 6

Activity 1: Static and dynamic balance

- Place all the bean bags on the floor.
- Play music to the children.
- The children have to run around to the music.
- When the music stops, the children have to run to a bean bag and stand with one foot on the bean bag.

Progression for this activity:

- The student has to give a command as to which leg to stand on (left and right).
- Increase the standing on one leg to 10 seconds, 15 seconds, 20 seconds and 30 seconds.

Underlying focusses and reasoning:

Balancing on bean bags makes the balancing surface very small. The children completing the activity together also makes it more difficult as they need to try to avoid each other. The music creates a fun environment.

The underlying focusses to this activity:

1. Motor planning - stop and start to the music.
2. Reaction time - stop and start to the music.
3. Bilateral coordination - animal actions.
4. Spatial awareness - stepping on the next bean bag a distance away and not bumping into the other children.
5. Laterality - standing on left or right foot.

Activity 2: Object control – kicking

- Divide the children into two rows.
- In front of each row, set out a line with tactile feet.
- Make sure to have left and right feet.
- Set out a sequence for e.g.; left, left, right, left, right, right.
- The children have to hop on their right foot on the right tactile foot.

- At the end, throw a yellow ball at them and they have to kick it into a basket.

Progression for this activity:

- Put the basket further away.
- Hop consecutively.

Underlying focusses and reasoning:

Balancing on the tactile feet makes the balancing surface very small. The changing of the feet makes the motor planning for this activity extremely hard.

The underlying focusses to this activity:

1. Motor planning - switching between the feet.
2. Laterality - left and right foot.
3. Coordination – hopping.
4. Spatial awareness - hopping to the next foot.
5. Foot -eye coordination - hopping on the feet and kicking the ball into a basket.
6. Tactile stimulation - surface of the feet.

Activity 3: Object control – bouncing, rolling and hitting

- The children have to be in two lines.
- In front of each line a row of five hula hoops will be placed on the floor.
- Let the children sit in a line and the hula hoops have to be placed horizontally to them.
- The children have to move outside of the hula hoops.
- They also have to bounce and catch the yellow ball in each hula hoop while walking to the side.
- At the end, they have to roll the ball back to the beginning of the line.
- They then have to pick up a purple racket and hit a bean bag that is thrown to them.

Progression for this activity:

- Bounce the ball in each hula hoop without catching it.

Underlying focusses and reasoning:

Adding more than one action to an activity increases the stress on motor planning. The walking whilst bouncing makes the brain focus on two different actions.

The underlying focusses to this activity:

1. Motor planning - walking and bouncing.
2. Hand-eye coordination – bounce, catch and hit the bean bag
3. Bilateral coordination - bounce and catch.
4. Spatial awareness - stepping next to the hula hoop on the outside.
5. Foot-eye coordination - stepping next to the correct hula hoop.

Activity 4: Catching, aiming, throwing and striking

- Make three lines.
- In front of the line about 1.5m away place the Lily pads on the floor.
- In a tree, hang 2 bean bags on a rope. Place two baseball bats under them on the floor.
- The child has to throw a Lily pad – the student has to give them a number.
- They then have to run to the Lily pad, pick up the bean bag.
- The child then has to throw the bean bag up in the air and catch the bean bag (5 times).
- Focus on catching the bean bag and not trapping it.

- Focus on throwing the bean bag inside the circle.
- After catching the bean bag they have to run to the bean bags in the tree and hit the bean bag once like a piñata.

Progression for this activity:

- Scatter the Lily pads further away.
- Place the bean bag launchers behind the Lily pads.
- The child has to step and catch the bean bag.
- Pair up the children.
- Give every child a small cone and one bean bag between the pair.
- They have to throw and catch the bean bags by using the cones.
- They can throw the bean bag with their hands.

Underlying focusses and reasoning:

Combining more than on aspect and focus into an activity help the children to plan their actions and movements. The progression with the cones: the children throwing to each other makes the throwing unpredictable. Using the cones make the contact surface smaller.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line) and bean bag launchers.
2. Hand-eye coordination - aiming and catching as well as hitting the objects from the tree.
3. Spatial awareness - hitting the hanging object and aiming.
4. Perceptual motor integration - throwing and catching the bean bag with cones.

WEEK 7

Activity 1: Static and dynamic balance

- Place all the bean bags on the floor.
- Play music to the children.
- The children have to run around to the music.
- When the music stops, the children have to run to a bean bag and stand with one foot on the bean bag.

Progression for this activity:

- The student has to give a command as to which leg to stand on (left and right).
- Increase the standing on one leg to 10 seconds, 15 seconds, 20 seconds and 30 seconds.

Underlying focusses and reasoning:

Balancing on bean bags makes the balancing surface very small. The children completing the activity together also makes it more difficult as they need to try to avoid each other. The music creates a fun environment.

The underlying focusses to this activity:

1. Motor planning - stop and start to the music.
2. Reaction time - stop and start to the music.
3. Bilateral coordination - animal actions.
4. Spatial awareness - stepping on the next bean bag a distance away and not bumping into the other children.
5. Laterality - standing on left or right foot.

Activity 2: Object control – kicking

- Divide the children into two rows.

- In front of each row, set out a line with tactile feet.
- Make sure to have left and right feet.
- Set out a sequence for e.g.; left, left, right, left, right, right.
- The children have to hop on their right foot on the right tactile foot.
- At the end, throw a yellow ball to them and they have to kick it into a basket.

Progression for this activity:

- Put the basket further away.
- Hop consecutively.

Underlying focusses and reasoning:

Balancing on the tactile feet makes the balancing surface very small. The changing of the feet makes the motor planning for this activity extremely hard.

The underlying focusses to this activity:

1. Motor planning - switching between the feet.
2. Laterality - left and right foot.
3. Coordination – hopping.
4. Spatial awareness - hopping to the next foot.
5. Foot -eye coordination - hopping on the feet and kick the ball into a basket.
6. Tactile stimulation - surface of the feet.

Activity 3: Object control – bouncing, rolling and hitting

- The children have to be in two lines.
- In front of each line a row of five hula hoops will be placed on the floor.
- Let the children sit in a line and the hula hoops have to be placed horizontally to them.
- The children have to move outside of the hula hoops.
- They also have to bounce and catch the yellow ball in each hula hoop while walking to the side.
- At the end, they have to roll the ball back to the beginning of the line.
- They then have to pick up a purple racket and hit a bean bag that is thrown to them.

Progression for this activity:

- Bounce the ball in each hula hoop without catching it.
- Bounce the ball with one hand only without catching it.

Underlying focusses and reasoning:

Adding more than one action to an activity increases the stress on motor planning. The walking whilst bouncing makes the brain focus on two different actions.

The underlying focusses to this activity:

1. Motor planning - walking and bouncing.
2. Hand-eye coordination – bounce, catch and hit the bean bag.
3. Bilateral coordination - bounce and catch.
4. Spatial awareness - stepping next to the hula hoop (on the outside).
5. Foot-eye coordination - stepping next to the correct hula hoop.

Activity 4: Catching, aiming, throwing and striking

- Make three lines.
- In front of the line about 1.5m away place the Lily pads on the floor.
- In a tree, hang 2 bean bags on a rope. Place two baseball bats under them on the floor.
- The child has to throw a Lily pad – the student has to give them a number.
- They then have to run to the Lily pad, pick up the bean bag.
- The child then has to throw the bean bag up in the air and catch the bean bag (5 times).
- Focus on catching the bean bag and not trapping it.
- Focus on throwing the bean bag inside the circle.
- After catching the bean bag they have to run to the bean bags in the tree and hit the bean bag once like a piñata.

Progression for this activity:

- Scatter the Lily pads further away.
- Place the bean bag launchers behind the Lily pads.
- The child has to step and catch the bean bag.
- Pair up the children.
- Give each child a small cone and one bean bag between the pair.
- They have to throw and catch the bean bags by using the cones.
- They can throw the bean bag with their hands.

Underlying focusses and reasoning:

Combining more than on aspect and focus into an activity help the children to plan their actions and movements. The progression with the cones: the children throwing to each other makes the throwing unpredictable. Using the cones makes the contact surface smaller.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line) and bean bag launchers.
2. Hand-eye coordination - aiming and catching as well as hitting the objects from the tree.
3. Spatial awareness - hitting the hanging object and aiming.
4. Perceptual motor integration - throwing and catching the bean bag with cones.
5. Number recognition - throwing the Lily pads on the correct number.

WEEK 8

Activity 1: Balance – static and dynamic

- Split the children into two rows.
- Place out two rope routes on the floor.
- Use 5 ropes for each.
- Make curls and twirls with the ropes.
- The children have to walk on the ropes to the music.
- When the music stops, they have to freeze on the ropes.

Progression for this activity:

- When freezing they have to stand on one leg (give the children a specific foot to stand on, e.g. left or right.

Underlying focusses and reasoning:

Balancing on the ropes makes the balancing surface very small and the curls let them change direction. The children completing the activity together also makes it more difficult as they need to try to avoid each other. The music creates a fun environment.

The underlying focusses to this activity:

1. Motor planning - stop and start to the music.
2. Reaction time - stop and start to the music.
3. Directionality - changing directions.
4. Spatial awareness - not bumping into the other children.
5. Lower body strength - standing on one leg.
6. Laterality - standing on left or right foot.

Activity 2: Object control – Balance: static and dynamic

- Divide the children into two rows.
- In front of each row, set out a line with tactile feet.
- Make sure to have left and right feet.
- Set out a sequence for e.g.; left, left, right, left, right, right.
- The children have to hop on their right foot on the right tactile foot.

Progression for this activity:

- Make the sequence more complex.

Underlying focusses and reasoning:

Balancing on the tactile feet makes the balancing surface very small. The changing of the feet makes the motor planning for this activity extremely hard.

The underlying focusses to this activity:

1. Motor planning - switching between the feet.
2. Laterality - left and right foot.
3. Coordination – hopping.
4. Spatial awareness - hopping to the next foot.
5. Foot -eye coordination - hopping on the feet and kick the ball into a basket.
6. Tactile stimulation - surface of the feet.

Activity 3: Object control – rolling and kicking

- Divide the children into two rows.
- Place out 5 x medium cones in a line.
- Give every row a yellow ball.
- The one row will roll the ball zig-zag through the cones (dribble with hands).
- The other row will kick the ball zig-zag through the cones (dribble with feet).

Progression for this activity:

- Use small netballs.

Underlying focusses and reasoning:

Dribbling balls between cones stimulates not only hand eye coordination but the spatial awareness as well. Trying to dribble balls between cones also increase the motor planning as there are obstacles to get around.

The underlying focusses to this activity:

1. Motor planning - moving through the cones.
2. Hand-eye coordination - dribbling with hands.
3. Coordination – dribbling.
4. Spatial awareness - moving through the cones.
5. Foot -eye coordination - dribbling the ball with feet.

Activity 4: Catching, aiming and throwing

- Divide the children into two rows.
- Scatter different pictures on the floor in front of the two lines (two sets of different pictures).
- The children will come to the students two at a time.
- The students will name a picture and the child has to bounce a yellow ball on the picture and catch it again.

Progression for this activity:

- Use a small netball.

Underlying focusses and reasoning:

The pictures are a way to incorporate visual motor integration. The child also has to plan their movements to the pictures and then select the right picture to complete the task.

The underlying focusses to this activity:

1. Motor planning - moving through the pictures and selecting the correct picture.
2. Hand-eye coordination - bounce and catch.
3. Visual motor integration - seeing the picture and bouncing the ball on the picture.
4. Spatial awareness - moving through the pictures.

WEEK 9

Activity 1: Balance – static and dynamic

- Split the children into two rows.
- Place out two rope routes on the floor.
- Use 5 ropes for each.
- Make curls and twirls with the ropes.
- The children have to walk on the ropes to the music.
- When the music stops, they have to freeze on the ropes.

Progression for this activity:

- When freezing they have to stand on one leg (give the children a specific foot to stand on e.g. left or right foot.

Underlying focusses and reasoning:

Balancing on the ropes makes the balancing surface very small and the curls let them change direction. The children completing the activity together also makes it more difficult as they need to try to avoid each other. The music creates a fun environment.

The underlying focusses to this activity:

1. Motor planning - stop and start to the music.
2. Reaction time - stop and start to the music.
3. Directionality - changing directions.
4. Spatial awareness - not bumping into the other children.
5. Lower body strength - standing on one leg.
6. Laterality - standing on left or right foot.

Activity 2: Object control – balance: static and dynamic

- Divide the children into two rows.
- In front of each row, set out a line with tactile feet.
- Make sure to have left and right feet.
- Set out a sequence for e.g.; left, left, right, left, right, right.
- The children have to hop on their right foot on the right tactile foot.

Progression for this activity:

- Make the sequence more complex.

Underlying focusses and reasoning:

Balancing on the tactile feet makes the balancing surface very small. The changing of the feet makes the motor planning for this activity extremely hard.

The underlying focusses to this activity:

1. Motor planning - switching between the feet.
2. Laterality - left and right foot.
3. Coordination – hopping.
4. Spatial awareness - hopping to the next foot.
5. Foot -eye coordination - hopping on the feet and kicking the ball into a basket
6. Tactile stimulation - surface of the feet.

Activity 3: Object control – rolling and kicking

- Divide the children into two rows.
- Place out 5 x medium cones in a line.
- Give each row a yellow ball.
- The one row will roll the ball zig-zag through the cones (dribble with hands).
- The other row will kick the ball zig-zag through the cones (dribble with feet).

Progression for this activity:

- Use small netballs.

Underlying focusses and reasoning:

Dribbling balls between cones stimulates not only hand eye coordination but the spatial awareness as well. Trying to dribble balls between cones also increase the motor planning as there are obstacles to get around.

The underlying focusses to this activity:

1. Motor planning - moving through the cones.
2. Hand-eye coordination - dribbling with hands.
3. Coordination – dribbling.
4. Spatial awareness - moving through the cones.
5. Foot -eye coordination - dribbling the ball with feet.

Activity 4: Catching, aiming and throwing

- Divide the children into two rows.
- Scatter different pictures on the floor in front of the two rows (two sets of different pictures).
- The children will come to the students two at a time.
- The students will name a picture and the child has to bounce a yellow ball on the picture and catch it again.

Progression for this activity:

- Use a small netball.

Underlying focusses and reasoning:

The pictures is a way to incorporate visual motor integration. The child also has to plan their movements to the pictures and then select the right picture to complete the task on.

The underlying focusses to this activity:

1. Motor planning - moving through the pictures and selecting the correct picture.
2. Hand-eye coordination - bounce and catch.
3. Visual motor integration - seeing the picture and bouncing the ball on the picture.
4. Spatial awareness - moving through the pictures.

WEEK 10

Activity 1: Balance – static and dynamic

- Split the children into two rows.
- Place out two rope routes on the floor.
- Use 5 ropes for each.
- Make curls and twirls with the ropes.
- The children have to walk on the ropes to the music.
- When the music stops, they have to freeze on the ropes.

Progression for this activity:

- When freezing they have to stand on one leg (give the children a specific foot to stand on, left and right).

Underlying focusses and reasoning:

Balancing on the ropes makes the balancing surface very small and the curls let them change direction. The children completing the activity together also makes it more difficult as they need to try to avoid each other. The music creates a fun environment.

The underlying focusses to this activity:

1. Motor planning - stop and start to the music.
2. Reaction time - stop and start to the music.
3. Directionality - changing directions.
4. Spatial awareness - not bumping into the other children.
5. Lower body strength - standing on one leg.
6. Laterality - standing on left or right foot.

Activity 2: Object control – Balance: static and dynamic

- Divide the children into two rows.
- In front of each row, set out a line with tactile feet.
- Make sure to have left and right feet.
- Set out a sequence for e.g.; left, left, right, left, right, right.
- The children have to hop on the right foot on the right tactile foot.

Progression for this activity:

- Make the sequence more complex.

Underlying focusses and reasoning:

Balancing on the feet makes the balancing surface very small. The changing of the feet makes the motor planning for this activity extremely hard.

The underlying focusses to this activity:

1. Motor planning - switching between the feet.
2. Laterality - left and right foot.
3. Coordination – hopping.
4. Spatial awareness - hopping to the next foot.
5. Foot -eye coordination - hopping on the feet and kicking the ball into a basket.
6. Tactile stimulation - surface of the feet.

Activity 3: Object control – rolling and kicking

- Divide the children into two rows.
- Place out 5 x medium cones in a line.
- Give every row a yellow ball.
- They have to roll the ball zig-zag through the cones (dribble with hands).
- After that they have to try to kick a large cone over.

Progression for this activity:

- Use a small netball**.**

Underlying focusses and reasoning:

Dribbling balls between cones stimulates not only hand eye coordination but the spatial awareness as well. Trying to dribble balls between cones also increase the motor planning as there are obstacles to get around.

The underlying focusses to this activity:

1. Motor planning - moving through the cones.
2. Hand-eye coordination - dribbling with hands.
3. Coordination – dribbling.
4. Spatial awareness - moving through the cones.
5. Foot -eye coordination - kicking the cone.

Activity 4: Catching, aiming and throwing

- Make two circles.
- Give each circle a big beach ball.
- One by one the children have to bounce the ball to a friend.
- Before they bounce the ball they have to call out the friends' name.
- They friend has to catch the ball.

Progression for this activity:

- Use yellow balls and then small netball.

Underlying focusses and reasoning:

By letting the children bounce to each other, the student cannot bounce the ball into the child's hands directly, as children are not hat accurate. Trying to say the friend's name before incorporates a cognitive aspect.

The underlying focusses to this activity:

1. Cognitive stimulation - saying a friend's name before bouncing the ball.
2. Hand-eye coordination - catching the ball.
3. Coordination - throwing and catching.
4. Eye tracking - tracking the ball to see if the ball is coming or you.
5. Spatial awareness - not bumping the children next to which they are standing.

WEEK 11

Activity 1: Balance – static and dynamic

- Place the balance sponges in two straight lines.
- Split the children into two rows.
- Let the children hop from one sponge to the other.
- They are not allowed to step on the floor.
- If they step on the floor they have to do jumping jacks at the end.

Progression for this activity:

- Blow a whistle - the children then have to stand on one leg.
- Increase the time for standing on one leg.

Underlying focusses and reasoning:

Balancing on the sponges makes the surface very unstable. They need to contract their lower body muscles in order to hop form one block to another.

The underlying focusses to this activity:

1. Motor planning - hopping and staying on the blocks.
2. Vestibular stimulation - unstable foam block surface.
3. Spatial awareness - hopping from one block to another.
4. Lower body strength - standing and stepping on the sponges.
5. Laterality - standing on left or right foot.

Activity 2: bouncing and catching

- Make two circles.
- Give each circle a big beach ball.
- One by one the children have to bounce the ball to a friend.
- Before they bounce the ball they have to call out the friend's name.
- They friend has to catch the ball.

Progression for this activity:

- Use a yellow balls and then small netball.

Underlying focusses and reasoning:

By letting the children bounce to each other, it eliminates the accuracy of the bounce. Trying to say the friend's name before, incorporates a cognitive aspect.

The underlying focusses to this activity:

1. Cognitive stimulation - saying a friend's name before bouncing the ball.
2. Hand-eye coordination - catching the ball.
3. Coordination - throwing and catching.
4. Eye tracking - tracking the ball to see if the ball is coming or you.
5. Spatial awareness - not bumping the children next to whom they are standing.

Activity 3: Object control – rolling and kicking

- Let the children make two rows.
- The children have to stand in a line with open legs.
- One child has to stand at the one end and roll the ball through all the children in the row's legs.

Progression for this activity:

- Let the children kick the ball instead of rolling the ball.

Underlying focusses and reasoning:

Playing a game such as this will help the child plan all the movements that need to be completed after each other.

The underlying focusses to this activity:

1. Motor planning - rolling and then running to the back of the line.
2. Hand-eye coordination - rolling the ball through the legs.
3. Coordination - rolling and kicking.

Activity 4: aiming and throwing

- Divide the children into two rows.
- Place two large cones, with beach balls on it, about 2 m away.
- The children have to throw the ball at the cones, and hit it, for the ball has to fall off.
- First throw with yellow balls.

Progression for this activity:

- Use small netball and then tennis ball.

Underlying focusses and reasoning:

Placing the ball on the cone makes the target area very small. The elevated ball also makes it more difficult to judge the distance and height.

The underlying focusses to this activity:

1. Hand-eye coordination - throwing the ball.
2. Coordination – throwing.
3. Spatial awareness - height of ball.

WEEK 12

Activity 1: Balance – static and dynamic

- Place the balance sponges in two straight lines.
- Split the children into two rows.
- Let the children hop from one sponge to the other.
- They are not allowed to step on the floor.
- If they step on the floor they have to do jumping jacks at the end.

Progression for this activity:

- Blow a whistle - the children then have to stand on one leg.
- Increase the time for standing on one leg.

Underlying focusses and reasoning:

Balancing on the sponges makes the surface very unstable. They need to contract their lower body muscles in order to hop form one block to another.

The underlying focusses to this activity:

6. Motor planning - hopping and staying on the blocks.
7. Vestibular stimulation - unstable foam block surface.
8. Spatial awareness - hopping from one block to another.
9. Lower body strength - standing and stepping on the sponges.
10. Laterality - standing on left or right foot.

Activity 2: bouncing and catching

- Make two circles.
- Give each circle a big beach ball.
- One by one the children have to bounce the ball to a friend.
- Before they bounce the ball they have to call out the friend's name.
- They friend has to catch the ball.

Progression for this activity:

- Use a yellow balls and then small netball

Underlying focusses and reasoning:

By letting the children bounce to each other, it eliminates the accuracy of the bounce. Trying to say the friend's name before, incorporates a cognitive aspect.

The underlying focusses to this activity:

1. Cognitive stimulation - saying a friend's name before bouncing the ball.
2. Hand-eye coordination - catching the ball.
3. Coordination - throwing and catching.
4. Eye tracking - tracking the ball to see if the ball is coming or you.
5. Spatial awareness - not bumping the children next to whom they are standing.

Activity 3: Object control – rolling and kicking

- Let the children make two rows.
- The children have to stand in a line with open legs.
- One child has to stand at the one end and roll the ball through all the children in the row's legs.

Progression for this activity:

- Let the children kick the ball instead of rolling the ball.

Underlying focusses and reasoning:

Playing a game such as this will help the child plan all the movements that need to be completed after each other.

The underlying focusses to this activity:

1. Motor planning - rolling and then running to the back of the line.
2. Hand-eye coordination - rolling the ball through the legs.
3. Coordination - rolling and kicking.

Activity 4: aiming and throwing

- Divide the children into two rows.
- Place two large cones, with beach balls on it, about 2 m away.
- The children have to throw the ball at the cones, and hit it, for the ball has to fall off.
- First throw with yellow balls.

Progression for this activity:

- Use small netball and then tennis ball.

Underlying focusses and reasoning:

Placing the ball on the cone makes the target area very small and elevated.

The underlying focusses to this activity:

1. Hand-eye coordination - throwing the ball.
2. Coordination – throwing.
3. Spatial awareness - height of ball.
4. Upper body strength - throwing far.

PRESENTER 2 TO 6 – PAIRED GROUP (CHILD 11 to 20)

Focus: Manual dexterity, aiming & catching, balance, locomotion and object control

All the activities will mainly focus on motor planning. Coordination will also be included in each activity: bilateral coordination, unilateral coordination, ipsilateral coordination and contralateral coordination.

As the children were very young, the warm-up and cool-down stayed the same from week 1 to 7 and then from week 8 to 12. This ensured that the children stuck to a routine and helped with the organization and discipline of the children.

Warm-up: Locomotion (week 1 to 7)

- The children have to move to the music while performing different animal actions.
- As the music stops, the children have to freeze as they are.
- After the music stops, a different locomotion action will be used to move to the music.
- The student will change the different locomotion actions.
- All the children need to perform every action in this warm-up to insure stimulation in all locomotion aspects.

Animal actions to be used:

- Run like a cheetah as fast as you can.
- Gallop like a horse.
- Slide like a crab to the side (to both sides).
- Hop like a bunny (two legs together hops).
- Jump like a frog (bend down and jump as far as they can).

Progression for this activity:

Animal actions:

- Skip like when you are picking flowers.
- Hop like a flamingo (hop on one leg).
- Leap like a ballerina (set out small cones and they have to leap over them).
- Jump like a frog (mark out an area with two ropes and they have to jump from the one rope over the other – increase distance).

Underlying focusses and reasoning:

As the children are very young they are so excited when they get to the sessions. To have structure the sessions will all start with the same locomotion actions to create a start to the sessions. In this way the children will know that the session is about to start.

The underlying focusses to this activity:

1. Motor planning - stop and start to the music.
2. Reaction time - stop and start to the music.
3. Bilateral coordination - animal actions.
4. Spatial awareness - leaping and jumping over distances.
5. Static balance - freezing to the music.
6. Dynamic balance - animal actions.

Cool-down: Manual dexterity (week 1 to 7)

- Weave pipe cleaners through a baking drying rack.
- Place elastic bands over a small cone by only using the fingers of one hand.

Underlying focusses and reasoning:

Same as for the warm-up the children are so excited when they do the sessions. To have structure the sessions will all end with fine motor activities to create an end to the sessions. In this way the children will know that the session is about to end.

The underlying focusses to this activity:

1. Motor planning – weaving.
2. Finger strength – elastic bands.
3. Tactile stimulation - pipe cleaners.
4. Hand-eye coordination - all the fine motor activities.
5. Spatial awareness - weaving through the drying racks (top and bottom).

Warm-up: Locomotion (week 8 to 12)

- The student will show different pictures to the children.
- The children have to copy the different animal pictures.
- The student will change the different animal action pictures.
- All the children need to perform every action in this warm-up to insure stimulation in all locomotion aspects.

Animal actions to be used:

- Run like a cheetah as fast as you can.
- Gallop like a horse.
- Slide like a crab to the side (to both sides).
- Hop like a bunny (two legs together hops).
- Jump like a frog (bend down and jump as far as they can).

Progression for this activity:

Animal actions:

- Skip like when you are picking flowers.
- Hop like a flamingo (hop on one leg).
- Leap like a ballerina (set out small cones and they have to leap over them).
- Jump like a frog (mark out an area with two ropes and they have to jump from the one rope over the other – increase distance).

Underlying focusses and reasoning:

As the children are very young they are so excited when they get to the sessions. To have structure the sessions will all start with the same locomotion actions to create a start to the sessions. In this way the children will know that the session is about to start.

The underlying focusses to this activity:

1. Motor planning - look at the picture and simulate the movement.
2. Muscle endurance and strength - all the actions.
3. Bilateral coordination - animal actions.
4. Spatial awareness - leaping and jumping over distances.
5. Dynamic balance - animal actions.

Cool-down: Manual dexterity (week 8 to 12)

- Give every child a card with the numbers one to ten.
- Give them each stickers from one to ten.
- Let them place the sticker on the right number on the card.
- Do 5 with the right hand and 5 with the left hand.

Underlying focusses and reasoning:

Same as for the warm-up the children are so excited when they do the sessions. To have structure the sessions will all end with fine motor activities to create an end to the sessions. In this way the children will know that the session is about to end.

The underlying focusses to this activity:

1. Motor planning - picking the sticker and placing it on the correct number.
1. Finger strength - taking the stickers one by one.
2. Number recognition – numbers.
3. Hand-eye coordination - fine motor activity.
4. Visual motor integration - seeing the number and matching it with the correct sticker.

WEEK 1

Activity 1: Aiming & catching

- The two children will stand a meter apart.
- They will throw a bean bag at one another, 5 times.
- When they have completed 5 throws and catches, they can both take one step backwards so that the distance between them increases.
- Stop the activity if you see they are too far apart and can't catch the bean bags.

Progression for this activity:

- Give each child a small cone and one bean bag between the pair.
- They have to catch the bean bag by using the cones.
- They can throw the bean bag with their hands.
- If they find this easy, they have to throw the bean bag with the cone as well.
- Place 5 beacons on the floor.
- Randomly, while they are throwing and catching, blow a whistle and they then have to throw a beacon.

Underlying focusses and reasoning:

The reason why the children have to throw at one another, is because this creates an unstable pattern. Children do not throw accurate. Catching with a cone also makes the contact surface smaller and less accurate.

The underlying focusses to this activity:

1. Motor planning - catching a bean bag with a cone.
2. Proprioception - how hard to throw the bean bag at the other child.
3. Coordination – catching.
4. Spatial awareness - catching with a cone.
5. Hand-eye coordination – catching.

Activity 2: Dynamic balance

- 6 Colour mats will be placed in a straight line about 30cm apart.
- The children will hop with two legs on the mats.
- After the hopping, they will walk on a line.
- They then have to complete 10 correct star jumps.

Progression for this activity:

- Jump on the mats with one leg.
- Place the colour mats in a zig-zag formation (jump two legs and then one).
- Walk on the line backwards.

- Walk on the line heel-to-toe.

Underlying focusses and reasoning:

The reason why the colour mats were selected, is because the mats are slippery on the floor. It is not fixed on the floor. When the child jumps on the mat they have to contract their muscles so that the mat does not slip. They also have to jump in the middle. The line creates a more intensive balancing movement.

The underlying focusses to this activity:

1. Motor planning - jumping on the colour mats.
2. Proprioception - ankle joints.
3. Spatial awareness - jumping form one mat to another.
4. Static balance - trying to stop and stand on the mat.
5. Vestibular stimulation - hopping on the mats and then walking on the line.
6. Directionality - zig-zag hopping and walking backwards on the line.

Activity 3: Static balance

- Have a competition between the children.
- First stand on the one leg and then the other.
- See who can stand on one leg the longest.
- After every round, tandem stand for 30 seconds.

Progression for this activity:

- Try to let them stand on one leg for 30 seconds.
- Stand on blue foam blocks.
- Stand on foam blocks and hold onto one another with stretched-out arms.

Underlying focusses and reasoning:

The competition aspect of this activity challenges the boys to stand on one leg longer than the other boy. Holding onto one another will make the activity more difficult as they will pull on each other. The foam blocks create an unstable surface.

The underlying focusses to this activity:

1. Tactile stimulation - foam blocks.
2. Core strength - foam block standing.
3. Lower body strength and endurance - standing on one leg.
4. Spatial awareness - holding onto a friend
5. Competitiveness – competition.

Activity 4: Object control - underarm rolling, overhand throwing, bouncing, kicking

- Make a big square by marking it off with 4 medium cones.
- Each side of the square will be a different action.
- First line: the children will roll the ball through a hula hoop (on the floor - 3-5m away).
- Second line: the children will throw the ball through a raised hula hoop (3-5m away).
- Third line: the children will bounce (dribble) the ball continuously from one side to the other.
- Fourth line: they will kick a ball through the hula hoop (on the floor in a hula stand)

Progression for this activity:

- First line: use a smaller hula hoop (shape from center).

- Second line: put the hula hoop further away and use a smaller shape.
- Third line: use only one hand.

Underlying focusses and reasoning:

Combining more than on aspect and focus into an activity, helps the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - obstacle course (many activities in a line).
2. Active memory - remembering what do at every line.
3. Hand-eye coordination - rolling the ball through the hula hoop and dribbling.
4. Foot-eye coordination - kicking the ball through the hula hoop.
5. Spatial awareness - throwing ball into raised hula hoop and kicking / rolling into the hula hoop.

WEEK 2

Activity 1: Aiming & catching

- Two children will stand a meter apart.
- One child will have a wooden bat and the other child a balloon.
- One child has to throw the balloon at the other child and catch it when it returns. The other child has to hit the balloon with the wooden bat.

Progression for this activity:

- After the balloon, use a bean bag and then a tennis ball.
- Increase the distance between the children.

Underlying focusses and reasoning:

The reason why the children use a balloon is that the balloon travels slower and not so accurate. This helps with the difficulty level. The wooden bat is also a bit heavier and further away from the hand (makes hitting the balloon more difficult).

The underlying focusses to this activity:

1. Motor planning - hitting a balloon with a wooden bat.
2. Proprioception - how hard to hit the balloon.
3. Coordination - using the bat.
4. Spatial awareness - hitting the balloon (bat correct distance form balloon).
5. Hand-eye coordination – hitting.
6. Arm strength - keeping the wooden bat upright.

Activity 2: Dynamic and static balance

- Start by skipping around a cone 10m away, they must pick up a cone to find a colour.
- There will be 3 cones set out next to each other, each cone will have a cone 10m opposite them. The cones (in no specific order) will have corresponding colours.
- They children will have to choose a path to find the matching cone colour (maze).
- Route one will be walking along a rope.
- Route two will be double leg jumping on beanbags.
- Route three will be walking on stilts (progression: bear crawl sideways).

Progression for this activity:

- Route 1: walk on tip-toe along a rope and then heel-to-toe.
- Route 2: one leg jumping.
- Route 3: turn the stilts around.

Underlying focusses and reasoning:

Incorporating a lot of aspects to activities increase the motor planning. These children love to do a lot of aspects in one activity. This activity was solely selected for the many aspects especially for motor planning.

The underlying focusses to this activity:

1. Motor planning - many aspects.
2. Proprioception - tip-toe walking and heel-to-toe walking.
3. Coordination – stilts.
4. Spatial awareness - moving through paths.
5. Locomotion - skipping and jumping.
6. Colour recognition – colours.

Activity 3: Object control- rolling and kicking

- Place a beacon, with a balloon on it, about 2 m away.
- The children have to bump the balloon off the beacon with a small netball (use both hands).
- The child then has to collect a yellow ball and kick it over the balloon.

Progression for this activity:

- Increase the distance.
- Place a smaller ball on the beacon for rolling and kicking.
- Roll with a tennis ball.

Underlying focusses and reasoning:

The balloon was selected for this activity as they love balloons. The balloon is also a small object and is not stable and thus makes the aiming very difficult.

The underlying focusses to this activity:

1. Proprioception - how hard to roll and kick the ball.
2. Coordination – catching.
3. Spatial awareness - how far away the balloon is.
4. Hand-eye coordination – rolling.

Activity 4: Object control - overhand throwing, bouncing

- Place a basket about 1.5m away.
- The child has to bounce the ball 5 times with one hand on the spot (do both hands).
- After that, they have to try to bounce the ball into the basket.
- It is only allowed to bounce once before it lands in the basket.
- They then have to take a bean bag, and overhand throw, the bean bag into the basket.

Progression for this activity:

- Increase the distance of the basket.

Underlying focusses and reasoning:

Bouncing into the basket is much more difficult that just throwing it into the basket. A lot more is required to do this activity.

The underlying focusses to this activity:

1. Motor planning - trying to bounce the ball into the basket.
2. Proprioception - how hard to bounce the ball.
3. Coordination - bouncing and catching.
4. Spatial awareness - how far to bounce the ball.
5. Hand-eye coordination - bouncing and catching.
6. Visual motor integration - seeing the basket and then creating the correct response to get the ball in.

WEEK 3

Activity 1: Aiming & catching

- Two children will stand a meter apart.
- Both children will have orange net bats in their hands.
- The children have to throw and catch the bean bag at one another, by only using the bat.
- After about ten times, place a picture on the wall.
- The children have to throw the bean bag with the bat, and hit the picture.

Progression for this activity:

- Increase the distance between the children.
- Increase the distance between the children and the wall.

Underlying focusses and reasoning:

The net bat is a progression from the wooden bat. It is more difficult to throw with the net bat. The children also has to switch from throwing to one another and to hitting a picture higher on the wall.

The underlying focusses to this activity:

1. Motor planning - catching a bean bag with a net bat.
2. Proprioception - how hard to throw the bean bag.
3. Coordination - using the bat.
4. Spatial awareness - hitting the picture (picture higher on the wall)
5. Hand-eye coordination - catching and throwing.

Activity 2: Dynamic and static balance

- The children have to flip a bean bag by using the bean bag launchers. They have to catch the bean bag.
- The child then has to crab walk with the bean bag on their stomach to the big cone.
- The bean bag has to be placed on the big cone and the ball has to be dribbled around the cone.
- The child then has to bear crawl to a rope that is lifted 30cm from the floor.
- The child has to jump over the rope.

Progression for this activity:

- Jump sideways over the rope.
- Catch the flipped bean bag with one hand.
- Dribble the ball around more than one cone.

Underlying focusses and reasoning:

Incorporating a lot of aspects to activities increases the motor planning. These children love to do a lot of aspects in one activity. This activity was solely selected for the many aspects especially for motor planning.

The underlying focusses to this activity:

1. Motor planning - many aspects and bean bag launcher.
2. Proprioception - crab walk and bear crawl.
3. Total body strength - crab walk and bear crawl.
4. Hand-eye coordination – dribbling.
5. Spatial awareness - jumping over the rope.
6. Locomotion – jumping.

Activity 3: Object control- rolling and kicking

- One child will have a small cricket bat and one child will have a tennis ball.
- One child has to roll the ball to the child with the cricket bat.
- The child with the cricket bat has to hit the ball.
- The other child has to run and get the ball.
- The child with the bat has to run to the cones set out, and knock over as many cones as they can, (using their hands), before the other child is back with the ball.

Progression for this activity:

- The child rolling the ball now has to kick the ball.

Underlying focusses and reasoning:

Playing a game lets the child have fun. But this game, with a lot of aspects, help to incorporate motor planning. They have to remember all the aspects and need to remember what to do after every activity.

The underlying focusses to this activity:

1. Motor planning - the game.
2. Spatial awareness - how far away the ball is.
3. Hand-eye coordination - hitting and rolling.
4. Foot-eye coordination - kicking the ball.
5. Locomotion – running.
6. Eye tracking - following the ball.

Activity 4: Object control - overhand throwing, bouncing

- Place a basket about 1.5m away.
- The child has to bounce the ball 5 times with one hand on the spot (do both hands).
- After that, they have to try to bounce the ball inside the basket.
- It is only allowed to bounce once before it lands in the basket.
- They then have to take a bean bag and overhand throw the bean bag into the basket.

Progression for this activity:

- Increase the distance of the basket.

Underlying focusses and reasoning:

The bouncing into the basket is much more difficult that just throwing it into the basket. A lot more is required to do this activity.

The underlying focusses to this activity:

1. Motor planning - trying to bounce the ball into the basket.
2. Proprioception - how hard to bounce the ball.
3. Coordination - bouncing and catching.
4. Spatial awareness - how far to bounce the ball.
5. Hand-eye coordination - bouncing and catching.
6. Visual motor integration - seeing the basket and then creating the correct response to get the ball in.

WEEK 4

Activity 1: Catching and throwing

- Place the shapes on the wall.
- Tell the children to which shape to run to.
- The children have to run to that shape, pick up the ball and stand a meter from the wall.
- They will throw the ball in the correct shape and catch the ball.

Progression for this activity:

- After catching the ball, they have to throw the ball up in the air and catch it.
- They can then throw the ball at the other child.

Underlying focusses and reasoning:

Throwing against the wall increases the difficulty. Not only do they have to aim more but they have to determine how high and how hard to throw the bean bag.

The underlying focusses to this activity:

1. Motor planning - throwing in the correct shape.
2. Proprioception - how hard to throw the ball.
3. Spatial awareness - throwing higher.
4. Hand-eye coordination – throwing.
5. Colour recognition - throwing into the correct colour.
6. Shape recognition - throwing into the correct shape.

Activity 2: Aiming and throwing

- Place 4 small hula hoops in a straight vertical line.
- The child has to throw the same colour bean bag in the correct colour hula hoop.
- They have to start with the nearest hula hoop and progress to the furthest colour.
- The number of correct throws are the number of jumping jacks they have to do at the end.

Progression for this activity:

- Move the hula hoops further away and change the order of throwing – give them a sequence.
- Place 5 beacons on the floor.
- Randomly, while they are throwing and catching, blow a whistle and they then have to aim at a beacon.

Underlying focusses and reasoning:

The vertical line of how the hula hoops are placed on the floor makes it difficult. The children have to know that they have to throw harder for every hula hoop.

The underlying focusses to this activity:

1. Motor planning - throwing harder each time and jumping jacks.
2. Bilateral coordination - jumping jacks.
3. Colour recognition - same colour bean bags in correct colour hula.
4. Proprioception - how hard to throw the bean bag.
5. Spatial awareness - throwing inside the hula.
6. Hand-eye coordination – throwing.

Activity 3: Object control- rolling and throwing

- Place 1 hula hoop in the middle of the two children – straight up.
- The children will roll the ball through a hula hoop to one another (on the floor - 3-5m away).
- After they have completed 10, they can move on.
- The children will then throw the ball through a raised hula hoop to each other (3-5m away).
- They have to complete this 10 times.

Progression for this activity:

- Hula hoops on the ground: use a smaller hula hoop (shape from centre).
- Hula hoop in the air: put the hula hoop further away and use a smaller shape.
- Use a smaller ball with one hand only – small netball then tennis ball.

Underlying focusses and reasoning:

By letting the children roll the ball to one another the accuracy decreases. The children then have to react very fast to collect the ball.

The underlying focusses to this activity:

1. Hand-eye coordination - rolling and throwing the ball through the hula hoop.
2. Spatial awareness - rolling and throwing into the hula hoop.
3. Reaction time - catching the ball wherever it is rolled to.

Activity 4: Object control- kicking and bouncing

- Place a colour mat and a beacon with a balloon on it in a line.
- Give the child a yellow ball.
- The children will bounce the yellow ball on the colour mat 5 times, using both hands. They have to catch the ball.
- After the bouncing, they have to kick the ball so that it knocks over the beacon with the balloon on it (2-3m away).

Progression for this activity:

- Bounce the ball 5 times with both hands, without catching it.
- Switch to using only one hand when bouncing (left and right).
- Put the balloon with hula further away.
- Roll the ball to the child and the child has to kick the moving ball.

Underlying focusses and reasoning:

By adding more than one aspect to the activity the children will have to plan their movements beforehand. The bouncing on the mat also gives a specific area to bounce on. The balloon gives a specific area to hit and makes the target area very small.

The underlying focusses to this activity:

1. Hand-eye coordination - bouncing and catching ball.
2. Foot-eye coordination - kicking the ball.
3. Spatial awareness - bouncing on the mat.
4. Motor planning - how and where to use the ball.

WEEK 5

Activity 1: Aiming & catching

- Place a pictures on the wall at different heights.
- Give every child a yellow ball.
- The child has to throw the ball at the picture and catch it again.
- The ball is not allowed to bounce.

Progression for this activity:

- After 5 successful throws and catches the child can move one step back.
- Keep moving backwards until they cannot do the activity anymore.
- Use a smaller ball, like a tennis ball and small netball.

Underlying focusses and reasoning:

The reason why the children have to throw the ball at the picture on the wall, is because a picture is small and fixed. The elevated pictures make it difficult to throw at, as it is not the height you would normally throw. They have to change between different levels of aiming. Spatial awareness plays a role here.

The underlying focusses to this activity:

1. Motor planning - throwing a ball and catching it before it bounces.
2. Proprioception - how hard to throw the ball to be able to catch it again.
3. Coordination - catching and throwing.
4. Spatial awareness - throwing pictures at different heights.
5. Hand-eye coordination – catching.

Activity 2: Dynamic balance

- Place 2 ropes on the floor to form a long line.
- Place pictures on every side of the rope.
- The child has to walk on the rope and pick up all the pictures while staying on the line.

Progression for this activity:

- Walk heel-to-toe on the line.
- Place the line in a zig zag way and not straight.
- Walk with a bean bag on their head.

Underlying focusses and reasoning:

The reason why the pictures need to be picked up, is because during the dynamic balance the child has to stop, bend down (very hard whilst staying on the line) pick up the picture and continue walking.

The underlying focusses to this activity:

1. Motor planning - collecting the pictures.
2. Spatial awareness - walking to the picture and picking it up.
3. Static balance - stopping and bending.
4. Directionality - zig-zag walking.
5. Proprioception - walking heel-to-toe.

Activity 3: Static balance

- Have a competition between the boys.
- First stand on the 1 leg and then the other.
- See who can stand on their 1 leg the longest.
- After each round, tandem stand for 30 seconds.

Progression for this activity:

- Try to let them stand on 1 leg for 30 seconds.
- Stand on blue foam blocks.
- Stand on foam blocks and hold onto 1 another by their outstretched arms.

Underlying focusses and reasoning:

The competition aspect of this activity challenges the boys to stand on one leg longer because they want to win. Holding onto one another will make the activity more difficult as they will pull on each other. The foam blocks create an unstable surface.

The underlying focusses to this activity:

1. Tactile stimulation - foam blocks.
2. Core strength - foam block standing.
3. Lower body strength and endurance - standing on one leg.
4. Spatial awareness - holding onto friend.
5. Competitiveness – competition.

Activity 4: Object control - underarm rolling, bouncing and kicking

- Child 1 and 2 will stand about 3m apart.
- Child 1 will bounce the ball with both hands (continuously bouncing the ball without catching it).
- After the bouncing, the child will roll the ball to child 2.
- Child 2 will stop the ball and then kick the ball back to child one.
- Remember to swop the children.

Progression for this activity:

- Bounce the ball with one hand (left and right).
- Increase the distance between the children.
- Child 2 has to kick the ball back to child 1 while it is still rolling to them- do not stop the ball.
- Use a smaller ball.

Underlying focusses and reasoning:

Combining more than one aspect and focus into one activity help the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - many activities in a line.
2. Hand-eye coordination - rolling, bouncing and catching.
3. Foot-eye coordination – kicking.
4. Spatial awareness - knowing where the other child is.
5. Bilateral coordination - bouncing and rolling.
6. Laterality - left and right hand and foot.

WEEK 6

Activity 1: Aiming & catching

- Place out 2 small twister mats (one mat for each child).
- Let the children stand on the feet of the twister mat.
- Give every child a yellow ball.
- They have to bounce the ball and catch the ball with 2 hands on every colour - the student has to tell them which colour to bounce the ball on.

Progression for this activity:

- Use a smaller ball - small netball and then tennis ball.

Underlying focusses and reasoning:

The twister mats makes the children's feet fixed. They can't move when they aim. The dots they have to aim at is now on different levels. They have to change between different levels of aiming. Spatial awareness plays a role here.

The underlying focusses to this activity:

1. Motor planning – bouncing on correct dot and catching it.
2. Proprioception - how hard to bounce the ball to be able to catch it again.
3. Coordination - catching and bouncing.
4. Spatial awareness - hitting the dots.
5. Hand-eye coordination – catching.

Activity 2: Dynamic balance

- Place tactile feet on the floor back to back.
- Place puzzle pieces on each side of the tactile feet.
- The child has to walk on the tactile feet and pick up all the puzzle pieces while staying on the tactile feet.
- At the end they have to place the pieces on the puzzle to complete it.
- Go back to get more pieces.

Progression for this activity:

- Walk heel-to-toe on the tactile feet.
- Place the tactile feet in a zig zag way and not straight.
- Walk with a bean bag on their head.

Underlying focusses and reasoning:

The reason why the puzzle pieces need to be picked up, is because during the dynamic balance the child has to stop, bend down (very hard whilst staying on the line) pick up the puzzle piece and continue walking.

The underlying focusses to this activity:

1. Motor planning - collecting the pieces.
2. Spatial awareness - walking to the puzzle piece and picking it up.
3. Static balance - stopping and bending.
4. Directionality - zig-zag walking.
5. Proprioception - walking heel-to-toe.

Activity 3: Static balance

- Have a competition between the boys.
- First stand on the 1 leg and then the other.
- See who can stand on their 1 leg the longest.
- After each round, tandem stand for 30 seconds.

Progression for this activity:

- Try to let them stand on 1 leg for 30 seconds.
- Stand on blue foam blocks.
- Stand on foam blocks and hold onto 1 another by their outstretched arms.

Underlying focusses and reasoning:

The competition aspect of this activity challenges the boys to stand on one leg longer because they want to win. Holding onto one another will make the activity more difficult as they will pull on each other. The foam blocks create an unstable surface.

The underlying focusses to this activity:

1. Tactile stimulation - foam blocks.
2. Core strength - foam block standing.
3. Lower body strength and endurance - standing on one leg.
4. Spatial awareness - holding onto friend.
5. Competitiveness – competition.

Activity 4: Object control - underarm rolling, bouncing and kicking

- Place tactile feet back to back in a straight line
- Child walks over it heel to toe with blue soft ball
- Dribble the ball 5 times once they reach the colour circle on the ground
- Roll the ball at the 2 colour stands to knock them over

Progression for this activity:

- Bounce the ball with 1 hand (left and right).
- Kick the ball at the colour stands.
- Use a smaller ball.

Underlying focusses and reasoning:

Combining more than on aspect and focus into one activity help the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - many activities in a line.
2. Hand-eye coordination - dribbling and rolling.
3. Foot-eye coordination – kicking.
4. Spatial awareness - through the colour stands.
5. Bilateral coordination - bouncing and rolling.
6. Laterality - left and right hand and foot.
7. Tactile stimulation - tactile feet.

WEEK 7

Activity 1: Bouncing & catching

- Place out 8 hula hoops in a circle.
- Give every child a yellow ball.
- They have to bounce and catch the ball with 2 hands in every hula hoop, while stepping into every hula hoop.
- Progression is important! Try to do progression.

Progression for this activity:

- Use a smaller tennis ball or netball.

Underlying focusses and reasoning:

Stepping into hula hoops in a circle is difficult if you consider spatial awareness. Adding bouncing and catching a ball stimulates the motor planning tremendously.

The underlying focusses to this activity:

1. Motor planning - stepping into a hula hoop in a circle and bouncing and catching a ball.
2. Proprioception - how hard to bounce the ball.
3. Coordination - catching and bouncing.
4. Spatial awareness - bouncing and stepping into hula hoops.
5. Hand-eye coordination – catching.
6. Dynamic balance - hopping on one leg at a time in the hula hoop.

Activity 2: Static and dynamic balance

- Place all the lily pads on the floor.
- Play music to the children.
- The children have to step onto the lily pads on the rhythm of the music and say the number.
- When the music stops, the children have to stand with one foot on the lily pad.

Progression for this activity:

- The student has to give a command as to which leg to stand on (left and right).
- Increase the standing on 1 leg to 10 seconds, 15 seconds, 20 seconds and 30 secon*ds.*

Underlying focusses and reasoning:

The reason why the lily pads were selected is because of the different numbers. This gives another dimension to balancing. The child will not only focus on the balancing, but on the numbers as well. They also have to listen to the music so that they can stop when the music stops.

The underlying focusses to this activity:

1. Motor planning - planning the movement and sequence.
2. Spatial awareness - stepping onto the lily pads.
3. Visual motor integration - seeing the dot and jumping on it.
4. Reaction time - stop and start to the music.
5. Laterality - left and right foot.
6. Number recognition - lily pads.

Activity 3: Aiming and catching

- Place 3 rocks upside down on the floor.
- One child has to be by the rocks and the other about 2m away.
- The child has to throw the correct colour bean bag in the correct colour rock.
- The other child then has to throw the bean bags on1 by 1 back to the other child.
- Remember to swop the children.
- Each child has to aim, throw and catch 9 bean bags, therefore, 3 rounds.

Progression for this activity:

- Move the rocks further away.
- Spread them out.
- Bounce the ball with 1 hand only without catching it.

Underlying focusses and reasoning:

The reason the rocks were selected is because the rocks are not the same size. The child has to alternate between throwing in a big rock, a smaller rock and a small rock.

The underlying focusses to this activity:

1. Hand-eye coordination - throwing the bean bag.
2. Colour recognition - rocks and bean bags.
3. Spatial awareness - how far away the rocks are.
4. Proprioception - how hard to throw.

Activity 4: Bouncing & catching

- Give every child a plastic cricket bat.
- Let the children bounce a beach ball with the bats.
- Let them bounce it continuously (like dribbling).

Progression for this activity:

- Use a smaller ball - yellow ball, small netball and then tennis ball.

Underlying focusses and reasoning:

Bouncing a ball with a bat decreases the control over the ball. The bat makes the bouncing very unstable.

The underlying focusses to this activity:

1. Motor planning - trying to bounce the ball with the bat.
2. Proprioception - how hard to bounce the ball.
3. Coordination – bouncing.
4. Spatial awareness - how high to bounce the ball.
5. Hand-eye coordination - bouncing with a bat.

WEEK 8

Activity 1: Aiming & catching

- Place a block with a pole in it about 1.5m away.
- The child has to throw some small rings over the pole.
- The amount of chances they had, is the amount of times they must catch the bean bag from the student.

Progression for this activity:

- Move the pole further away.
- Use the swimming rings.

Underlying focusses and reasoning:

Throwing a ring over an upright pole, makes the surface area very small. There is a small room for error. The children also have to count how many times they had tried, in order to know how many times they have to catch a bean bag.

The underlying focusses to this activity:

1. Motor planning - throwing, counting and catching a bean bag.
2. Proprioception - how hard to throw the ring.
3. Number recognition - counting the amount.
4. Spatial awareness - how far away the pole is.
5. Hand-eye coordination - catching and throwing.

Activity 2: Static and dynamic balance

- Scatter bean bags out on the floor generally making a straight line.
- Place pictures on the other side.
- The children have to walk over the bean bags to collect the pictures.
- The student will take a bean bag away after every round.

Progression for this activity:

- Blow a whistle from time to time.
- The children have to freeze as they are.

Underlying focusses and reasoning:

The reason why the pictures need to be picked up, is because during the dynamic balance the child has to stop, bend down (very hard whilst staying on the line) pick up the pictures and continue walking.

The underlying focusses to this activity:

1. Motor planning - collecting the pieces.
2. Spatial awareness - walking to the pictures and picking it up.
3. Static balance - stopping and bending.
4. Directionality - zig-zag walking.
5. Proprioception - walking heel-to-toe.

Activity 3: Object control- rolling and throwing

- Use 4 ropes to make a long path (2 on each side, parallel to each other).
- The child has to roll a yellow ball through the lines without touching the lines.
- They have to run to catch their ball on the other end.
- Hang something from a tree.
- The child then has to hit the item that is hanging with the ball.

Progression for this activity:

- Make the path narrower and use a tennis ball.
- Make the hanging item smaller.

Underlying focusses and reasoning:

Combining more than one aspect and focus into an activity, helps the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - many activities.
2. Hand-eye coordination - rolling the ball and hitting the hanging item.
3. Spatial awareness - rolling the ball between the lines.
4. Bilateral coordination - catching and rolling.

Activity 4: Object control – bouncing and kicking

- Place four hula hoops in a vertical line.
- The child has to bounce the ball consecutively in every hula.
- At the end, they have to kick over a ball placed on a beacon.

Progression for this activity:

- Move the ball on the beacon further away.
- Use a ladder to bounce the ball in.
- Use one hand to bounce the ball – do both hands.

Underlying focusses and reasoning:

Adding more than one action to an activity increases the stress on motor planning. The walking whilst bouncing makes the brain focus on two different actions.

The underlying focusses to this activity:

1. Motor planning - walking and bouncing.
2. Hand-eye coordination - bouncing and catching.
3. Foot-eye coordination – kicking.
4. Spatial awareness - stepping next to the hula hoop on the outside.
5. Foot-eye coordination - stepping next to the correct hula hoop and kicking.

WEEK 9

Activity 1: Aiming & catching

- Place a block with a pole in, about 1.5m away.
- The child has to throw some small rings over the pole.
- The amount of chances they had, is the amount of times they must catch the bean bag from the student.

Progression for this activity:

- Move the pole further away.
- Use the swimming rings.

Underlying focusses and reasoning:

Throwing a ring over an upright pole, makes the surface area very small. There is a small room for error. The children also have to count how many times they had tried, in order to know how many times they have to catch a bean bag.

The underlying focusses to this activity:

1. Motor planning - throwing, counting and catching a bean bag.
2. Proprioception - how hard to throw the ring.
3. Number recognition - counting the amount.
4. Spatial awareness - how far away the pole is.
5. Hand-eye coordination - catching and throwing.

Activity 2: Static and dynamic balance

- Set out the twister mat.
- The student will call the colours and the children have to complete the actions.
- Use only feet.
- Make sure they stand on one leg, as well as both legs (right and left).

Progression for this activity:

- Put the hands in as well.
- Throw bean bags on some dots and they are not allowed to use them.
- Make it tricky and difficult.

Underlying focusses and reasoning:

Playing a game is fun for the children. In order to play this game they have to stand in a certain position for a long time and not fall. Adding the hands will increase the stabilizing in this position.

The underlying focusses to this activity:

1. Motor planning - planning the body movements.
2. Spatial awareness - where the dots are.
3. Colour recognition - colour dots.
4. Body concept - body parts.
5. Laterality - left and right hand, and feet.
6. Total body strength and endurance - stabilizing in a position.
7. Proprioception – ankles.

Activity 3: Object control- rolling and throwing

- Use 4 ropes to make a long path (2 on each side, parallel to each other).
- The child has to roll a yellow ball through the lines, without touching the lines.
- They have to run to catch their ball on the other end.
- Hang something from a tree.
- The child then has to hit the item that is hanging with the ball.

Progression for this activity:

- Make the path narrower together and use a tennis ball.
- Make the hanging item smaller.

Underlying focusses and reasoning:

Combining more than one aspect and focus into an activity, helps the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - many activities.
2. Hand-eye coordination - rolling the ball and hitting the hanging item with the ball.
3. Spatial awareness - rolling the ball between the lines.
4. Bilateral coordination - catching and rolling.

Activity 4: Object control – bouncing and kicking

- Place four hula hoops in a vertical line.
- The child has to bounce the ball consecutively in every hula hoop.
- At the end, they have to kick over a ball placed on a beacon.

Progression for this activity:

- Move the ball on the beacon further away.
- Use a ladder to bounce the ball in.
- Use one hand to bounce the ball – do both hands.

Underlying focusses and reasoning:

Adding more than one action to an activity increases the stress on motor planning. The walking whilst bouncing makes the brain focus on two different actions.

The underlying focusses to this activity:

1. Motor planning - walking and bouncing.
2. Hand-eye coordination - bouncing and catching
3. Foot-eye coordination – kicking.
4. Spatial awareness - stepping next to the hula hoop on the outside.
5. Foot-eye coordination - stepping next to the correct hula hoop and kicking.

WEEK 10

Activity 1: Aiming & catching

- Two children will stand a meter apart.
- Both children will have orange net bats in their hands.
- The children have to throw and catch the bean bag, (at one another), by only using the bat.
- After about ten time, place a picture on the wall.
- The children have to throw the bean bag with the bat and hit the picture.

Progression for this activity:

- Increase the distance between the children.
- Increase the distance between the children and the wall.

Underlying focusses and reasoning:

The net bat is a progression from the wooden bat. It is more difficult to throw with the net bat. The children have to switch from throwing to one another, and to throwing at a picture higher on the wall.

The underlying focusses to this activity:

1. Motor planning - catching a bean bag with a net bat.
2. Proprioception - how hard to throw the bean bag.
3. Coordination - using the bat.
4. Spatial awareness - hitting the picture (picture higher on the wall).
5. Hand-eye coordination - catching and throwing.

Activity 2: Balance – static and dynamic

- With all the ropes make a curly maze.
- The children have to walk on the ropes.
- While they are walking the student will clap her hands.
- The children then have to freeze.

Progression for this activity:

- Walk heel-to-toe.
- Stand on one leg whilst freezing.
- The student has to give a command as to which leg to stand on (left and right).
- Increase the standing on one leg to 10 seconds, 15 seconds, 20 seconds and 30 seconds.

Underlying focusses and reasoning:

Balancing on the ropes makes the balancing surface very small and the curls let them change direction. The children completing the activity together also makes it more difficult as they need to try to avoid one another.

The underlying focusses to this activity:

1. Motor planning - stopping and starting to the clapping of the hands.
2. Reaction time - stopping and starting to the clapping of the hands.
3. Directionality - changing directions.
4. Spatial awareness - not bumping into the other child.
5. Lower body strength - standing on one leg.

Activity 3: Object control - underarm roll, dribble and kicking

- Put 5 medium cones in a straight line on the floor - about 1m apart.
- The children have to stand 2m away from the cones (children stand and cones are horizontal to them).
- Tell the child which cone to roll over.
- The child has to aim, and roll that specific cone over.
- Then they have to stand in line with the cones, and bounce the ball around every cone.
- Use yellow balls.

Progression for this activity:

- Kick the ball instead of rolling the ball.
- Dribble the ball through the cones.
- Use small netballs.

Underlying focusses and reasoning:

Combining more than one aspect and focus into an activity help the children to plan their actions and movements. Giving them a specific cone to roll at, eliminates the possibility of rolling over a cone by accident.

The underlying focusses to this activity:

1. Motor planning - many activities in a line.
2. Hand-eye coordination - dribbling and rolling.
3. Spatial awareness - through cones.
5. Bilateral coordination - bouncing and rolling.

Activity 4: Object control - bouncing

- Place the Lily pads in a straight line.
- They have to bounce the ball onto the Lily pads.
- They can start by bouncing and catching, but they have to try not to catch the ball.

Progression for this activity:

- Place the Lily pads in a zig-zag line.

Underlying focusses and reasoning:

Adding more than one action to an activity increases the stress on motor planning. The walking whilst bouncing makes the brain focus on two different actions.

The underlying focusses to this activity:

1. Motor planning - walking and bouncing.
2. Hand-eye coordination - bouncing and catching.
3. Foot-eye coordination – kicking.
4. Spatial awareness - stepping next to the lily pad.
5. Foot-eye coordination - stepping next to the correct lily pad and kicking.

WEEK 11

Activity 1: Aiming & catching

- Scatter out 10 beacons.
- Place a colour mat in front of the scattered-out beacons.
- A child has to throw at the beacons with bean bags.
- Every time a beacon is hit, the other child has to take it away.
- Keep going until all the beacons are taken away.

Progression for this activity:

- Move the colour mat further away.
- Use the swimming rings to throw at the beacons.

Underlying focusses and reasoning:

The reason why the children have to throw at the beacons, is because the beacons are a small object. Using the swimming rings makes the throwing more unstable, as the swimming ring does not necessarily go where you want it to go.

The underlying focusses to this activity:

1. Proprioception - how hard to throw the bean bag.
2. Spatial awareness - how far to throw the bean bag.
3. Hand-eye coordination – throwing.
4. Motor planning - throwing and taking a beacon away.

Activity 2: Dynamic and static balance

- Make a hop scotch course with the agility squares.
- Put a number in every block.
- They have to complete the hop scotch course.
- In the single squares jump with two legs in a square.
- Say a number, and the child has to skip that square and jump over it.

Progression for this activity:

- In the single squares, jump with one leg.
- Make sure that you have two single squares after one another, so that they hop on one leg twice.

Underlying focusses and reasoning:

Hop scotch is great for motor planning and coordination. Adding the numbers will not only increase the difficulty, but will let the children focus on more than one aspect.

The underlying focusses to this activity:

1. Motor planning – jumping.
2. Proprioception - ankle joints.
3. Spatial awareness - jumping form one square to another.
4. Directionality - skipping some of the squares.
5. Number recognition - numbers in squares.
6. Laterality - left and right foot.

Activity 3: Object manipulation- rolling and throwing

- Use a table and a basket.
- The child has to roll the ball on the table so that it lands in the basket under the table.
- Use a long table with a yellow ball.
- After this, they have to throw the ball in the basket by throwing the ball overhand.

Progression for this activity:

- Use a smaller ball and a smaller bucket.
- For the throwing, move the basket further away.

Underlying focusses and reasoning:

The rolling into the basket is much more difficult that just rolling it through something, as you work with different levels. A lot more is required to do this activity. Throwing overhand is much harder and less controlled.

The underlying focusses to this activity:

1. Motor planning - trying roll the ball into the basket.
2. Proprioception - how hard to roll the ball.
3. Spatial awareness - how far to roll the ball.
4. Hand-eye coordination - rolling and throwing.
5. Visual motor integration - seeing the basket and then creating the correct response to get the ball in.

Activity 4: Object control – bouncing and kicking

- Place two blue sponges on the floor.
- The children have to dribble the yellow balls around the sponges with their hands.
- After doing that, they have to lie down on the sponges on their backs.
- The student will throw the ball at them and they have to kick the ball.

Progression for this activity:

- The children have to dribble the ball with one hand (both hands).

Underlying focusses and reasoning:

Combining more than on aspect and focus into an activity helps the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - more than one aspect to complete.
2. Hand-eye coordination – dribbling.
3. Foot-eye coordination – kicking.
4. Spatial awareness - knowing where the ball is when thrown to them, while lying on their backs.
6. Core strength - kicking the ball while lying on their backs.

WEEK 12

Activity 1: Object control - underarm roll, dribble and kicking

- Put 5 medium cones in a straight line on the floor - about 1m apart.
- The children have to stand 2m away from the cones (children stand and cones are horizontal to them).
- Tell the child which cone to roll over.
- The child has to aim and roll that specific cone over.
- They have to stand in line with the cones and bounce the ball around every cone.
- Use yellow balls.

Progression for this activity:

- Kick the ball instead of rolling the ball.
- Dribble the ball through the cones.
- Use small netballs.

Underlying focusses and reasoning:

Combining more than on aspect and focus into an activity helps the children to plan their actions and movements. Giving them a specific cone to roll at, eliminates the possibility of rolling over a cone by accident.

The underlying focusses to this activity:

1. Motor planning - many activities in a line.
2. Hand-eye coordination - dribbling and rolling.
3. Spatial awareness - through cones.
4. Bilateral coordination - bouncing and rolling.

Activity 2: Balance – static and dynamic

- Give every child a twister mat.
- They have to stand with their feet on the feet of the mat.
- The student will give those commands, for e.g.: left foot red (they have to stand on the one leg then go back to the feet of the mat).

Progression for this activity:

- Do two legs at a time.
- Use bilateral coordination for e.g.: switch legs, right foot red and left foot red, they have to hop and land on it).

Underlying focusses and reasoning:

The reason why the twister mat was selected, is because of the different colour dots and the tactile surface. This gives another dimension to balancing. The child will not only focus on the balancing but on the colours as well.

The underlying focusses to this activity:

1. Motor planning - planning the movement and sequence.
2. Spatial awareness - stepping on the one dot only.
3. Visual motor integration - seeing the dot and jumping on it.
4. Tactile stimulation – mat.
5. Colour recognition – dots.
6. Laterality - left and right foot.

Activity 3: Object manipulation- rolling and throwing

- Set out nine cones in a pyramid.
- The children have to throw at the pyramid.
- If they hit a cone, the student has to take away that cone.
- Keep going till the cones were all hit.

Progression for this activity:

- Do the same but let them roll the ball.

Underlying focusses and reasoning:

Throwing at a set of cones is unstable. In the end when there is only a few cones left, it is very difficult to aim and hit a certain one.

The underlying focusses to this activity:

1. Motor planning - many activities.
2. Hand-eye coordination - rolling the ball.
3. Spatial awareness - rolling the ball.
4. Bilateral coordination - catching and rolling

Activity 4: Object control – bouncing and kicking

- Place two beach balls on two cones, about 2m apart.
- Let two children stand next to a ball.
- One child has to bounce the ball 5 times, put the ball back on the cone and then try to kick the other child's ball from his cone.
- They can reset and the other child can have a turn.

Progression for this activity:

- The children have to dribble the ball with one hand (do both hands).
- Put the cones further away.

Underlying focusses and reasoning:

Combining more than on aspect and focus into an activity helps the children to plan their actions and movements.

The underlying focusses to this activity:

1. Motor planning - more than one aspect to complete.
2. Hand-eye coordination - bouncing and catching.
3. Foot-eye coordination – kicking.
4. Spatial awareness - knowing how far away the other child is.