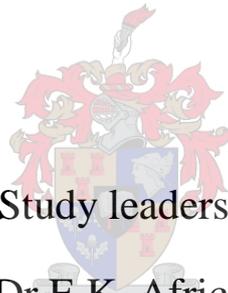


A MOTOR SKILLS DEVELOPMENT  
PROGRAMME FOR 10 TO 12 YEAR-OLD  
CHILDREN

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Thesis submitted in partial fulfilment of the requirements for the  
degree of Master of Sport Science (Kinderkinetics)



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March 2015

To those who believed in me

## DECLARATION

I herewith declare that the content of this thesis is my own original work and has not been undertaken in its entirety or in part at any other University with the intention of obtaining a degree.

18 February 2013

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Date

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## SUMMARY

Many children experience developmental problems without being aware thereof. In a school setting these developmental delays mostly remain unnoticed and are scarcely remediated sufficiently, if at all. Children with developmental deficits often experience movement difficulties and are labelled as clumsy, sloppy or having two left feet. The development of, and proficiency in specific motor skills have been found to play a critical role in the participation of physical activity in children, as well as the maintenance of health and well-being later in life, when entering adulthood. There are, however, countless other factors that affect the optimal development of motor skills and physical activity participation. One such factor is ascribed to instances where children experience problems associated with their environment or the circumstances in which they grow up. Poor socio-economic circumstances and a culturally poor environment, lacking sufficient developmental opportunities, may hinder a child's motor skills development and skill learning to such an extent that they cannot reach their full developmental potential.

Research suggests that the school environment can provide ample opportunity for the development of motor skills and that all schools should consider implementing motor skills development programmes during the Physical Education (PE) time slots. The mastery of motor skills may influence and benefit the participation in various school sports and may also enhance the ability of children to learn and master new and more complex movement skills within and outside the classroom environment. Thus, due to the fact that children spend a great part of their day at school and in the classroom setting, teachers, especially those facilitating PE, have the opportunity to play a vital role in the acquisition and mastery of important motor skills and subsequently affect the physical activity and developmental future of children.

The purpose of this study was to design and implement a motor skills development programme to improve the balance and bilateral coordination of children between the ages of 10 and 12 years in the Stellenbosch region. Two existing classes, from a previously disadvantaged school, were recruited and randomly selected as an experimental (n=35) and control group (n=32). The children completed the Short Form as well as all the Long Form activities for the balance and bilateral coordination subtests of the Bruininks-Oseretsky Test of Motor Proficiency-2 (BOT-2). This was done to provide an overview of the overall motor proficiency and more specifically the level of

balance and bilateral coordination. A 12-week motor skills development programme, with a specific focus on balance and bilateral coordination, was designed and implemented by the researcher. The effect of this programme was determined by statistically analysing and comparing the pre- and post-test results with the use of Statistica 2010. The main findings of this study indicated that the intervention programme had a positive, although not statistically significant, effect on the overall motor proficiency and balance and significantly improved bilateral coordination.

This study suggests that some of the children, between the ages of 10 and 12, from a previously disadvantaged school in the Stellenbosch region and with access to an established school PE programme, experienced movement difficulties. Consequently, there is great room for improvement and motor skill development in these children. This study can, therefore, be a stepping stone into future research regarding further motor skills research in primary school children, the implementation of expanded motor skills intervention programmes and to improve all the motor skills as opposed to selected motor skills as in this study.

## OPSOMMING

Ontwikkelingsprobleme word, sonder dat 'n mens daarvan bewus is, deur vele kinders ervaar. In die skool-omgewing bly hierdie ontwikkelingsagterstande meestal ongesiens en word min kinders, indien enige, voldoende geredieer. Kinders met ontwikkelingsagterstande ervaar gereeld bewegingsprobleme en word as lomp, slordig of as iemand met twee linkervoete beskryf. Daar word beweer dat die ontwikkeling van, en vaardigheid in, spesifieke motoriese vaardighede van kinders 'n kritieke rol in hul deelname aan fisieke aktiwiteit, asook die onderhoud van gesondheid en welstand tydens volwassenheid, speel. Daar is egter talle ander faktore wat die optimale motoriese ontwikkeling en fisieke aktiwiteit deelname van kinders kan beïnvloed. 'n Voorbeeld van so 'n faktor word toegeskryf aan gevalle waar kinders probleme, wat met hulle omgewing of die omstandighede waarin hul grootword geassosieer word, ervaar. Swak sosio-ekonomiese omstandighede en 'n kultureel-arme omgewing, wat tekort skiet aan voldoende ontwikkelingsgeleenthede, mag die motoriese ontwikkeling en die aanleer van nuwe vaardighede tot so 'n mate inhibeer dat kinders nie in staat is om hulle volle ontwikkelingspotensiaal te bereik nie.

Navorsing dui daarop dat die skoolomgewing vele geleenthede vir die ontwikkeling van motoriese vaardighede kan bied en dat daar onderneem moet word om motoriese vaardigheid-ontwikkelingsprogramme tydens Liggaamlike Opvoeding (LO) periodes te implementeer. Die bemeestering van motoriese vaardighede mag die deelname aan verskeie skoolsporte beïnvloed en bevoordeel, asook die vermoë om nuwe en meer komplekse bewegingsvaardighede binne en buite die klasomgewing aan te leer en te bemeester, bevorder. Dus, aangesien kinders 'n groot gedeelte van hul dag by die skool en in 'n klasomgewing deurbring, het onderwysers, veral die wat LO fasiliteer, die geleentheid om 'n noodsaaklike rol in die aanleer en bemeestering van belangrike motoriese vaardighede, en vervolgens fisieke aktiwiteit, asook die toekomstige ontwikkeling van kinders te beïnvloed.

Die doel van hierdie studie was om 'n motoriese vaardigheid-ontwikkelingsprogram, wat balans en bilaterale koördinasie bevorder, vir 10 tot 12-jarige kinders in die Stellenbosch omgewing te ontwerp en implementeer. Twee bestaande klasse vanuit 'n voorheenbenadeelde skool was gewerf en lukraak verkies as 'n eksperimentele- (n=35) en kontrolegroep (n=32). Kinders het die kort vorm- asook al die lang vorm-aktiwiteite vir balans en bilaterale koördinasie sub-toetse van die *Bruininks-Oseretsky Test of*

*Motor Proficiency-2* (BOT-2) voltooi. Hierdie toetse is afgelê om 'n oorsig van die algehele motoriese vaardigheidsvlak, en meer spesifiek die vlak van balans en bilaterale koördinasie, te bepaal. 'n 12-week motoriese vaardigheid-ontwikkelingsprogram, met 'n spesifieke fokus op balans en bilaterale koördinasie, is deur die navorser ontwerp en geïmplementeer. Die effek van hierdie program is bepaal deur die pre- en post-toets resultate met behulp van Statistica 2010 statisties te analiseer en vergelyk. Die primêre bevindinge van hierdie studie dui daarop dat die intervensieprogram 'n positiewe, alhoewel nie statisties beduidende, effek op die bevordering van algehele motoriese vaardigheidsvlak en balans, asook 'n statisties beduidende effek op bilaterale koördinasie gehad het.

Hierdie studie dui daarop dat kinders, tussen die ouderdomme van 10 en 12, vanuit 'n voorheenbenadeelde skool in die Stellenbosch omgewing en wat toegang tot 'n gevestigde LO program het, steeds bewegingsprobleme ervaar. Dus, is daar groot ruimte vir die verbetering en ontwikkeling van motoriese vaardighede by hierdie kinders. Hierdie studie kan dus as 'n beginpunt vir toekomstige navorsing in verdere motoriese vaardigheds-navorsing van laerskool kinders, die implementering van uitgebreide motoriese intervensieprogramme, asook die bevordering van alle motoriese vaardighede in vergelyking met geselekteerde motoriese vaardighede soos in die huidige studie dien.

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# INDEX

	<b><u>P.</u></b>
<b>DECLARATION</b> .....	i
<b>SUMMARY</b> .....	ii
<b>OPSOMMING</b> .....	iv
<b>ACKNOWLEDGEMENTS</b> .....	vi
 <b>CHAPTER ONE</b>	
<b>PROBLEM STATEMENT</b>	
Introduction .....	1
Problem statement .....	4
Meaning of the study .....	4
Methodology .....	5
Statistical analysis .....	5
Limitations .....	6
Chapter outline .....	7
 <b>CHAPTER TWO</b>	
<b>LITERATURE REVIEW</b>	
Introduction .....	8
Motor development .....	10
The relationship between motor skills & physical activity participation .....	16
Physical Education (PE) .....	22
Influencing factors of physical activity participation .....	23
Motor skill assessment .....	24
Balance .....	26
Bilateral coordination .....	30

Motor skills development programme.....	31
---	----

**CHAPTER THREE**

**METHODOLOGY**

Introduction.....	35
Research design.....	37
Problem statement .....	38
Subjects.....	38
Inclusion and exclusion criteria.....	39
Place of study.....	39
Statistical analysis .....	39
Ethical approval .....	40
Testing procedures .....	40
Pre-test .....	41
Motor proficiency test .....	41
Scoring of the BOT-2.....	45
Standard scores .....	45
Confidence intervals.....	46
Percentile rank .....	46
Descriptive categories .....	46
Intervention: Motor skills development programme .....	51
Post-test.....	53

**CHAPTER FOUR**

**RESULTS AND DISCUSSION**

Introduction.....	54
Demographic profiling .....	56

Long Form .....	57
Balance .....	57
Bilateral coordination.....	59
Short Form .....	63
Overall motor proficiency .....	63
Standard score .....	63
Percentile rank.....	65
Balance and bilateral coordination .....	67
Other subtests .....	69
Fine motor precision.....	69
Fine motor integration .....	71
Manual dexterity .....	73
Running speed and agility .....	76
Upper-limb coordination .....	77
Strength.....	80
Summary of results.....	82
Long Form.....	82
Balance .....	82
Bilateral coordination .....	82
Short Form.....	83
Overall motor proficiency (standard score and percentile rank) .....	83
Balance and bilateral coordination.....	83
Other subtests.....	83

## **CHAPTER FIVE**

### **CONCLUSIONS AND RECOMMENDATIONS**

Introduction.....	85
-------------------	----

Conclusions.....	85
Objective one.....	85
Objective two.....	86
General summary .....	87
Recommendations .....	88
<b>LIST OF REFERENCES .....</b>	<b>90</b>
<b>APPENDICES</b>	
Appendix A: Parent consent form .....	100
Appendix B: Child assent form.....	104
Appendix C: Child sport questionnaire .....	107
Appendix D: Motor skills development programme outline and activity descriptions .....	109
Appendix E: Research approval letter from the Western Cape Education Department (WCED) .....	200

#### **LIST OF ABBREVIATIONS**

BOTMP:	Bruininks-Oseretsky Test of Motor Proficiency
BOT-2:	Bruininks-Oseretsky Test of Motor Proficiency-2
CAPS:	Curriculum and Assessment Policy Statement
CEMIS:	Centralised Educational Information System
CTRL:	Control
DBE:	Department of Basic Education
DCD:	Developmental Coordination Disorder
EXP:	Experimental
FMS:	Fundamental Motor Skills
FMV:	Fundamentele Motoriese Vaardighede
LO:	Liggaamlike Opvoeding

MABC:	Movement Assessment Battery for Children
MABC-2:	Movement Assessment Battery for Children-2
PDMS-2:	Peabody Developmental Motor Scales-2
PE:	Physical Education
PSRA:	Princeton Survey Research Associates
SEM:	Standard Error of Measurement
TGMD-2:	Test of Gross Motor Development-2
TMC:	Total Motor Composite
TRS:	Teen Risk Screen
US:	United States
WCED:	Western Cape Education Department
WHO:	World Health Organisation

# LIST OF FIGURES

	<b><u>P.</u></b>
2.1 Phases of motor development .....	12
3.1 Recommended set-up of the BOT-2 running course.....	44
4.1 Balance between the experimental and control group and from pre- to post-test (Long Form).....	59
4.2 Bilateral coordination between the experimental and control group and from pre- to post-test (Long Form) .....	61
4.3 Bilateral coordination between boys and girls of the experimental and control group and from pre- to post-test (Long Form).....	62
4.4 Standard scores of the motor proficiency between the experimental and control group and from pre- to post-test (Short Form).....	65
4.5 Percentile rank between the experimental and control group and from pre- to post-test (Short Form).....	67
4.6 Number of observations in the balance activities, for the experimental and control group, during the pre- and post-test (Short Form).....	68
4.7 Number of observations in the bilateral coordination activities, for the experimental and control group, during the pre- and post-test (Short Form) .....	69
4.8 Number of observations in the drawling lines through paths (crooked) activity, for the experimental and control group, during the pre- and post-test (Short Form) .....	71
4.9 Number of observations in the folding paper activity, for the experimental and control group, during the pre- and post-test (Short Form).....	71
4.10 Number of observations in the copying a square activity, for the experimental and control group, during the pre- and post-test (Short Form) .....	73
4.11 Number of observations in the copying a star activity, for the experimental and control group, during the pre- and post-test (Short Form).....	73
4.12 Transferring pennies activity between the experimental and control group and from pre- to post-test (Short Form) .....	74

4.13	Transferring pennies activity between boys and girls of the experimental and control group and from pre- to post-test (Short Form).....	76
4.14	One-legged stationary hop activity between the experimental and control group and from pre- to post-test (Short Form).....	77
4.15	Number of observations in the dropping and catching a ball activity, for the experimental and control group, during the pre- and post-test (Short Form) .....	79
4.16	Number of observations in the dribbling a ball (alternating hands) activity, for the experimental and control group, during the pre- and post-test (Short Form)	79
4.17	Number of observations in the push-up (full) activity, for the experimental and control group, during the pre- and post-test (Short Form).....	80
4.18	Sit-up activity between the experimental and control group and from pre- to post-test (Short Form).....	82

# LIST OF TABLES

	<b><u>P.</u></b>
2.1	Movement stages children progress through ..... 11
2.2	Classification of the different fundamental motor skills ..... 14
2.3	Three phases of fundamental motor skills performance..... 15
2.4	Phases of development before school entry ..... 19
2.5	Summary of appropriate physical activity guidelines for elementary school children ..... 20
2.6	Recommendations to promote physical activity and physical fitness in Physical Education ..... 21
2.7	Emergence of static and dynamic balance ..... 27
2.8	Suggested content of movement programmes for young children ..... 32
2.9	Guidelines for the use of equipment during movement programmes ..... 33
3.1	Tuckman’s five characteristics of problem solving (Tuckman, 1978)..... 35
3.2	Different types of research..... 36
3.3	Motor area composites of the BOT-2..... 42
3.4	Subtests of the BOT-2 ..... 42
3.5	Descriptive categories used during the interpretation of BOT-2 results ..... 46
3.6	Steps in the scoring process of the BOT-2 ..... 48
3.7	Summarised outline of the motor skills development programme ..... 52
4.1	Balance means, standard deviations and mean differences for the experimental and control group between pre- and post-tests (Long Form)..... 58
4.2	Bilateral coordination means, standard deviations and mean differences for the experimental and control group between pre- and post-tests (Long Form)..... 60
4.3	Standard score means, standard deviations and mean differences for the motor proficiency of the experimental and control group between pre- and post-tests (Short Form)..... 64

4.4 Percentile rank means, standard deviations and mean differences for the experimental and control group between pre- and post-tests (Short Form) ..... 66

## CHAPTER ONE

### PROBLEM STATEMENT

#### INTRODUCTION

*“It is through the body that man can be himself and can become himself. It is also through the body that man can orientate himself, can move, explore and conduct dialogue with the world. Through this body man also experiences his world, accomplishes self-realisation and exists”* (Smith, 1991:176).

As humans, each individual is born with a genetic code that makes him or her who they are. This code is also referred to as a person’s nature. Nature is defined as the potential each individual is born with, to achieve his or her optimal physical structure and level of skill. However, when an individual is born with, for example, the potential for music brilliance but is never exposed to a musical instrument, that potential will never be realised or nurtured. Thus, it is nurture, also known as the environment in which humans develop, that determines the extent to which each individual fulfils their optimal developmental potential (Faure & Richardson, 2011:71,72). The first two years of a baby’s life are filled with countless opportunities for movement and play to ensure the optimal development. This includes the development of the brain, limbs, senses, reflexes, social and language skills, feelings and thought processes (De Jager, 2009:backcover).

According to De Jager (2009:13), the brain of baby in utero is developed well enough to survive within the safe and nourishing environment of the womb. However, after birth, the baby’s brain is not developed sufficiently enough to survive and function in a meaningful manner in the real world. Thus, these skills need to be taught and developed. A similarity lies between a new-born animal and a baby in their struggle to get up and start moving. It is in this struggling to get up that they develop all the necessary skills and abilities that will enable them to survive outside the safe environment of their mother’s womb that they have known for approximately the past nine months.

Humans differ from other species in various ways. These include: differences on a spiritual level, intellectual level and on a physical level. Within the physical level, there are four specific developmental areas that distinguish human beings from other species. These physical developmental areas are known as: gross motor development, fine motor

development, language development and social and emotional development. Human beings are the only species that use the upright standing posture as their primary position for any interaction with their environment and the rest of the outside world. The development and maintenance of this upright posture greatly requires gross motor development. The term gross motor development is used to describe the large movements performed by the body. During the first year of a baby's life, the primary goal of the gross motor system is to achieve successful control against the pull of gravity, transforming the baby from a helpless, curled-up bundle through the stages of rolling, sitting and crawling, to the mobile toddler after approximately one year (Faure & Richardson, 2011:69). A child experiencing gross motor difficulties may appear to be clumsy or have difficulty with tasks such as walking, running or riding a bicycle (Bizos, 2009:36).

Similarly, when observing fine motor development, humans have wonderfully and uniquely designed hands that enable the precise manipulation of objects of varying shapes and sizes. Furthermore, humans possess the ability to coordinate their hands and eyes (eye-hand coordination) for precise tasks such as writing. This requires the development of fine motor skills which include refining the movements of the arms and hands and fingers (Faure & Richardson, 2011:69,70). A child with fine motor difficulty may struggle to perform tasks such as completing puzzles, cutting out with scissors or building blocks. Writing is especially a problem for these children as they may not always be able to write as fast as they are thinking. They may also experience difficulty with holding the pen in the correct position or producing letters in the correct manner. Children with fine motor problems fatigue easily as they struggle with further aspects such as shapes, spacing and position. A child experiencing visual-motor difficulties will struggle with any task that requires the eyes and hands to work together. Examples of these tasks may include catching a ball or hitting a nail with a hammer (Bizos, 2009:36).

According to Pienaar (2009:50), physical development, including motor development, is crucial for the total development and well-being of all children. Thus, it is vital that physical development, more specifically motor development, is addressed during the early years of development. "Babies can only learn what they have experienced" (De Jager, 2009:23). Previous theorists suggest that the way an individual learns and develops is influenced by everything that happens to him or her. Thus, children will develop differently according to their differing experiences (Harcombe, 2009:64).

Infancy and childhood are regarded as and defined by dynamic periods of growth and change. Neurodevelopmental and physical growth occur in an orderly and predictable fashion that is intrinsically determined. Motor skills progress from cephalic to caudal; from proximal to distal; and from generalised, stimulus-based reflexes to specific, goal-orientated reactions that gradually become more precise as the child grows and develops (Gerber *et al.*, 2010:267). The order and duration of all the developmental phases is crucial to every individual's future performance (De Jager, 2009:53). The environment, however, may cause many challenges to the physical and motor skill development of children as seen, especially, in the diversity of the South African living conditions. These challenges may include poor socio-economic circumstances such as malnutrition, over feeding, disease, trauma and violence (Pienaar, 2009:50).

These neurodevelopmental sequences often are described in terms of developmental milestones. Milestones are used to provide a general framework for observing and monitoring a child over a period of time. Milestones should be observed and analysed within the determining context of a child's history, growth and a physical examination to identify a child that may be at risk for developmental delays. A thorough understanding of the normal or typical sequence of development in all domains (gross motor, fine motor, problem-solving, receptive language, expressive language and social-emotional) allows the researcher to formulate an accurate overall impression of a child's true developmental status. However, no researcher or medical professional should solely rely on their knowledge of milestones to identify children who have developmental deficits. Every child is a unique individual and will not develop at the precise rate as another child of a similar age. Thus, milestones should be regarded as guidelines and not as the sole assessment of the physical and motor skill development status in babies (Gerber *et al.*, 2010:267).

The development and refinement of motor skills is regarded as extremely important as this determines the level of motor control and integration within each child. These aspects later affect each individual's ability to concentrate, delay gratification (wait), plan and carry out tasks to completion (De Jager, 2009:51), therefore, affecting the future learning and development of new skills. The role that motor ability plays in the total development of children has been considered so imperative by previous researchers that many of them have developed and designed programmes to improve the motor ability of children. Through these programmes they attempt to enhance the

learning experience and subsequently the development of children. Some researchers have even worked from the premise that a child's motor ability forms the foundation for all types of learning encountered in life (Derbyshire, 1991B:386).

According to Logan *et al.* (2011:305), children do not develop motor skills naturally through innate maturational processes. Thus, it is vital that these skills are learnt, practised and reinforced from an early age. Research indicates that motor skill interventions are found to be effective in the improvement of motor skills in children. Logan *et al.* (2011:305,306) also point out that there is a need for research to understand the effectiveness of motor skill interventions, more specifically to determine the overall effect of motor skill intervention programmes on the improvement of motor skill competence in children, as well as to determine the effectiveness of motor skill interventions comparative to free play in the improvement motor proficiency.

Accordingly, the main aim of the current study was to design and implement a motor skills development programme with the focus on developing and improving the balance and bilateral coordination of children between the ages of 10 and 12 years in the Stellenbosch region.

## **PROBLEM STATEMENT**

The main purpose of the current study will be to design an appropriate motor skills development programme that can be implemented in any primary school to improve selected motor skills of children between the ages of 10 and 12 years-old.

This study will investigate the following specific objectives:

- To determine the current status of motor proficiency in the selected group according to the Bruininks-Oseretsky Test of Motor Proficiency-2 (BOT-2)
- To improve the balance and bilateral coordination of children between the ages of 10 and 12 years-old

## **MEANING OF THIS STUDY**

Logan *et al.* (2011:305), suggests that early childhood education centres should implement planned movement programmes as a strategy to promote the necessary motor skills development of children. Thus, this study designed a motor skills development programme to improve selected motor skills of children, including balance and bilateral coordination, which plays an important role in the execution of many daily activities (Bruininks & Bruininks, 2005:6). This motor skills development programme

was designed in such a manner that it may be used and implemented by teachers during the weekly Physical Education (PE) lessons of 10- to 12-year-old children in a primary school setting. The correct implementation of this motor skills development programme may also be used to enhance the development of balance and bilateral coordination skills of children and may serve as a tool to indicate the types of activities and skill area that children of this age may be experiencing difficulty with. When children at this age experience constant difficulty with some of the basic balance and bilateral coordination activities in this programme, they should be referred to professionals for further evaluation as these difficulties may be inhibiting further learning and development as well as performance in other skill areas (Derbyshire, 1991B:386).

## **METHODOLOGY**

The study can be classified as a quasi-experimental design. Children (N=67) between the ages of 10 and 12 years-old were recruited. Two existing classes were recruited from a previously disadvantaged school in the Stellenbosch region and were randomly selected either as the experimental (n=35) or control group (n=32).

The Bruininks-Oseretsky Test of Motor Proficiency-2 (BOT-2) was administered during the pre- and post-test to obtain a screening picture of the children's motor proficiency levels and to determine whether there were any changes in the skill level of balance and bilateral coordination after the implementation of the motor skills development programme.

The researcher designed and administered a 12-week motor skills development programme (Appendix D) to the experimental group during their usual PE lessons, whilst the control group continued with participation in their usual school PE programme. The focus of this programme was to improve the balance and bilateral coordination of the participants in the experimental group.

An in-depth discussion of the research methodology used during this study is provided in Chapter Three.

### **Statistical analysis**

The statistical analysis of research data was conducted by Prof M. Kidd at the Centre for Statistical Consultation of Stellenbosch University. A three-way mixed model analysis of variance was performed to determine the effects of time, gender and group. The third order interaction effect (time\*group\*gender) was investigated to determine if gender in

any way affected the results, and thereafter the time\*group second order interaction effect was investigated to determine if the intervention (experimental group) showed a different effect to the control group. Descriptive data and summary results are presented as means and standard deviations. Statistical significance was set at ( $p < 0.05$ ).

## **LIMITATIONS**

- Due to the developmental nature of some of the BOT-2 subtests, these subtests produce little variability in the performance of some age groups (Bruininks & Bruininks, 2005:29). This was observed for some of the subtest activities of the BOT-2 Short Form and some of the activities appeared to be too easy during the current study (see Chapter four). Therefore, using the Short Form as the only evaluative tool for motor proficiency, balance and/or bilateral coordination may not have allowed the researcher to establish the true effectiveness of the 12-week motor skills development programme implemented during the current study.
- The original sample size decreased due to factors such as failing, expulsion and children transferring to other schools. This complicated the generalisability of the results.
- Teachers were not always available to assist during Physical Education (PE) lessons, thus maintaining discipline and obtaining full attention and cooperation from the children at all times was a challenge.
- The duration of lessons were limited to 30 minutes per lesson and only two of the three lessons attributed to PE were allowed to be utilised. This made it very difficult to give specific attention to individual children when struggling with certain balance and bilateral coordination tasks.
- Time constraints only allowed for this motor skills development programme to focus on two selected motor skills.
- The incorporation of PE components, according to curriculum specifications and not belonging to balance or bilateral coordination skills, was requested by the PE teacher of the selected school. Thus, the limited time could not be allocated purely to the selected motor skills (examples of these components included target skills, gymnastics skills, etcetera).

## **CHAPTER OUTLINE**

Successive chapters will provide in-depth discussions of previous literature (Chapter two), the research methodology (Chapter three), the report and discussion of research results (Chapter four) and finally the conclusions and recommendations made by the researcher (Chapter five).

## CHAPTER TWO

### LITERATURE REVIEW

#### INTRODUCTION

*“Once a child can sit, stand and walk, adults take for granted that he [she] has the motor development necessary to function in school and everyday activities. But stop and take a closer look at the child”* (Cheatum & Hammond, 2000:8).

Movement is such a natural part of a human’s daily life that the importance thereof is often overlooked. It is, however, vital for the development of a child’s physical, cognitive and social characteristics (Cools *et al.*, 2009:154). Many children who appear to be normal at first sight may experience complications with the acquisition and performance of motor skills. These children may often be described as clumsy (Smyth, 1992:283) and the cause of the impaired motor performance is usually ascribed to an underlying problem that is not always easy to notice. According to Tara (1992:33), a major concern is that the youth of today live increasingly more sedentary lifestyles, which may contribute to the underlying problems that are causing complications to motor skill development and performance. Literature provides more and more evidence that children may even be less physically active than formerly suspected (Jackson *et al.*, 2003:420; Kelly *et al.*, 2004:324; Reilly *et al.*, 2004:211).

Technological pastimes, including watching television, using computers, surfing the internet and using mobile phones, are mostly of a sedentary nature and may seriously impede physical and motor development of children during the early years (Pienaar, 2009:51). Increased television viewing is regarded as a reflection of an unhealthy lifestyle, leading to the reduction of physical activity as well as incorrect dietary choices (Grund *et al.*, 2001:1246). According to Steyn (2007:8), 33% of South African adolescent boys and 42% of girls had a sedentary lifestyle and 22% of boys and 27% of girls spend more than three hours of their day watching television. Other than television, the fascination and interest in computers and electronic games has led to an increase in the time children dedicate to sedentary activities (Andersen *et al.*, 1998:938; Hill & Peters, 1998:1372; Sallis *et al.*, 1999:127). Modern developments and improvements seen in technology and transportation today lead to a decreased need for daily physical activity (Hill & Peters, 1998:1371; Piek *et al.*, 2010:78). Due to the increased dependency on cars and other modes of public transport, populations show low levels of

walking and consequently, decreased physical activity levels (Lumsdon & Mitchel, 1999:276). Decreased physical activity is associated with decreased daily energy requirements and will eventually lead to obesity (Hill & Peters, 1998:1371; Piek *et al.*, 2010:78). Obesity is regarded as a serious condition of being overweight due to high levels of excess body fat. When ingesting more kilojoules than the body needs, all excessive foods are stored as fat. Obesity is, therefore, regarded as a form of malnutrition and can be prevented by consuming the correct amounts of nutritional foods and performing adequate amounts of physical exercise (Smith, 1991:163).

According to Pienaar (2009:51), it appears as if children have much less control over their own activity habits than before. Traffic and stranger danger are some of the environmental factors that limit the freedom of children to play outside and function independently outside their family home (Hillman *et al.*, 1991:55). Violent crimes and a decline in safe playing areas reduce the opportunity and motivation for children, especially girls, to be physically active even more (*PSRA*, 1994:70; Gómez *et al.*, 2004:876; Carver *et al.*, 2008:217; Lopez, 2011:2). Research suggests that proximity (distance) concerns and safety from crime or potential injuries determines how public physical activity areas such as parks and playgrounds are utilised (Cradock *et al.*, 2005:357; Lopez, 2011:3). A further major concern is the limited access to physical activity facilities for those who fall in a lower socio-economic bracket (Cradock *et al.*, 2005:357; Gordon-Larsen *et al.*, 2006:417; Lopez, 2011:3).

Children that come from a low socio-economic background are reported to perform worse in motor activities such as speed, speed endurance and power and this may be attributed to malnutrition and decreased physical activity (Mészáros *et al.*, 2008:153,158). Failing to include physical activity into children's daily lives and not being able to master motor skills may hinder the participation in physical activity. More importantly, this failure will prevent children from obtaining the recommended levels of physical activity that is required to achieve and maintain good health (Van Beurden *et al.*, 2003:494). According to Strong *et al.* (2005:732) and the World Health Organisation (WHO) (2010:7), children between the ages of five and 17 years should accumulate at least 60 minutes of moderate to vigorous physical activity every day. This is the recommended daily amount of physical activity required for health. Physical activity can include sport, play, games, recreation, transportation (walking, running, etcetera), Physical Education (PE) or planned exercise programmes.

The following section will thus investigate the physical development of children and more specifically, the motor development of children.

## **MOTOR DEVELOPMENT**

According to Pienaar (2009:50), physical development, including motor development, is the key aspect of children's total development and well-being and must be addressed during the early years of development. Early childhood is described as a unique period in a child's life as it is seen as a period when children develop physically, emotionally, intellectually and socially (Garcia *et al.*, 2002:27).

*“Development is defined by several characteristics. First, it is a continuous process of change in functional capacity. Think of functional capacity as the capability to exist – to live, move, and work – within the real world. This is a cumulative process. Living organisms are always developing, but the amount of change may be more noticeable, or less noticeable, at various points in the life span”* (Haywood & Getchell, 2009:4).

The term development usually refers to attaining and transitioning through a series of stages, more commonly known as milestones, developmental milestones or stages of development (Cheatum & Hammond, 2000:19). Children generally progress through an orderly, predictable sequence of development and one stage in the sequence leads to another (Cheatum & Hammond, 2000:19; Wait, 2005:14; Davids *et al.*, 2008:7; Haywood & Getchell, 2009:4) in an orderly and irreversible fashion (Wait, 2005:14; Haywood & Getchell, 2009:4). According to De Jager (2009:48), it is fascinating to observe how consistently each developmental stage or milestone emerges from the preceding one, and how development in all children occurs according to the same basic laws, regardless of all the evident individual, ethnic and gender differences. Milestones are the basic building blocks of all learning later in school, thus, the sequence of the development is crucial to optimal functioning.

According to Erasmus (2009:3), development takes place along a timeline between birth and adulthood and specific developmental process can only take place during particular sensitive periods in the brain development. Thus, a developmental process that should occur during a specific developmental stage will not occur in the same manner or to the same degree during a later developmental stage. After birth, the different stages of development occur in a sequence that follows a head-to-toe progression (De Jager, 2009:49).

Developmental changes result from the interactions within the individual as well as between the individual and his or her environment (Davids *et al.*, 2008:8; Haywood & Getchell, 2009:4). It is, however, very important to remember that every child is unique and that each child will progress through each developmental stage at an age that is right for him or her (Cheatum & Hammond, 2000:20; Haywood & Getchell, 2009:4). It is evident that development is related to, but not entirely dependent on, age. It does, however, proceed as age increases. The rate of development may be slower or faster at different times and may differ between children of the same age (Haywood & Getchell, 2009:4). One child may reach a specific milestone early and another child may reach the same milestone at a later stage, yet both children may fall within a normal range. Each child has their own rhythm of development and will only progress from one stage to the next when they are ready (Cheatum & Hammond, 2000:20; De Jager, 2009:54). Development continues throughout life and will not stop at a particular age (Haywood & Getchell, 2009:4). Developmental milestones or stages should thus only be used as a framework of guidelines when investigating the development of a child. (Cheatum & Hammond, 2000:20; Gerber *et al.*, 2010:267). Cheatum and Hammond (2000:23) suggest that most children progress through a sequence of movement stages as seen as follows (Table 2.1).

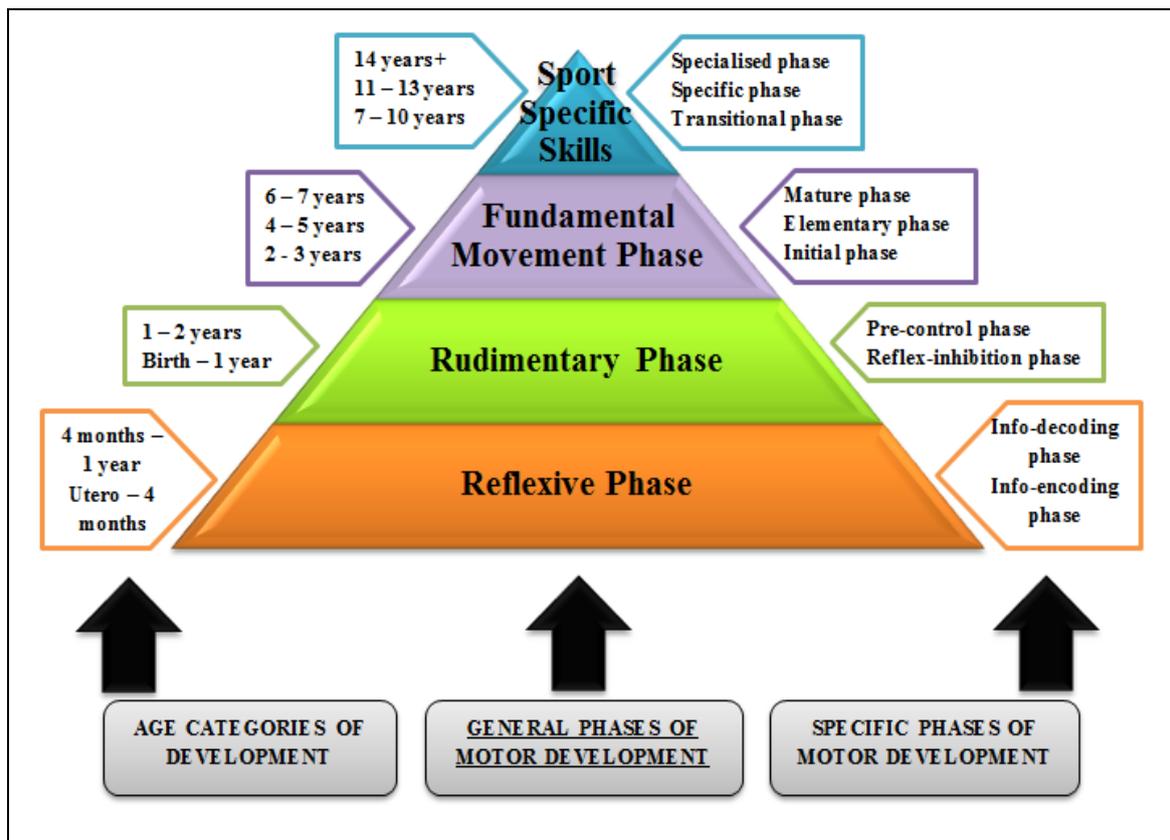
**TABLE 2.1: MOVEMENT STAGES CHILDREN PROGRESS THROUGH**

<b>STAGE:</b>	<b>DESCRIPTION:</b>
<b>1.</b>	Moving all four limbs (both arms and both legs) in the same manner at the same time
<b>2.</b>	Moving both arms together in the same manner
<b>3.</b>	Moving both legs together in the same manner
<b>4.</b>	Moving one arm separately from the other
<b>5.</b>	Moving one leg separately from the other
<b>6.</b>	Moving an arm on one side of the body with a leg on the same side in the same manner
<b>7.</b>	Moving an arm on one side of the body with the opposite leg side and vice versa

Source: Adapted from Cheatum and Hammond (2000:23)

The term motor development refers to the development of a person's movement abilities. It is a continuous and age-related process of change in movement. This process is influenced by interacting constraints or factors in the individual, environment and

task that drives these changes in movement (Haywood & Getchell, 2009:5; Pienaar, 2012:5). The first aspect that any movement specialist should be knowledgeable about regarding motor development is that it consists of different phases occurring from birth until adulthood (Figure 2.1). The following diagram depicts a framework of the different phases and stages of motor development that a child progresses through from birth to adulthood. This framework may serve as an important guideline when planning the content of movement programmes for children of different ages and different developmental stages (Gallahue & Ozman, 2002:46; Pienaar, 2012:7).



**FIGURE 2.1: PHASES OF MOTOR DEVELOPMENT**

Source: Adapted from Gallahue and Ozmun (2002:46) and Pienaar (2012:7)

The first phase of motor development is the reflexive phase (Figure 2.1) (Gallahue & Donnely, 2003:62; Pienaar, 2012:7). This phase begins during foetal development, also known as the prenatal stage, and continues until after birth. Babies are born with an intrinsic need for movement and sensory functions that are ready to be used. At this stage of development all movements occur as reflexes and are controlled subconsciously. Examples of movements during this phase include the sucking and moro-reflex (Pienaar, 2012:7).

The reflexive phase develops simultaneously with the first phase of movement, or rudimentary phase (Pienaar, 2012:7). These phases are characteristic of infancy and toddlerhood (Gallahue & Donnelly, 2003:62). Various exercises and activities can stimulate babies to control their movements and to learn from their environment. These activities also stimulate the central nervous system and other important bodily functions. It is important to remember, that during this developmental phase, progressions of stimulation exercises should be based on the developmental level of the baby and not on their age. A person can determine the developmental level of a baby by playing with him or her and then be able to select the most appropriate stimulation activities and exercises. A person may also be able to identify any developmental deficits or inappropriate behaviour whilst establishing the developmental level (Pienaar, 2012:7,8).

The second phase of motor development is known as the first phase of movement or the rudimentary phase (Figure 2.1). This phase begins shortly after birth and continues up to the age of approximately two years-old. Locomotor skills, such as crawling and walking, manipulative skills, such as reaching and grabbing, and stability skills, such as controlling the head, neck and torso during sitting and/or standing activities, now start to develop. Babies have very little, if any, control over fine motor movements during this phase even if they already possess many of the components that later develop into finely coordinated arm, hand and finger movements. Babies and toddlers initially display uneven shoulder and elbow movements that later develop into wrist movements, hand rotations and the coordination of the thumbs and forefingers. Maturation of hand-eye coordination is thus, accordingly reflected in the improvement of fine motor skills (Pienaar, 2012:8). The reflexive and rudimentary phases are characteristic of the baby- and toddler years and are critical to the foundation of the fundamental and more specialised movement phases that occur during the toddler and early childhood years (Gallahue & Donnelly, 2003:62; Pienaar, 2012:8).

Motor skills are learnt in a general to specific order. General movements, such as random arm waving, are learnt before specific movements, such as reaching for an object, rolling over or hitting a ball. Development of the nervous system determines the order of skill development. A child is neurologically ready for gross motor activities before fine motor tasks or specific skills. Thus, gross motor skills develop before fine motor skills. This explains why young children and especially those with motor

difficulties usually prefer participating in gross motor activities. Gross motor skills are executed using the large muscle groups and include activities such as throwing, hitting, striking, walking, running, leaping, jumping and climbing. Fine motor skills are performed using the small muscle groups and include activities such as drawing, colouring, cutting with scissors, writing, stringing beads, building blocks and putting together toys such as Legos, using mainly the fingers and wrists (Cheatum & Hammond, 2000:25,26; De Jager, 2009:51).

The fundamental movement phase is the third phase of motor development and occurs between the early childhood years of two and seven (Figure 2.1). This period is a very critical phase for the mastery of basic motor skills. Stability; locomotor; and manipulative skills, are the three categories used to define fundamental motor skills and originate during the first two years of life. These skills are developed and refined during the fundamental movement phase (Gallahue & Donnelly, 2003:63; Pienaar, 2012:8). These categories are briefly described in Table 2.2.

**TABLE 2.2: CLASSIFICATION OF THE DIFFERENT FUNDAMENTAL MOTOR SKILLS**

<b>SKILL:</b>	<b>DESCRIPTION:</b>
<b>Stability skills:</b>	<ul style="list-style-type: none"> <li>• Emphasis is placed on maintaining balance (body control)</li> <li>• <i>Examples:</i> bending, stretching, turning, swinging, rolling, holding positions (standing on toes), stopping, starting, dodging, balancing</li> </ul>
<b>Locomotor skills:</b>	<ul style="list-style-type: none"> <li>• Movements in a forward motion with an upward or forward direction</li> <li>• <i>Examples:</i> walking, running, jumping, hopping, galloping, skipping, gliding, climbing (combinations)</li> </ul>
<b>Manipulative skills:</b>	<ul style="list-style-type: none"> <li>• Manipulation of objects such as balls, bats and other equipment</li> <li>• <i>Examples:</i> throwing, kicking, hitting, bouncing, rolling, dribbling, catching, blocking (absorbing)</li> </ul>

Source: Adapted from Pienaar (2012:8,9)

The performance of fundamental motor skills can be further subdivided into three phases, including an initial, elementary and mature phase (Gallahue & Donnelly, 2003:63; Pienaar, 2012:8) as shown in Table 2.3.

**TABLE 2.3: THREE PHASES OF FUNDAMENTAL MOTOR SKILL PERFORMANCE**

<b>PHASE:</b>	<b>CHARACTERISTICS:</b>	<b>AGE:</b>
<b>Initial:</b>	Movements are relatively crude and uncoordinated	2 – 3 years
<b>Elementary:</b>	Coordination and rhythm improve with greater movement control, however, movements are not yet executed in a smooth/flowing manner	4 – 5 years
<b>Mature:</b>	Skills during this phase are characterised as well-coordinated, mechanically correct and as having a smooth/flowing execution	6 – 7 years

Source: Adapted from Gallahue and Donnelly (2003:63) and Pienaar (2012:8)

Fundamental motor skills that develop during the rudimentary phase (Figure 2.1) continue to develop during the subsequent phases as the child matures. These motor skills can be developed into sport specific skills as soon as they meet all the criteria of the mature phase of development. The development of mature movement patterns forms the basis of all sport skills. Therefore, if movement patterns are not developed to a mature stage, the ability to develop specialised movement skills later in life will be inhibited. Research shows that the motor skill development of many children does not reach the mature phase and that obstacles such as safety, the mechanical and technological age, television viewing and computer usage further inhibit the development of motor skills (Pienaar, 2012:9).

The fourth and final phase of motor development is the specialised movement or sport related movement phase (Figure 2.1), when motor skills become sport specific. This phase is subdivided into three further stages, which include the general or transitional stage, the specific or application movement stage and the specialisation or lifelong utilisation stage (Figure 2.1) (Gallahue & Donnelly, 2003:64; Pienaar, 2012:21).

Children that are in Grade 1, 2 and 3 or between the ages of seven and 10 years-old are likely to fall in the transitional stage (Figure 2.1). This phase is characterised by the further development and refinement of motor skills. Children start showing increasing interest in different types of sport and their own level of physical performance, start competing with friends and no longer feel limited by physiological, anatomical or environmental factors. Skilled performance is still limited during this stage seeing they are only now starting to develop an idea of the performance of specific movements. Presenters of movement programmes now start to look at the accuracy and skill refinement during the child's performance of certain sport skills. The nature of the

development of motor skills is at such a level that it can be applied in relevant sport specific games such as refining the skill of hitting a ball with a stick, bat or racquet. The development of specialised movements is, however, greatly dependent on the experience, encouragement and quality of teaching or coaching (Gallahue & Donnelly, 2003:64; Pienaar, 2012:21).

During the late childhood years and early adolescence, approximately between the ages of 11 and 13, children move into the application or specific movement stage (Figure 2.1). The child is now regarded as more mature in terms of neurological and physical development and he or she is now able to overcome the physiological and psychological demands placed on the body easier. The child now starts to discover and realise his or her physiological and personality restrictions as well as specific personal strengths and weaknesses he or she might possess and accordingly focuses more on specific types of sport. Improvements in skill, technique and style occur during this stage and focus is placed on the improvement of specific skills through repetitive practice. More complex skills that can be applied in official sports are thus refined during this stage (Gallahue & Donnelly, 2003:65,66; Pienaar, 2012:24).

Finally, the specialisation of lifelong utilisation stage may occur from the approximate age of 14 years (high school years) and onwards (Figure 2.1). However, moving into this stage is highly dependent on the previous sport and fundamental skill stages. The child now applies the skills and techniques, that he or she mastered during the previous phases of development, in recreational, performance orientated or daily activities. This is ultimately the phase where sport specialisation; according to ability, interest, availability of coaching and facilities, previous experience and ambition, can take place. Further refinements of specific techniques occur during this stage. The development of specialised movement skills is highly dependent on experience, encouragement and the quality of instruction (Gallahue & Donnelly, 2003:66; Pienaar, 2012:24).

## **THE RELATIONSHIP BETWEEN MOTOR SKILLS AND PHYSICAL ACTIVITY PARTICIPATION**

The foundation for future movement skills is the development of motor skills (Seefeldt, 1980:330; Clark & Metcalfe, 2002:70). Motor skills are regarded as a requirement and foundation of certain skills practiced in adult physical activity (Payne & Isaacs, 2008:201), therefore, a relationship may exist between physical activity participation

and mastery of motor skills (Okely *et al.*, 2001:1899). Caspersen *et al.* (1985:126) describes physical activity as any bodily movement that is caused by skeletal muscles and that leads to the output of energy. The fundamental motor skills consist of stability skills, object control skills (catching, throwing, object manipulation with hands and feet) and locomotor skills (running, jumping and moving your body through space) (Payne & Isaacs, 2008:202). The performance of motor skills is generally broken down into three parts or phases: the preparation phase, the execution or force phase and the follow-through or recovery phase. When looking at jumping as an example, critical performance cues involve preparing the body by contracting and bending it to gather energy with the arms held low at the sides. The arms swing vigorously from low to high during the force phase and the legs straighten or bend depending on the type of jump. During the recovery phase, the landing should be on two feet simultaneously, with knees bent to absorb the force and arms lowered again for balance (Gallahue & Donnelly, 2003:620,621). Proficiency in motor skill performance is considered to be a very crucial aspect of participation in physical activity among youth (Corbin, 1980:280; De Oreo & Keogh, 1980:85; Haubenstricker & Seefeldt, 1986:52). Fisher *et al.* (2005:684) report that children who devote more time to moderate-to-vigorous physical activity are more likely to have higher levels of motor proficiency.

Research suggests that motor proficiency also plays an important part in the participation in physical activity later in life (Seefeldt, 1980:315; Clark & Metcalfe, 2002:65; Gallahue & Ozman, 2006:316; Stodden *et al.*, 2008:290; Barnett *et al.*, 2009:257). This supports the general belief that motor skills are related to habitual physical activity during childhood and adolescence (Fulton *et al.*, 2001:113; McKenzie *et al.*, 2004:238; Okely *et al.*, 2004:238; Raudsepp & Päll, 2006:426). Accordingly, literature provides evidence that children who are physically active are more likely to be physically active adults, thus enhancing their health throughout their lifespan (Kuth & Cooper, 1992:114; Glenmark *et al.*, 1994:530; McKenzie *et al.*, 2004:240). Not only does childhood participation in physical activity play an important role in future adult participation, the enjoyment thereof may also lead to increased adult participation (Sallis & Patrick, 1994:312; Martens, 1996:307).

Pre-school and early elementary school years are suggested to be the best period to aspire towards motor skill improvements. This may be due to the possibility that children have not yet developed bad physical activity habits, they are not as self-

conscious about performing poorly and not too scared of injuries or being teased and laughed at by their peers. It is also very important that enough time is devoted and sufficient resources recruited for optimal skill development during this period. This period is also known as a “window of opportunity” as the speed and ease of learning new skills are maximised (Gallahue & Donnely, 2003:42-45). It is during this critical period or window of opportunity that the brain is most receptive to appropriate stimulation compared to any other given time during development (Chugani, 1998:184). Thus, implementing an intervention programme during this period may produce more significant results than at a later developmental stage.

According to De Jager (2009:27), a window of opportunity is the crucial time or milestones that define a child’s developmental progress. For example, motor skills are seen to progress rapidly during the first eighteen months after birth and the window for learning language occurs during the first six years of a child’s life. The developmental process after birth comprises four major windows of opportunity including:

1. the opportunity to develop the body (neurochemical networks, muscle strength, muscle coordination, balance and the senses);
2. the opportunity to develop feelings and emotions;
3. the opportunity to develop language;
4. the opportunity to develop thinking.

However, the first window of opportunity for a baby is to discover his or her own body as a fixed point of reference (De Jager, 2009:29).

Chapey (1986:4), refers to pre-school years as “the wonder years” and also suggests that they are the most important years in the child’s life, when great changes occur regarding all aspects of becoming and development. The pre-school years also play a significant role in the gradual preparation of the child for entry into the school environment. School readiness preparation already commences at birth, thus, it is important to briefly mention the developmental periods (Table 2.4) (Derbyshire, 1991A:187).

**TABLE 2.4: PHASES OF DEVELOPMENT BEFORE SCHOOL ENTRY**

<b>PERIOD:</b>	<b>AGE (YEARS):</b>	<b>DESCRIPTION:</b>
<b>Baby phase</b>	Birth – 1	Characterised by the coordination of the sensory and motor skills, which constitute an important step toward school-readiness
<b>Toddler phase</b>	1 – 3	Many changes occur during this phase of children's lives. They become more independent as they can now walk and do things for themselves – gradually expanding their life-world. The development of language and gross motor movement is prominent during this phase and serves as an important precursor for readiness to enter school later
<b>Pre-schooler</b>	3 – 6	Further growth; relating to fine and gross motor skills, language and thought, and the refinement of the skills mastered in the previous phase; occurs during this period

Source: Adapted from Derbyshire (1991A:187)

Knowledge regarding the various benefits of having an active lifestyle has been available for years, but it is only recently that the importance of physical activity has received more attention. This is due to the large increase of the obesity epidemic affecting the United States (US) and many other developed and developing countries. Research trends show that the prevalence of this epidemic in the US has increased consistently across all age groups, genders, races and ethnicities, by more than 50% since 1990 (Meredith & Welk, 2007:15). Children who are overweight or obese suffer from limited mobility, increased vulnerability to accidents and possible future health problems. They are also often teased and mocked by others and this may result in a poor self-image, social isolation or loneliness (Smith, 1991:163). Due to this increasing prevalence, overweight children have become a greater concern, as overweight and obesity have been found to track throughout the lifespan. Thus, the importance of promoting physical activity in PE has increased greatly and various ways in which teachers can promote physical activity behaviour among children have been designed (Meredith & Welk, 2007:15).

The goals and objectives of PE have been adapted and changed according to the public health views over the years. These views relate to the importance and contributions of physical activity and fitness to health and well-being. A shift in public health policy toward the importance of regular physical activity has led to changes in the views and opinions of PE. Physical fitness remains an important goal of PE, but the focus of PE has, however, shifted toward the promotion of the process or behaviour of physical activity as opposed to the product or outcome of fitness. The reason for this is the fact

that physical activity has the ability to promote being physically active during adulthood and physical fitness will only be maintained if the child remains physically active. Hence, promoting lifetime physical activity has become the most important role of PE in the US (Meredith & Welk, 2007:15). This importance of promoting lifetime physical activity may be relevant in the US, however, this may not be the case in a South African context.

When promoting lifetime physical activity among children, it is important to provide the appropriate instruction and reinforcement directly to the behaviour of the child and not on the intended outcome. Physical activity guidelines are designed to provide behavioural targets that may assist children in the adoption of healthy and active lifestyles. The guidelines for children and those for adults differ due to the simple fact that children are different from adults. The daily amount of physical activity recommended for children (60 minutes per day) is greater than for adults (30 minutes per day) as children have more time available in the day. There is also a greater need to establish physical activity patterns and promote the development of motor skills early in a child's life. Increased inactivity leads to obesity and inhibits opportunities for children to be physically active, consequently, decreasing the levels of physical inactivity is also considered in physical activity guidelines. These guidelines recognise that physical activity of a moderate intensity can provide significant health benefits even when performed intermittently throughout the day. The emphasis of these guidelines, as seen in Table 2.5, is placed on getting all individuals to be somewhat physically active as opposed to promoting high levels of physical activity in only certain subsamples of the population. Research reports have indicated that the physical activity levels of children decline sharply during the adolescent years as children start to take on adult responsibilities and adopt adult lifestyle patterns. As a result, maintaining a child's natural interest in physical activity has become an evident challenge for PE teachers (Meredith & Welk, 2007:16,17).

**TABLE 2.5: SUMMARY OF APPROPRIATE PHYSICAL ACTIVITY GUIDELINES FOR ELEMENTARY SCHOOL CHILDREN**

GUIDELINE:	
<b>1.</b>	<ul style="list-style-type: none"> <li>• Children should accumulate at least 60 minutes and up to several hours of age-appropriate physical activity on all or most days of the week</li> <li>• This daily accumulation should include moderate and vigorous physical activity of which the majority is intermittent in nature</li> </ul>

2.	<ul style="list-style-type: none"> <li>• Children should participate in several bouts of physical activity lasting 15 minutes or more everyday</li> </ul>
3.	<ul style="list-style-type: none"> <li>• Children should participate in a variety of age-appropriate physical activities everyday</li> <li>• These activities should be designed to achieve optimal health, wellness, fitness and performance benefits</li> </ul>
4.	<ul style="list-style-type: none"> <li>• Extended periods (of two hours or more) of inactivity are discouraged for children, especially during the daytime hours</li> </ul>

Source: Adapted from Meredith and Welk (2007:16)

Table 2.6 lists some additional recommendations that can be used for the promotion of physical activity and physical fitness in PE (Meredith & Welk, 2007:19).

**TABLE 2.6: RECOMMENDATIONS TO PROMOTE PHYSICAL ACTIVITY AND PHYSICAL FITNESS IN PHYSICAL EDUCATION**

	RECOMMENDATION:
1.	<ul style="list-style-type: none"> <li>• Provide a rationale for children to participate in regular physical activity</li> <li>• Ensure that reasons are relevant to their daily life</li> <li>• The benefits of looking good, feeling good and enjoying life are usually most striking with children</li> </ul>
2.	<ul style="list-style-type: none"> <li>• Provide feedback regarding the current status of physical activity or physical fitness</li> <li>• Test results should be used for education about physical activity and fitness and for selecting areas in which to improve or maintain good performance</li> </ul>
3.	<ul style="list-style-type: none"> <li>• Encourage students to establish short- and long-term goals</li> <li>• Short-term goals are probably the most important and should be goals that are related to physical activity (process goal) rather than goals related to fitness achievement (product goal)</li> <li>• Process goals allow individuals to achieve success while slowly making process toward the desired result or product goal</li> </ul>
4.	<ul style="list-style-type: none"> <li>• Help each child to identify a regular time and place to fit physical activity into daily schedule</li> <li>• Talk about fitting activities such as walking or biking to school, to a friend's house or to the store into daily routines</li> <li>• Part of making time for physical activity may be spending less time watching television or playing video games</li> </ul>
5.	<ul style="list-style-type: none"> <li>• Have children make a written commitment to participate in the physical activity required to achieve their goals</li> <li>• Activities should be enjoyable to the children</li> <li>• The list of activities should be a specific list of the type of activity, day of the week, time of day, place and other specific important details</li> </ul>
6.	<ul style="list-style-type: none"> <li>• Encourage children to keep track of their participation on a personal exercise log</li> </ul>

7.	<ul style="list-style-type: none"> <li>Periodically ask students about their progress, showing that you are seriously interested in the programme</li> </ul>
8.	<ul style="list-style-type: none"> <li>Discuss progress/problems that children are experiencing, as being active is not easy for some</li> <li>If a child is having difficulty achieving a goal, ask other children to suggest solutions</li> </ul>
9.	<ul style="list-style-type: none"> <li>Praise children even for the smallest accomplishments in their efforts to achieve their goals</li> <li>Feedback on success is very important in making children feel competent and thus establishing intrinsic motivation</li> </ul>
10.	<ul style="list-style-type: none"> <li>Recommend activities that are of low to moderate intensity since these activities are more likely to be maintained than some team sport activities</li> <li>Activities such as walking and recreational bike riding are good examples</li> </ul>
11.	<ul style="list-style-type: none"> <li>Be a role model to children by including regular physical activity as part of your own lifestyle</li> <li>Tell the children about your enjoyment of physical activity and its benefits</li> </ul>

Source: Adapted from Meredith and Welk (2007:19)

### **PHYSICAL EDUCATION (PE)**

According to the Curriculum and Assessment Policy Statement (CAPS) (DBE, 2011:6), PE in schools focus on physical growth and development, perceptual motor development, games, sport and also play. All these aspects contribute to the development and promotion of a healthy and active lifestyle. The aims of PE include to develop the children's knowledge regarding movement and safety and to improve their physical well-being. Thus, PE will accordingly cultivate positive values and attitudes that help children to be physically fit, mentally alert, socially well-adjusted, mentally balanced, spiritually uplifted and morally true. The time allocated for PE in the Intermediate phase (Grade 4 to 6) is only 90 minutes per week (DBE, 2011:6,7).

The most important goal of past and present PE programmes has always been to obtain and develop motor skills (Siedentop, 2001:211). Many schools believed that removing PE from the curriculum and allocating this time to academic work would improve academic performance. Research has, however, proven this belief to be false (Dwyer *et al.*, 1983:308; Shephard *et al.*, 1984:60; Dwyer *et al.*, 1996:27; Shephard, 1996:34; Sallis *et al.*, 1999:127; Coe *et al.*, 2006:1517; Ahmed *et al.*, 2007:371). Thus, removing PE to increase time in the classroom does not improve academic performance (Troost, 2007:2). Evidence also suggests that increases in time devoted to PE and physical activity during school hours maintains or even improves grades and standardised test scores (Troost, 2007:2), and will not negatively affect academic performance. A positive

correlation is evident between physical activity and academic performance and physical activity has a positive effect on concentration, memory and classroom behaviour (Shephard, 1997:113; Pellegrini & Smith, 1998:597; Sibley & Etnier, 2003:243; Tomporowski, 2003:348; Strong *et al.*, 2005:737). Consequently, children who are more physically active seem to perform academically better (McIntosh, 1966:20; Smart, 1967:47; Schurr & Brookover, 1970:96; Williams, 1988:37; Fejgin, 1994:227; Pate *et al.*, 1996:1578; Dwyer *et al.*, 2001:225; Field *et al.*, 2001:105; Taras, 2005:216; Coe *et al.*, 2006:1515; Nelson & Gordon-Larson, 2006:1288; Trost, 2007:2), especially those who are physically fit (Knight & Rizzuto, 1993:1296; Dwyer *et al.*, 2001:225; Kim *et al.*, 2003:186; Castelli *et al.*, 2007:239; Trost, 2007:3). Research also suggests that small activity breaks should be taken during the school day as it can improve the cognitive performance, concentration and behaviour of students in the classroom (Gabbard & Barton, 1979:286; Raviv & Low, 1990:67; McNaughten & Gabbard, 1993:1157; Jarret *et al.*, 1998:121; Caterino & Polak, 1999:246; Mahar *et al.*, 2006:2092; Trost, 2007:3). The school environment serves as an excellent setting to provide children with daily opportunities to be physically active, to educate children on the importance of daily physical activity for health, and to build skills that support an active lifestyle (Trost, 2007:3). There are, however, currently very few schools that offer PE to children in South Africa (Pienaar, 2009:51) and most children will get little to no regular physical activity during their school years (Trost, 2007:3). Many schools also do not have qualified PE teachers, implicating prominence of Life Orientation and PE in schools and especially in the growth development of children in South Africa (Van Deventer, 2009:127). Furthermore, according to results found by Van Deventer (2012:160), it seems that most secondary schools experience difficulties relating to the availability of sufficient facilities and equipment to present PE, sport and recreation. This was also reported by foundation and intermediate phase teachers in most South African provinces (Van Deventer *et al.*, 2010:42,73).

## **INFLUENCING FACTORS OF PHYSICAL ACTIVITY PARTICIPATION**

*“Man is a unique individual and various factors help to make him what he is. He is not merely the product of his hereditary biological composition as the naturalists believe. Neither is he merely the product of his environment... Both hereditary factors and environmental influences play a great role in man’s personality development and his general development”* (Botha 1991:233).

Factors such as gender, environmental factors and opportunities to be physically active are only a few of the many factors that are considered to influence motor skill development and performance (Langendorfer & Robertson, 2002:65; Goodway & Branta, 2003:37). It is very important that each of these factors are considered in the assessment of motor development status, motor skill performance and the design and implementation of developmentally appropriate programmes (Barnett *et al.*, 2009:257; Barnett *et al.*, 2010:163). For an intervention programme to produce successful results, it is critical that the researcher understands the current status of motor development within the chosen population. This will also assist in determining and meeting the specific needs of the population (Goodway *et al.*, 2010:23). Even the smallest improvements in the motor skill performance of children may lead to increased physical activity participation (Okely *et al.*, 2001:1902).

## **MOTOR SKILL ASSESSMENT**

*“Any assessment of movement skill must begin with the question ‘why?’ – not why does a person move in a particular way, but why do we assess movement skill in the first place? The purpose of assessment must be clearly specified before a test is administered and even before a test is selected. Across the professional areas involved in the assessment of movement skills, there are at least five major groupings of purposes: (a) to categorise or identify, (b) to plan treatment or instructional strategies, (c) to evaluate change over time, (d) to provide feedback to the performer or to some other concerned party, or (e) to predict”* (Burton & Miller, 1998:5,6).

Early researchers viewed motor skills as extensions, combinations and refinements of rudimentary movements. They strongly believed that motor behaviours originated due to the interaction between the maturation and experience of a child. Due to this early research, the first assessment instruments of motor development emerged (Folio & Fewell, 2000:1,2).

Screening tools and test batteries investigating motor proficiency may be very useful in determining the level of motor skills of each child and where he or she might be experiencing difficulty. Screening tools can be used as a means of early identification, lead to early intervention and aid in prevention of the development of secondary academic, emotional and social problems (Larkin & Rose, 2005:140; Rosenblum, 2006:619). Screening tools such as questionnaires are good methods to gather information regarding motor skill deficits such as coordination problems and to identify children predisposed to physical disorders such as Developmental Coordination

Disorder (DCD) (Schoemaker *et al.*, 2008:190). Screening tools such as self-report instruments are advantageous as they can be administered to groups of people in relatively short periods of time (Hay, 1992:8). Screening tools can be very useful in the school setting as teachers possess great opportunity to observe daily motor behaviour in the classroom and on the playground (Larkin & Rose, 2005:139). Due to this opportunity that teachers possess a number of teacher questionnaires have been designed to identify children at the risk of developing DCD. The most popular example is the Movement Assessment Battery for Children-2 (MABC-2) Checklist (Henderson *et al.*, 2007:3). The Teen Risk Screen (TRS) is another screening tool that aims to provide an easy-administered screening checklist to determine children's motor proficiency in a school setting and is a useful tool designed especially for teachers (Africa & Kidd, 2012: In press). According to Cliff *et al.* (2009:448), it is important that future research using validated screening checklists is conducted in conjunction with validated movement skill assessment tools.

Numerous motor skill test batteries are currently available (Cools *et al.*, 2009:154) there is however no "gold standard" assessment tool when determining motor impairments. Motor impairment can include various problems such as difficulties in balance, locomotion on objects such as bicycles and with manual dexterity skills such as writing or using cutlery (Branter *et al.*, 2009:413). The Peabody Developmental Motor Scales-2 (PDMS-2) is designed to assess the movement skills of an individual child between birth and five years of age and includes gross and fine motor movement subtests. This test also aims to distinguish motor development delays and disorders (Folio & Fewell, 2000:2,4,8; Cools *et al.*, 2009:158). The Test of Gross Motor Development-2 (TGMD-2) assesses the gross motor performance of locomotion and object control skills of children between the ages of three and 10 years old. The assessment is based on qualitative movement skill criteria and can be used to identify children who are significantly developmentally delayed when compared to their peers (Ulrich, 2000:3,5; Cools *et al.*, 2009:158). The Movement Assessment Battery for Children-2 (MABC-2) is a revision of the MABC and it is used to identify and describe motor performance impairments in children between the ages of three to 16 years old. This assessment tool is one of the most widely used by occupational therapists, physiotherapists, psychologists, Kinderkineticists and educational professionals (Henderson *et al.*, 2007:3,5,9,113).

The test battery used during this study to assess the motor skills of children is the Bruininks-Oseretsky Test of Motor Proficiency-2 (BOT-2) (Bruininks & Bruininks, 2005:1). Previous research indicates that this test battery has been used widely in school environments (Plimpton & Regimbal, 1992:399; Hay & Missiuna, 1998:64; Reeves *et al.*, 1999:739; Piek *et al.*, 2010:83, Gupta *et al.*, 2011:425) and its use is recommended for instances where a brief, screening picture of the level of motor proficiency is needed (Bruininks & Bruininks, 2005:8; Cools *et al.*, 2009:158). The BOT-2 is often used in occupational therapy, physical therapy and adapted PE (Burton & Miller, 1998:162). According to literature, the recommended uses of this test battery include: the diagnosis of motor impairment; screening; placement decisions; development and evaluation of motor training programmes and supporting research goals (Cools *et al.*, 2009:158).

The BOT-2 is an established and tested motor skills test battery. It is also one of the most popular test batteries for children (Burton & Miller, 1998:162). This tool assesses fine and gross motor skill development and identifies mild to moderate motor coordination deficits in children between the ages of four and 21 years of age (Cools *et al.*, 2009:158). The Short Form comprises of four motor composites: fine manual control; manual coordination; body coordination; and strength and agility (Bruininks & Bruininks, 2005:4). The composites are further subdivided into eight subtests that include: fine motor precision; fine motor integration; manual dexterity; bilateral coordination; balance; running speed and agility; upper-limb coordination and strength (Bruininks & Bruininks, 2005:4; Cools *et al.*, 2009:158). Compared to the 53 items of the Long Form, the Short Form consists of 14 items in total that provide a brief overview of a child's motor proficiency (Bruininks & Bruininks, 2005:4; Cools *et al.*, 2009:158; Venetsanou *et al.*, 2009:544). This test has an internal consistency of  $r \geq .80$ , an inter-rater reliability of  $r \geq .90$  and a test-retest reliability of  $r \geq .80$  (Deitz *et al.*, 2007:93,94). Construct validity of this test is also good,  $r = 0.78$  (Cools *et al.*, 2009:161).

Children are assessed according to test guidelines and the Short Form testing procedures take approximately 15-20 minutes per child. Administration guidelines include familiarisation with and adherence to specified test equipment, scoring and administration rules. Emphasis should always be placed on proper form even if the task requires speed (Bruininks & Bruininks, 2005:5, 11,12).

The following section will investigate balance and the importance thereof to the motor development of children.

## BALANCE

Balance is the ability of a human to maintain his or her equilibrium in relation to the force of gravity, whether the body is in a static posture or performing a dynamic activity, as well as the ability to make very small alterations in the body when placed in various positions. To be able to achieve balance, the line of gravity that passes through the centre of gravity must also lie within the base of support. If this line falls outside the base of support, one cannot maintain balance and will fall unless compensatory movements are made (Gallahue & Donnelly, 2003:89,419,420). Balance involves motor control skills that are required for the maintenance of posture whilst standing, walking or other common tasks such as reaching for an object on a shelf (Bruininks & Bruininks, 2005:6). Balance is regarded as a complex part of a person's motor fitness that is affected by vision; the inner ear; the cerebellum; the proprioceptors (also known as nerve endings) in muscles, joints and tendons; and the skeletal muscles (Gallahue & Donnelly, 2003:89). Balance can be static (stationary) or dynamic (movement) (Gallahue & Donnelly, 2003:89; Bruininks & Bruininks, 2005:6) and is seen to be influenced by factors such as the trunk stability, movement or stasis and the use of visual cues (Bruininks & Bruininks, 2005:6). Static balance is the ability to maintain equilibrium in a fixed position, such as standing on one foot or when balancing on a balance board. Dynamic balance is the ability to maintain equilibrium while the body is moving, such as walking on a balance beam or jumping on a trampoline. It is evident that all movement involves an element of balance, whether static or dynamic, as balance is a basic aspect of all movement. Due to this, it is critical that children develop their ability to balance from an early age (Gallahue & Donnelly, 2003:90,420). The development of static and dynamic balance is briefly described in Table 2.7.

**TABLE 2.7: EMERGENCE OF STATIC AND DYNAMIC BALANCE**

<b>STATIC BALANCE:</b>	<b>SELECTED ABILITIES:</b>	<b>APPROXIMATE AGE OF ONSET:</b>
<b>Static balance involves maintaining equilibrium while the centre of gravity remains stationary.</b>	<ul style="list-style-type: none"> <li>• Pulls to standing position</li> <li>• Stands without handholds</li> <li>• Stands alone</li> <li>• Balances on one foot 3 to 5 seconds</li> <li>• Supports body in basic 3-point invert positions</li> </ul>	<ul style="list-style-type: none"> <li>• 10 months</li> <li>• 11 months</li> <li>• 12 months</li> <li>• 5 years</li> <li>• 6 years</li> </ul>

<b>DYNAMIC BALANCE:</b>	<b>SELECTED ABILITIES:</b>	<b>APPROXIMATE AGE OF ONSET:</b>
<b>Dynamic balance involves maintaining equilibrium as the centre of gravity shifts.</b>	<ul style="list-style-type: none"> <li>• Walks 2.54cm straight line</li> <li>• Walks 2.54cm circular line</li> <li>• Stands on low balance beam</li> <li>• Walks on 10.16cm-wide beam for short distance</li> </ul>	<ul style="list-style-type: none"> <li>• 3 years</li> <li>• 4 years</li> <li>• 2 years</li> <li>• 3 years</li> </ul>

Source: Adapted from Gallahue and Donnelly (2003:40,41)

When balancing with a partner, one can perform two other types of balances. These include counterbalance and counter-tension. Counterbalancing occurs when weight and force are distributed inward or toward a partner. A popular example is performed from a standing position, with hands pressed against the hands of the partner. Different body parts may also be used, including the back, sides of the body, feet, shoulders and/or the bottom. Counter-tension is the complete opposite of counterbalance as the weight and force is distributed away from a partner. A popular example is performed by holding hands and leaning away from a partner. The feet of both partners should be placed as close together as possible and the legs should be kept straight. Different forms of counter-tension can be achieved by using different body parts, levels and directions (Gallahue & Donnelly, 2003:623).

Balance is regarded as one of the performance-related components of physical fitness. Other components include coordination, agility, the speed of movement and power. Performance-related fitness is an aspect of physical fitness and is related to the quality of a person's movement skill when looking at improved performance in play, games and sport activities. Children who skilfully perform several activities such as bicycling, swimming, throwing catching and climbing are regarded as possessing good skill-related fitness. Balance is emphasized as the performance-related component to be developed first in children. Thus, activities promoting balance skills should be addressed first in developmentally based PE programmes. This is due to the importance of developing movement control; including balance, coordination and agility, before developing force production (speed and power) (Gallahue & Donnelly, 2003:88).

Common evaluation measures of balance, as a performance-related fitness component, include a beam walk (dynamic) and the stick balance or one-foot stand (static). Research findings of these balance measure show year-by-year improvements with an

increase in age. Up to the age of eight-years-old, girls often outperform boys, especially during dynamic balance activities. However, after the age of eight years, balance abilities appear to be similar between girls and boys (Gallahue & Donnelly, 2003:89).

The ability to maintain balance, also known as equilibrium, is dependent on the vestibular system.

*“The vestibular system is the sensory system considered to have the most important influence on the other sensory systems and on the ability to function in everyday life. It is the unifying system in our brain that modifies and coordinates information received from the visual, proprioceptive, auditory, and tactile systems. The vestibular system functions like a traffic cop, telling each sensation where and when it should go or stop”* (Cheatum & Hammond, 2000:143).

The vestibular system is critical in the maintenance of balance as this system informs the nervous system of where the body is in relationship to the pull of gravity. With the help of the visual- and proprioception system, the vestibular system is able to inform a person of whether his or her body is upright, upside down or lying down, in motion or still, speeding up or slowing down. The vestibular system is located in the brain and the vestibular receptors are located in the inner ear. These vestibular receptors are also known as the balance sense organs. The role of these receptors is to inform the body of where it is in space and to maintain the correct posture and balance, allowing one to perform motor activities. When looking at activities such as walking or running, the body continuously moves forward and out of balance. The next foot must automatically move forward to prevent one from falling and maintain balance and movement. The vestibular system also plays a role in tonic muscle control. Tonic muscle control is required for a child to be able to keep his or her body still in various positions such as sitting at a desk or standing in a row or at a chalkboard. The vestibular system provides the tonic muscle control that is required to hold the neck still and keep the eyes focused on a specific target or object, which is critical during reading and writing tasks (Cheatum & Hammond, 2000:143,149,153).

Children labelled as hypovestibular, who are subconsciously not aware of the pull of gravity on their bodies, will experience problems with overall control of their bodies and maintaining their balance. When these children experience a disturbance in balance they are not able to execute sufficient postural muscle control to maintain their balance during everyday activities such as sitting, standing or moving. These children are unable to rely on their body's subconscious vestibular system functioning to sit still and must

now consciously force themselves to focus all their attention to sitting still. This will affect their ability to take in any new information given by the class teacher. Furthermore, if the child averts his attention back to the information provided by the teacher, he or she will automatically lose balance and begin moving around in the chair. These children appear to be and are often incorrectly labelled as being hyperactive. Balance may also be affected by other factors including: vestibular viruses; whiplash; head trauma; inner ear infection and the long-term use of caffeine, alcohol and nicotine (Cheatum & Hammond, 2000:165,166,167). According to Gallahue and Donnelly (2003:31), Otitis media, or inflammation of the inner ear, commonly occurs among young children, as they are more sensitive to infections of the ear and this may influence their ability to perform balancing activities.

The following section will investigate bilateral coordination and the importance thereof to the motor development of children.

## **BILATERAL COORDINATION**

Bilateral coordination is the ability to use both arms and/or both legs together in a coordinated manner and is also known as bilateral integration (Le Roux, 2011:4; Pienaar, 2012:178). It is vital to development as it lays the foundation for the establishment of hand dominance and is used in various daily tasks in the school and home environment. These daily tasks may include using eating utensils, tying shoelaces, washing dishes, ball skills or cutting with scissors. Bilateral coordination skills begin to emerge during the early baby years and consist of symmetrical and asymmetrical movements (Le Roux, 2011:4). Symmetrical movements occur when moving both arms and legs together. Examples may include jumping, clapping hands, rolling out dough or pastry with a rolling pin or when pushing a large object such as a piece of furniture (Le Roux, 2011:4, Pienaar, 2012:179). Crawling helps a baby to learn how to use each side of his or her body in a rhythmical manner, one side at a time. This is also known as reciprocal movement. Crawling is therefore, critical in the development of a child as it provides the opportunity to develop sufficient bilateral coordination and thus, the foundation for establishing hand and/or foot dominance (Le Roux, 2011:4).

Various reciprocal skills such as walking, running and climbing emerge during the development of a child. During these activities, both sides of the body are doing the same task, one side at a time. Examples of reciprocal bilateral coordination skills

include pulling a rope (hands) or riding a bicycle (legs). Once reciprocal bilateral coordination has developed sufficiently, asymmetrical movements emerge. Both sides of the body work together but perform entirely different yet complementary tasks. Cutting with scissors is a good example of asymmetrical bilateral coordination (Le Roux, 2011:4,5, Pienaar, 2012:179). The child's one hand leads/cuts whilst the other only supports or assists/holds the paper during the activity. Other examples include drawing, threading beads, kicking a ball (Le Roux, 2011:5), jumping on one foot and even the tennis serve (Pienaar, 2012:179). Alternating movements occur when one limb relieves the duty of another limb, using the same movement, in a rhythmic and coordinated manner. Examples include running, crawling and climbing stairs (Pienaar, 2012:179).

Bilateral coordination involves tasks that require total body control, as well as simultaneous and sequential coordination of the upper and lower limbs. Bilateral coordination has also been found to play an important role in the participation of various sports and recreational games (Bruininks & Bruininks, 2005:6).

The aforementioned motor skills, including balance and bilateral coordination, formed part of the motor skills development programme compiled for this study. The final section of this chapter will investigate and describe various aspects of a motor skills development programme.

## **MOTOR SKILLS DEVELOPMENT PROGRAMME**

*“Early detection of barriers to learning and development is desirable in order to obtain timely and appropriate help for the child. The earlier the intervention, the better the outcome for the child's future”* (Croock, 2009:19).

As soon as a child experiencing problems is identified, remediation should follow immediately (Kapp, 1991:38). Researchers suggest that motor skills are improved through intervention (Folio & Fewell, 2000:2). The role played by motor ability in the total development of the child has been considered so important that numerous programmes have been designed to improve the motor ability of children. These programmes attempt to increase the child's learning and subsequently his or her development. Research also indicates that motor skills intervention programmes have been designed from the premise that motor ability forms the point of departure for all types of learning (Derbyshire, 1991B:386).

According to Hardy *et al.* (2010:503), the mastery of motor skills is low in primary school children indicating the importance of early intervention programmes in the school environment, especially in pre-schools. Pre-school and other child care centres are regarded as the optimal setting for the implementation of motor skills development programmes. Grantham-McGreggor *et al.* (1999:4) reinforces this by stating that the early years of life is essential as the foundation for all future development.

When planning intervention programmes it is crucial to take into account important aspects such as; culture, ecology, language, and demographic factors, among others, and to devise interventions that reflect these variables. Intervention programme facilitators should also be aware of and understand that many children with disabilities can respond productively to the same developmental interventions as children without disabilities and should be included in their intervention efforts (Grantham-McGreggor *et al.*, 1999:5).

Movement programmes for young children should ideally include the following main aspects with appropriate age progressions as they get older (Table 2.8) (Pienaar, 2012:20).

**TABLE 2.8: SUGGESTED CONTENT OF MOVEMENT PROGRAMMES FOR YOUNG CHILDREN**

	<b>SKILL ASPECT:</b>	<b>CONTENT:</b>
<b>1.</b>	Body awareness:	<ul style="list-style-type: none"> <li>• Knowledge of different body parts</li> <li>• Control of different body parts</li> <li>• Coordination of both sides of the body, as well as of the top and bottom parts of the body (bilateral coordination)</li> <li>• Relaxing of the entire body as well as selected parts of the body</li> </ul>
<b>2.</b>	Balance:	<ul style="list-style-type: none"> <li>• Static balance</li> <li>• Dynamic balance</li> <li>• Balancing with / on top of objects</li> </ul>
<b>3.</b>	Locomotor skills:	<ul style="list-style-type: none"> <li>• These skills require the use of time, rhythm and energy</li> <li>• Rolling, crawling, walking, running, jumping, hopping, galloping, skipping, animal walks, climbing, agility and flexibility</li> </ul>
<b>4.</b>	Spatial orientation:	<ul style="list-style-type: none"> <li>• Laterality: <ul style="list-style-type: none"> <li>○ 'Map of inner space'</li> <li>○ Internal awareness of direction</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>• Directionality:             <ul style="list-style-type: none"> <li>○ ‘Map of outer space’</li> <li>○ Outward projection of laterality</li> <li>○ Internal awareness of the two sides of the body that must develop</li> </ul> </li> <li>• Personal space:             <ul style="list-style-type: none"> <li>○ Amount of personal space to be given is dependent on the individual</li> </ul> </li> <li>• Motor planning:             <ul style="list-style-type: none"> <li>○ Time and rhythm are incorporated here</li> <li>○ <i>Example:</i> when learning a sequence of movements, one has to listen to the instructions, give attention to details and remember the entire sequence of movements</li> </ul> </li> </ul>
5.	Manipulation skills:	<ul style="list-style-type: none"> <li>• Manipulation of objects can include contact, sending away and absorbing</li> <li>• <i>Example:</i> throwing, catching, rolling, kicking, bouncing and hitting</li> </ul>
6.	Rhythm and timing:	<ul style="list-style-type: none"> <li>• Can be included in the movement programme or practiced separately during a music activity</li> <li>• Internal rhythm – develops first</li> <li>• External rhythm – reacting to external stimuli and rhythm</li> <li>• Flowing movement – dance</li> </ul>

Source: Adapted from Pienaar (2012:20)

Programme characteristics and content determine the outcome of motor skill interventions. Thus, aspects such as the timing, duration and frequency of an intervention regulate its effect. It has been suggested that the earlier and the longer the interventions are, the larger the developmental benefits and outcomes will be. The more frequent the contact time and the more intense the intervention, the more likely it will be for children to benefit from an intervention programme (Grantham-McGregor *et al.*, 1999:5).

Furthermore, according to Pienaar (2012:66), the nature of equipment used during planned interventions and movement development programmes is also important and must be adaptable to body size and growth differences of all the participating children. One can follow a set of guidelines to maximise the equipment efficiency when considering or purchasing equipment for the use in movement development programmes as described in Table 2.9.

**TABLE 2.9: GUIDELINES FOR THE USE OF EQUIPMENT DURING MOVEMENT PROGRAMMES**

GUIDELINES:	
1.	Equipment must be adapted according to the size of the child and according to increases in growth
2.	Equipment providing information/feedback to the child regarding his or her motor performance may be very effective
3.	Equipment must be compiled in such a manner that it encourages the child to move mechanically correct
4.	Equipment must be adaptable to and selected according to any visual and/or perceptual deficits any child may have
5.	The development of a normal posture must be encouraged during the use of equipment at all times
6.	The safety of a child must always be considered when designing, making and/or setting up equipment

Source: Adapted from Pienaar (2012:66,67)

Early adolescence, approximately between the ages of 10 to 14, is a time of great change for young people. It is regarded as a time when many physical changes are occurring at an accelerated rate. As adolescents grow and develop, these young people are influenced by outside factors such as; parents, peers, community, culture, religion, school, world events and the media. Girls are also seen to develop and physically mature faster than boys during this stage (Spano, 2004:1). Thus, in light of these factors, a motor skills development programme may yet prove to be beneficial and provide the needed opportunities for motor skill development if implemented correctly and efficiently by influential peers during this period.

According to literature balance and bilateral coordination are regarded as very important motor skills that may play a role in the home- and school environment. Proficiency in these skills may also influence the physical activity participation, including sport, of school children. A study performed by Tober and Pollak (2005) assessed and compared the motor proficiency of nine year-old children raised in orphanages before being adopted with the motor proficiency of their peers raised by their birth family and in a stable home environment. Results indicated that the children, from a previously disadvantaged background such as being raised in an orphanage, presented delayed balance and bilateral coordination and that these delays persisted over time. Therefore, one might expect to find similar delays in other children from previously disadvantaged schools and –backgrounds (Roeber *et al.*, 2012:528). Roeber *et al.* (2012:527) suggest

that children from a previously disadvantaged background does not simply benefit from environment enrichment and that this is not beneficial for the remediation of delays in motor skills. They further suggest that previously disadvantaged children may benefit from early identification as well as a specific and targeted intervention programme. Thus, balance and bilateral coordination were chosen as the focus of the motor skills development programme designed for the current study.

The following chapter will provide an in-depth investigation and description of the research methodology that was followed during this study. This includes a discussion of the participants that formed part of the sample groups, the different testing procedures and the intervention programme that was designed and implemented by the researcher.

## CHAPTER THREE

### METHODOLOGY

#### INTRODUCTION

*“Research is to see what everybody else has seen, and to think what nobody else has thought – Szent Gyorgyi” (Thomas et al., 2005:3).*

According to the Reader’s Digest Pocket Dictionary (1969:456), the word research refers to a “careful search or inquiry”; an “endeavour to discover facts by study or investigation”; or a “course of critical investigation”. Depending on a person’s background and personal experience, every person will have a different idea or opinion as to what research is. Some might see it as searching the Internet on a computer or a visit to the local library, whilst others might see it as a lab with test tubes, vials and rats. Thus, it is very important that a common understanding of research is established. This chapter introduces the nature of research by discussing methods of problem solving involved in the research process as well as different types of research that exist (Thomas et al., 2005:3). The objective of research, according to Tuckman (1978) in Thomas et al. (2005:3), is to determine how things really are compared to how they might be. He also believes that in order to achieve this, research implies a careful and systematic means of problem solving and this includes five characteristics as indicated in Table 3.1.

**TABLE 3.1: TUCKMAN’S FIVE CHARACTERISTICS OF PROBLEM SOLVING (TUCKMAN, 1978)**

CHARACTERISTIC:	DESCRIPTION:
<b>Systematic:</b>	Problem solving is accomplished through the identification and labelling of variables and is followed by the design of research that tests the relationships among these variables. Data is then collected that, when related to the variables, allow the evaluation of the problem and hypothesis
<b>Logical:</b>	Examination of the procedures used in the research process allows researchers to evaluate the conclusions drawn
<b>Empirical:</b>	Researcher collects data on which to base decisions
<b>Reductive:</b>	Researcher takes individual events (data) and uses them to establish general relationships
<b>Replicable:</b>	Research process is recorded, enabling others to test the findings by repeating the research or to build future research on previous results

Source: Adapted from Thomas et al. (2005:3)

The current study fulfilled four of the five above mentioned characteristics as it was systematic, logical, empirical and replicable.

According to Thomas *et al.* (2005:17,22), research is a simple and structured manner of solving problems. In their opinion, there are various kinds of problems in physical activity research and thus various types of research that can be used to solve these problems. Table 3.2 provides a brief description of four different types of research commonly used.

**TABLE 3.2: DIFFERENT TYPES OF RESEARCH**

TYPE:	DESCRIPTION:
<b>Analytical:</b>	<p>Involves in-depth study and evaluation of available information in an attempt to explain complex phenomena</p> <p><i>Types:</i> historical, philosophical, reviews, research synthesis</p>
<b>Descriptive:</b>	<p>Concerned with status. The most prevalent descriptive research technique is the survey, most notably the questionnaire</p> <p><i>Types:</i> questionnaire, interview, normative survey, case study, job analysis, observational research, correlational studies, epidemiological research</p>
<b>Experimental:</b>	<p>Major advantage over the other types of research as the researcher can manipulate treatments to cause things to happen (for example., a cause-and-effect situation can be established)</p> <p><i>Types:</i></p> <ul style="list-style-type: none"> <li>• <i>Pre-experimental designs</i> (one-shot study, one-group pre-post-test design, static group comparison)</li> <li>• <i>True experimental designs</i> (randomized-groups design, pre-post-test randomized-groups design, Solomon four group design)</li> <li>• <i>Quasi-experimental designs</i> (reversal design, non-equivalent-control-group design, ex post facto design, time-series design, single subject design)</li> </ul>
<b>Qualitative:</b>	<p>A systematic method of inquiry and follows the scientific method of problem solving to a considerable degree. Characterised by intensive first-hand presence and uses more general questions to guide the study</p> <p><i>Types:</i> observation, interviews, researcher designed instruments</p>

Source: Adapted from Thomas *et al.* (2005:17-20,330-342)

Research in physical activity can be placed on a continuum with basic research at one end and applied research at the opposite end. Basic research normally addresses theoretical problems, is based in a laboratory setting, often uses animals as subjects, controls research conditions and produces results that have limited direct application (generalisability). Applied research, on the other hand, addresses immediate problems, uses so-called real-world settings, recruits humans as subjects, has limited control over research settings and produces results that have direct value to practitioners. Research problems may arise from various sources and may require resolving controversial issues, testing different theories and attempting to improve existing and current practice. These problems may vary along a basic to applied continuum depending on their goal and approach (Thomas *et al.*, 2005:3,5).

According to Mouton (2001:46), irrespective of the type of study or the selected methodology, all empirical or social research follows a standard logic. He calls this the ProDEC framework of social scientific reasoning. This framework consists of four standard research elements: the research problem (Pro), research design (D), empirical evidence (E) and the conclusions (C) of the research.

In conjunction with Chapter 2, this chapter aims to provide a clear outline of the selected topic that was investigated, what the specific research aims and objectives were, what type of study was conducted (research design), a detailed discussion of how the research was conducted (research methodology), as well as the extent (for example time-frame, required resources, etcetera) of this study (Mouton, 2001:46).

The following section will discuss the research design chosen for this particular study. The research design addresses a key question: What type of study will be selected to provide the necessary answers to the questions and problems posed by the selected research topic? More specifically, this section will identify why the specific research design was selected, as well as what the possible challenges and limitations of the chosen research design were (Mouton, 2001:49).

## **METHODOLOGY**

### **Research design**

According to Mouton (2001:55) a research design is the blueprint of how researchers plan to best conduct their research.

*“As researchers attempt to increase external [generalizability of results of a study] and ecological validity [extent to which research emulates the real world], the careful and complete control of the true designs becomes increasingly difficult, if not impossible. The purpose of the quasi-experimental designs is to fit the design to settings more like the real world while still controlling as many of the threats to internal validity as possible. The use of these types of designs in kinesiology, physical education, exercise science, sport science, and other areas (e.g., education psychology, and sociology) has increased considerably in recent years” (Thomas et al., 2005:5,13,335).*

A quasi-experimental design was accordingly chosen for the current study (Gravetter & Forzano, 2003:156,157) as the research population already belonged to existing groups (Baumgartner *et al.*, 2002:176) in the form of Grade 5 classes. This prevents randomised selection and placement into different sample groups (Bernard, 2000:117-118; Thomas *et al.*, 2005:335) and “no school district would agree to permit the study if it had to change the students’ classes” (Thomas *et al.*, 2005:336). This research design includes limitations such as: context effects; sampling error; measurement error (operationalising and measuring outcome indicators); maturation; history effect; selectivity effects; instrumentation effects and generalisability. Its greatest strength, however, is the ability to assess causal outcomes and impact (Mouton, 2001:160,161). The following is a detailed and descriptive outline of the selected research design.

### **Problem statement**

The main purpose of the current study was to design an appropriate motor skills development programme that can be implemented in any primary school to improve the balance and bilateral coordination of children between the ages of 10 and 12 years-old.

This study investigated the following specific objectives:

- To determine the current status of motor proficiency in the selected group according to the Bruininks-Oseretsky Test of Motor Proficiency-2 (BOT-2)
- To improve the balance and bilateral coordination, of children between the ages of 10 and 12 years-old

### **Subjects**

The Stellenbosch region has been chosen as schools are easier accessible, making this study more cost effective. Thus, a convenience sampling method was used (Baumgartner *et al.*, 2002:133). One school was selected from the Stellenbosch region as the focus of this study. The school was selected from a previously disadvantaged

community as children from a lower socio-economic bracket reportedly perform worse in motor activities which may be attributed to malnutrition and decreased participation in physical activity (Mészáros *et al.*, 2008:158).

This study initially aimed to recruit children (N=85) between the ages of 10 and 12 years-old. Two existing classes in the selected school were recruited and randomly selected either as the experimental (n=43) or control group (n=42). However, due to failing, expulsion and children transferring to other schools (Fallout group, n=18), the sample size decreased to 67 children. The experimental group consisted of 35 children (15=girls; 20=boys) and the control group of 32 children (14=girls; 28=boys) at the pre-test. Only the experimental group participated in the 12-week motor skills development programme designed for this study. The control group continued their usual participation in school sport, Physical Education (PE) and recreational activities and were only allowed to participate in the motor skills development programme after the completion of this study. By comparing the final post-test results of the experimental and control group's motor skill performance, the effects of the motor skills development programme may be observed (Torgerson & Torgerson, 2008:2).

### ***Inclusion and exclusion criteria***

Boys and girls between the ages of 10 and 12 years, from the selected school were included in this study. Any child with an obvious disability or physical injury, who was not able to participate in the motor proficiency test, was excluded from this study. Children who did not provide personal assent or parental consent were also excluded.

### **Place of study**

The conduction of the motor proficiency test battery and the implementation of the self-designed motor skills development programme took place in the facilities provided by the school involved in this study.

### **Statistical analysis**

The data was statistically analysed with Statistica (StatSoft, 2010) by Prof M. Kidd at the Centre for Statistical Consultation of Stellenbosch University.

A three-way mixed model analysis of variance was done with time, gender and group as the fixed effects and the participants nested in group\*gender as the random effect. The third order interaction effect (time\*group\*gender) was investigated to determine if

gender in any way affected the results, and thereafter the time\*group second order interaction effect was investigated to determine if the intervention (experimental group) showed a different effect to the control group. Normal probability plots were investigated to check the normality of the data and were found to be acceptable.

Summary results are presented as means and standard deviations. A significance level of less than 5% ( $p < 0.05$ ) was used as guideline for reporting significant results, but in some instances trends are reported for results that were not statistically significant. No claims are, however, made on the validity of these trends, which typically need to be further investigated in follow-up studies.

### **Ethical approval**

A research proposal, clearly stating the aims and objectives, as well as the methodology and extent of this study, was submitted to the Stellenbosch University Ethics Committee for approval (Protocol #: HS764/2012). Permission to conduct this study was requested and obtained from the principal of the selected school. A research proposal was also submitted to the Western Cape Education Department (WCED) to obtain permission to conduct this study in the selected school.

Parents of all prospective participants were required to provide written informed consent (Appendix A) before the commencement of any research screening or testing. The purpose of this study was explained to children and any uncertainty or questions that children had were addressed. Each participant received an assent form (Appendix B), which they had to complete and sign personally. A time period of two weeks was provided to obtain parental consent and individual assent and this allowed the children to complete the testing procedures and to participate in the motor skills development programme. All personal details and individual test scores remain unpublished and confidential as only the researcher and supervisors has access to this data.

The testing procedures of this study will now be discussed in more detail.

### **Testing procedures**

During the pre- and post-tests, the experimental and control group completed the Short Form, as well as the rest of the balance and bilateral coordination subtest activities in the Long Form of the Bruininks-Oseretsky Test of Motor Proficiency-2 (BOT-2) (Bruininks & Bruininks, 2005:25). This motor proficiency test has been extensively used in school environments (Plimpton & Regimbal, 1992:399; Hay & Missiuna,

1998:64; Reeves *et al.*, 1999:739; Nourbakhsh, 2006:40; Wrotniak *et al.*, 2006:1758; Venetsanou *et al.*, 2007:846; Faught *et al.*, 2008:177; Venetsanou *et al.*, 2009:543) and its use is recommended for instances where a brief, screening picture of motor proficiency is required (Bruininks & Bruininks, 2005:4; Deitz *et al.*, 2007:89). The motor skills development programme (Appendix D) was compiled using information gathered from an extensive literature review (Cheatum & Hammond, 2000:1-341; Bruininks & Bruininks, 2005:1-263; Dinoffer, 2011:np; Le Roux, 2011:1-29) and the researcher's experience as a Kinderkineticist (postgraduate degree in Human Movement Science, specialising in motor development). Only the experimental group participated in the self-designed motor skills development programme, thus the control group did not perform any additional motor skill development activities other than their usual school sport, PE classes or other physical activities. Participation in sport and recreational activities was taken into account and recorded, by providing the children with a questionnaire (Appendix C) that they completed during the post-test.

The order of the study's testing procedures, including the presentation of the pre- and post-tests and the implementation of the motor skills development programme, will now be discussed in more detail.

## **Pre-test**

### ***Motor Proficiency test***

The BOT-2 is an established and tested motor skills test battery and also one of the most popular test batteries used to determine the level of motor abilities or overall motor proficiency in children (Burton & Miller, 1998:162). This individually administered test battery provides a comprehensive motor skill assessment of children and youths four to 21 years of age (Bruininks & Bruininks, 2005:1; Deitz *et al.*, 2007:89), including a variety of measures of gross and fine motor proficiency. This enables the BOT-2 to be a useful tool to a wide variety of practitioners, specialists and researchers in different settings. Some of the important uses of the BOT-2 includes: supporting the diagnoses of motor impairments; serving as a screening device to identify those who might have motor ability deficits and may benefit from further testing; making educational placement decisions (for example regarding placement into specific and/or adapted PE programmes); developing and evaluating motor development programmes; and also assisting clinicians and researchers in assessments. This test battery consists of a Long-

and Short Form (Burton & Miller, 1998:161; Bruininks & Bruininks, 2005:8; Deitz *et al.*, 2007:88,89).

Both the Long and Short Form of the BOT-2 comprise of four motor area composites: fine manual control; manual coordination; body coordination; and strength and agility. The BOT-2 uses a composite structure that differentiates motor skills according to the limbs and muscles involved during movement, as well as according to the relationship to functional activities in the areas of postural control, locomotion and object manipulation (Bruininks & Bruininks, 2005:61). These composites are briefly described in Table 3.3.

**TABLE 3.3: MOTOR AREA COMPOSITES OF THE BOT-2**

<b>COMPOSITE:</b>	<b>DESCRIPTION:</b>
<b>Fine manual control:</b>	Motor skills involving the control and coordination of the distal musculature of the hands and fingers
<b>Manual coordination:</b>	Motor skills involving the control and coordination of the arms and hands, especially for object manipulation
<b>Body coordination:</b>	Control and coordination of the large musculature used in maintaining posture and balance
<b>Strength:</b>	Aspects of fitness and coordination involved in causal play, competitive sports and other physical therapy

Source: Adapted from Bruininks and Bruininks (2005:8,61) and Deitz *et al.* (2007:90)

The four BOT-2 motor area composites are further divided into eight subtests including: fine motor precision, fine motor integration, manual dexterity, upper-limb coordination, bilateral coordination, balance, running speed and agility and strength (Bruininks & Bruininks, 2005:4). These subtests are described in more detail in Table 3.4.

**TABLE 3.4: SUBTESTS OF THE BOT-2**

<b>SUBTEST:</b>	<b>DESCRIPTION:</b>
<b>Fine motor precision:</b>	<ul style="list-style-type: none"> <li>• Consists of activities that require the control of hand and finger movement</li> <li>• Includes drawing, paper-folding and cutting items</li> <li>• The objective of each item is to draw, fold or cut within the specified boundary</li> <li>• Performance is evaluated based on how well the participant stays within the specified boundary</li> <li>• Emphasis is placed on precision, thus items are not timed</li> </ul>

<p><b>Fine motor integration:</b></p>	<ul style="list-style-type: none"> <li>• Participant is required to reproduce various geometric shapes, ranging in complexity</li> <li>• Consists of activities that require the precise control of hand and finger movement</li> <li>• Includes drawing items</li> <li>• The objective of each item is to reproduce each shape as accurately as possible</li> <li>• Emphasis is placed on precision, thus items are not timed</li> <li>• Also measures visual-motor integration, which is the ability to integrate visual stimuli with motor control, as the participant is required to reproduce drawings without using additional visual aids or guidelines</li> <li>• Each shape is scored according to some or all of the following:             <ul style="list-style-type: none"> <li>○ Basic shape</li> <li>○ Closure</li> <li>○ Edges</li> <li>○ Orientation</li> <li>○ Overlap</li> <li>○ Overall size</li> </ul> </li> </ul>
<p><b>Manual dexterity:</b></p>	<ul style="list-style-type: none"> <li>• Consists of goal directed activities that involve reaching, grasping and bi-manual coordination with small objects</li> <li>• Activities include picking up and transferring small plastic pennies into a box, sorting cards, stringing small blocks and placing pegs into a pegboard</li> <li>• The skills required to perform these activities are meant to correspond to common daily activities such as holding and using eating utensils, buttoning buttons and sorting coins to make change, as well as recreational activities such as playing cards, putting together puzzles and building with blocks</li> <li>• The participant is requested to perform each item as fast as possible</li> <li>• Emphasis is placed on accuracy, but items are timed</li> <li>• By including the aspect of speed, timed activities more precisely differentiate levels of dexterity</li> <li>• Speed and accuracy are also important in the identification of disorders such as developmental coordination disorder (DCD)</li> </ul>
<p><b>Bilateral coordination:</b></p>	<ul style="list-style-type: none"> <li>• Evaluates motor skills involved in playing sports and various recreational games</li> <li>• Consists of activities that require body control and the sequential and simultaneous coordination of the upper and lower limbs</li> <li>• Activities require the participant to perform a sequence of movements such as jumping jacks, pivoting thumbs and fingers, and tapping feet and finger on the same or opposite sides of the body</li> </ul>
<p><b>Balance:</b></p>	<ul style="list-style-type: none"> <li>• Evaluates the motor skills that are critical in the maintenance of posture when standing, walking or performing other common activities such as reaching for a cup on a shelf</li> </ul>

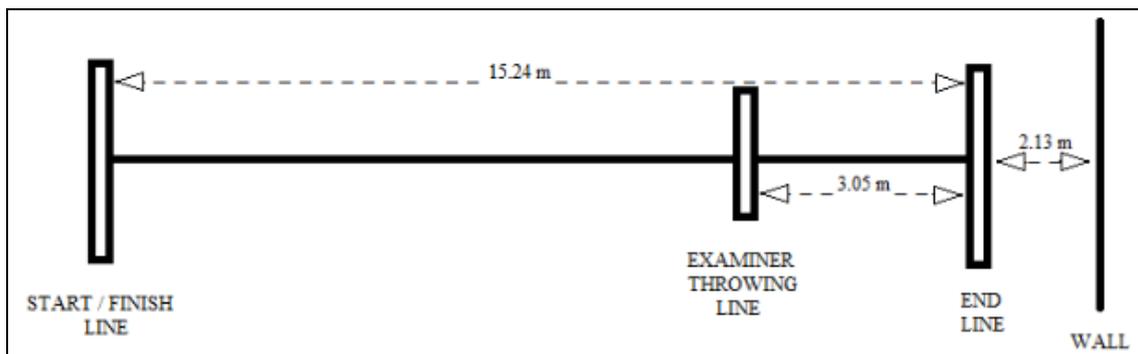
	<ul style="list-style-type: none"> <li>• Items in this subtest measures three areas that affect balance: <ul style="list-style-type: none"> <li>○ <i>Stability of trunk:</i> <ul style="list-style-type: none"> <li>▪ Activities include standing on one or both feet and standing on the floor or on a balance beam</li> </ul> </li> <li>○ <i>Stasis and movement</i> <ul style="list-style-type: none"> <li>▪ Activity performance either requires stationary balance (static) or walking forward on a line (dynamic)</li> </ul> </li> <li>○ <i>Use of visual cues</i> (1leg balance-eyes closed) <ul style="list-style-type: none"> <li>▪ Certain activities require the participant’s eyes to be closed and thus, assesses the extent of dependence on visual cues for maintaining balance</li> </ul> </li> </ul> </li> </ul>
<b>Running speed &amp; agility:</b>	<ul style="list-style-type: none"> <li>• Activities assess running speed and agility</li> <li>• Activities include a shuttle run, hopping on one or both feet and stepping over a balance beam</li> <li>• Observations regarding gait can also be made during activities such as the shuttle run</li> <li>• Items are timed</li> </ul>
<b>Upper-limb coordination:</b>	<ul style="list-style-type: none"> <li>• Consists of activities designed to measure visual tracking with coordinated arm and hand movement</li> <li>• Activities include catching, dribbling and throwing a tennis ball with the use of one hand or the coordination of both hands</li> </ul>
<b>Strength:</b>	<ul style="list-style-type: none"> <li>• Designed to measure trunk and upper and lower body strength</li> <li>• Important component in a comprehensive measure of motor skills as strength is an essential in component of gross motor performance in many daily activities</li> </ul>

Source: Adapted from Bruininks and Bruininks (2005:5,6)

The Short Form consists of 14 items in total that are carefully selected to ensure a sufficient representation of all eight BOT-2 subtests, to cover the widest range of ability and to produce reliable scores (Bruininks & Bruininks, 2005:6). The Short Form is used to provide a brief overview of a child’s motor proficiency (Venetsanou *et al.*, 2009:544). This test has an internal consistency of  $r \geq 0.80$ , an inter-rater reliability of  $r \geq 0.90$  and a test-retest reliability of  $r \geq 0.80$  (Deitz *et al.*, 2007:93,94). Construct validity of this test is also good,  $r=0.78$  (Cools *et al.*, 2009:161).

When preparing to administer this test battery it is important to consider and follow the BOT-2 guidelines regarding the set-up of the testing area. This set-up will require approximately 10 minutes to suitably prepare the testing area. Testing should always be administered in a space that is free from noise and any other unnecessary distraction that may hinder testing procedures. The testing area should be at least 18.29 meter long and

3.66 meter wide and include two suitable and age appropriate chairs and a table. The feet of the participant should be able to rest comfortably on the floor when in a seated position. The performance of certain activities requires the set-up of a running course as seen in Figure 3.1. This running course is created by taping out a 15.24 meter line on the floor and includes: a start/finish line; an examiner (researcher) throwing line; and an end line. Different sections of this running course diagram are used during the different BOT-2 activities and the Short form will only make use of selected sections of this course (Bruininks & Bruininks, 2005:10).



**FIGURE 3.1: RECOMMENDED SET-UP OF THE BOT-2 RUNNING COURSE**

Source: Adapted from Bruininks and Bruininks (2005:10)

Participants were tested according to the test guidelines and testing procedures took approximately 15-20 minutes per child to complete. Administration guidelines included familiarisation with and adherence to specified test equipment, scoring and administration rules. The researcher understood the tasks well enough to be able to sufficiently explain each task to the participants. The researcher is experienced in the administration and scoring of the test and the testing area was kept free of all equipment not in use. This ensured the safety and full attention of the participants. Emphasis was always placed on proper form even if the task required speed. The subtests of the BOT-2 are placed in a specific order so that all the paper and pencil activities are performed first and activities that require greater physical exertion at the end of the test. This ensures that fatigue does not influence those activities that may require steadiness and precision. The design of this test structure also makes it very convenient for examiners when only working with selected subtests (Bruininks & Bruininks, 2005:3,11,12).

Along with the Short Form activities, the participants were required to complete all the activities in the balance and bilateral coordination subtests, of the Long Form of the BOT-2. This was done to conduct a more in-depth investigation of the level of balance

and bilateral coordination, as these motor skills were the focus of this study. All activities performed during the pre- and post-tests of the BOT-2 are subject to copyright. For this reason, none of these activities will be described. The BOT-2 examiner's manual and/or BOT-2 administration easel should be used to obtain any further information.

### ***Scoring of the BOT-2***

The Short Form of the BOT-2 is a quick and easy to administer screening tool and provides a single score of motor proficiency, similar to the Total Motor Composite (TMC). The TMC is the most reliable and also the preferred measure when determining and describing overall motor proficiency. It is computed by calculating the sum of the four motor-area composite standard scores, when using the Long Form of the BOT-2. When describing the overall motor proficiency the researcher reports the standard score, the confidence interval, the corresponding percentile rank and the relevant descriptive category (Bruininks & Bruininks, 2005:30).

### **Standard scores**

Standard scores are used to describe a child's level of proficiency in each of the four motor-area composites and may range from 20 to 80, with a mean of 50 and a standard deviation of 10 (Bruininks & Bruininks, 2005:27). Table 3.5 provides an outline of the different categories ranging from well-above average to well-below average that are used to classify standard scores.

### **Confidence intervals**

A confidence interval is the range of scores around a child's achieved standard score and that has a certain likelihood of including the child's true score. The higher the confidence level is the wider the confidence interval will be. The selected confidence interval is 90% as recommended by the authors of the BOT-2 (Bruininks & Bruininks, 2005:28).

### **Percentile rank**

Percentile rank refers to the percentage of individuals that the child has outranked within his own age group (Bruininks & Bruininks, 2005:28). An outline of the different categories used to define percentile rank is provided in Table 3.5.

### Descriptive categories

Five descriptive categories, as seen in Table 3.5, were used as an additional tool for communicating results to the participant, parents and/or teachers. These categories describe the levels of motor proficiency within the BOT-2 motor subtests and composites by using wide ranges of scale or standard scores. The use of these categories allows the researcher to highlight the differences found between the various subtests or among the different motor composites (Bruininks & Bruininks, 2005:29).

**TABLE 3.5: DESCRIPTIVE CATEGORIES USED DURING THE INTERPRETATION OF BOT-2 RESULTS**

<b>DESCRIPTIVE CATEGORY:</b>	<b>STANDARD SCORE RANGE:</b>	<b>PERCENTILE RANK RANGE:</b>
<b>Well-above average:</b>	70 or greater	98 or greater
<b>Above average:</b>	60 – 69	84 – 97
<b>Average:</b>	41 – 59	18 – 83
<b>Below average:</b>	31 – 40	3 – 17
<b>Well-below average:</b>	30 or less	2 or less

Source: Adapted from Bruininks and Bruininks (2005:29)

This test battery quantifies motor skills according to the results of goal-directed activities. The results may be in the form of a drawing, a number of objects or events, or a length of time. Each test battery item is scored on a graded scale that was designed to span the widest possible range of performance. By using this graded scoring approach it allows the BOT-2 to include a wide variety of activities within each subtest, that are appropriate for a diverse population as most examinees will achieve some success on every task.

The BOT-2 provides gender-specific norms as well as norms based on a combined sample of males and females. Gender-specific norms are provided due to the performance differences between males and females on certain subtest items. The use of gender-specific norms ultimately removes the differences that may occur during the interpretive process and any impairment in motor proficiency is identified according to the performance of one's own gender. Therefore, gender-specific norms are regarded as the preferred norms to use in most situations. Using combined norms should only be due to an important clinical or research reason (Bruininks & Bruininks, 2005:6,7,30).

Scoring objectively is just as critical to obtaining valid results as proper administration. Each test item must be scored regardless of the examinee's success or failure on surrounding items, as well as independently of the examiner or researcher's knowledge and/or assumptions regarding the examinee's level of ability. Norms and the interpretation of all collected test data, including the validity and reliability, is dependent on the careful adherence to the specific rules of administration and scoring. Altering these rules in any way, such as allowing an additional trial or extending the time limit of a subtest item, will influence the results and the researcher will not be able to correctly interpret the abilities of the examinee in a normative sense. Any deviations from the standard procedure must be noted and taken into account when interpreting the performance and ability of the examinee (Bruininks & Bruininks, 2005:10). Table 3.6 provides a brief overview of the various steps in the scoring process of the BOT-2 that should be followed strictly to maintain this standard procedure of scoring and the correct interpretation of all test results. A detailed description of these steps will follow below.

**TABLE 3.6: STEPS IN THE SCORING PROCESS OF THE BOT-2**

<b>STEP:</b>	<b>PROCEDURE:</b>
<b>1.</b>	Record raw scores of all subtest items
<b>2.</b>	Convert raw scores to point scores
<b>3.</b>	Point scores are summed to yield the subtest point scores / total point scores and carried to the cover page
<b>4.</b>	Subtest total point scores are converted to scale scores (Mean = 15, Standard Deviation = 5)
<b>5.</b>	Scale scores are converted to composite standard scores and percentile ranks
<b>6.</b>	Standard scores of subtests are summed and then converted to calculate the TMC (Mean = 50, Standard Deviation = 5)
<b>7.</b>	Confidence intervals are determined for scale and standard scores (90% or 95%)
<b>8.</b>	Age equivalents are obtained for the point scores of each subtest
<b>9.</b>	Scale and standard scores are converted to the following descriptive categories

Source: Adapted from Burton and Miller (1998:163-166) and Bruininks and Bruininks (2005:15-26)

*Step 1: Record raw scores of all test items*

The participant's performance of each test item is recorded in the space provided, in the raw score column, on the BOT-2 score sheet. Recording the item performance after completing each test item allows the researcher to keep a clear record of what test items have been administered and will prevent unknowingly omitting any test items (Bruininks & Bruininks, 2005:15). A raw score may consist of a number of points, a number of units completed (number of activities correctly performed), a number of errors, a time (number of seconds) or just a pass or fail (Burton & Miller, 1998:163; Bruininks & Bruininks, 2005:15). The scoring of certain items may require the computation of scores to reach a final item raw score, as seen in the fine motor precision and fine motor integration subtests of the BOT-2 (Bruininks & Bruininks, 2005:15).

*Step 2: Convert raw scores to point scores*

Once recorded, the raw scores are converted to point scores to appropriately weight the difficulty of each individual item (Burton & Miller, 1998:163; Bruininks & Bruininks, 2005:15). A point score is a type of standard score that enables the researcher to assess the performance of each participant according to a graded scale. The point score of each subtest item is calculated by looking at the corresponding raw score to point score conversion table. This conversion table is located to the right of the raw score column on the BOT-2 score sheet. The researcher must find the corresponding number or range for the each raw score in the row that is labelled raw. Once the correct number or range is established, look directly below, in the row labelled point, and find and circle the corresponding point score that is provided. This score is then transferred to the space provided to the right in the point score column. When two trials are given during a test item, the better of the two raw scores are always converted to the point score (Bruininks & Bruininks, 2005:15,16).

*Step 3: Point scores are summed to yield the subtest point scores / total point scores and carried over*

A subtest total point score may be calculated by adding the point scores of all the individual test items within each subtest (Burton & Miller, 1998:163; Bruininks & Bruininks, 2005:16). The total point score is calculated by adding the point scores of all the subtests together and recorded in the space provided, labelled total point score,

located on the bottom right hand corner of the BOT-2 Short Form score sheet (Bruininks & Bruininks, 2005:16).

*Step 4: Subtest total point scores are converted to scale scores (Mean=15, Standard Deviation=5)*

When using the Long Form, all the subtest total point scores are transferred from the score sheet to the corresponding lines on the cover page. Depending on the chosen norms (gender-specific or combined), locate the appropriate norm tables in the BOT-2 manual required to obtain the subtest scale scores. Locate the correct page of the relevant norm table that corresponds to the participant's age in years and months. Locate the participant's total point score for each subtest in the appropriate column and read across to the left or right to obtain each corresponding scale score. Scale scores are recorded in the appropriate space provided, under the scale score column, on the cover of the score sheet (Bruininks & Bruininks, 2005:18).

*Step 5: Scale scores are converted to composite standard scores and percentile ranks*

The subtest scale scores, within each motor area composite, are added together and recorded on the appropriate line provided labelled sum. Depending on the chosen norms (gender-specific or combined), locate the appropriate norm table and page in the BOT-2 manual corresponding to the participant's age in years and months. Locate the corresponding standard score and percentile rank for the participant's sum of subtest scale scores for each composite. Record the relevant standard score and percentile rank in the appropriate space provided on the score sheet cover page (Bruininks & Bruininks, 2005:19).

*Step 6: Standard scores are summed and then converted to calculate the TMC (Mean=50, Standard Deviation=10)*

In order to calculate the TMC, the four motor area composite standard scores are summed. Recorded this value on the appropriate line, labelled sum, in the standard score column on the score sheet cover page. Depending on the chosen norms (gender-specific or combined), locate the appropriate norm table in the BOT-2 manual corresponding to the participant's age in years and months and locate the calculated sum of standard scores in the appropriate column. Read across to locate the relevant standard score and percentile for the TMC (Bruininks & Bruininks, 2005:19).

*Step 7: Confidence intervals are determined for scale scores (90% or 95%)*

The range of scores that is most likely to include the participant's true score, with either 90 or 95% confidence (level is choice dependent), is known as the confidence interval. Different norm tables provide the bands of error at subtest and composite level. Once again, depending on the chosen norms (gender-specific or combined), locate the appropriate norm table in the BOT-2 manual corresponding to the participant's age in years and months and locate the band of error for each of the following: subtest scale score; motor area composite standard score and TMC standard score. Record this value in the appropriate column provided on the score sheet cover page labelled band. To calculate the lower end of the confidence interval, subtract the band of error value from the standard score and record it on the left line under the column labelled interval. Similarly, to calculate the higher end of the confidence interval, add the band of error value to the standard score and record it on the right line under the column labelled interval (Bruininks & Bruininks, 2005:19,20).

*Step 8: Age equivalents are obtained for the point scores of each subtest*

Age equivalents for the relevant subtest total point scores are provided in different norm tables in the BOT-2 manual depending on the chosen norms (gender-specific or combined). Find the relevant total point score for each subtest in the appropriate table and read across to locate the appropriate age equivalent value. Age equivalents for each total point score is recorded in the space provided on the score sheet cover page under the column labelled age equivalent (Bruininks & Bruininks, 2005:20).

*Step 9: Scale and standard scores are converted to descriptive categories*

Descriptive categories are useful when the researcher wishes to include verbal descriptions of where a participant's scale and standard scores fall compared to the norm sample. The five descriptive categories include: well-above average; above average; average; below average and well-below average. The appropriate norm table in the BOT-2 manual provides all the relevant descriptive categories corresponding to different ranges of scale and standard scores. Locate the appropriate descriptive category that corresponds with each of the participant's scale and standard scores and record them in the space provided on the score sheet cover page under the column labelled descriptive category. The descriptive categories of the BOT-2 are based on standard deviations from the mean. A standard deviation of 15 is used for scale scores

and 50 for standard scores. The researcher should not feel forced to limit the description to one specific category. When a score falls within one category but lies very close to another category, it may be best to classify the participant as a combination of the two categories. Using a combination of two categories to describe a scale or standard score can be used as a general rule when the relevant scores falls in one category but lies within one standard error of measurement (SEM) of another. Standard error of measurement values vary for each subtest and motor area composite and as a function of age (Bruininks & Bruininks, 2005:20,21).

The following section will provide an overview of the motor skills development programme that was implemented for 12 weeks between the pre- and post-tests.

### **Intervention: Motor skills development programme**

A motor skills development programme (Appendix D) was compiled by the researcher for children between the ages of 10 and 12 years-old. The focus of this programme was to improve selected motor skills, needed to maintain a healthy and active lifestyle. The two skills selected as the focus of the motor skills development programme, was balance and bilateral coordination. Balance involves motor control skills that are required for the maintenance of posture whilst standing, walking or other common tasks such as reaching for an object on a shelf. Balance can be static (stationary) or dynamic (movement). Bilateral coordination involves tasks that require body control, as well as simultaneous and sequential coordination of the upper and lower limbs. Bilateral coordination plays an important role in playing various sports and recreational games (Bruininks & Bruininks, 2005:6).

The researcher implemented the programme whilst the Grade 5 PE teacher assisted with discipline when available and where necessary. The nature of this programme may help empower the teachers to individually implement each lesson and further improve the balance and bilateral coordination of the children after the conclusion of this study. The programme was presented during the second and third school term, thus for approximately 12 weeks. The required 90 minutes (DBE, 2011:7) of PE time was divided into three lessons per week of 30 minutes each. Two lessons of 30 minutes each was allowed for the implementation of the motor skills development programme. The third lesson was reserved by the PE teacher for a compulsory theory lesson. The skill focus was alternated weekly between balance and bilateral coordination. The two

lessons within each week thus had the same skill focus. During the first lesson of each week, the researcher introduced and taught activities to children and allowed them time to practice each activity as far as the allocated PE time allowed. The second lesson of each week used the same activities as taught during the first lesson, however, with added progression to each activity to further develop the relevant motor skill. This motor skills development programme also had to be adapted to include the specific elements such as rhythmic movements and target games. These elements are required to be covered during PE lessons according to the WCED (WCED, 2011:1-12). Table 3.7 provides a summarised outline of the weekly skill focus of the motor skills development programme.

**TABLE 3.7: SUMMARISED OUTLINE OF THE MOTOR SKILLS DEVELOPMENT PROGRAMME**

<b>WEEK:</b>	<b>LESSONS:</b>	<b>SKILL FOCUS:</b>
<b>1.</b>	1 – 2	Balance
<b>2.</b>	3 – 4	Bilateral Coordination
<b>3.</b>	5 – 6	Balance
<b>4.</b>	7 – 8	Bilateral Coordination
<b>5.</b>	9 – 10	Balance
<b>6.</b>	11 – 12	Bilateral Coordination
<b>7.</b>	13 – 14	Balance
<b>8.</b>	15 – 16	Bilateral Coordination
<b>9.</b>	17 – 18	Balance
<b>10.</b>	19 – 20	Bilateral Coordination
<b>11.</b>	21 – 22	Balance
<b>12.</b>	23 – 24	Bilateral Coordination

### **Post-test**

The Short Form was repeated during the post-test, along with the rest of the balance and bilateral coordination subtest activities in the Long Form of the BOT-2. A comparison between the pre- and post-test results will provide insight to whether the implemented motor skills development programme was successful in improving the balance and bilateral coordination of the learners.

The following chapter will provide a detailed investigation, interpretation and discussion of the BOT-2 results. Results from the pre- and post-tests will be compared to provide evidence regarding the efficiency of the motor skills development programme, more specifically in the improvement of the balance and bilateral coordination of children between the ages of 10 and 12 in the Stellenbosch region.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### INTRODUCTION

*“Statistics are like a bikini. What they reveal is suggestive, but what they conceal is vital”* – Aaron Levinstein (Thomas *et al.*, 2005:125).

The idea of statistics is extremely intimidating to many. It is, however, one of the few ways that researchers are able to consistently report data, allowing relevant and accurate conclusions and comparisons to be made (Thomas *et al.*, 2005:97). It also refers to a set of procedures and rules that can be used to reduce large masses of research data into smaller manageable portions (Howell, 2008:2). Numeric data such as statistics are usually well structured and relatively easy to capture when compared to textual data. It, is, however, not as rich in meaning as textual data (Mouton, 2001:108). According to Thomas *et al.* (2005:97), statistics are logical, methodological and necessary; and not random, inconsistent or as terrifying as they seem to appear. It is an objective method of interpreting a collection of observations. Various statistical techniques are required to efficiently describe the vast array of the characteristics of research data. Statistics are also used to test the relationships between different data sets (determining the relationships among variables) and to test the differences among different sets of data (testing the differences among groups) (Thomas *et al.*, 2005:97,110). An investigation of the relationships between different concepts, constructs or variables, and to determine whether there are any patterns, trend or themes to be identified or isolated within the research data, are all aims of a statistical analysis (Mouton, 2001:108). Thus, statistical techniques answer two important questions regarding the data to which these techniques are applied. These questions are (Thomas *et al.*, 2005:109):

1. Is the effect or relationship of interest reliable? Or in other words, will the effect or relationship be found again if the research is repeated (is it significant)?
2. How strong or meaningful is the effect or relationship that the researcher is interested in? Or in other words, what is the magnitude or size of this effect or relationship?

The significance of statistics refers to the reliability of, or the confidence in, the likelihood of a statistic reoccurring if the study was repeated (whether it represents a real relationship). In other words, the relationship or difference is reliable and will reoccur if the study is repeated. The meaningfulness of statistics refers to the importance

or practical significance of the results. Thus, when using statistics to test the differences between two or more groups, a person wants to determine whether the groups in question are significantly different from each other, what the strength of the relationship is between the independent and dependent variables, and/or the size of the differences between the groups in question (Thomas *et al.*, 2005:110,115,132,148). According to Howell (2008:22), variables refer to the properties of objects or events that can take on different values. Independent variables include those factors that the researcher can control or manipulate such as requiring a child to perform the same activity under different test conditions. A good example can include a throwing activity that requires throwing balls of different weights, throwing at varying distances or throwing at different sized targets (Burton & Miller, 1998:64; Howell, 2008:22). Dependent variables, on the other hand, are the actual measurements, assessments or scores used to record the performance of the participants under a specified set of constraints. These variables are dependent due to the fact that they rely on the conditions that are caused by the independent variables (Burton & Miller, 1998:64; Howell, 2008:22).

When collecting group movement performance scores, the data can be treated in two different manners. When the only focus is group performance, the researcher may use descriptive statistics that represent and summarize the commonality and variability of the group to interpret data. The interpretation of descriptive statistics, such as means and standard deviations, require researchers to possess a sufficient understanding of the distribution of the scores of the group as well as the reliability of the scores for individual performers. However, when the assessment of group performance is supposed to represent as well as predict the performance of a larger population, inferential statistics should be used for interpretation. Inferential statistics should be used as estimates of the population from the limited sample and not as exact values (Burton & Miller, 1998:64,65). Literature suggests that the results of a study may be plausible in other participants, treatments and situations, depending on their similarity to the specific study characteristics (Thomas *et al.*, 2005:102).

In accordance with the primary aim and specific objectives of this study, the results reported in this chapter are discussed in such a way as to provide a clear picture regarding the following aspects:

1. To provide a brief overview of the overall motor proficiency of the experimental and control groups, as determined by the Short Form, before and after the motor skills intervention programme
2. To determine the effect the motor skills development programme had on the performance of activities as seen in the balance and bilateral coordination subtests of the Long and Short Form of the BOT-2

Group\*time interactions were investigated to determine whether there were any observable changes in the performance within and/or between the experimental and control groups over time. Thus, whether the intervention (12-week motor skills development programme) had any significant effect on the performance of the experimental group and finally to determine if there was any change in the performance of the control group. Gender, as a third order interaction (group\*time\*gender), was investigated to determine whether it played any significant role in the interpretation of the research data. If gender did not play a significant role, these results will not be reported in this chapter. Before reporting the results regarding balance, bilateral coordination and overall motor proficiency, descriptive information regarding the age and gender is briefly discussed.

#### **DEMOGRAPHIC PROFILING:**

All the Grade 5 children of the selected school took part in this study, thus a general age group of 10 to 12 years was selected. All relevant dates of birth were provided by the school in the form of Centralised Educational Information System (CEMIS) class lists. The average age and standard deviation for both the experimental ( $11.40 \pm 0.66$  years) and control group ( $11.24 \pm 0.69$  years) was approximately  $11.32 \pm 0.67$  years. Classes were randomly selected and divided as an entire entity, into either an experimental or control group. Thus, both boys and girls were included in this study and participated together as a group. It was observed that there were relatively more boys (55%) than girls (45%) belonging to both groups participating in this study. The experimental group consisted of 19 boys (56%) and 15 girls (44%) and the control group consisted of 18 boys (55%) and 15 girls (45%).

## LONG FORM

### Balance

This section provides a brief overview of the effect the motor skills development programme had on the performance of activities as seen in the balance subtest of the Long Form of the BOT-2. This motor subtest assesses motor skills that are critical in the maintenance of posture whilst standing, walking, or performing other common activities such as reaching for an object on a shelf (Bruininks & Bruininks, 2005:6).

Balance means, standard deviations and mean differences for the entire duration of the study are summarised in Table 4.1. No significant differences were found for the mean balance score within the experimental ( $p=0.09$ ) and control group ( $p=0.67$ ), or between the pre- ( $p=0.93$ ) and post-tests ( $p=0.32$ ) (Table 4.1). Thus, there was no significant balance improvement in the experimental group that participated in the motor skills development programme. However, a trend toward significance was observed in the mean balance score between the pre- and post-test of the experimental group ( $p=0.09$ ). This indicates that the mean balance score improvement was relatively higher for the experimental group ( $p=0.09$ ) compared to the control group ( $p=0.67$ ) by the end of this study. This suggests that a change occurred within the experimental group that did not occur in the control group, possibly due to participation in the motor skills development programme.

The researcher was not able to find any previous comparable studies, emulating the exact research characteristics as the current study. Similar studies were, however, conducted using different populations and different modes or duration of intervention. Gupta *et al.* (2011:430) also found increased balance performance, within their experimental group, and almost no change in their control group after a 6-week strength and balance training programme for children with Down's syndrome. Connolly *et al.* (1993:175) conducted a longitudinal study on the effects of an early intervention programme on Down syndrome children and found further increased balance performance during the third follow-up test. There was, however, no control group to compare the early intervention group to. Lewis & Fragala-Pinkham (2005:34) also presented improved balance, in the absence of a control group, after a 6-week aerobic conditioning and strength training intervention programme on a Down syndrome girl.

**TABLE 4.1: BALANCE MEANS, STANDARD DEVIATIONS AND MEAN DIFFERENCES FOR THE EXPERIMENTAL AND CONTROL GROUP BETWEEN PRE- AND POST-TESTS (LONG FORM)**

<b>GROUP:</b>	<b>PRE-TEST: Mean ± SD</b>	<b>POST-TEST: Mean ± SD</b>	<b>p#</b>	<b>Δ (Pre - Post)</b>
<b>EXPERIMENTAL:</b>	11.11 ± 0.66	11.40 ± 0.66	0.09	-0.78
<b>CONTROL:</b>	10.96 ± 0.69	11.24 ± 0.69	0.67	-0.20
<b>p+</b>	0.93	0.32	-	-

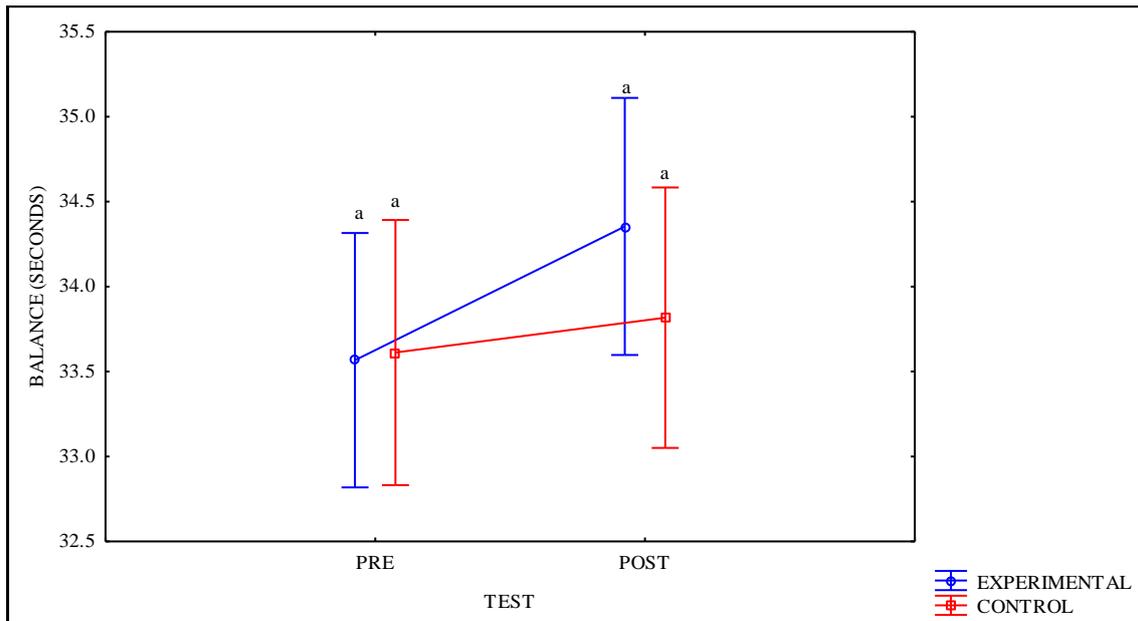
p+ Differences between groups for the pre- and post-test

p# Differences within groups from pre-to post-test

Δ Mean differences within groups from pre- to post-test

According to the mean differences between groups, the experimental group improved their balance during the post-test by approximately 0.58 seconds more than the control group (Figure 4.1). This increase may be due to participation in balance activities addressed in the 12-week motor skills development programme. Van Niekerk *et al.* (2007:166) similarly, found significant improvements in their experimental group's balance after a 10-week intervention programme amongst South African shelter-dwelling children. Their control group showed no significant improvements. Peens *et al.* (2008:321) observed a significant improvement in their motor-based intervention group of seven to nine year old DCD children compared to the psychological intervention group who did not improve significantly.

Alphabet letters are used in the next figures to indicate a significant difference of 5% between and/or within the experimental (Exp) and control group (Ctrl). If there are any overlapping letters, (a-a)/(ab-a)/(a-ab)/(ab-b)/(b-ab)/(ab-ac)/(ab-ab)/(c-ac)/(ac-ac)/(cb-ab)/(ac-a)/(c-ac)/(ac-ac), this indicates that there was no statistically significant difference and where the letters are completely different, (a-b)/(b-a)/(cb-a), it indicates a statistically significant difference between and/or within the experimental and control group.



(a-a) Indicates no statistically significant difference Pre vs. Post and/or Exp vs. Ctrl ( $p > 0.05$ )

**FIGURE 4.1: BALANCE BETWEEN THE EXPERIMENTAL AND CONTROL GROUP AND FROM PRE- TO POST-TEST (LONG FORM)**

### **Bilateral coordination**

A brief overview of the effect that the motor skills development programme had on the performance of activities as seen in the bilateral coordination subtest of the Long form of the BOT-2 is provided in this section. This motor subtest assesses the motor skills that are involved in playing sport and various recreational games (Bruininks & Bruininks, 2005:6). Bilateral coordination means, standard deviations and mean differences for the entire duration of the study are summarised in Table 4.2.

A significant difference was found for the mean bilateral coordination score between the pre- and post-test of the experimental group ( $p=0.04$ ) (Table 4.2). No significant difference was found for the mean bilateral coordination score between the pre- and post-test of the control group ( $p=0.61$ ). Thus, significant change was observed only within the experimental group and not in the control group, which may be ascribed to the bilateral coordination activities that were performed during the 12-week motor skills intervention programme. In addition, no significant differences were found for the mean bilateral coordination score between groups at pre- ( $p=0.49$ ) and post-testing ( $p=0.64$ ). The significant difference found within the experimental group is, however, not supported by the interaction  $p$ -values between groups. Thus, according to the mean differences between groups, the experimental group improved their bilateral

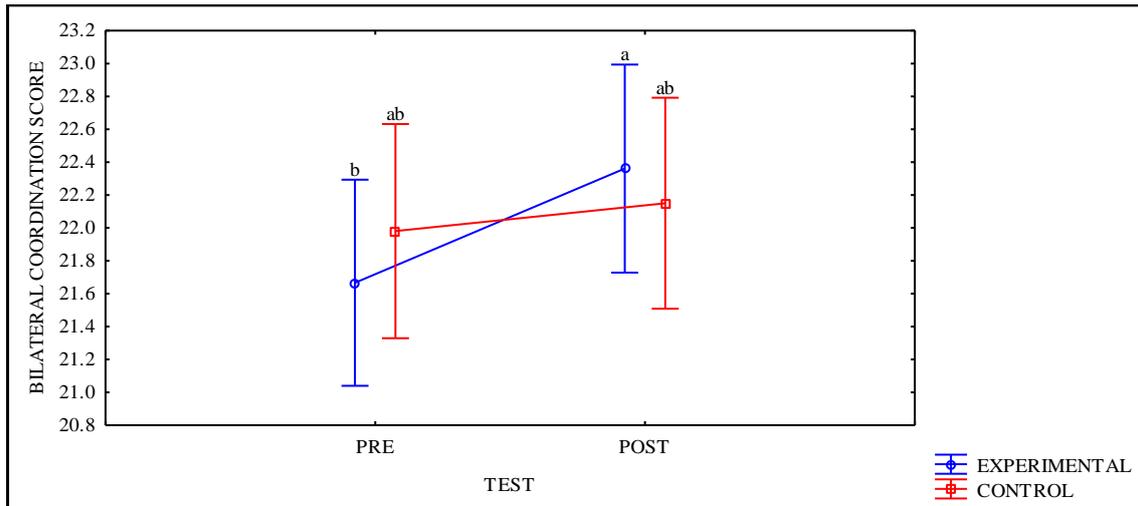
coordination score by approximately 0.52 (touches, jumping jacks, jumps, pivots, taps combined) more than the control group. This improvement is shown in Figure 4.2.

Connolly *et al.* (1993:173,177) found further increased bilateral coordination performance during their third follow-up test during the longitudinal study on the effects of an early intervention programme on Down syndrome children. There was, however, no control group to compare the early intervention group to. Lewis and Fragala-Pinkham (2005:34) also presented an improvement in bilateral coordination, in the absence of a control group, after a 6-week aerobic conditioning and strength training intervention programme on a Down syndrome girl. Van Niekerk *et al.* (2007:166) also found significant improvements in the experimental group's bilateral coordination after a 10-week intervention programme amongst South African shelter-dwelling children. These researchers' control group showed no significant improvements after 10 weeks.

**TABLE 4.2: BILATERAL COORDINATION MEANS, STANDARD DEVIATIONS AND MEAN DIFFERENCES FOR THE EXPERIMENTAL AND CONTROL GROUP BETWEEN PRE- AND POST-TESTS (LONG FORM)**

<b>GROUP:</b>	<b>PRE-TEST: Mean ± SD</b>	<b>POST-TEST: Mean ± SD</b>	<b>p#</b>	<b>Δ (Pre - Post)</b>
<b>EXPERIMENTAL:</b>	21.47 ± 2.03	22.32 ± 1.57	0.04*	-0.69
<b>CONTROL:</b>	21.94 ± 1.72	22.18 ± 1.99	0.61	-0.17
<b>p+</b>	0.49	0.64	-	-

p+ Differences between groups for the pre- and post-test  
p# Differences within groups from pre-to post-test  
Δ Mean differences within groups from pre- to post-test  
\* Statistically significant difference (Pre vs. Post) (p<0.05)



- (a-b)/(b-a) Indicates a statistically significant difference Pre vs. Post ( $p < 0.05$ )  
 (ab-a)/(a-ab) Indicates no statistically significant difference Pre vs. Post and/or Exp vs. Ctrl ( $p > 0.05$ )  
 (ab-b)/(b-ab) Indicates no statistically significant difference Pre vs. Post and/or Exp vs. Ctrl ( $p > 0.05$ )  
 (ab-ab) Indicates no statistically significant difference Pre vs. Post ( $p > 0.05$ )

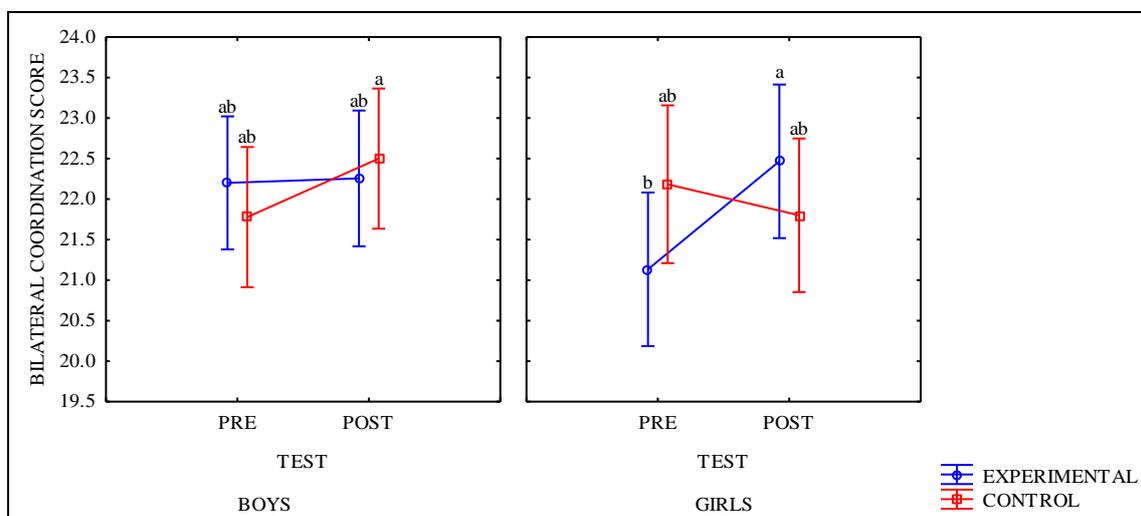
**FIGURE 4.2: BILATERAL COORDINATION BETWEEN THE EXPERIMENTAL AND CONTROL GROUP AND FROM PRE-TO POST-TEST (LONG FORM)**

As seen in Figure 4.3, no significant differences were found in the mean bilateral coordination scores, according to gender, at the commencement of this study. However, when investigating the third order interaction (time\*group\*gender), a significant difference was found for gender ( $p=0.01$ ). Thus, gender appeared to play a significant role in the improvement of bilateral coordination. A trend towards significance was found between the boys and girls in the experimental group at pre-test ( $p=0.09$ ). This may be explained by the observation that the girls belonging to the experimental group began this study with a relatively lower mean bilateral coordination score when compared to the boys at pre-test. This trend, however, disappeared after participating in the 12-week motor skills development programme ( $p=0.74$ ). Thus, the girls in the experimental group seem to have improved their bilateral coordination to a similar level as the boys after performing the bilateral coordination activities in the motor skills development programme. No similar results were found in previous studies.

When investigating the performance of the boys, no significant differences were found for the mean bilateral coordination score within the experimental ( $p=0.90$ ) and control group ( $p=0.11$ ) or between the pre- ( $p=0.48$ ) and post-tests ( $p=0.67$ ). Although not significant, it appears that the boys belonging to the control group began this study with a slightly lower mean bilateral coordination score compared to the experimental group

( $p=0.48$ ). A greater increase in the bilateral coordination of boys was also observed within the control group ( $p=0.11$ ), whereas the experimental group presented almost no change ( $p=0.90$ ). The change in the control group may be due to the fact that the control group began the study with a lower mean bilateral coordination score and may have improved as a result of maturation. The researcher found no similar supporting results.

It appears that the improvement in bilateral coordination was greater amongst girls when compared to boys. Accordingly, when investigating the mean bilateral coordination scores of girls, a significant difference was observed between the pre- and post-test of the experimental group ( $p=0.01$ ). A trend towards significance was observed for the mean bilateral coordination score between the girls of the experimental and control group at the pre-test ( $p=0.13$ ). This trend, however, decreased after completion of the post-test ( $p=0.32$ ). This is supported by the significant increase found within the experimental group ( $p=0.04$ ) and the mean bilateral coordination score of the control group remaining relatively similar ( $p=0.45$ ). Thus, this may be due to participation in bilateral coordination activities in the 12-week motor skills development programme. The researcher was not able to find similar research to support this.



(a-b)/(b-a) Indicates a statistically significant difference Pre vs. Post ( $p<0.05$ )  
 (ab-a)/(a-ab) Indicates no statistically significant difference Pre vs. Post and/or Exp vs. Ctrl ( $p>0.05$ )  
 (ab-b)/(b-ab) Indicates no statistically significant difference Exp vs. Ctrl ( $p>0.05$ )  
 (ab-ab) Indicates no statistically significant difference Pre vs. Post and/or Exp vs. Ctrl ( $p>0.05$ )

**FIGURE 4.3: BILATERAL COORDINATION BETWEEN BOYS AND GIRLS OF THE EXPERIMENTAL AND CONTROL GROUP AND FROM PRE- TO POST-TEST (LONG FORM)**

## SHORT FORM

### Overall motor proficiency

This section provides a brief overview of the overall motor proficiency of the experimental and control group, as determined by the Short Form of the BOT-2, before and after the implementation of the 12-week motor skills intervention programme. Results from the BOT-2 Short Form provide important information regarding the motor proficiency of children. These results should, however, always be interpreted in combination with clinical observations, medical and educational histories and previous test scores. When describing the overall motor proficiency the researcher reports the standard score, corresponding percentile rank and the relevant descriptive category (Bruininks & Bruininks, 2005:30), such will be reported in the following sections.

### *Standard score*

Standard scores are used to describe a child's level of motor proficiency (Bruininks & Bruininks, 2005:27). Standard score means, standard deviations and mean differences for the entire duration of the study are summarised in Table 4.3, which shows that no significant differences were found for the mean standard scores within the experimental ( $p=0.21$ ) and control group ( $p=0.72$ ) or between the pre- ( $p=0.05$ ) and post-tests ( $p=0.24$ ). Thus, there was no significant improvement in the overall motor proficiency of the experimental group that participated in the motor skills development programme. However, a trend toward significance was observed between the mean standard scores of the experimental and control group during the pre-test ( $p=0.05$ ). Thus, the mean standard score of the control group was relatively higher than the mean standard score of the experimental group at the beginning of this study. This difference may be due to the possibility that the class belonging to the control group was a stronger class overall to begin with. The researcher was not able to find any supporting results.

The trend, however, disappeared during the post-test ( $p=0.24$ ), along with a greater increase in the standard score of the experimental group when compared to the control group. This indicates that a change occurred within the experimental group that did not occur in the control group. Participation in the motor skills development programme may have led to this change in the experimental group's standard score. Although not significant, the experimental group improved from falling in the below average to the average descriptive category. This may be due to the increased mean standard score

observed in the experimental group after participation in the motor skills development programme. Wang and Su (2009:852) found that 50% of the intellectually disabled participants in their study showed significant improvement in the BOT-2 total score after a four-month paediatric rehabilitation programme and the remaining participants presented no change. There was, however, no control group to compare their findings to and to prove the effectiveness of their intervention programme.

**TABLE 4.3: STANDARD SCORE MEANS, STANDARD DEVIATIONS AND MEAN DIFFERENCES FOR THE MOTOR PROFICIENCY OF THE EXPERIMENTAL AND CONTROL GROUP BETWEEN PRE- AND POST-TESTS (SHORT FORM)**

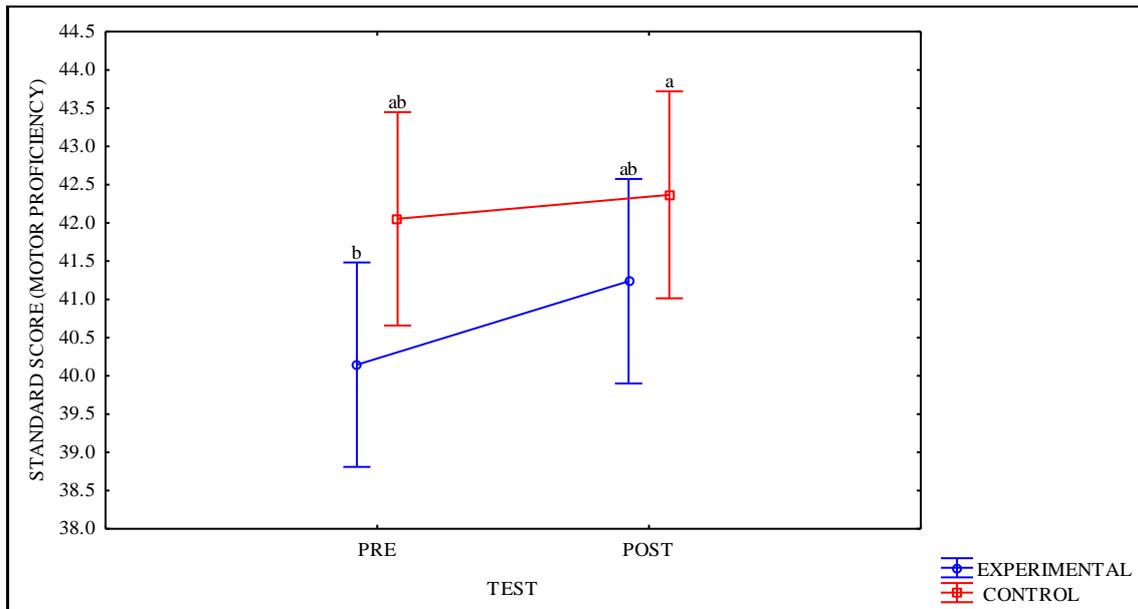
<b>GROUP:</b>	<b>PRE-TEST: Mean ± SD</b>	<b>POST-TEST: Mean ± SD</b>	<b>p#</b>	<b>Δ (Pre - Post)</b>	<b>DESCRIPTIVE CATEGORY</b>
<b>EXPERIMENTAL:</b>	40.38 ± 3.95	41.38 ± 3.83	0.21	-1.09	Below average (pre) Average (post)
<b>CONTROL:</b>	42.26 ± 4.65	42.49 ± 4.08	0.72	-0.31	Average (pre) Average (post)
<b>p+</b>	0.05	0.24	-	-	-

p+ Differences between groups for the pre- and post-test

p# Differences within groups from pre-to post-test

Δ Mean differences within groups from pre- to post-test

According to Figure 4.4, it seems that the control group achieved a higher mean standard score overall and also started with a higher mean standard score compared to the experimental group at pre-test. However, according to the mean differences between the groups, the experimental group improved their standard score, thus, their overall motor proficiency, by approximately 0.78 more than the control group after participating in the 12-week motor skills development programme.



(ab-a)/(a-ab) Indicates no statistically significant difference Pre vs. Post and/or Exp vs. Ctrl ( $p > 0.05$ )  
 (ab-b)/(b-ab) Indicates no statistically significant difference Pre vs. Post and/or Exp vs. Ctrl ( $p > 0.05$ )

**FIGURE 4.4: STANDARD SCORES OF MOTOR PROFICIENCY BETWEEN THE EXPERIMENTAL AND CONTROL GROUP AND FROM PRE- TO POST-TEST (SHORT FORM)**

### *Percentile rank*

Percentile rank refers to the percentage of individuals that the child has outranked within his own age group (Bruininks & Bruininks, 2005:28). Percentile rank means, standard deviations and mean differences for the entire duration of the study are summarised in Table 4.4. No significant differences were found for the mean percentile rank within the experimental ( $p=0.28$ ) and control group ( $p=0.99$ ) or between the pre- ( $p=0.05$ ) and post-tests ( $p=0.31$ ) (Table 4.4). Thus, there was no significant improvement in the experimental group's percentile rank after completing the motor skills development programme. The researcher did not find any similar studies reporting the effect on percentile rank after completion of an intervention programme.

However, a trend toward significance was observed between the mean percentile ranks of experimental and control group during the pre-test ( $p=0.05$ ). Thus, the mean percentile rank for the control group was relatively higher than the mean percentile rank of the experimental group at the beginning of this study. This is due to the higher mean standard score of the control group when compared to the experimental group at pre-test, as seen above in the previous section (Figure 4.4). This difference may be due to the possibility that the class belonging to the control group was a stronger class overall to begin with. The trend, however, disappears during the post-test ( $p=0.31$ ) along with a

greater increase in the percentile rank of the experimental group when compared to the control group. This shows that a change occurred within the experimental group that did not occur in the control group. This may indicate that the participation in the motor skills development programme possibly caused this change in the experimental group mean percentile rank. The researcher did not find any similar results reporting the effect on percentile rank after completion of an intervention programme.

**TABLE 4.4: PERCENTILE RANK MEANS, STANDARD DEVIATIONS AND MEAN DIFFERENCES FOR THE EXPERIMENTAL AND CONTROL GROUP BETWEEN PRE- AND POST-TESTS (SHORT FORM)**

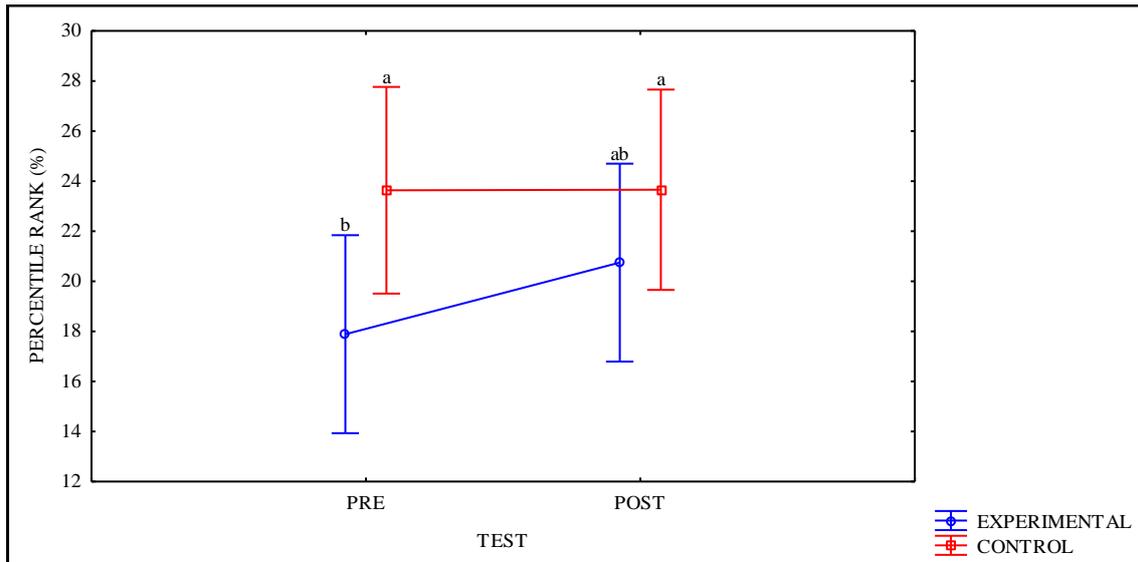
<b>GROUP</b>	<b>PRE-TEST: Mean ± SD</b>	<b>POST-TEST: Mean ± SD</b>	<b>p#</b>	<b>Δ (Pre - Post)</b>	<b>DESCRIPTIVE CATEGORY</b>
<b>EXPERIMENTAL:</b>	18.50 ± 10.89	21.03 ± 10.32	0.28	-2.86	Average
<b>CONTROL:</b>	24.13 ± 13.43	24.06 ± 13.35	0.99	-0.02	Average
<b>p+</b>	0.05	0.31	-	-	-

p+ Differences between groups for the pre- and post-test

p# Differences within groups from pre-to post-test

Δ Mean differences within groups from pre- to post-test

According to Figure 4.5, it seems that the control group achieved a higher mean percentile rank overall and also started with a higher mean percentile rank compared to the experimental group at the commencement of this study. This is due to the higher percentile rank of the control group when compared to the experimental group at pre-test, as seen in the above in the previous section (Figure 4.4). However, according to the mean differences between the groups, the experimental group improved their standard score, thus their percentile rank, by approximately 2.8% more than the control group after participating in the 12-week motor skills development programme. No previous research results were found to support this.



- (a-b)/(b-a) Indicates a statistically significant difference Exp vs. Ctrl ( $p < 0.05$ )  
 (ab-a)/(a-ab) Indicates no statistically significant difference Exp vs. Ctrl ( $p > 0.05$ )  
 (ab-b)/(b-ab) Indicates no statistically significant difference Pre vs. Post ( $p > 0.05$ )  
 (a-a) Indicates no statistically significant difference Pre vs. Post ( $p > 0.05$ )

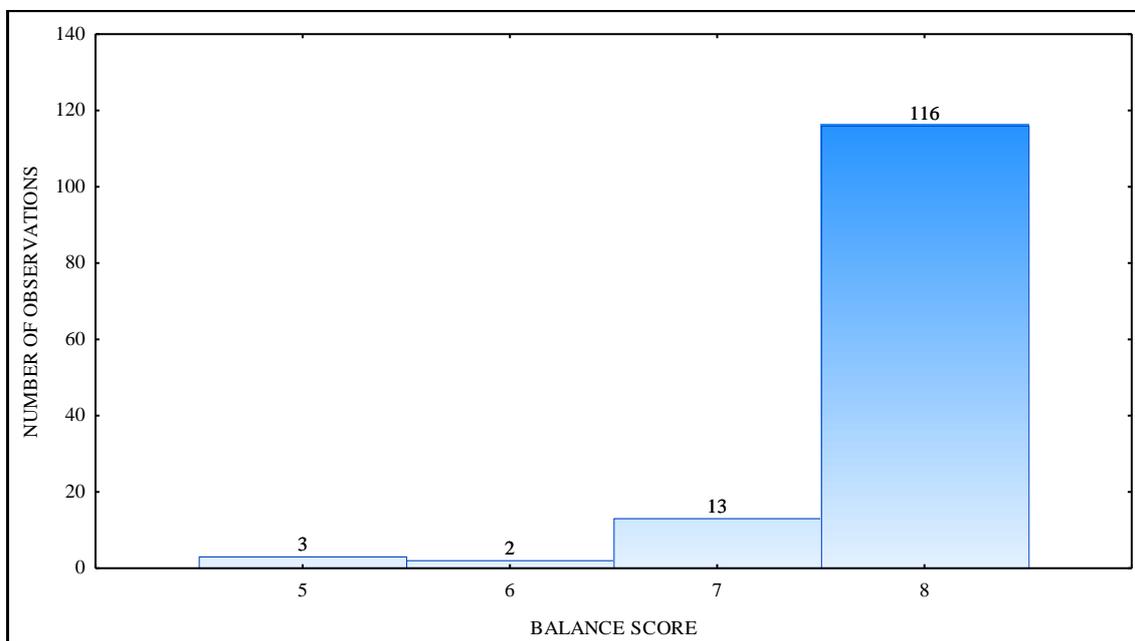
**FIGURE 4.5: PERCENTILE RANK BETWEEN THE EXPERIMENTAL AND CONTROL GROUP AND FROM PRE- TO POST-TEST (SHORT FORM)**

### **Balance and bilateral coordination**

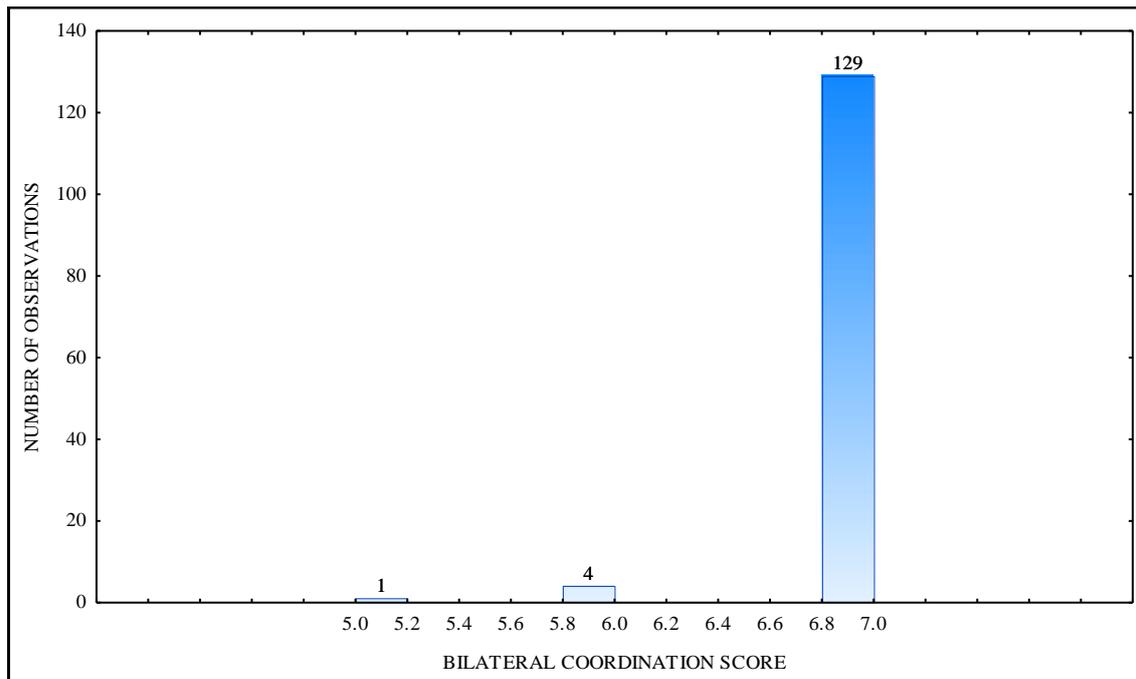
The scores for both the experimental and control group as well as the scores achieved on both Short Form balance and bilateral coordination activities are presented together in Figure 4.6 and Figure 4.7 respectively. According to Figure 4.6 and Figure 4.7, it is evident that there is very little variation in the scores achieved during the two balance and two bilateral coordination activities used in the Short Form of the BOT-2. Most children achieved the maximum scores possible. Thus, no further statistical analyses were conducted between groups or between pre- and post-tests and no significant differences were found ( $p > 0.05$ ). Bruininks and Bruininks (2005:29) state that due to the developmental nature of some BOT-2 subtests, these subtests produce little variability in the performance for some age groups. Thus, this may have been the case for balance and bilateral coordination. Wang and Su (2009:854) found a similar occurrence for the balance subtest during their study with intellectually disabled children. They found that most of the items on the balance subtest were too easy for the sample as more than half of the group achieved the maximum scores.

The Short Form activities used to evaluate the level of balance and bilateral coordination in children of this age group might not be the most suitable representation of these motor skills as most children did not have a problem in achieving the maximum

score. The fact that almost all participants were able to achieve the maximum score may indicate that these activities were too easy and may not be suitable in efficiently measuring balance and/or bilateral coordination. Therefore, using these Short Form activities of the BOT-2 as the only evaluation of balance and bilateral coordination may limit the ability to investigate the true effect that the motor skills development programme had on these motor skills. Gupta *et al.* (2011:430) found similar results regarding balance and describes no variation between the pre- and post-tests or between the two sample groups as a ceiling effect as the median score achieved during the pre-test already was the maximum score. Therefore no significant improvement in balance was seen at the post-test after completion of the motor skills development programme.



**FIGURE 4.6: NUMBER OF OBSERVATIONS IN THE BALANCE ACTIVITIES, FOR THE EXPERIMENTAL AND CONTROL GROUP, DURING THE PRE- AND POST-TEST (SHORT FORM)**



**FIGURE 4.7: NUMBER OF OBSERVATIONS IN THE BILATERAL COORDINATION ACTIVITIES, FOR THE EXPERIMENTAL AND CONTROL GROUP, DURING THE PRE- AND POST-TEST (SHORT FORM)**

### **Other subtests**

This section provides additional details relating to the research participants' performance of the remaining subtest activities, during the pre- and post-tests, as seen in the Short Form of the BOT-2. These subtests include: fine motor precision, fine motor integration, manual dexterity, running speed and agility, upper-limb coordination and strength.

#### ***Fine motor precision***

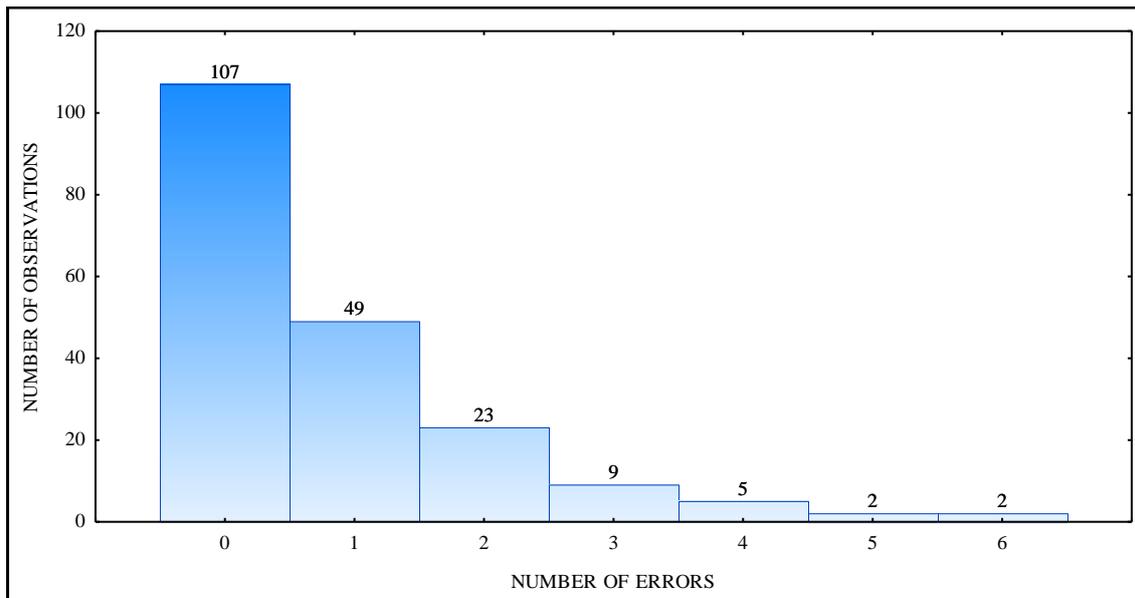
The raw scores for both the experimental and control groups as well as the raw scores achieved during the pre- and post-tests for the Short Form's fine motor precision activities are presented together in Figure 4.8 and Figure 4.9 respectively. There was very little variation in the scores achieved during the fine motor precision activities used in the Short Form of the BOT-2. Most children achieved the maximum score possible (Figure 4.8 and Figure 4.9), thus, there was no reason to conduct any further statistical analyses between groups or between pre- and post-tests and no significant differences were observed ( $p > 0.05$ ).

Van Niekerk *et al.* (2007:166) found significant improvements for the visual motor control subtest, according to the original version of the Bruininks-Oseretsky Test of

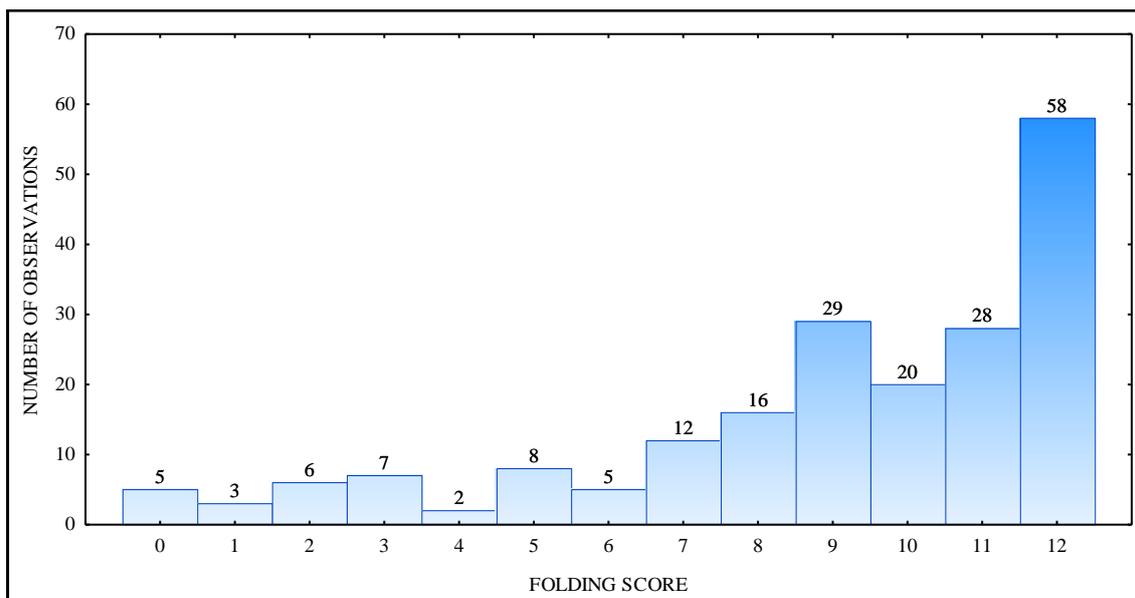
Motor Proficiency (BOTMP), in both the experimental and control groups after conducting a 10-week intervention programme amongst South African shelter-dwelling children. The BOTMP visual motor control subtest corresponds with the BOT-2 fine motor precision subtest (visual motor control in BOTMP was separated into fine motor precision and fine motor integration in BOT-2). Thus, no significant differences in fine motor precision differences were established between the experimental and control group after completion of the intervention programme and the improvements in the experimental group can, thus, not be attributed to the intervention programme. Similarly, indicating that the intervention programme of Van Niekerk *et al.* (2007:166) had no significant effect on fine motor precision either.

Connolly *et al.* (1993:173,177) also found significant improvement in the visual motor coordination of Down syndrome children that were exposed to an early intervention programme. There was, however, no control group used for comparison purposes during this longitudinal study, thus, the significant improvement in the performance of the children cannot be solely attributed to the early intervention programme.

The BOT-2 Short Form activities used to evaluate the level of fine motor precision in children of this age group might not be the most suitable representation of this motor skill as most of the children did not have a problem in achieving the maximum score. The fact that almost all the research participants were able to effortlessly achieve the maximum score may indicate that these Short Form activities of the BOT-2 were too easy and may not be suitable in efficiently measuring and representing fine motor precision. Bruininks and Bruininks (2005:29) state that due to the developmental nature of some BOT-2 subtests, these subtests produce very little variability in the performance for some age groups. Therefore, this may have been the case for fine motor precision in this study. Consequently, using these Short Form activities of the BOT-2 as the only tool of evaluation for fine motor precision may limit the ability to observe the true effect that an intervention programme may have on this fine motor skill. Fine motor precision was, however, not addressed by the motor skills development programme, and thus, no significant differences were anticipated in the performance of the experimental or control group.



**FIGURE 4.8: NUMBER OF OBSERVATIONS IN THE DRAWING LINES THROUGH PATHS (CROOKED) ACTIVITY, FOR THE EXPERIMENTAL AND CONTROL GROUP, DURING THE PRE- AND POST-TEST (SHORT FORM)**



**FIGURE 4.9: NUMBER OF OBSERVATIONS IN THE FOLDING PAPER ACTIVITY, FOR THE EXPERIMENTAL AND CONTROL GROUP, DURING THE PRE- AND POST-TEST (SHORT FORM)**

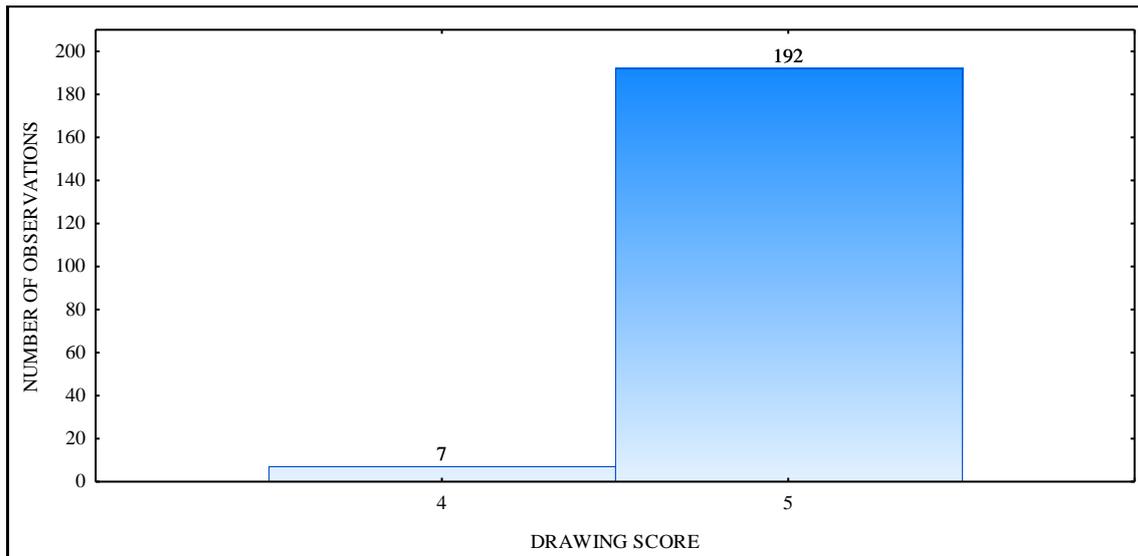
***Fine motor integration***

The raw scores for both the experimental and control group as well as the raw scores achieved during the pre- and post-test for the Short Form’s fine motor integration activities are presented together in Figure 4.10 and Figure 4.11 respectively. There was very little variation in the scores achieved during the fine motor integration activities used in the Short Form of the BOT-2, as most children achieved the maximum or just

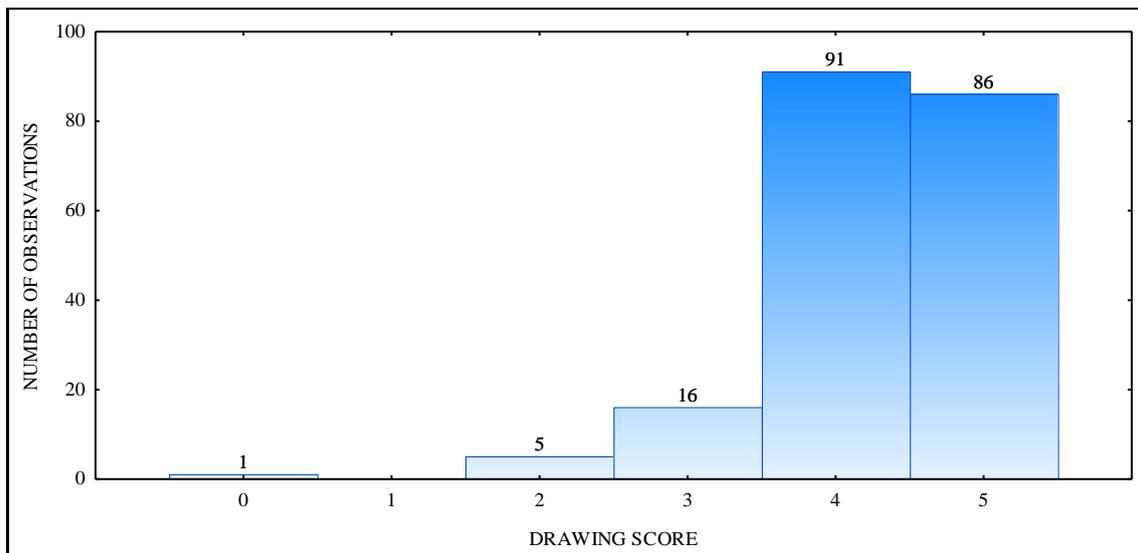
below the maximum score possible (Figure 4.10 and Figure 4.11). Due to this, there was no reason to conduct any further statistical analyses between groups or between pre- and post-tests and no significant differences were found ( $p > 0.05$ ).

Van Niekerk *et al.* (2007:166) found significant improvements for the visual motor control subtest, according to the previous version of the BOTMP, in both the experimental and control groups after participation in a 10-week intervention programme amongst South African shelter-dwelling children. The BOTMP visual motor control subtest also corresponds with the BOT-2 fine motor integration subtest (visual motor control in BOTMP was divided into fine motor precision and fine motor integration in BOT-2). Therefore, no significant were observed, for fine motor integration, between the experimental and control group after completion of the intervention programme. Any improvements in the experimental group can, thus, not be attributed to the 10-week intervention programme. Similarly, suggesting that the intervention programme of Van Niekerk *et al.* (2007:166) had no significant effect on fine motor integration either. Connolly *et al.* (1993:173,178) also found significant improvement in the visual motor coordination of Down syndrome children that were exposed to an early intervention programme. There was, however, no control group used for comparison during this longitudinal study, thus, the significant improvement cannot be solely ascribed to the early intervention programme.

The BOT-2 Short Form activities used to evaluate the level of fine motor integration in children of this age group might not be the most suitable representation of this motor skill as most children did not have a problem in achieving the maximum score. Most research participants were able to achieve the maximum score possible and as a result, suggest that these activities may have been too easy and might not be suitable in efficiently measuring fine motor integration. Bruininks and Bruininks (2005:29) state that due to the developmental nature of some BOT-2 subtests, these subtests produce little variability in the performance for some age groups. Thus, this may have been the case for fine motor integration. Therefore, using these Short Form activities as the only evaluation of fine motor integration may limit the ability to investigate the true effect that an intervention programme may have on this fine motor skill. Fine motor integration was, however, not addressed by the motor skills development programme, and thus, no significant differences were anticipated.



**FIGURE 4.10: NUMBER OF OBSERVATIONS IN THE COPYING A SQUARE ACTIVITY, FOR THE EXPERIMENTAL AND CONTROL GROUP, DURING THE PRE- AND POST-TEST (SHORT FORM)**

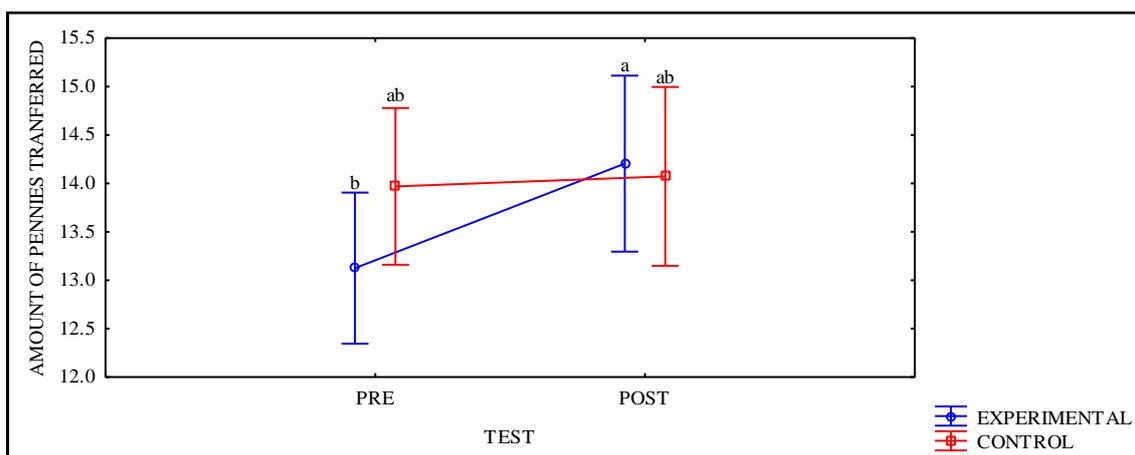


**FIGURE 4.11: NUMBER OF OBSERVATIONS IN THE COPYING A STAR ACTIVITY, FOR THE EXPERIMENTAL AND CONTROL GROUP, DURING THE PRE- AND POST-TEST (SHORT FORM)**

***Manual dexterity***

As seen in Figure 4.12, a significant difference was found for the amount of pennies transferred, therefore, the mean manual dexterity raw score achieved between the pre- and post-test of the experimental group ( $p=0.01$ ). Thus, the amount of pennies transferred increased from pre- to post-test. No significant difference was found for the mean manual dexterity raw score between the pre- and post-test of the control group ( $p=0.80$ ), indicating that a change occurred within the experimental group and not in the control group.

In addition, a trend towards significance was found between the experimental and control group during the pre-test ( $p=0.14$ ). This trend, however, disappears at the post-test ( $p=0.84$ ) with an increase in the experimental group manual dexterity raw score. This significant improvement in manual dexterity was unexpected and may have occurred due to chance, as manual dexterity was not specifically addressed during the 12-week motor skills development programme. However, the significant improvement in the mean manual dexterity raw score may also be ascribed to the participation in certain bilateral coordination activities that were performed during the 12-week motor skills development programme. Some of the hand and arm movements used during bilateral coordination activities may have similar characteristics to those used in the transferring pennies activity (such as Lesson 23 and 24, or when completing a task with the non-dominant hand in Appendix D). Charles and Gordon (2007:772) found significant improvements in hand speed and dexterity of children with hemiplegic cerebral palsy at their second follow-up test after attending constraint-induced movement therapy. There was, however, no control group to compare the intervention group to. These researchers also suggest that one cannot rule out that these improvements may have been due to chance (Charles & Gordon, 2007:772). Van Niekerk *et al.* (2007:166) found significant improvements in experimental upper-limb speed and agility, compared to their control counterparts, according to the original BOTMP. This score may correspond with the manual dexterity score of the BOT-2.



- (a-b)/(b-a) Indicates a statistically significant difference Pre vs. Post ( $p<0.05$ )
- (ab-a)/(a-ab) Indicates no statistically significant difference Exp vs. Ctrl ( $p>0.05$ )
- (ab-b)/(b-ab) Indicates no statistically significant difference Exp vs. Ctrl ( $p>0.05$ )
- (ab-ab) Indicates no statistically significant difference Pre vs. Post ( $p>0.05$ )

**FIGURE 4.12: TRANSFERRING PENNIES ACTIVITY BETWEEN THE EXPERIMENTAL AND CONTROL GROUP AND FROM PRE-TO POST-TEST (SHORT FORM)**

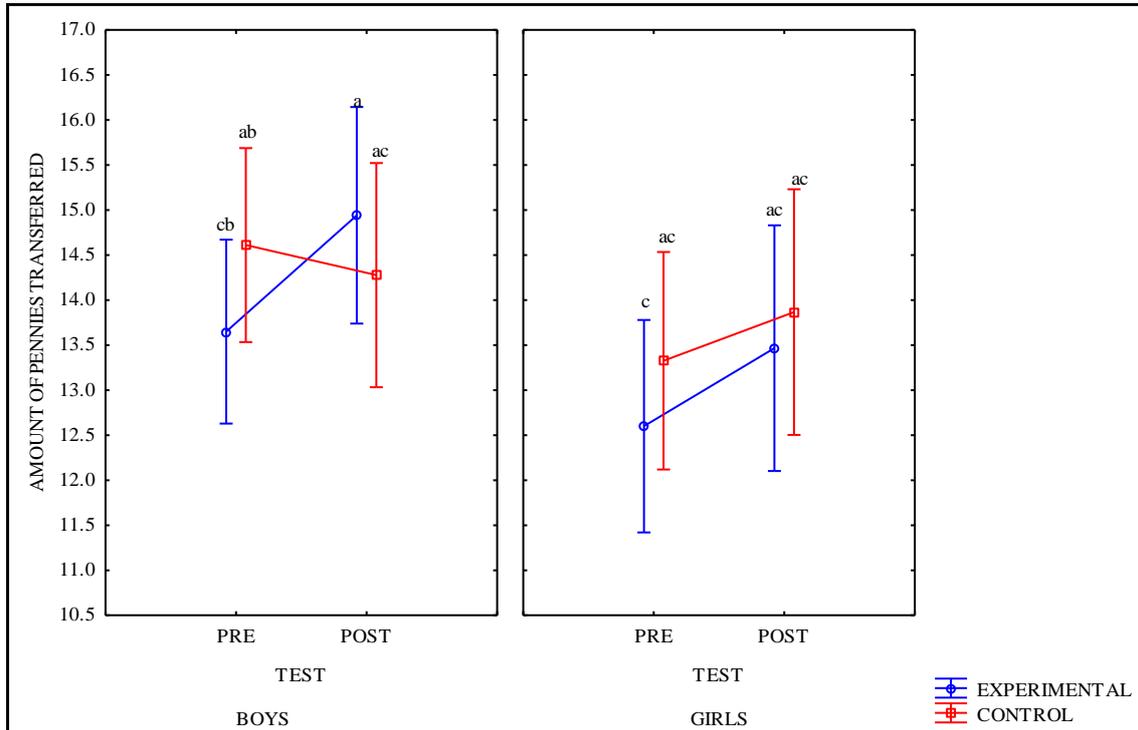
As indicated in Figure 4.13, no significant differences were found in the mean manual dexterity raw scores, according to gender, at the commencement of this study ( $p=0.26$ ), regarding the amount of pennies transferred. However, when investigating the third order interaction (time\*group\*gender) a trend towards difference was found ( $p=0.26$ ). As a result, gender appears to affect the improvement of manual dexterity. A significant increase was observed in the mean manual dexterity raw score, therefore, the amount of pennies boys transferred between the pre- and post-tests of the experimental group ( $p=0.02$ ). Thus, it appears that the improvement in the amount of pennies boys transferred was greater when compared to girls ( $p=0.15$ ).

A trend towards significance was found between the boys and girls in the experimental and control group during the pre-test ( $p=0.19$ ). This trend may be explained by the observation that the girls belonging to the both groups began this study with a relatively lower mean manual dexterity raw score when compared to the boys during the pre-test. This trend, remains evident between the boys and the girls, belonging to the experimental group, after the post-test ( $p=0.11$ ). However, the trend towards significance between the girls and boys belonging to the control group seemed to disappear after the post-test ( $p=0.66$ ).

No significant differences were found for the mean manual dexterity raw scores of girls within the experimental ( $p=0.15$ ) and control group ( $p=0.38$ ) or between the pre- ( $p=0.40$ ) and post-tests ( $p=0.68$ ). Although not significant, it appeared that the boys belonging to the experimental group began this study with a slightly lower mean manual dexterity raw score compared to the control group ( $p=0.20$ ). A greater increase in the manual dexterity of boys was also observed within the experimental group ( $p=0.02$ ), whereas the control group presented an unexpected decrease ( $p=0.54$ ). The change in the control group may have occurred due to chance. No similar studies were, however, found to support this.

When investigating the mean manual dexterity raw scores of girls, a trend towards significance was observed between the pre- and post-test of the experimental group ( $p=0.15$ ) and no significant difference was observed within the girls of the control group ( $p=0.38$ ). This may be due to participation in bilateral coordination activities in the 12-week motor skills development programme. Some of the hand and arm movements used during bilateral coordination activities may have similar characteristics to those the

transferring pennies activity (Lesson 23 and 24 in Appendix F). No similar studies, presenting similar findings were found by the researcher.



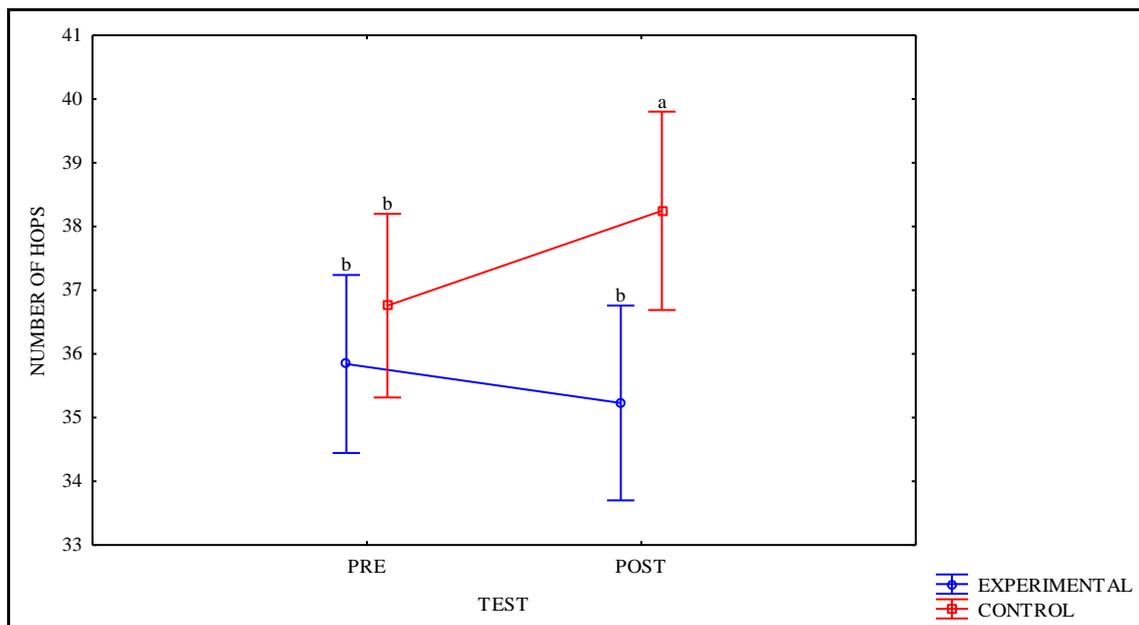
(cb-a) Indicates a statistically significant difference Pre vs. Post ( $p < 0.05$ )  
 (ab-ac)/(c-ac)/(ac-ac) Indicates no statistically significant difference Pre vs. Post ( $p > 0.05$ )  
 (cb-ab)/(ac-a)/(c-ac)/(ac-ac) Indicates no statistically significant difference Exp vs. Ctrl ( $p > 0.05$ )

**FIGURE 4.13: TRANSFERRING PENNIES ACTIVITY BETWEEN BOYS AND GIRLS OF THE EXPERIMENTAL AND CONTROL GROUP AND FROM PRE- TO POST-TEST (SHORT FORM)**

***Running speed and agility***

As seen in Figure 4.14, a significant difference was found for the mean running speed and agility raw score or the amount of one legged hops performed between the pre- and post-tests of the control group ( $p=0.01$ ). This indicates that there was an increase in the mean running speed and agility raw score of the control group, whereas the experimental group score remained relatively unchanged. This significant difference was unexpected and may have occurred due to chance. No significant difference was observed between the pre- and post-test of the experimental group ( $p=0.25$ ) and the mean running speed and agility raw score appeared to remain relatively unchanged. No change or significant improvements were expected, as running speed and agility was not specifically addressed during the 12-week motor skills development programme. In addition, no significant difference was found between the experimental and control group at the pre-test ( $p=0.37$ ). There was, however, a significant difference between the two groups at the post-test ( $p=0.01$ ), possibly due to the unexpected significant

improvement observed within the mean running speed and agility performance of the control group. Van Niekerk *et al.* (2007:166) found significant improvements in the running speed agility of the experimental group and not in the control group after a 10-week intervention, indicating that the unexpected improvement in the control group of the current study may have occurred to chance. Lewis and Fragala-Pinkham (2005:34) also presented improved running speed and agility, in the absence of a control group, after a 6-week aerobic conditioning and strength training intervention programme on a Down syndrome girl.



(a-b)/(b-a) Indicates a statistically significant difference Pre vs. Post and/or Exp vs. Ctrl ( $p < 0.05$ )  
 (b-b) Indicates no statistically significant difference Pre vs. Post and/or Exp vs. Ctrl ( $p > 0.05$ )

**FIGURE 4.14: ONE-LEGGED STATIONARY HOP ACTIVITY BETWEEN THE EXPERIMENTAL AND CONTROL GROUP AND FROM PRE-TO POST-TEST (SHORT FORM)**

### *Upper-limb coordination*

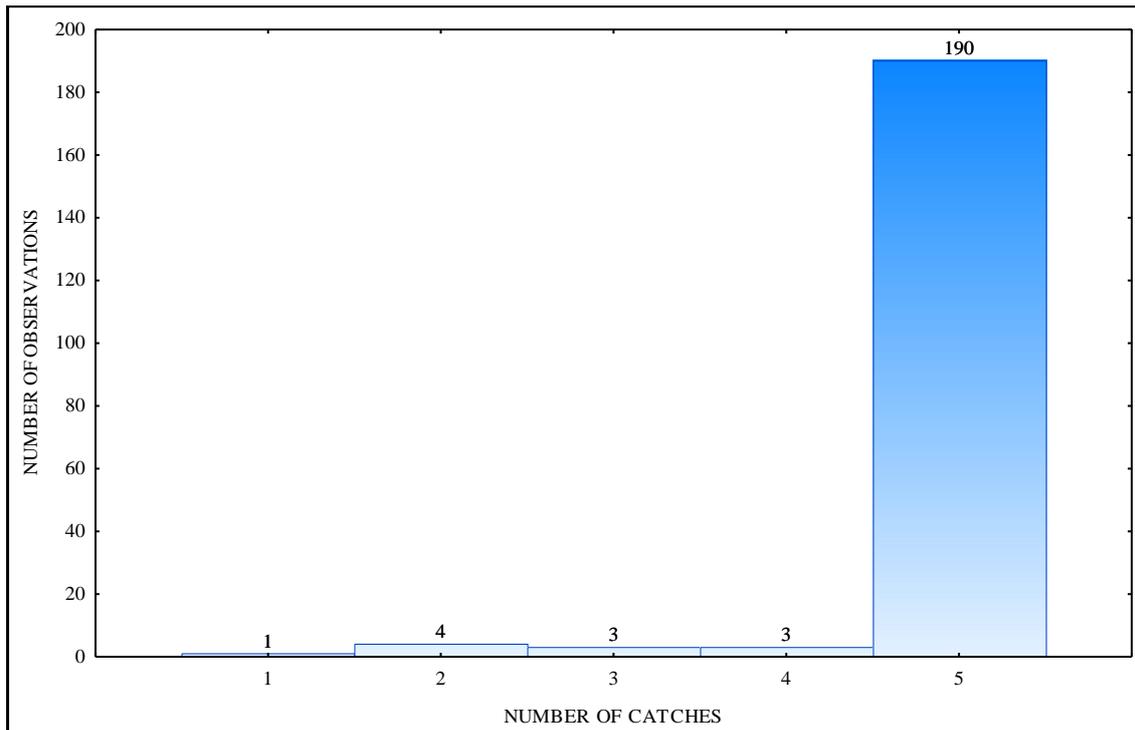
The raw scores for both the experimental and control group as well as the raw scores achieved during the pre- and post-test for the Short Form upper-limb coordination activities are presented together in Figure 4.15 and Figure 4.16 respectively. It is evident that there is very little variation in the scores achieved during the upper-limb coordination activities used in the Short Form of the BOT-2. Most children achieved the maximum score possible during the dropping and catching a ball and dribbling a ball (alternating hands) activity (Figure 4.15 and Figure 4.16). As most participants were able to achieve the maximum score possible, it may indicate that these activities were possibly too easy and may not be suitable in efficiently measuring upper-limb

coordination. Bruininks and Bruininks (2005:29) state that due to the developmental nature of some BOT-2 subtests, these subtests produce little variability in the performance for some age groups. Thus, this may have been the case for upper-limb coordination. Due to this, there was no reason to conduct any further statistical analyses between groups or between pre- and post-tests. Therefore, no significant differences were established between or within the two sample groups after the completion of the 12-week motor skills development programme and the programme led to no significant improvement in upper limb coordination ( $p>0.05$ ).

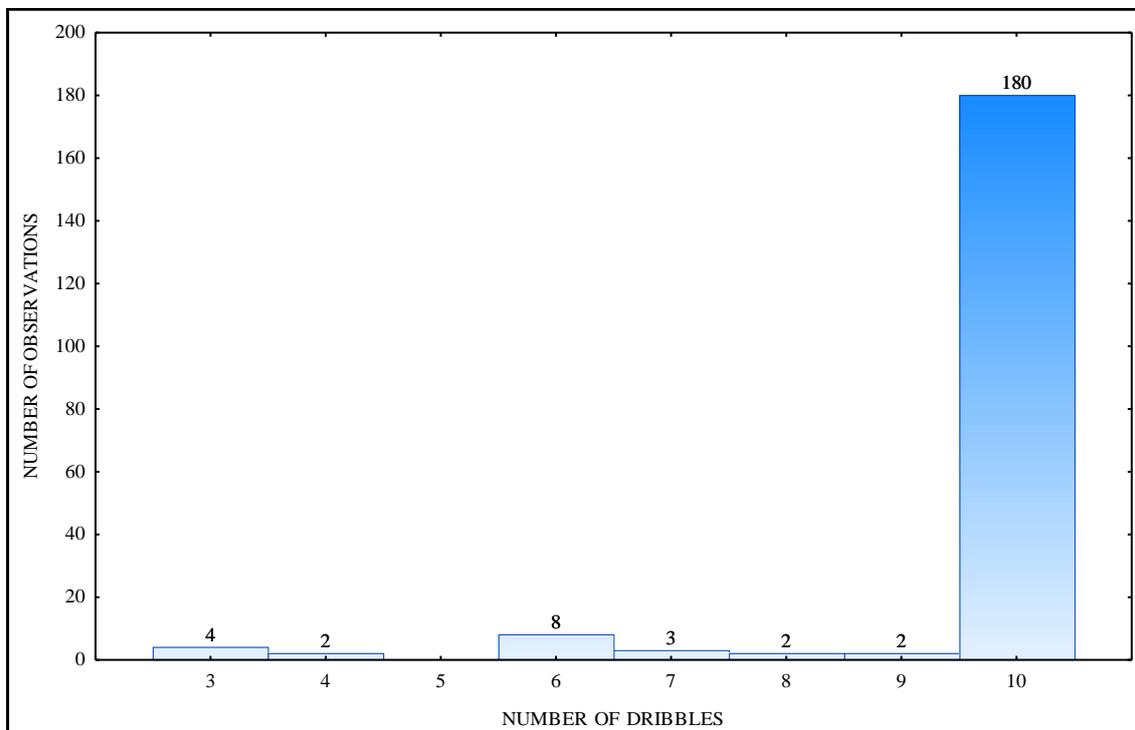
Van Niekerk *et al.* (2007:166) found significant improvements in both the experimental and control groups after conducting a 10-week intervention programme amongst South African shelter-dwelling children. Thus, no significant differences were established between the experimental and control group after the intervention programme and the improvements in their experimental group can, thus, not be attributed to the intervention programme. This indicates that, similar to the current study, Van Niekerk *et al.*'s (2007:166) intervention programme had no significant effect on upper-limb coordination.

The Short Form activities used to evaluate the level of upper-limb coordination in children of this age group might not be the most suitable representation of this motor skill, as most children had no problem in achieving the maximum score. As most participants were able to achieve the maximum score, this indicates that the activities were perhaps too easy and may not be suitable in efficiently measuring upper-limb coordination.

Bruininks and Bruininks (2005:29) state that due to the developmental nature of some BOT-2 subtests, little variability occurs in the performance of some age groups. Hence, this may have been the case for upper-limb coordination. As a result, using these Short Form activities as the only evaluation of upper-limb coordination may limit the ability to investigate the true effect that an intervention programme may have on this motor skill. Upper-limb coordination was, however, not addressed by the motor skills development programme and no significant differences were expected.



**FIGURE 4.15: NUMBER OF OBSERVATIONS IN THE DROPPING AND CATCHING A BALL ACTIVITY, FOR THE EXPERIMENTAL AND CONTROL GROUP, DURING THE PRE- AND POST-TEST (SHORT FORM)**

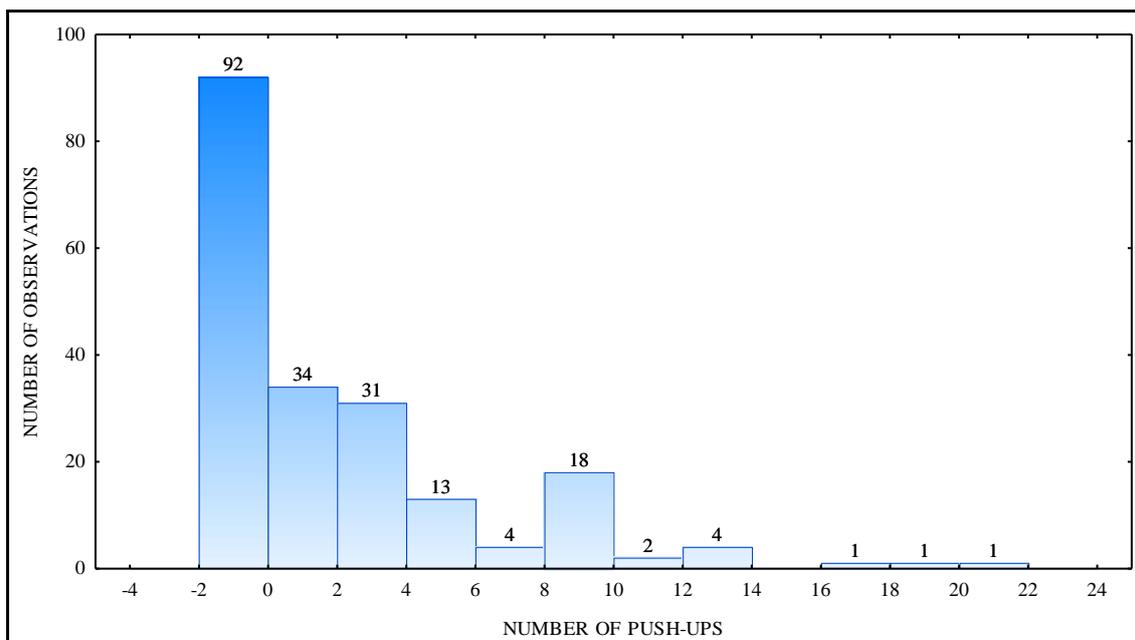


**FIGURE 4.16: NUMBER OF OBSERVATIONS IN THE DRIBBLING A BALL (ALTERNATING HANDS) ACTIVITY, FOR THE EXPERIMENTAL AND CONTROL GROUP, DURING THE PRE- AND POST-TEST (SHORT FORM)**

### ***Strength***

The raw scores for both the experimental and control group as well as the raw scores achieved during the pre- and post-test for the Short Form strength activity are presented together in Figure 4.17. It is evident that there was very little variation in the scores achieved during the strength activity used in the Short Form of the BOT-2, as most children achieved similar scores for the full push-up and couldn't perform two correct repetitions (Figure 4.17). Due to this, there was no reason to conduct any further statistical analyses between groups or between pre- and post-tests and no significant differences were found ( $p>0.05$ ).

The Short Form activities used to evaluate the level of strength in children of this age group might not be the most suitable representation of this motor skill as most children did not have a problem in achieving the maximum score. As most participants achieved the same score possibly indicates that these activities were too difficult and may not be suitable in efficiently measuring strength. No research, reporting similar findings was found to support this. Thus, using this Short Form activity as the only evaluation of strength may limit the ability to investigate the true effect that an intervention programme may have on this motor skill. Strength was, however, not addressed by the 12-week motor skills development programme, and consequently, no significant differences were expected.



**FIGURE 4.17: NUMBER OF OBSERVATIONS IN THE PUSH-UP (FULL) ACTIVITY, FOR THE EXPERIMENTAL AND CONTROL GROUP, DURING THE PRE- AND POST-TEST (SHORT FORM)**

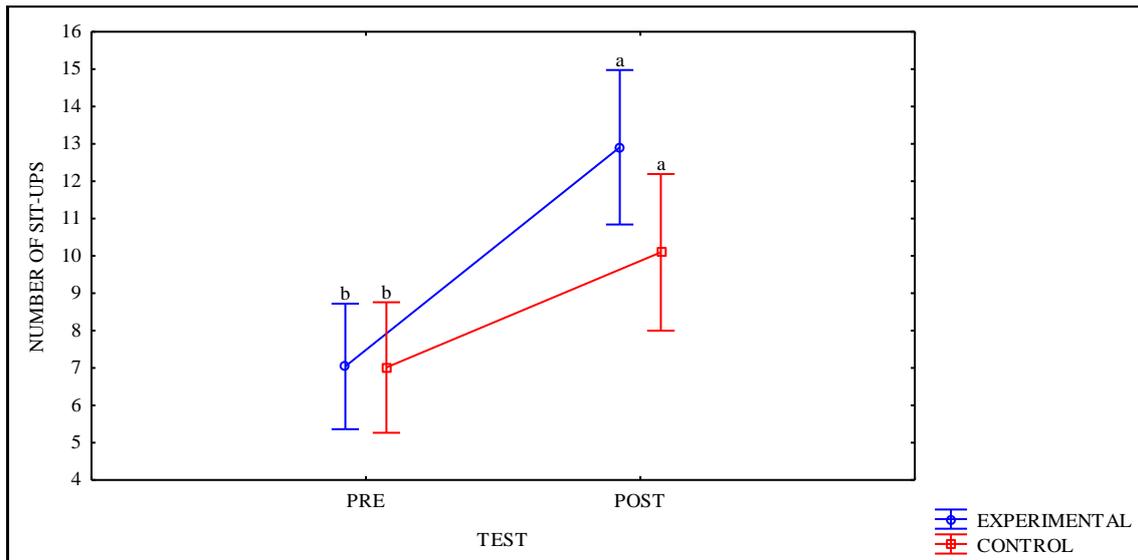
As seen in Figure 4.18, a significant difference was found for the amount of sit-ups performed between the pre- and post-tests of both the experimental ( $p=0.0000001$ ) and control group ( $p=0.004$ ). This indicates that a change occurred in the performance of both groups. Strength was not specifically addressed during the motor skills development programme, thus no changes were expected and the significant improvements in both groups may be ascribed to chance. No significant differences were found between the two groups at the pre-test ( $p=0.98$ ).

A trend towards significance was, however, found between the experimental and control group at the post-test ( $p=0.06$ ). Although not significant, it appeared that there was a greater increase in the experimental mean strength raw score of the sit-up activity according to Figure 4.18. This may be due to the possibility that some of the activities performed during the 12-week motor skills intervention programme developed core strength along the selected skill focus. Examples may include crab soccer (Lesson 17 and 18), cross crawl (Lesson 19, 20, 23 and 24), mirror hands and feet (Lesson 19 and 20) and drum beats (Lesson 23 and 24) etcetera.

Connolly *et al.* (1993:173) found a further significant improvement in the strength performance the third follow-up test of Down syndrome children that formed part of an early intervention. There was, however, no control group to compare the early intervention group to during this longitudinal study.

Lewis and Fragala-Pinkham (2005:34) also presented improved strength, in the absence of a control group, after a 6-week aerobic conditioning and strength training intervention programme on a Down syndrome girl.

Van Niekerk *et al.* (2007:166) found a trend towards the significant improvement of strength in both the experimental and control groups after a 10-week intervention programme presented to South African shelter-dwelling children.



(a-b)/(b-a) Indicates a statistically significant difference Pre vs. Post ( $p < 0.05$ )  
 (a-a)/(b-b) Indicates no statistically significant difference Exp vs. Ctrl ( $p > 0.05$ )

**FIGURE 4.18: SIT-UP ACTIVITY BETWEEN THE EXPERIMENTAL AND CONTROL GROUP AND FROM PRE- TO POST-TEST (SHORT FORM)**

The following section provides a brief summary on the findings of the current study.

**SUMMARY OF RESULTS**

Group\*time interactions were performed and investigated to determine changes in the performance within and/or between the experimental and control groups over time. Therefore, whether the 12-week motor skills development programme had any significant effect on the performance of the experimental group, and lastly to determine whether there was any change in the control group's performance. Gender, was considered as a third order interaction to determine whether it played any significant role in the interpretation of the results.

**Long Form**

***Balance***

No significant improvements were found in the balance of either the experimental or the control group. A trend towards significant improvement was, however, observed within the experimental group, thus the improvement in balance was greater for the experimental group compared to the control group.

***Bilateral Coordination***

Significant improvement in bilateral coordination was observed within the experimental group after participation in the motor skills development programme, compared to the

control group, who showed no significant improvements. Regarding gender, no significant differences were found in the mean bilateral coordination scores. When investigating the bilateral coordination of the boys; the control group showed greater improvement in their mean bilateral score compared to the experimental group who presented almost no change. When investigating the girls, a significant improvement in bilateral coordination was found within the experimental group. Hence, the girls displayed a greater improvement in bilateral coordination when compared to the boys.

### **Short Form**

#### ***Overall motor proficiency (standard score and percentile rank)***

No significant improvements in mean standard scores or mean percentile ranks were found for the experimental or the control group. A trend towards significance indicated that the control group started with a relatively higher standard score and percentile rank compared to the experimental group at pre-test. These trends, however, disappeared at the post-test showing a greater improvement in the overall motor proficiency of the experimental group when compared to the control group after the 12-week motor skills development programme.

#### ***Balance and bilateral coordination***

There was very little variance in the scores achieved by all the participants in this study as most of the children were able to achieve the maximum score on the selected subtests activities according to the Short Form of the BOT-2. As a result, no further statistical analyses were conducted, indicating no significant improvements in either the experimental or control group.

#### ***Other subtests***

No significant improvements were observed in either the experimental or control group for the fine motor precision, fine motor integration and upper-limb coordination subtests of the Short Form. This was due to the appearance of very little variance in the scores achieved by all the participants in this study. Most of the children were able to achieve the maximum score on the selected subtests activities according to the Short Form. Thus, no further statistical analyses were conducted.

The experimental group showed a significant improvement in manual dexterity when compared to the control group after participation in the 12-week motor skills

development programme. No significant differences were observed according to gender, but a trend towards significance was evident indicating that there were greater improvements amongst the boys when compared to the girls. Boys, belonging to the experimental group, displayed a significant improvement in manual dexterity compared to the unexpected decrease in the control group. The girls of the experimental group displayed a trend towards significant improvement in manual dexterity, compared to no significant improvements of the control group.

An unexpected significant improvement was observed in the running speed and agility score of the control group, compared to relatively no change in the score of the experimental group.

When investigating the strength subtest of the Short Form, no significant improvements were observed in either the experimental or control group for the full push-up activity. This was due to there being very little difference in the scores achieved by all the participants in this study. Most of the children were not able to achieve the two correct repetitions of the full push up activity according to the Short Form. Thus, no further statistical analysis was conducted.

However, when investigating the push-up activity of the strength subtest, significant improvements were unexpectedly evident in both the experimental and control groups. No significant differences were evident between the experimental and control group at the commencement of this study, however, a trend towards significant difference does appear at the post-test, indicating that the experimental group improved their strength more than their control counterparts.

The final chapter will provide a conclusion to the current study as well as recommendations suggested by the researcher.

## CHAPTER FIVE

### CONCLUSIONS AND RECOMMENDATIONS

#### INTRODUCTION

The focus of this study was to design and implement a 12-week motor skills development programme to improve the balance and bilateral coordination of children between the ages of 10 and 12 year-old in the Stellenbosch region.

The conclusions that follow relate directly to the summary of results presented in Chapter four.

#### CONCLUSIONS

According to the objectives stated in Chapter one, the findings of the current study were used to make the following conclusions:

##### **Objective one:**

- *To determine the current status of motor proficiency of children between the ages of 10 and 12 years-old according to the BOT-2*

When investigating the overall motor proficiency of the two sample groups it was found that the experimental group fell in the below average category compared to the control group who fell in the average category. After completion of the 12-week motor skills development programme the experimental group improved, although not significantly, their overall motor proficiency score and fell in the average category, whereas the control group's proficiency remained unchanged. No similar studies were found to support the findings of the current study. However, a study by Wang and Su (2009:852) found that half of their sample group significantly improved their total BOT-2 score and the remaining half presented an unchanged score. There was unfortunately no control group to perform comparisons and determine the effect of the intervention programme. However, the fact remains that a significant improvement occurred.

Along with these findings, literature suggests that it is likely that millions of young children are failing to reach their potential in development (Grantham-McGregor, 1999:3) and that the motor proficiency of children may serve as an appropriate target for developing motor skills and increasing physical activity in youth (Wrotniak *et al.*, 2006:1758).

The mastery of motor skills has been found to be low in primary school children; hence, indicating the importance of early intervention programs in pre- and primary schools. These educational environments have the potential to play a vital role in the implementation of motor development programmes to remediate the low level of motor proficiency (Hardy *et al.*, 2010:503)

The school environment plays a critical role in the development of motor skills of children from a young age. Therefore, the provision of structured opportunities to participate in goal driven physical activity may facilitate the improvement of certain motor skills such as balance and bilateral coordination. Proficiency in motor skills may not only ultimately play a role on the playground, sports field or in the classroom but also in the overall development of the child including his or her confidence, self-esteem and future physical activity participation.

**Objective two:**

- *To improve the balance and bilateral coordination, of children between the ages of 10 and 12 years-old*

Improvements in balance and bilateral coordination were observed in the experimental group after completion of the 12-week motor skills development programme. The improvement in balance was not significant, yet presented a trend towards significance when compared to the control group. These changes in the experimental group suggest that the motor skills development programme may have played a role in the improvement of balance. Gupta *et al.* (2011:430) found similar results after implementing a 6-week strength and balance training programme.

A significant improvement was seen in the bilateral coordination of the experimental group, especially amongst the girls, when compared to the control group. This improvement may be ascribed to the participation in the motor skills development programme as corresponding results were found by Van Niekerk *et al.* (2007:166) after implementing a 10-week intervention programme amongst shelter dwelling children.

An interesting appearance was the significant improvements in the manual dexterity and strength (sit-up). These improvements were unexpected as these skills were not included in the focus of the motor skills development programme. These improvements may have been caused by the participation in certain balance and bilateral coordination activities (Appendix D) that also require manual dexterity or strength.

Therefore, reiterating the words of Logan *et al.* (2011:305); early childhood education centres, especially pre- and primary schools, should implement planned movement programmes, such as the 12-week motor skills development programme implemented during the current study, as a strategy to promote motor development in children. These programmes may be beneficial to all primary school children, including those with possible movement difficulties, especially from previously disadvantaged schools.

## **GENERAL SUMMARY**

Motor skill proficiency, especially in balance and bilateral coordination, plays such an important role in the physical activity participation of children. According to literature, children should have mastered the basic motor skills by the age of seven. Yet, as seen in this study, children between the ages of 10 and 12 still struggle to perform some of the most basic balance and bilateral coordination tasks, such as skipping or balancing on one leg. This suggests that the children of today are struggling to master their motor skills during the relevant windows of opportunity and thus experience delays in motor skill proficiency, subsequently affecting their participation in physical activity. If participation in physical activity is inhibited in this manner, already within a primary school setting, it may be detrimental to physical activity participation later in life and add to an increase in adults living sedentary lifestyles. What kind of examples would these adults then be to their children?

Delays in motor skill proficiency may not only be detrimental to physical activity participation, but it may additionally affect children within the classroom environment. Motor skill proficiency plays an important role in the maintenance of the correct posture (for example sitting correctly at the school desk), as well as the performance of reading and writing skills. Therefore, motor skill proficiency may benefit children within and outside of the classroom environment, as well as adulthood.

The current Physical Education (PE) system appears not to be as beneficial in all schools as hoped it would be, as children between the ages of 10 and 12 still struggle to perform basic motor skills that should have been mastered during the earlier stages of development. Thus, implementing movement programmes that promote and develop motor skills may be more beneficial in the improvement of motor skill proficiency. Increased motor skill proficiency may lead to children wanting to participate in the current physical activity opportunities offered by the school (including PE and sport)

and hopefully to lead increased physically active lifestyles outside of the school environment as well.

## **RECOMMENDATIONS**

Based on the findings of the study, the following recommendations are offered:

- At this age, children may benefit more from PE lessons that include a focus on the promotion of specific and required motor skills, compared to sport-specific skills. If the level of motor proficiency is not adequate, children may not be able to successfully participate in sport and other sport-related activities. Therefore, obtaining an adequate level of motor proficiency should be more important than learning sport-specific skills during pre- and primary schools and this can be achieved through accordingly planned PE lessons.
- Participating in longer PE lessons may be more beneficial to children and more specifically to the successful implementation of motor skills development programmes.
- A longer implementation period of the programme may yield more significant results.
- The use of larger sample sizes may be more representative of the population.
- Recruiting samples from a former Model C school may prove beneficial to compare differences with a previously disadvantaged school and to determine whether the intervention programme of this study would have a similar effect in a former Model C school.
- This motor skills development programme proved to be useful in the improvement of balance (not significant) and bilateral coordination (significant). Thus, it may be beneficial for all pre- and primary schools to implement and frequently use such programmes during their PE lessons.
- Early intervention programme should be used and implemented in pre-and primary schools to remediate the observed low levels of motor proficiency and prevent further motor skill deficits.
- Intervention programme facilitators should be informed regarding the various developmental windows of opportunity as implementation during these specific periods may produce more significant results than at later developmental stages.

- Training the relevant PE teachers to present this motor skills development programme during future PE lessons would expand the opportunity for more children to participate in and benefit from this programme.
- All PE teachers should obtain some background information on and experience in presenting motor skills development programmes in order to ensure their presentation and skill teaching efficiency and thus, ensure an opportunity for every child to participate and benefit from a motor skills development programme.
- Most of the children were able to achieve the maximum scores on the BOT-2 Short Form activities and, consequently, was not suitable for statistical interpretation. Therefore, when investigating specific motor skills, as was done in this study, it may be better to use the specific subtests of each skill as seen in the Long Form of the BOT-2. Furthermore, using alternative test batteries such as the MABC-2 may also appear to be more useful.
- It appears that bilateral coordination activities, involving the upper-limbs, may have had a positive effect on the manual dexterity of young children. Therefore, it may be beneficial to include these activities when designing intervention programmes to improve manual dexterity.
- Balance and bilateral coordination activities seemed to have a positive effect on the strength of young children in the current study. When including these activities in strength training intervention programmes it may enhance the improvements in strength even further.
- The level of motor proficiency can be used as an appropriate target for the development of motor skills and to increase physical activity participation.

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## **APPENDIX A**

# **PARENT CONSENT FORM**



UNIVERSITEIT•STELLENBOSCH•UNIVERSITY  
jou kennisvennoot • your knowledge partner

**STELLENBOSCH UNIVERSITEIT  
TOESTEMMING OM AAN NAVORSING DEEL TE NEEM**

---

**Ouers**

**‘n Bewegings (Motoriese vaardigheid-ontwikkelings-) program vir kinders tussen die ouderdom van nege en 12 jaar oud.**

As ouer van \_\_\_\_\_ [u kind se naam] word u vriendelik versoek om toestemming te verleen vir [sy/haar] deelname aan hierdie studie. Hierdie navorsingsprojek sal deur *Riana Breytenbach* (Meesters student) en *Carla-Rae Hagemann* (assistent), onder die leiding van *Dr E.K. AFRICA & Dr K.J. VAN DEVENTER*, van die *DEPARTEMENT SPORTWETENSKAP* aan Universiteit Stellenbosch uitgevoer word. U kind is as moontlike deelnemer geselekteer omdat hy/sy tussen die ouderdom van nege en 12 jaar is, en ‘n leerder aan Weber Gedenk Primêre skool is.

**1. DOEL VAN DIE STUDIE**

Onderwysers kom daagliks in kontak met kinders en adolessente wat ongesonde gedrag openbaar. Onderwysers kan ‘n positiewe bydra in die lewens van hierdie kinders maak sodat hulle eendag aktiewe en produktiewe volwassenes kan wees. Die hoofdoel van hierdie studie is om ‘n bewegings (motoriese vaardigheid-ontwikkelings-) program vir kinders tussen die ouderdom van nege en 12 jaar oud te ontwikkel. Hierdie program sal tydens skool LO (Liggaamlike Opvoeding) periodes aangebied word. Die hoofdoel van die program is om motoriese vaardighede van pre-adolessente seuns en dogters te ontwikkel en te verbeter. Die program word spesiaal ontwerp om geskik te wees vir gebruik in primêre skole, en wat deur onderwysers ondersteun sal word. Die kinders se motoriese vaardighede sal deur die navorser met die “Bruininks-Oseretsky Test of Motor Proficiency 2” (BOT-2) geëvalueer word. Hierdie toetsbattery sal inligting aangaande die vlak van groot motoriese vaardighede van die deelnemers voorsien. Na die afloop van die toets sal die hele klas in een van twee groepe geplaas word, waarvan een groep die eksperimentele groep en die ander die kontrole groep is. Die eksperimentele groep sal aan die bewegingsprogram deelneem terwyl die kontrole groep met hul normale LO periodes aangaan. Die motoriese vaardigheid ontwikkelingsprogram word deur die navorser ontwerp en aangebied. Na die voltooiing van die program sal al die kinders weer die BOT-2 toets aflê om te sien of daar enige verandering in hul vaardigheidsvlak is. Hierdie toetsgeleentheid sal weereens deur die navorser uitgevoer word.

**2. PROSEDURES**

**Ouer**

Na die verlening van u toestemming sal daar van u kind verwag word om die volgende te voltooi:

- Om die Bruininks-Oseretsky Test of Motor Proficiency 2 (BOT-2) te voltooi. Die BOT-2 is ‘n gevestigde toetsbattery wat fyn- en grootmotoriese vaardighede evalueer. Hierdie toets instrument sluit fyn motoriese presiesheid, fynmotoriese integrasie, handvaardigheid, boonste-ledemaat koördinasie, bilaterale koördinasie, balans, hardloop spoed en ratsheid en spierkrag in. Die gebruik van ‘n gevestigde toetsbattery is die enigste wyse waarop navorsers kan bepaal waar Suid-Afrikaanse kinders in vergelyking met hulle internasionale eweknieë is.
- Om deel te neem aan ‘n bewegingsprogram of aan te gaan met normale LO periodes, afhange van die groep waarvan u kind deel vorm.

**3. MOONTLIKE RISIKOS EN ONGEMAKLIKHEDE**

Alle evaluasies en deelname aan hierdie studie bevat geen indringende tegnieke nie, dus word minimale risiko verwag. Die toets of program deelname bied geen gevaar vir die kind nie, as

enige aktiwiteit u kind ongemaklik laat voel hoef hy/sy dit nie te voltooi nie. Die BOT-2 en bewegingsprogram bevat geen toetse of aktiwiteite wat enige ongemak of ongerief vir die kind sal veroorsaak nie.

#### **4. MOONTLIKE VOORDELE VIR DEELNEMERS EN/OF VIR DIE GEMEENSAP**

Hierdie studie is belangrik vir die Departement van Basiese Onderwys, onderwysers, leerders en ouers, want swak fundamentele motoriese vaardighede beïnvloed leervermoë in die klaskamer. Die verbetering van motoriese vaardighede kan 'n groot rol in verbeterde akademiese sukses en fisieke bewegingsprestasie speel.

#### **5. BETALING VIR DEELNAME**

Geen betaling vir deelname aan hierdie studie word aan u gegee nie.

#### **6. VERTROULIKHEID**

Enige inligting wat tydens hierdie studie verkry word en wat u kan identifiseer, sal konfidensieël gehou word. Dit sal net met u toestemming bekend gemaak word of soos die wet dit vereis. Vertroulikheid sal behou word deur gebruik te maak van 'n getalle sisteem wat 'n nommer aan alle resultate koppel. Dus, sal u of u kind se naam nooit bekend gemaak word aan enige party nie. Data sal veilig toegesluit word in 'n kantoor, waar dit vir 'n minimum van drie jaar gehou word indien u enige verifikasie of bewys van enige gepubliseerde informasie en uitkomstes sou verlang. Behalwe vir die navorsers en die studieleiers, sal geen ander persoon toegang tot enige data hê nie. Daar is 'n moontlikheid dat hierdie studie gepubliseer mag word in 'n tydskrif van Pediatriese Gesondheid of Sportwetenskap. In hierdie geval sal u voor publikasie daarvan ingelig word. Die doel van enige moontlike publikasie is om 'n positiewe bydrae in die navorsing van hierdie studierigting, veral in die Suid-Afrikaanse konteks te maak. Streng vertroulikheid sal vir die hele duur van die studie sal van toepassing wees.

#### **7. DEELNAME EN ONTTREKKING**

Deelname aan hierdie studie is vrywillig en u kind kan die uitnodiging om deel te neem weier. As u kind vrywilliglik instem, mag hy/sy enige tyd van die studie onttrek sonder enige nagevolge. Hy/sy mag ook weier om enige van die aktiwiteite te voltooi en nogsteeds aan die studie deelneem. Die navorsers mag u kind van die studie onttrek as enige omstandighede dit verg.

#### **8. IDENTIFIKASIE VAN NAVORSERS**

As u enige vrae het, moet asseblief nie huiwer om die volgende persone te kontak nie:

Dr E. K. Africa: 021 8084591, [africa@sun.ac.za](mailto:africa@sun.ac.za)

Dr K. J. van Deventer: 021 8084715, [kjvd@sun.ac.za](mailto:kjvd@sun.ac.za)

Riana Breytenbach: 072 187 8110, [14415674@sun.ac.za](mailto:14415674@sun.ac.za)

Sportwetenskap Departement  
Universiteit van Stellenbosch  
Matieland, 7600

#### **9. REGTE VAN DEELNEMERS**

U mag u toestemming enige tyd tydens die studie onttrek en die deelname van u kind staak sonder enige nagevolge. U deelname in hierdie navorsingsprojek oortree geen wetlike eise, regte of drastiese maatreëls nie. Kontak gerus Me. Maléne Fouché [[mfouche@sun.ac.za](mailto:mfouche@sun.ac.za); 021 808 4622] by die Afdeling van Navorsingsontwikkeling vir enige vrae oor u regte as deelnemer in navorsing.

**HANDTEKENING VAN DEELNEMER/OUER OF REGSVERTENWOORDIGER**

Die bogenoemde informasie was in Afrikaans deur die navorsers [Riana Breytenbach/Carla-Rae Hagemann] aan my verduidelik. Ek verstaan Afrikaans of dit was voldoende aan my vertaal. Genoeg geleentheid is aan my gegun om enige vrae te vra en hierdie vrae is bevredigend beantwoord.

Hiermee gee ek vrywilliglik toestemming dat my kind aan hierdie studie mag deelneem. Ek het 'n afskrif van hierdie dokument ontvang.

\_\_\_\_\_  
**Naam van deelnemer**

\_\_\_\_\_  
**Naam van ouer/regsverteenwoordiger (waar dit toepaslik is)**

\_\_\_\_\_  
**Handtekening van deelnemer/ouer of regsverteenwoordiger**

\_\_\_\_\_  
**Datum**

**HANDTEKENING VAN NAVORSER**

Ek verklaar dat die gegewe inligting in hierdie dokument verduidelik is aan \_\_\_\_\_ [*naam van deelnemer*] en/of [sy/haar] regsverteenwoordiger \_\_\_\_\_ [*naam van regsverteenwoordiger*]. [Hy/sy] was aangemoedig en genoeg tyd gegun om my enige vrae te vra. Hierdie gesprek was in Afrikaans uitgevoer en geen vertaler was benodig nie.

\_\_\_\_\_  
**Handtekening van navorser**

\_\_\_\_\_  
**Datum**

## **APPENDIX B**

# **CHILD ASSENT FORM**



UNIVERSITEIT STELLENBOSCH

## INLIGTINGSTUK EN TOESTEMMINGSVORM VIR DEELNEMERS



**TITEL VAN NAVORSINGSPROJEK:** ‘n Bewegingsprogram vir kinders tussen die ouderdom van nege en 12 jaar oud.

**NAVORSER(S):** Riana Breytenbach

**ADRES:** Departement Sportwetenskap  
Universiteit van Stellenbosch  
Matieland  
7600

**KONTAKNOMMER:** 072 187 8110

### Wat is navorsing?

**Deur navorsing leer ons hoe dinge (en mense) werk. Ons gebruik navorsingsprojekte of -studies om meer oor beweging en bewegingsprobleme uit te vind. Navorsing leer ons ook hoe om kinders met bewegingsprobleme beter te help of te behandel.**

### Waarom gaan hierdie navorsingsprojek?

Tydens hierdie studie gaan die navorser ‘n paar aktiwiteite gebruik om jou bewegingsvaardighede te toets. Daarna gaan die navorser ‘n bewegingsprogram tydens jou LO lessies aanbied waaraan sommige kinders sal deelneem. Met hierdie program gaan jy lekker aktiwiteite doen wat jou balans en koördinasie (gebruik van linker- en regterhand) kan ontwikkel en verbeter. Na die program voltooi is, gaan die navorser jou bewegingsvaardighede weer toets om te kyk of dit beter geword het.

### Hoekom vra julle my om aan hierdie navorsingsprojek deel te neem?

Ons wil hê dat jy aan hierdie studie moet deelneem omdat jy tussen die ouderdom van 9 en 12 jaar oud is en skoolgaan aan ‘n laerskool in die Stellenbosch omgewing.

### Wie doen die navorsing?

My naam is Riana Breytenbach. Ek is op die oomblik besig met my Meesters graad in Sportwetenskap (Kinderkinetika) by die Universiteit Stellenbosch. Ek werk vir Dr E. Africa en Dr K. van Deventer by die Departement Sportwetenskap. Ek wil baie graag eendag met kinders werk en daarom bestudeer ek hoe die liggaam werk, hoe ons beweeg en hoe ons oefeninge kan gebruik om aan bewegingsprobleme te werk. In hierdie studie wil ek graag ‘n bewegingsprogram ontwerp wat julle balans en bilaterale koördinasie kan ontwikkel en verbeter.

### **Wat sal in hierdie studie met my gebeur?**

Die bewegingstoetse en bewegingsprogram bestaan alleenlik uit prettige aktiwiteite wat voltooi moet word. Daar sal niks sleg met jou gebeur nie en geen aktiwiteit sal vir jou pyn veroorsaak of ongemaklik laat voel nie.

### **Kan enige iets fout gaan?**

Die aktiwiteite is maklik en veilig, dus behoort niks fout te gaan nie. Jy behoort nooit seer te kry of ongemaklik te voel tydens enige van die aktiwiteite in hierdie studie nie. As jy wel siek voel of pyn het as gevolg van enige ander rede moet jy asseblief vir die navorsers, jou juffrou of jou ouers sê.

### **Watter goeie dinge kan in die studie met my gebeur?**

Die aktiwiteite in hierdie studie kan help om jou balans en koördinasie te ontwikkel en verbeter as jy daaraan deelneem. Die program sal vir die klas wat nie kon deelneem nie, asook vir die res van die skool beskikbaar gestel word nadat die studie voltooi is. Hulle sal dan ook hul balans en koördinasie kan ontwikkel en verbeter.

### **Sal enigiemand weet ek neem deel?**

Enige persoonlike inligting wat jy of jou ouers vir ons gee en enige persoonlike toets resultate sal net deur die navorser en haar studieleiers gesien word. Geen ander mense sal hierdie inligting of resultate sien nie, dus sal niemand kan sien dat jy deel van hierdie studie was nie.



### **Met wie kan ek oor die studie praat?**

Jy kan enige van die volgende drie mense kontak as jy of jou ouers enige vrae of probleme met hierdie studie het:

Dr E. K. Africa: [africa@sun.ac.za](mailto:africa@sun.ac.za), 021 8084591

Dr K. J. van Deventer: [kjvd@sun.ac.za](mailto:kjvd@sun.ac.za), 021 8084715

Riana Breytenbach: [14415674@sun.ac.za](mailto:14415674@sun.ac.za), 072 187 8110

Sportwetenskap Departement  
Universiteit van Stellenbosch  
Matieland, 7600

### **Wat gebeur as ek nie wil deelneem nie?**

Sodra jy voel dat jy nie meer aan die aktiwiteite wil deelneem nie, mag jy ophou. Al het jou ouers gesê dat jy aan hierdie studie mag deelneem, mag jy enige tyd ophou sonder om in die moeilikheid te beland. Die besluit is joune en niemand sal jou forseer om iets te doen wat jy nie wil

nie.

Verstaan jy hierdie navorsingstudie, en wil jy daaraan deelneem?

JA

NEE

Het die navorser ál jou vrae beantwoord?

JA

NEE

Verstaan jy dat jy kan ophou deelneem net wanneer jy wil?

JA

NEE

\_\_\_\_\_  
Handtekening van kind

\_\_\_\_\_  
Datum

## **APPENDIX C**

# **CHILD SPORT QUESTIONNAIRE**

## SPORT QUESTIONNAIRE FOR CHILDREN:

NAAM: \_\_\_\_\_

GRAAD: \_\_\_\_\_

Aan watter van die volgende sport soorte neem jy deel?

Maak 'n kruisie (X) in die blokkie langs die sport soorte waaraan jy deelneem.

Hokkie

Netbal

Swem

Atletiek

Rugby

Krieket

Sokker

Gimnastiek

Golf

Dans/ballet

Basketbal

Ander (noem):



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## **APPENDIX D**

# **MOTOR SKILLS DEVELOPMENT PROGRAMME OUTLINE AND ACTIVITY DESCRIPTIONS**



## LESSON 2

## BALANCE

ACTIVITY:	INTRUCTIONS:	FOCUS:	EQUIPMENT:
<b>Warm-up:</b> (5mins) 1. Freeze game	Skipping forward – freeze in heel-to-toe stance when whistle blows <i>Progression:</i> Running backwards – freeze, standing on dominant leg, when whistle blows	Dynamic: skipping Static: heel-to-toe freeze Dynamic: running Static: 1 leg freeze	<ul style="list-style-type: none"> <li>Whistle</li> <li>4 x traffic cones - marked skipping area</li> </ul>
<b>Core activities:</b> (20mins) 2. Rope walking with target shoot	Walking backwards – normal walking strides Kick soccer ball between 2 traffic cones (1m apart) <i>Progression:</i> Walking backwards – heel-to-toe	Dynamic: walking Static: kicking Dynamic	<ul style="list-style-type: none"> <li>2 x 1m ropes (2m per group)</li> <li>1 x soccer ball per group</li> <li>2 x traffic cones per group</li> </ul>
3. Ladder activity	Run backwards – 1 foot in each block <i>Progression:</i> Jump backwards – 2 feet in each block	Dynamic Dynamic	<ul style="list-style-type: none"> <li>1 x agility ladder</li> </ul>
4. Target game	Work in groups of 3 and stand on dominant leg in a row ( $\pm 2$ m apart) Middle partner holds hoop and outside partners take turns to throw bean bags through hoop (partners alternate positions) <i>Progression:</i> Balance on non-dominant leg	Static Static	<ul style="list-style-type: none"> <li>13 x hoops (1/group)</li> <li>39 x bean bags (3/group)</li> </ul>
<b>Cool down:</b> (5mins) 5. Partner balance	Work in groups of 2 (perform standing on dominant leg) <ul style="list-style-type: none"> <li><b>Forward lean</b> (towards partner)</li> <li><b>Backwards lean</b> (away from partner)</li> <li><b>Sideways lean</b> (away from partner)</li> </ul>	Static/counterbalance Static/counter tension Static/counter tension	<ul style="list-style-type: none"> <li>Safety mats if available</li> </ul>

LESSON 3

BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Jacks</p>	<p>Walk in a large circle formation (left/right)</p> <p>Stop when whistle blows and perform leg movements of the jumping jack (open-close-open-close)</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked walking area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Basket push &amp; pull</p>	<ul style="list-style-type: none"> <li>• <b>Push basket</b>, holding the handle with both hands, to opposite side and pass to next person</li> <li>• <b>Pull basket</b> towards self by pulling rope (alternating hands); run to opposite side and give rope to next person</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 8 x 1m ropes (4/group)</li> <li>• 2 x plastic shopping baskets (1/group)</li> </ul>
<p>3. Ball relays</p>	<p>Children stand behind each other in a row</p> <p>Ball is passed backwards from one end of the line to the opposite end and then back to the front</p> <ul style="list-style-type: none"> <li>• <b>Over</b> – pass ball overhead to next person in line</li> <li>• <b>Under</b> – pass ball through legs to next person in line</li> <li>• <b>Left</b>– pass ball at left side to next person in line</li> <li>• <b>Right</b>– pass ball at right side to next person in line</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Use smaller ball and/or add more balls</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x netball/dodge balls (1/group)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>4. Snow angels</p>	<p>Lying flat on the back, with arms and legs at the sides, move:</p> <ul style="list-style-type: none"> <li>• Left arm</li> <li>• Right arm</li> <li>• Left leg</li> <li>• Right leg</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Both arms</li> <li>• Both legs</li> <li>• Arms and legs together</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Safety mats/old blankets if available</li> </ul>

LESSON 4

BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Jacks</p>	<p>Walk in a large circle formation (left/right)</p> <p>Stop when whistle blows and perform complete jumping jack (legs - open-close; arms – clap above head and then at sides)</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked walking area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Partner push &amp; pull</p>	<p>Work in partners (alternate between lying down and pushing/pulling)</p> <ul style="list-style-type: none"> <li>• <b>Push partner</b> (roll forward) using both hands so that they are performing log rolls; alternate roles when reaching opposite side</li> <li>• <b>Pull partner</b> (roll backwards) towards opposite side (alternating hands); alternate roles when reaching opposite side</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Safety mats/old blankets if available</li> </ul>
<p>3. Ball relays</p>	<p>Children stand behind each other in a row</p> <p>Ball is passed backwards from one end of the line to the opposite end and then back to the front</p> <ul style="list-style-type: none"> <li>• <b>Over and under</b> – children in row alternate passing ball overhead or through legs to next person in line</li> <li>• <b>Left and right</b> – children in row alternate passing ball to left- or right side to next person in line pass ball at left side to next person in line</li> </ul> <p><i>Progression:</i></p> <p>Use smaller ball and/or add more balls</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x netball/dodge balls (1/group)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>4. Snow angels</p>	<p>Lying flat on the back, with arms and legs at the sides, move:</p> <ul style="list-style-type: none"> <li>• Left arm and left leg</li> <li>• Right arm and right leg</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Left arm and right leg</li> <li>• Right arm and left leg</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Safety mats/old blankets if available</li> </ul>

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<b>Warm-up:</b> (5mins) 1. Partner hop	Work in groups of 2, facing one another and holding onto each other by the shoulders  Partners alternate turns to be in charge of leading (direction)  Leading partner must change the direction of hopping according to instruction when the whistle blows  Perform according to given instruction, hopping with 2 feet together: <ul style="list-style-type: none"> <li>• Forward hop</li> <li>• Backwards hop</li> </ul> <u>Progression:</u> <ul style="list-style-type: none"> <li>• Left hop</li> <li>• Right</li> </ul>	Dynamic	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked hopping area</li> </ul>
<b>Core activities:</b> (20mins) 2. Tippy toes walk	Walk on tippy toes (slow and controlled) from one cone to opposite side <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backwards</li> </ul> <u>Progression:</u> <ul style="list-style-type: none"> <li>• Left</li> <li>• Right</li> </ul>	Dynamic	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> </ul>
3. Roped cones	Walk on rope and step over flat cones spaced out along the rope <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backwards</li> <li>• Left</li> <li>• Right</li> </ul> <u>Progression:</u> Replace flat cones with higher traffic cones	Dynamic	<ul style="list-style-type: none"> <li>• 6 x 1m ropes (3/group)</li> <li>• 20 x flat cones (10/group)</li> </ul>
4. Cone dribble & shoot (soccer)	Dribble a soccer ball through 10 traffic cones <ul style="list-style-type: none"> <li>• Left foot only</li> </ul>	Dynamic: dribble	<ul style="list-style-type: none"> <li>• 24 x traffic cones (12/group)</li> </ul>

	<ul style="list-style-type: none"> <li>• Right foot only</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Using the both feet alternatively</li> </ul>	Static: kick	<ul style="list-style-type: none"> <li>• 2 x soccer balls (1/group)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>5. Pass around</p>	<p>Form smaller groups (not more than 10 children), standing in circle formations</p> <p>Pass ball around using both hands together (to the left/right)</p> <p>When whistle blows, stop passing ball around, balance according to instruction (eyes open)</p> <ul style="list-style-type: none"> <li>• Heel-to-toe stance</li> <li>• Left leg</li> <li>• Right leg</li> </ul>	Static	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x netball/dodge balls (1/group)</li> </ul>

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<b>Warm-up:</b> (5mins) 1. Partner hop	Work in groups of 2, facing one another and holding onto each other by the shoulders Partners alternate turns to be in charge of leading (direction) Leading partner must change the direction of hopping according to instruction when the whistle blows Perform according to given instruction, hopping on dominant leg: <ul style="list-style-type: none"> <li>• Forward hop</li> <li>• Backwards hop</li> </ul> <u>Progression:</u> <ul style="list-style-type: none"> <li>• Left hop</li> <li>• Right hop</li> </ul>	Dynamic	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked hopping area</li> </ul>
<b>Core activities:</b> (20mins) 2. Tippy toes walk	Walk on tippy toes (slow and controlled) on a rope from one cone to opposite side <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backwards</li> </ul> <u>Progression:</u> <ul style="list-style-type: none"> <li>• Left</li> <li>• Right</li> </ul>	Dynamic	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 6 x 1m ropes (3/group)</li> </ul>
3. Roped cones	Walk on rope and hop (2 feet) over cones spaced out along the rope <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backwards</li> <li>• Left</li> <li>• Right</li> </ul> <u>Progression:</u> <ul style="list-style-type: none"> <li>• Replace flat cones with higher traffic cones</li> </ul>	Dynamic	<ul style="list-style-type: none"> <li>• 6 x 1m ropes (3/group)</li> <li>• 20 x flat cones (10/group)</li> </ul>
4. Cone dribble & shoot (soccer)	Dribble a soccer ball through 10 traffic cones using a dribble hop (1 foot remains on top of the ball, controlling and rolling it forward, other leg hops next to the ball)	Dynamic: dribble	<ul style="list-style-type: none"> <li>• 24 x traffic cones (12/group)</li> </ul>

	<ul style="list-style-type: none"> <li>• Left foot only</li> <li>• Right foot only</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Using the both feet alternatively</li> </ul>	Static: kick	<ul style="list-style-type: none"> <li>• 2 x soccer balls (1/group)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>5. Pass around</p>	<p>Form smaller groups (not more than 10 children), standing in circle formations</p> <p>Pass ball around using both hands together (to the left/right)</p> <p>When whistle blows, stop passing ball around, balance according to instruction (eyes closed)</p> <ul style="list-style-type: none"> <li>• Heel-to-toe stance</li> <li>• Left leg</li> <li>• Right leg</li> </ul>	Static	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x netball/dodge balls (1/group)</li> </ul>

LESSON 7

BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Skiing</p>	<p>Jog in a large circle formation (left/right)</p> <p>Stop when whistle blows and perform leg movements of the ski (alternate jumping with one leg to the front and the other to the back)</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked jogging area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Line passing drills</p>	<p>Children stand in 2 rows opposite/facing each other</p> <p>Ball is passed/thrown back and forth, using both hands, between the 2 rows from one end of the line to the opposite end and then back to the start (zig-zag pattern)</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Throw with one hand, but catch with both hands</li> <li>• Use smaller ball and/or add more balls</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x netball/dodge balls (1/group)</li> </ul>
<p>3. Midline crossing</p>	<p>Mats are laid out in a long row between 2 cones with ropes forming a line along the middle on top of the mats</p> <ul style="list-style-type: none"> <li>• <b>Hands:</b> Crawl with rope between knees, alternately crossing hands from one side of the rope to the next</li> <li>• <b>Feet:</b> Walk alternately crossing feet over from one side of the rope to the opposite side, hands on hips and not looking at feet</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 8 x Safety mats (4/group)/ old blankets if available</li> <li>• 4 x traffic cones (2/group)</li> <li>• 6 x 1m ropes (3/group)</li> </ul>
<p>4. Dribbling (basketball)</p>	<p>Walk from one cone to the opposite side whilst dribbling the ball</p> <ul style="list-style-type: none"> <li>• 2 hands together</li> <li>• Left hand</li> <li>• Right hand</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x basketballs (1/group)</li> <li>• 4 x traffic cones (2/group)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>5. Double-ball walk</p>	<p>Place small ball on top of the large ball and roll the small backwards using only the fingers</p> <p>2 balls must always remain in contact and only the fingers are allowed to be contact with the small ball</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x large swiss balls (1/group)</li> <li>• 2 netball/dodge balls (1/group)</li> <li>• 4 x traffic cones (2/group)</li> </ul>

LESSON 8

BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Skiing</p>	<p>Jog in a large circle formation (left/right)</p> <p>Stop when whistle blows and perform arm and leg movements of the ski (alternate same arm and leg to the front and the other to the back)</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked jogging area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Line passing drills</p>	<p>Children stand arms-distance apart in 2 rows opposite/facing each other (rows are ±2m apart)</p> <p>Ball is bounced back and forth, using both hands, between the 2 rows from one end of the line to the opposite end and then back to the start (zig-zag pattern)</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Bounce with one hand, but catch with both hands</li> <li>• Use smaller ball and/or add more balls</li> <li>• Throw smaller ball and bounce bigger ball</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x netball/</li> <li>• dodge balls (1/group)</li> <li>• 2 x tennis balls</li> </ul>
<p>3. Midline crossing</p>	<p>Ropes are laid out in a long line between 2 cones</p> <p><b>Bunny hop:</b> start on haunches on 1 side of the rope, place hands together diagonally on the opposite side of rope, then jump forward over towards hands landing on both feet</p> <p><b>Criss-cross jump:</b> standing with 1 foot on either side of rope, jump forward crossing feet to opposite sides (dominant foot in front), jump forward opening feet up again (alternating crossing and opening)</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Jump with non-dominant leg crossing in front</li> <li>• Jump with alternating feet in from (left-right-left-right)</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 6 x 1m ropes (3/group)</li> </ul>
<p>4. Dribbling (basketball)</p>	<p>Walk from one cone to the opposite side whilst dribbling the ball</p> <ul style="list-style-type: none"> <li>• Left hand</li> <li>• Right hand</li> </ul> <p><i>Progression:</i></p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x basketballs (1/group)</li> <li>• 4 x traffic cones (2/group)</li> </ul>

	<ul style="list-style-type: none"> <li>• Alternating hands (left-right-left-right)</li> </ul>		
<p><b>Cool down:</b> (5mins)</p> <p>5. Double-ball walk</p>	<p>Place small ball on top of the large ball and roll the small backwards using only the fingers</p> <p>2 balls must always remain in contact and only the fingers are allowed to be contact with the small ball</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Roll small ball forwards and perform activity backwards</li> </ul>	Bilateral Coordination	<ul style="list-style-type: none"> <li>• 2 x large swiss balls (1/group)</li> <li>• 2 netball/dodge balls (1/group)</li> <li>• 4 x traffic cones (2/group)</li> </ul>

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Hop around</p>	<p>Children are spaced out in marked area and hop with 2 feet together, in the instructed direction, when whistle blows</p> <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backwards</li> <li>• Left</li> <li>• Right</li> </ul>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked hopping area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Connecting self</p>	<p>Children are spaced far enough from one another and touch the instructed body parts together (hold each position for 10-15 seconds)</p> <ul style="list-style-type: none"> <li>• Elbow to knee</li> <li>• Hand to foot</li> <li>• Foot to foot</li> <li>• Head to hand</li> <li>• Knee to ankle</li> <li>• Foot 2 head</li> </ul>	<p>Static</p>	<ul style="list-style-type: none"> <li>• Safety mats/blankets if available</li> </ul>
<p>3. Connecting pairs</p>	<p>Work in groups of 2, are spaced far enough from one another and touch the instructed body parts together (hold each position for 10-15 seconds)</p> <ul style="list-style-type: none"> <li>• 2 feet</li> <li>• 2 hands, 1 foot and 1 knee</li> <li>• 1 shoulder and 1 head</li> <li>• 1 elbow and 1 hip</li> <li>• 1 ankle and 1 knee</li> <li>• Knee to knee</li> </ul>	<p>Static</p>	<ul style="list-style-type: none"> <li>• Safety mats/blankets if available</li> </ul>
<p>4. Body part balance</p>	<p>Children are spaced far enough from one another and balance using only the instructed body parts (hold each position for 10-15 seconds)</p> <ul style="list-style-type: none"> <li>• 10 toes</li> <li>• 1 foot and 1 knee</li> <li>• 2 shoulders and 2 elbows</li> <li>• Bum and 2 hands</li> <li>• 2 feet, 2 hands and 1 head</li> </ul>	<p>Static</p>	<ul style="list-style-type: none"> <li>• Safety mats/blankets if available</li> </ul>

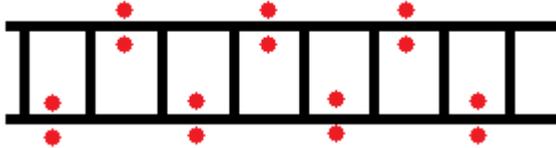
	<ul style="list-style-type: none"> <li>• 2 feet and 2 elbows</li> </ul>		
<p><b>Cool down:</b> (5mins)</p> <p>5. Group balance</p>	<p>Children work in smaller groups of not more than 10</p> <p>Standing in circle formation, children place arms around each other's shoulders</p> <p>Children stand in the heel-to-toe stance for 10-15 seconds and then close their eyes, on instruction, for another 10-15 seconds</p> <ul style="list-style-type: none"> <li>• Heel-to-toe stance left leg in front</li> <li>• Heel-to-toe stance right leg in front</li> </ul>	Static	

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Hop around</p>	<p>Children are spaced out in marked area and hop on 1 leg, in the instructed direction, when whistle blows</p> <p>Perform all direction with left- and then on the right leg</p> <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backwards</li> <li>• Left</li> <li>• Right</li> </ul>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked hopping area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Connecting self</p>	<p>Children are spaced far enough from one another and touch the instructed body parts together (hold each position for 10-15 seconds, eyes closed)</p> <ul style="list-style-type: none"> <li>• Elbow to knee</li> <li>• Hand to foot</li> <li>• Foot to foot</li> <li>• Head to hand</li> <li>• Knee to ankle</li> <li>• Foot 2 head</li> </ul>	<p>Static</p>	<ul style="list-style-type: none"> <li>• Safety mats/blankets if available</li> </ul>
<p>3. Connecting pairs</p>	<p>Work in groups of 2, are spaced far enough from one another and touch the instructed body parts together (hold each position for 10-15 seconds, eyes closed)</p> <ul style="list-style-type: none"> <li>• 2 feet</li> <li>• 2 hands, 1 foot and 1 knee</li> <li>• 1 shoulder and 1 head</li> <li>• 1 elbow and 1 hip</li> <li>• 1 ankle and 1 knee</li> <li>• Knee to knee</li> </ul>	<p>Static</p>	<ul style="list-style-type: none"> <li>• Safety mats/blankets if available</li> </ul>
<p>4. Body part balance</p>	<p>Children are spaced far enough from one another and balance using only the instructed body parts (hold each position for 10-15 seconds, eyes closed)</p> <ul style="list-style-type: none"> <li>• 10 toes</li> <li>• 1 foot and 1 knee</li> <li>• 2 shoulders and 2 elbows</li> </ul>	<p>Static</p>	<ul style="list-style-type: none"> <li>• Safety mats/blankets if available</li> </ul>

	<ul style="list-style-type: none"> <li>• Bum and 2 hands</li> <li>• 2 feet, 2 hands and 1 head</li> <li>• 2 feet and 2 elbows</li> </ul>		
<p><b>Cool down:</b> (5mins)</p> <p>5. Group balance</p>	<p>Children work in smaller groups of not more than 10</p> <p>Standing in circle formation, children place arms around each other's shoulders</p> <p>Children balance on 1 leg for 10-15 seconds and then close their eyes, on instruction, for another 10-15 seconds</p> <ul style="list-style-type: none"> <li>• Left leg</li> <li>• Right leg</li> </ul>	Static	

LESSON 11

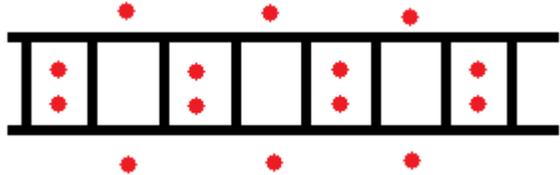
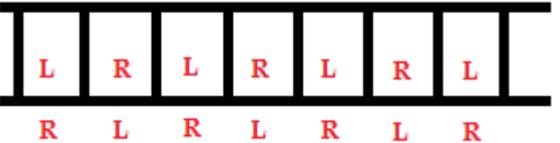
BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Skiing</p>	<p>Jog in a large circle formation (left/right)</p> <p>Stop when whistle blows and perform same side skiing movements (arm and leg on same sides move together in the same direction)</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked jogging area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Ladder drills</p>	<p>Jump with 2 feet together, straddling the outsides of the ladder</p>  <p>Jump with 2 feet together, inside the ladder and back out (zig-zag pattern)</p> 	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x agility ladders (1/group)</li> </ul>
<p>3. Hoop push</p>	<p>Place both hands flat on hoop with outside borders of hands facing away from body</p> <p>Not allowed to grip the hoop with fingers</p> <p>Alternate hands in the direction you are moving to roll the hoop</p> <p>1 hand must be on the hoop at all times</p> <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backwards</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 2 x hoops (1/group)</li> </ul>
<p>4. Hoop skip</p>	<p>Hold hoop in front of the body and jump through leading with the dominant leg</p> <p>Lift non-dominant leg at the back as hoop passes to the back and over top of the body</p> <p>Bring hoop over the head and back to front of the body to perform next skip</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 2 x hoops</li> </ul>

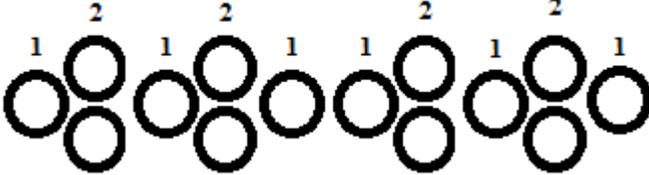
	<p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Perform with non-dominant leg</li> <li>• Perform backwards</li> </ul>		(1/group)
<p><b>Cool down:</b> (5mins)</p> <p>5. Travelling hoop</p>	<p>Children stand behind each other in a line person in front starts with hoop</p> <p>Hoop is moved backwards going down over one child's head and then from the feet upwards over the next</p> <p>Must keep two hands on the hoop at all times</p> <p>Bring hoop forward again in the same manner</p> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Add fun competition: instruct child at back of line to run forward and start again when hoop reaches them</li> <li>• Add more hoops</li> </ul>	Bilateral Coordination	<ul style="list-style-type: none"> <li>• 4 x hoops (2/group)</li> </ul>

LESSON 12

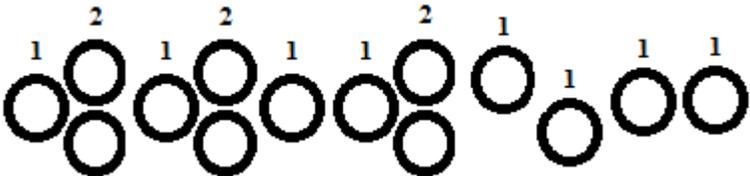
BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Skiing</p>	<p>Jog in a large circle formation (left/right)</p> <p>Stop when whistle blows and perform opposite side skiing movements (arm and leg on opposite sides of the body move together in the same direction)</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked jogging area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Ladder drills</p>	<p>Jump with 2 feet inside the ladder, and the outside straddling the ladder</p>  <p>Jump with 1 foot inside and other outside the ladder, alternate feet with every block</p> 	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x agility ladders (1/group)</li> </ul>
<p>3. Hoop push</p>	<p>Place both hands flat on hoop with thumbs of both hands facing each other</p> <p>Not allowed to grip the hoop with fingers</p> <p>Alternate hands in the direction you are moving to roll the hoop</p> <p>1 hand must be on the hoop at all times</p> <ul style="list-style-type: none"> <li>• Left</li> <li>• Right</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 2 x hoops (1/group)</li> </ul>
<p>4. Hoop skip</p>	<p>Hold hoop in front of the body and jump through with both feet together</p> <p>Bring hoop up behind the back towards top of the body</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 2 x hoops</li> </ul>

	<p>Bring hoop over the head and back to front of the body to perform next skip</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Perform backwards</li> </ul>		(1/group)
<p><b>Cool down:</b> (5mins)</p> <p>5. Travelling hoop</p>	<p>Children stand behind each other in a line person in front starts with hoop</p> <p>Hoop is moved backwards going down over one child's head and then from the feet upwards over the next</p> <p>Must keep two hands on the hoop at all times</p> <p>Bring hoop forward again in the same manner</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Add fun competition: instruct child at back of line to run forward and start again when hoop reaches them</li> <li>• Add more hoops</li> </ul>	Bilateral Coordination	<ul style="list-style-type: none"> <li>• 4 x hoops (2/group)</li> </ul>

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Bean bag balance</p>	<p>Children are spaced out in marked area, walk around balancing a bean bag on their heads</p> <p>Children have to freeze when whistle blows</p> <p>Try not to bump into other children</p> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>Balance in heel-to-toe stance</li> <li>Decrease the size of the moving area to increase difficulty</li> </ul>	<p>Dynamic: walk</p> <p>Static: freeze</p>	<ul style="list-style-type: none"> <li>Whistle</li> <li>4 x traffic cones - marked walking area</li> <li>± 40 bean bags (1/child)</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Hop scotch</p>	<p>Children complete the hop scotch pattern 1 at a time</p> <ul style="list-style-type: none"> <li>Hop with 2 feet for the first round (2 feet in the hoop marked 1 and 1 foot in each hoop marked 2)</li> <li>Hop with 1 foot in hoops marked 1 and 1 foot in each marked 2</li> </ul>  <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>Throw bean bag in a selected hoop and instruct children that this hoop may not be used</li> </ul>		<ul style="list-style-type: none"> <li>4 x traffic cones (2/group)</li> <li>28 hoops (14/group)</li> </ul>
<p>3. Crossing the river</p>	<p>Sponge blocks are spaced out in a line along the floor (river rocks)</p> <p>Children have to walk over the rocks, 1 at a time, without falling into the river</p> <ul style="list-style-type: none"> <li>Step with 1 foot and bring other foot onto the rock before stepping onto the next rock</li> <li>Only step with 1 foot on each rock (2 feet are never allowed on the same rock)</li> <li>Leap from rock to rock (2 feet don't have to land together)</li> </ul> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>Rocks are arranged so that they do not form a straight line any longer (slightly zig-zag)</li> <li>Space selected rocks further apart so that children have to perform a slight hop onto</li> </ul>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>4 x traffic cones (2/group)</li> <li>20 x sponge/foam blocks (10/group)</li> </ul>

	<p>those rocks</p> <ul style="list-style-type: none"> <li>• Jump with 2 feet from rock to rock</li> </ul>		
4. Group sit	<p>Children work in smaller groups of not more than 10</p> <p>Stand behind and relatively close to each other in a straight line</p> <p>All children in the group have to sit slowly and at the same time</p> <p>Children sit backwards onto the knees of the child behind them (except person at back of row)</p> <p>Helps if someone in the group counts to ensure that every one sits and stands-up together</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Increase the group sizes</li> </ul>	Static	<ul style="list-style-type: none"> <li>• Safety mats/blankets if available</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>5. Team stand-up</p>	<p>Children work in smaller groups of not more than 10</p> <p>Sitting in circle formation, facing inwards, children link arms together to form a chain</p> <p>Helps if someone in the group counts to ensure that every one sits and stands-up together</p> <ul style="list-style-type: none"> <li>• Everyone now stands up at same time without using arms and without breaking chain</li> <li>• Stand-up and sit down according to instructions</li> </ul>	Static	

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Bean bag balance</p>	<p>Children are spaced out in marked area, walk around in the instructed direction, balancing bean bag on their heads</p> <p>Children have to freeze when whistle blows and wait for the instructed direction</p> <p>Try not to bump into other children</p> <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backwards</li> <li>• Left</li> <li>• Right</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Freeze on 1 leg</li> <li>• Decrease the size of the moving area to increase difficulty</li> <li>• Limit children to dropping the bean bag twice before being eliminated from the game (Eliminated children stand around marked area balancing bean bag on their heads)</li> </ul>	<p>Dynamic : walk</p> <p>Static: freeze</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked walking area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Hop scotch</p>	<p>Children complete the hop scotch pattern 1 at a time</p> <ul style="list-style-type: none"> <li>• Hop with using 2 feet for the first round (2 feet in the hoop marked 1 and 1 foot in each hoop marked 2)</li> <li>• Hop with 1 foot in hoops marked 1 and 1 foot in each marked 2</li> </ul>  <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Throw bean bag in a selected hoop and instruct children that this hoop may not be used</li> <li>• Hop with non-dominant leg in hoops marked 1</li> </ul>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 28 hoops (14/group)</li> </ul>
<p>3. Crossing the river</p>	<p>Sponge blocks are spaced out in a line along the floor (river rocks)</p>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> </ul>

	<p>Children have to walk over the rocks without falling into the river</p> <p>A child from each side of the river performs the activity at the same time and will have to cross each other in the middle (allowed to hold onto each other)</p> <ul style="list-style-type: none"> <li>• Step with 1 foot and bring other foot onto the rock before stepping onto the next rock</li> <li>• Only step with 1 foot on each rock (2 feet are never allowed on the same rock)</li> <li>• Leap from rock to rock (2 feet don't have to land together)</li> </ul> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Rocks are arranged so that they do not form a straight line any longer (slightly zig-zag)</li> <li>• Space some rocks further apart so that children have to perform a slight hop onto selected rocks</li> <li>• Jump with 2 feet from rock to rock</li> <li>• Children are not allowed to touch when passing each other in the middle of the river</li> </ul>		<ul style="list-style-type: none"> <li>• 20 x sponge/foam blocks (10/group)</li> </ul>
4. Group sit	<p>Children work in smaller groups of at least 10</p> <p>Stand behind and relatively close to each other in a circle formation</p> <p>All children in the group have to sit slowly and at the same time</p> <p>Children sit backwards onto the knees of the child behind them</p> <p>Helps if someone in the group counts to ensure that every one sits and stands-up together</p> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Increase the group sizes</li> </ul>	Static	<ul style="list-style-type: none"> <li>• Safety mats/blankets if available</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>5. Team stand-up</p>	<p>Children work in smaller groups of not more than 10</p> <p>Sitting in circle formation, facing outwards, children link arms together to form a chain</p> <p>Helps if someone in the group counts to ensure that every one sits and stands-up together</p> <ul style="list-style-type: none"> <li>• Everyone now stands up at same time without using arms and without breaking chain</li> <li>• Stand-up and sit down according to instructions</li> </ul> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Increase the group sizes</li> </ul>	Static	<ul style="list-style-type: none"> <li>• Safety mats/blankets if available</li> </ul>

LESSON 15

BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Jacks &amp; skis</p>	<p>Jog in a large circle formation (left/right)</p> <p>Stop when whistle blows and perform jumping jacks or same side skis, depending on instruction</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked jogging area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Rolling snow balls</p>	<p>Each child get a chance to roll the ball forward through the cones from one end to the opposite side</p> <ul style="list-style-type: none"> <li>• Left hand only</li> <li>• Right hand only</li> <li>• Both bands together</li> <li>• Alternating hands</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 14 x traffic cones (12/group)</li> <li>• 2 x large swiss balls (1/group)</li> </ul>
<p>3. Rope skip</p>	<p>Hold rope behind the body, swing rope forward over the body and jump through leading with the dominant leg</p> <p>Lift non-dominant leg at the back as rope passes to the back and over top of the body</p> <p>Bring rope over the head and back to front of the body to perform next skip</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Perform with non-dominant leg</li> <li>• Perform backwards</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 2 x hoops (1/group)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>4. Double-ball walk maze</p>	<p>Place small ball on top of the large ball and roll the small forward through the cones using only the fingers</p> <p>2 balls must always remain in contact and only the fingers are allowed to be contact with the small ball</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 24 x traffic cones (12/group)</li> <li>• 2 netball/dodge balls (1/group)</li> <li>• 2 x large swiss balls (1/group)</li> </ul>

LESSON 16

BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Jacks &amp; skis</p>	<p>Jog in a large circle formation (left/right)</p> <p>Stop when whistle blows and perform jumping jacks or opposite side skis, depending on instruction</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked jogging area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Rolling snow balls</p>	<p>Each child get a chance to roll the ball backwards through the cones from one end to the opposite side</p> <ul style="list-style-type: none"> <li>• Left hand only</li> <li>• Right hand only</li> <li>• Both bands together</li> <li>• Alternating hands</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 2 x agility ladders (1/group)</li> </ul>
<p>3. Rope skip</p>	<p>Hold rope behind the body, swing rope forward over the body and jump through with both legs and land on 2feet together</p> <p>Bring rope up behind the back towards top of the body</p> <p>Bring rope over the head and back to front of the body to perform next skip</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Perform backwards</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 2 x hoops (1/group)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>4. Double-ball walk maze</p>	<p>Place small ball on top of the large ball and roll the small backwards through the cones using only the fingers</p> <p>2 balls must always remain in contact and only the fingers are allowed to be contact with the small ball</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• 24 x traffic cones (12/group)</li> <li>• 2 netball/dodge balls (1/group)</li> <li>• 2 x large swiss balls (1/group)</li> </ul>

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Skip around</p>	<p>Children skip around in marked area and freeze when whistle blows</p> <p>Balance on dominant leg, lift non-dominant leg and place opposite arm under the lifted leg and pinch the nose</p> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Balance on non-dominant leg and pinch nose under dominant leg</li> </ul>	<p>Dynamic: walk</p> <p>Static: freeze</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked skipping area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Roly poly</p>	<p>Pack mats out in a long line so that children can perform rolls</p> <ul style="list-style-type: none"> <li>• <b>Log roll</b> (arms and legs straight and stretched out, rolling over left/right sides of body)</li> <li>• <b>Egg roll</b> (pull knees to chest and hold them with arms, rolling over legs and the back)</li> </ul> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Perform activities with eyes closed and try to roll in a straight line</li> </ul>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 8 safety mats (4/group)</li> </ul>
<p>3. Advanced bean bag balance</p>	<p>Perform the following activities while balancing bean bag on head</p> <ul style="list-style-type: none"> <li>• Walk through cones</li> <li>• Walk on a rope</li> </ul>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• 24 x traffic cones (12/group)</li> <li>• 2 bean bags (1/group)</li> <li>• 6 x 1m ropes (3/group)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>4. Crab soccer</p>	<p>Children are divided into smaller teams (not more than 10 per team)</p> <p>Assume crab walk position with bum lifted off the floor</p> <p>Instructor tosses ball up in the air in the middle of the 2 groups to start the game</p> <p>Children try to kick the ball without losing the crab walk position and score between 2 cones</p>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• 16 x traffic cones (8/group)</li> <li>• 2 soccer balls (1/group)</li> </ul>

LESSON 18

BALANCE

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Skip around</p>	<p>Children skip around in marked area and freeze when whistle blows</p> <p>Perform buddha balance on dominant leg, lift non-dominant leg, bent at the knee and place ankle on knee of the dominant leg (that is also slightly bent) arms are held out to the sides</p> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Balance on non-dominant</li> </ul>	<p>Dynamic: walk</p> <p>Static: freeze</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked skipping area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Roly poly</p>	<p>Pack mats out in a long line so that children can perform rolls</p> <ul style="list-style-type: none"> <li>• <b>Egg roll</b> (pull knees to chest and hold them with arms, rolling over legs and the back)</li> <li>• <b>Forward roll</b> (8 steps)               <ol style="list-style-type: none"> <li>1 stand up straight, arms up in the air (next to ears)</li> <li>2 bring arms down to shoulder level in front of the body</li> <li>3 squat with arms out in front</li> <li>4 places hands on mat</li> <li>5 buttocks in the air, chin to chest</li> <li>6 kick &amp; roll</li> <li>7 squat with arms out in front</li> <li>8 stand up</li> </ol> </li> </ul> <p><u>Progression:</u></p> <p>Perform activities with eyes closed and try to roll in a straight line</p>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• 4 x traffic cones (2/group)</li> <li>• 8 safety mats (4/group)</li> </ul>
<p>3. Advanced bean bag balance</p>	<p>Perform the following activities while balancing bean bag on head</p> <ul style="list-style-type: none"> <li>• Slowly dribble a ball through cones</li> <li>• Walk on a rope with a bean bag on each shoulder (as well as 1 on head)</li> </ul>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• 24 x traffic cones (12/group)</li> <li>• 6 bean bags (3/group)</li> <li>• 6 x 1m ropes (3/group)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>4. Crab soccer</p>	<p>Children are divided into smaller teams (not more than 10 per team)</p> <p>Assume crab walk position with bum lifted off the floor, kicking ball as in soccer</p> <p>Instructor tosses ball up in the air in the middle of the 2 groups to start the game</p>	<p>Dynamic</p>	<ul style="list-style-type: none"> <li>• 16 x traffic cones (8/group)</li> <li>• 2 soccer balls (1/group)</li> </ul>

LESSON 19

BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Cross crawl</p>	<p>While walking forward lift 1 leg and tap hand/elbow on knee</p> <ul style="list-style-type: none"> <li>• Right hand to right knee / left hand to left knee</li> <li>• Right elbow to right knee / left elbow to left knee</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Right hand to left knee / left hand to right knee</li> <li>• Right elbow to left knee / left elbow to right knee</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked walking area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Mirror hands &amp; feet</p>	<p>Working in groups of 2, children sit facing each other</p> <p>Partners place both hands/feet flat against each other's, 1 takes the lead in direction</p> <p>Make circular motions as if cycling with hands/feet (both in same direction, at same time)</p> <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backward</li> <li>• Left</li> <li>• Right</li> </ul>	<p>Bilateral Coordination</p>	
<p>3. Newspaper fun</p>	<p>1 hand is place on each newspaper page and move together in the instructed direction</p> <ul style="list-style-type: none"> <li>• Up and down</li> <li>• Side to side (left and right)</li> <li>• Circles left</li> <li>• Circles right</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• ±40 x pages of old newspaper (2/child)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>4. Crumple dribble</p>	<p>1 hand is placed on each newspaper page, individually crumple both pieces at the same time</p> <p>Squeeze newspaper as hard as possible to make it turn into 2 small balls</p> <p>Dribble the newspaper balls through the cones, pick it up and throw in basket</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• ±40 x pages of old newspaper (2/child)</li> <li>• 24 x traffic cones (12/group)</li> <li>• 2 x shopping baskets</li> </ul>

LESSON 20

BILATERAL COORDINATION

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Cross crawl</p>	<p>While walking backwards lift 1 leg and tap hand/elbow on knee</p> <ul style="list-style-type: none"> <li>• Right hand to right knee / left hand to left knee</li> <li>• Right elbow to right knee / left elbow to left knee</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Right hand to left knee / left hand to right knee</li> <li>• Right elbow to left knee / left elbow to right knee</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked walking area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Mirror hands &amp; feet</p>	<p>Working in groups of 2, children sit facing each other</p> <p>Partners place both hands/feet flat against each other's, 1 takes the lead in direction</p> <p>Make circular motions as if cycling with hands/feet (alternating left and right)</p> <ul style="list-style-type: none"> <li>• Forward</li> <li>• Backward</li> <li>• Outward</li> <li>• Inward</li> </ul>	<p>Bilateral Coordination</p>	
<p>3. Newspaper fun</p>	<p>1 hand is place on each newspaper page and move together in the instructed direction</p> <ul style="list-style-type: none"> <li>• Alternating up and down</li> <li>• Criss-cross (left above right, open, right above left etc.)</li> <li>• Circles outward</li> <li>• Circles inward</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• ±40 x pages of old newspaper (2/child)</li> </ul>
<p><b>Cool down:</b> (5mins)</p> <p>4. Crumple dribble</p>	<p>1 hand is placed on each newspaper page, individually crumple both pieces at the same time</p> <p>Squeeze newspaper as hard as possible to make it turn into 2 small balls</p> <p>Dribble the newspaper balls through the cones, pick it up and throw in basket</p>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• ±40 x pages of old newspaper (2/child)</li> <li>• 24 x traffic cones (12/group)</li> <li>• 2 x shopping baskets</li> </ul>

ACTIVITY:	INTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Extreme balance</p>	<p>Children skip around in marked area and freeze when whistle blows, balance according to instruction</p> <ul style="list-style-type: none"> <li>• Heel-to-toe stance</li> <li>• 1 leg stationary hop</li> <li>• 1 leg balance</li> <li>• Pinch nose under leg</li> <li>• Buddha sit</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Balance on non-dominant leg</li> </ul>	<p>Dynamic: walk</p> <p>Static: freeze</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked skipping area</li> </ul>
<p><b>Core activities:</b> (15mins)</p> <p>2. Obstacle course</p>	<p>The diagram illustrates an obstacle course with the following stations:</p> <ul style="list-style-type: none"> <li><b>1) HOOPS:</b> Five red circles in a horizontal line.</li> <li><b>2) MINI TRAMPOLINE:</b> A blue trampoline.</li> <li><b>3) MAT:</b> A grey rectangular mat.</li> <li><b>4) ROPE:</b> A yellow horizontal rope.</li> <li><b>5) AGILITY LADDER:</b> A vertical ladder with seven rungs.</li> <li><b>6) RINGS:</b> Five green circles.</li> <li><b>7) MATS:</b> Six grey rectangular mats in a horizontal row.</li> <li><b>8) HOOPS:</b> A sequence of circles with numbers 1 and 2 above them, arranged in a zig-zag pattern.</li> <li><b>9) BALL &amp; CONES:</b> A blue ball and two orange triangles.</li> <li><b>10) SWISS BALL:</b> A green ball with horizontal lines.</li> </ul> <p>The course starts at 'START' and ends at 'END'.</p>		<ul style="list-style-type: none"> <li>• 3 x traffic cones</li> <li>• 7 safety mats</li> <li>• 1 x agility ladder</li> <li>• 5 x rubber rings</li> <li>• 20 x hoops</li> <li>• 1 x soccer ball</li> <li>• 1 x swiss ball</li> <li>• 1 x mini trampoline</li> <li>• 1 x blindfold</li> </ul>

	<p>1) Hoops are held at hip height and child climbs through without touching hoop with body</p> <p>2) Perform 10 jumps with heel-to-toe foot placement</p> <p>3) Land with 2 feet together and balance on 1 leg (dominant) in the aeroplane position</p> <p>4) Walk heel-to-toe on rope while balancing bean bag on head, turn back and throw bean bag in basket while standing heel-to-toe</p> <p>5) Run through ladder with high knees (tapping hands on the knees at hip-height)</p> <p>6) Walk over rubber rings with only 1 foot stepping on each ring</p> <p>7) Log rolls</p> <p>8) Jump through hoops using 2 feet with every hop</p> <p>9) Stationary kick between 2 cones</p> <p>10) Sit on swiss ball, hands on hips, feet together on floor, bouncing up and down for 15 seconds</p> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Work in groups of 2, partners guide and assist each other to complete obstacle course blindfolded</li> </ul>	<p>Dynamic</p> <p>Dynamic</p> <p>Static</p> <p>Dynamic/ static</p> <p>Dynamic</p> <p>Dynamic</p> <p>Dynamic</p> <p>Dynamic</p> <p>Dynamic</p> <p>Dynamic</p>	
<p><b>Cool down:</b> (10mins)</p> <p>3. Hovering hoop</p>	<p>Form one large circle with all children holding hands</p> <p>2 Children hold hands through the hoop and begin the game</p> <p>Children must move the hoop around the circle without letting go of the hands (thus, climb through)</p> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Add more hoops with following rounds</li> </ul>	<p>Static</p>	<ul style="list-style-type: none"> <li>• 5 x hoops</li> </ul>
<p>4. Human knot</p>	<p>Divide into smaller groups of not more than 10 children</p> <p>Children stand in a circle formation, facing each other</p> <p>Everyone puts their hands into the circle and joins hands with 2 other members (never same person)</p> <p>Children have to untangle the ‘knot’ to create 1 big circle with everyone holding hands</p> <p>Children are not allowed to let go of each other’s hands at any time</p>	<p>Static</p>	

ACTIVITY:	INTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Extreme balance</p>	<p>Children skip around in marked area and freeze when whistle blows, balance according to instruction</p> <ul style="list-style-type: none"> <li>• Heel-to-toe stance</li> <li>• 1 leg stationary hop</li> <li>• 1 leg balance</li> <li>• Pinch nose under leg</li> <li>• Buddha sit</li> </ul> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Balance on non-dominant leg</li> </ul>	<p>Dynamic: walk</p> <p>Static: freeze</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked skipping area</li> </ul>
<p><b>Core activities:</b> (15mins)</p> <p>2. Obstacle course</p>	<p>The diagram illustrates an obstacle course with the following stations:</p> <ul style="list-style-type: none"> <li><b>1) HOOPS:</b> Five red circles in a horizontal line.</li> <li><b>2) MINI TRAMPOLINE:</b> A blue trampoline.</li> <li><b>3) MAT:</b> A grey rectangular mat.</li> <li><b>4) ROPE:</b> A yellow horizontal line.</li> <li><b>5) AGILITY LADDER:</b> A vertical ladder with seven rungs.</li> <li><b>6) RINGS:</b> Five green circles.</li> <li><b>7) MATS:</b> Six grey rectangular mats in a horizontal line.</li> <li><b>8) HOOPS:</b> A sequence of circles with numbers 1 and 2 above them, arranged in a path.</li> <li><b>9) BALL &amp; CONES:</b> A blue ball and two orange triangles.</li> <li><b>10) SWISS BALL:</b> A green ball.</li> </ul> <p>The course starts at 'START' and ends at 'END'.</p>		<ul style="list-style-type: none"> <li>• 3 x traffic cones</li> <li>• 7 safety mats</li> <li>• 1 x agility ladder</li> <li>• 5 x rubber rings</li> <li>• 20 x hoops</li> <li>• 1 x soccer ball</li> <li>• 1 x swiss ball</li> <li>• 1 x mini trampoline</li> <li>• 1 x blindfold</li> </ul>

	<p>1) Hoops are held at various heights and child climbs through without touching hoop with body</p> <p>2) Perform 10 jumps bouncing on 1 leg (dominant)</p> <p>3) Land with 2 feet together and balance on 1 leg (non-dominant) in the aeroplane position</p> <p>4) Walk on tippy toes on rope while balancing bean bag on head, turn back and throw bean bag in basket while standing on 1 leg (dominant)</p> <p>5) Hop through ladder with 2 feet in and then 1 on either side of the ladder (lesson 11)</p> <p>6) Walk over rubber rings with both feet stepping and meeting on each ring</p> <p>7) Forward rolls (8 step lesson 18)</p> <p>8) Jump through hoops using 1 foot where marked one and 2 feet where marked 2</p> <p>9) Stationary kick at 1 cone</p> <p>10) Sit on swiss ball, hands on sides of ball, balancing on dominant leg and other foot lifted off the ground, keep balance for 15 seconds</p> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Work in groups of 2, partners guide and assist each other to complete obstacle course blindfolded</li> <li>• Station (5): Hop with 2 feet together only when blindfolded</li> </ul>	<p>Dynamic</p> <p>Dynamic</p> <p>Static</p> <p>Dynamic/ static</p> <p>Dynamic</p> <p>Dynamic</p> <p>Dynamic</p> <p>Dynamic</p> <p>Dynamic</p> <p>Dynamic</p>	
<p><b>Cool down:</b> (10mins)</p> <p>3. Hovering hoop</p>	<p>Form one large circle with all children holding hands</p> <p>2 Children hold hands through the hoop and begin the game</p> <p>Children must move the hoop around the circle without letting go of the hands (thus, climb through)</p> <p><u>Progression:</u></p> <ul style="list-style-type: none"> <li>• Add more hoops with following rounds</li> </ul>	<p>Static</p>	<ul style="list-style-type: none"> <li>• 5 x hoops</li> </ul>
<p>4. Human knot</p>	<p>Divide into smaller groups of not more than 10 children</p> <p>Children stand in a circle formation, facing each other</p> <p>Everyone puts their hands into the circle and joins hands with 2 other members (never same person)</p> <p>Children have to untangle the 'knot' to create 1 big circle with everyone holding hands</p> <p>Children are not allowed to let go of each other's hands at any time</p>	<p>Static</p>	

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Cross crawl</p>	<p>Children move around marked area using cross crawl movement (right hand to left knee / left hand to right knee),</p> <p>Freeze when whistle blows and perform 1 of the following, as instructed</p> <ul style="list-style-type: none"> <li>• 1 whistle blow: jumping jacks</li> <li>• 2 whistle blows: same-side skiing</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked walking area</li> </ul>
<p><b>Core activities:</b> (20mins)</p> <p>2. Drum beats</p>	<p>Children sit spaced out on the floor, with strips of paper placed in front of them</p> <p>Perform the drum beats individually following the instructor</p> <p><u>HANDS:</u></p> <ul style="list-style-type: none"> <li>• <b>2 hands up and down tap:</b> Both hands are tapped on floor, on either side of the strip, at the same time</li> <li>• <b>Alternating up-down tap:</b> Hands are tapped alternatively on either side of strip (e.g. left up-right down)</li> <li>• <b>Criss-cross tap:</b> Hands cross from either side to tap opposite side and then back (cross-open-cross-open...)</li> <li>• <b>2 handed line cross tap:</b> Both hands start on 1 side of strip and tap together on opposite side and back (L-R-L-R...)</li> <li>• <b>Hand clap:</b> Hands start on either side of strip, both tap floor and then clap in air (tap-clap-tap-clap...)</li> </ul> <p><u>FEET:</u></p> <ul style="list-style-type: none"> <li>• <b>2 feet up and down tap:</b> Both feet are tapped on floor, on either side of the strip, at the same time</li> <li>• <b>Alternating up-down tap:</b> Feet are tapped alternatively on either side of strip (e.g. left up-right down)</li> <li>• <b>Criss-cross tap:</b> Feet cross from either side to tap opposite side and back (cross-open-cross-open...)</li> <li>• <b>2 feet line cross tap:</b> Both hands start on 1 side of strip and tap together on opposite side and back (L-R-L-</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• ±40 x strips of old newspaper (1/child)</li> </ul>

	<p>R...)</p> <ul style="list-style-type: none"> <li>• <b>Hand clap:</b> Hands start on either side of strip, both tap floor and then clap in air (tap-clap-tap-clap...)</li> </ul>		
<p><b>Cool down:</b> (5mins)</p> <p>3. Consecutive drum beats</p>	<p>Once children are able to perform each individual drum beat 10 times without extended pauses and mistakes, start performing them consecutively</p> <p>Perform 10 repetitions of each drum beat and start with the next beat straight away</p> <p>Do this for the hands and then for the feet</p>	Bilateral Coordination	<ul style="list-style-type: none"> <li>• ±40 x strips of old newspaper (1/child)</li> </ul>

ACTIVITY:	INSTRUCTIONS:	FOCUS:	EQUIPMENT:
<p><b>Warm-up:</b> (5mins)</p> <p>1. Cross crawl</p>	<p>Children move around marked area using cross crawl movement (right elbow to left knee/ left elbow to right knee),</p> <p>Freeze when whistle blows and perform 1 of the following, as instructed</p> <ul style="list-style-type: none"> <li>• 1 whistle blow: jumping jacks</li> <li>• 2 whistle blows: opposite-side skiing</li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• Whistle</li> <li>• 4 x traffic cones - marked walking area</li> </ul>
<p><b>Core activities:</b> (15mins)</p> <p>2. Drum beats</p>	<p>Children sit spaced out on the floor, with strips of paper placed in front of them</p> <p>Recap and perform the drum beats individually following the instructor</p> <p><u>HANDS:</u></p> <ul style="list-style-type: none"> <li>• <b>2 hands up and down tap:</b> Both hands are tapped on floor, on either side of the strip, at the same time</li> <li>• <b>Alternating up-down tap:</b> Hands are tapped alternatively on either side of strip (e.g. left up-right down)</li> <li>• <b>Criss-cross tap:</b> Hands cross from either side to tap opposite side and then back (cross-open-cross-open...)</li> <li>• <b>2 handed line cross tap:</b> Both hands start on 1 side of strip and tap together on opposite side and back (L-R-L-R...)</li> <li>• <b>Hand clap:</b> Hands start on either side of strip, both tap floor and then clap in air (tap-clap-tap-clap...)</li> </ul> <p><u>FEET:</u></p> <ul style="list-style-type: none"> <li>• <b>2 feet up and down tap:</b> Both feet are tapped on floor, on either side of the strip, at the same time</li> <li>• <b>Alternating up-down tap:</b> Feet are tapped alternatively on either side of strip (e.g. left up-right down)</li> <li>• <b>Criss-cross tap:</b> Feet cross from either side to tap opposite side and then back (cross-open-cross-open...)</li> <li>• <b>2 feet line cross tap:</b></li> </ul>	<p>Bilateral Coordination</p>	<ul style="list-style-type: none"> <li>• ±40 x strips of old newspaper (1/child)</li> </ul>

	<p>Both feet start on 1 side of strip and tap together on opposite side and back (L-R-L-R...)</p> <ul style="list-style-type: none"> <li>• <b>Feet clap:</b> Feet start on either side of strip, both tap floor and then clap in air (tap-clap-tap-clap...)</li> </ul>		
3. Consecutive beats	<p>Once children are able to perform each individual drum beat 5 times without extended pauses and mistakes, start performing them consecutively</p> <p>Perform 5 repetitions of each drum beat and start with the next beat straight away until all the beats are performed sequentially</p> <p>Do this 5 times consecutively for the hands and then for the feet</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Alternate the hands and feet with each drum beat</li> </ul>	Bilateral Coordination	<ul style="list-style-type: none"> <li>• ±40 x strips of old newspaper (1/child)</li> </ul>
<p><b>Cool down:</b> (10mins)</p> <p>4. Create-a-beat</p>	<p>Children are divided into groups of not more than 5 children</p> <p>Groups have 10 minutes to create their own drum beat, using at least 3 different beats</p> <p>Each group then has a chance to show their drum beat to the other groups</p> <p><i>Progression:</i></p> <ul style="list-style-type: none"> <li>• Increase the amount of beats that groups have to use</li> <li>• Instruct groups that they are not allowed to use more than 1 beat used during this lesson</li> </ul>	Bilateral Coordination	<ul style="list-style-type: none"> <li>• ±40 x strips of old newspaper (1/child)</li> </ul>



ACTIVITY:	DESCRIPTION:
<p><b>Freeze game:</b></p>	<ul style="list-style-type: none"> <li>• Children run around in a forward motion</li> <li>• The instructor blows the whistle whenever he/she wants the children to stop running</li> <li>• Once the whistle is blown, children immediately freeze, standing with both feet together</li> <li>• This position is held until the instructor blows the whistle again, and children reassume running until the next whistle blow</li> </ul> <p><u>Progression:</u></p> <ol style="list-style-type: none"> <li>1. The activity is performed as above except that children skip in a forward motion instead of running               <ul style="list-style-type: none"> <li>○ Once the whistle is blown, children immediately freeze, standing in a heel-to-toe stance</li> <li>○ This position is held until the instructor blows the whistle again, and children resume running until the next whistle blow                   <ul style="list-style-type: none"> <li>▪ <i>Heel-to-toe stance</i> = place heel of 1 foot directly in front of the toes of the other foot, the heel of the front foot should just barely be touching the toes of the back foot</li> </ul> </li> </ul> </li> </ol> <div data-bbox="801 715 1032 975" data-label="Image"> </div> <ol style="list-style-type: none"> <li>2. The activity is performed as above except that children run backwards instead of running or skipping               <ul style="list-style-type: none"> <li>○ Once the whistle is blown, children immediately freeze, standing on 1 leg (dominant)</li> <li>○ This position is held until the instructor blows the whistle again, and children resume running until the next whistle blow</li> </ul> </li> </ol> <div data-bbox="795 1129 1010 1358" data-label="Image"> </div>

**Rope walking with target shoot:**

- Children stand in the row formation
- Rope is laid out in a straight line on the floor for children to walk on
- Children walk forward along the rope with normal walking strides
- Both feet are placed on top of the rope, with heels and toes touching the rope with every step

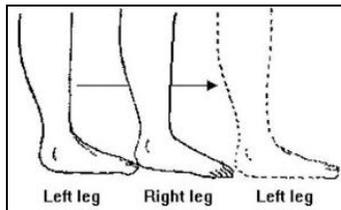


- Once the child has completed the walk across the rope he/she has to kick a soccer ball between 2 traffic cones (2m apart)



Progression:

1. Walking forward heel-to-toe
  - Place the heel of the right foot directly in front of the toes of the left foot, heel just barely touching the toes
  - Take a step forward, placing the left heel in front of the right toes this time
  - Continue taking steps in this fashion until the end of the rope is reached



- Kick a soccer ball between 2 traffic cones (2m apart)

2. Walking backwards with normal walking strides
  - Kick soccer ball between 2 traffic cones (1m apart)



3. Walking backwards heel-to-toe
  - Kick soccer ball between 2 traffic cone (1m apart)

**Ladder activity:**

- Children stand in the row formation
- Run forward through the ladder with 1 foot landing in each block



Progression:

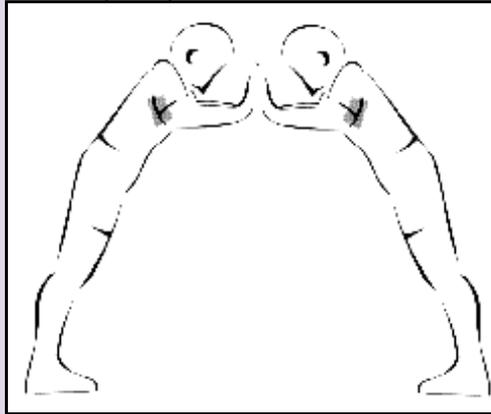
1. Jump forward through the ladder landing with 2 feet together in each block



2. Run backwards through the ladder with 1 foot landing in each block

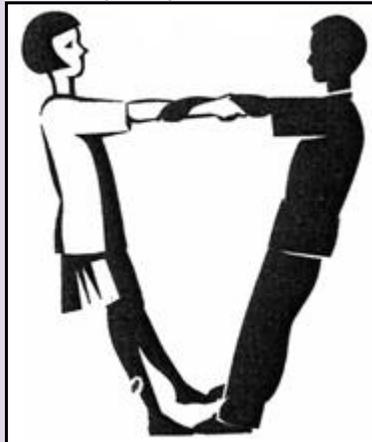
	<p>3. Jump backwards through the ladder with 2 feet landing together in each block</p>
<p><b>Target game:</b></p>	<ul style="list-style-type: none"> <li>• Children divide themselves into smaller groups of 3</li> <li>• The 3 partners stand heel-to-toe in a row formation with <math>\pm 2\text{m}</math> between each partner</li> <li>• The 2 outside partners face the partner that is standing in the middle (<math>x \rightarrow x \leftarrow x</math>)</li> <li>• The middle partner holds the hoop at shoulder height and outside partners take turns to throw bean bags through hoop (partners alternate positions)</li> </ul>  <p><i>Progression:</i></p> <ol style="list-style-type: none"> <li>1. Perform the activity as above but balance on the dominant leg instead of standing heel-to-toe</li> <li>2. Perform the activity as above but balance on the non-dominant leg instead</li> </ol>
<p><b>Partner balance:</b></p>	<ul style="list-style-type: none"> <li>• Children divide themselves into smaller groups of 2</li> <li>• The 2 partners perform the following balances standing with 2 feet together</li> <li>• Pairs must attempt to hold these positions for at least 30 seconds each:             <ol style="list-style-type: none"> <li>1. <b>Forward lean:</b> <ul style="list-style-type: none"> <li>○ Partners stand opposite and facing one another (<math>\pm 1\text{m}</math> apart)</li> <li>○ Partners place both their palms flat against each other (lock fingers if scared of slipping)</li> <li>○ Keeping the arms strong and the legs straight, partners slowly lean forward pushing their hands together to support their own body weight</li> </ul> </li> </ol> </li> </ul>

- To release this position push the bodies away from each other using the arms and hands or take a step forward to take the weight of the body away from the hands and release the hand grip



## 2. Backwards lean

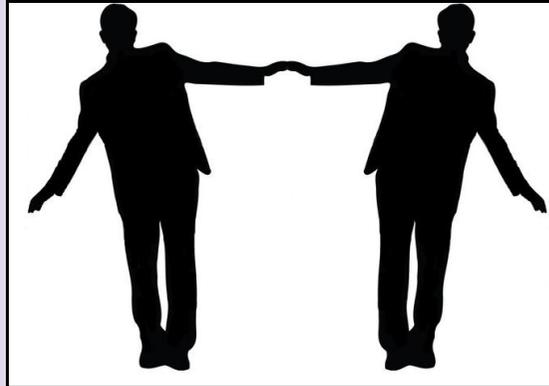
- Partners stand opposite and facing one another and the feet placed as close together as possible
- Partners hold each other's hands or onto each other's arms
- Keeping the arms strong and the legs straight, partners slowly lean backwards until the arms are completely straight
- To release this position pull the bodies towards each other using the arms and hands or take a step backwards to take the weight of the body away from the arms and hands and then release the hands grip



## 3. Sideways lean

- Partners stand next to each other, facing the same direction and arms stretched out to the side ( $\pm 1$ m apart)

- Partners hold each other's hands or onto each other's arms
- Keeping the arms strong and the legs straight, partners slowly lean sideways and away from each other until the arms are completely straight
- To release this position pull the bodies towards each other using the arms and hands or take a step outwards to the side with the outside legs to take the weight of the body away from the arms and hands and then release the hands grip



Progression:

1. Perform the above balancing position by standing only on the dominant leg

ACTIVITY:	INSTRUCTIONS:
<p><b>Jacks:</b></p>	<ul style="list-style-type: none"> <li>• Children stand in circle formation 2</li> <li>• Everyone walks in the same direction, either left or right, according to the instructor</li> <li>• Children immediately stop walking when the whistle blows</li> <li>• Children perform only the leg movements of a jumping jack (open-close-open-close)</li> <li>• Arms hang at the sides or are placed on the hips</li> <li>• Children perform the jumping jack leg movements until the whistle is blown again and walking is resumed</li> </ul> <div data-bbox="797 600 1368 820" data-label="Image"> </div> <p><i>Progression:</i></p> <ol style="list-style-type: none"> <li>1. Perform complete jumping jacks when the whistle blows:             <ul style="list-style-type: none"> <li>○ The legs jump open-close-open-close and the arms clap above the head and then down at the sides</li> <li>○ (Legs open with top clap, legs close with side clap, etc.)</li> </ul> </li> </ol> <div data-bbox="797 967 1379 1362" data-label="Image"> </div>

**Basket push & pull:**

- Children stand in the row formation and perform the following:
  1. Children **push** the **basket** forward, by holding onto the handle with both hands
    - The basket is pushed towards the opposite group and passed to the next person in line



2. Children **pull** the **basket** towards themselves by pulling the rope with alternating the hands grips
  - Once the basket has reached the child, he/she runs to opposite side and passes rope to next person in line



**Partner push & pull:**

- Children stand in the row formation
- Children assign themselves to partners and alternate between lying down (being rolled) or performing the partner push/pull (logrolling)

1. **Partner push** (forward logroll):

- 1 partner lies down on the floor in an outstretched position, with the arms above the head and the legs straight at all times
- The standing partner uses both hands (alternating) to push (roll in a forward motion) the partner lying down, along the floor so that he/she is performing log rolls
- When reaching the opposite side the partners join the end of the line and allow those next in line to have a turn, thus when reaching the front of the line again partners will have another chance to perform the activity in the opposite roles

2. **Pull partner** (backwards logroll):

- 1 partner lies down on the floor in an outstretched position, with the arms above the head and the legs straight at all times
- The standing partner uses both hands (alternating) to pull (roll in a backwards motion) the partner lying down, along the floor so that he/she is performing log rolls
- When reaching the opposite side the partners join the end of the line and allow those next in line to have a turn, thus when reaching the front of the line again partners will have another chance to perform the activity in the opposite roles



**Ball relays:**

- Children stand in the row formation
- The ball is always held with both hands and passed in a backwards direction from one end of the line to the opposite end
- Once the ball reaches the back of the line it is passed back in a similar fashion to the front of the line
- The ball is passed in the following manners:
  - **Over:** The ball is passed over the head to next person in line



- **Under:** The ball is passed through legs to next person in line



- **Left:** The ball is passed to the left side of the body to the next person in line (right arm crosses the body)
- **Right:** The ball is passed to the right side of the body to the next person in line (left arm crosses the body)



*Progression:*

1. **Over and under:** The ball is alternatively passed over the head or through legs to the next person in line
2. **Left and right:** The ball is alternatively passed to left- or right side of the body to the next person in line
3. Use a smaller ball and/or add more balls

**Snow angels:**

- Children are spread out across the area and are lying down flat on their backs
- The arms are placed straight and relaxed at the sides and the legs are straight, relaxed and together (a)
- Each child must have enough space to move the arms and legs freely on the floor (not part of the body is to be lifted from the floor)
- The children move the following in a waving manner on the floor according to the instructions given:
  - Left arm
  - Right arm (b)
  - Left leg
  - Right leg (c)

Progression:

1. Both arms
2. Both legs (d)
3. Arms and legs together
4. Left arm and left leg
5. Right arm and right leg (e)
6. Left arm and right leg
7. Right arm and left leg (f)



(a)



(b)



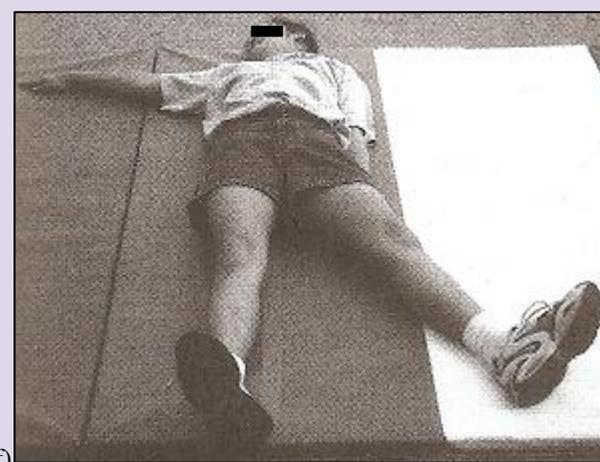
(c)



(d)



(e)



(f)

Source: Adapted from Cheatum & Hammond (2000:197)

ACTIVITY:	INTRUCTIONS:
<p><b>Partner hop:</b></p>	<ul style="list-style-type: none"> <li>• Children divide themselves into smaller groups of 2</li> <li>• Partners stand on 1 leg, facing one another and holding onto each other by the shoulders</li> <li>• Partners alternate turns to be in charge of leading the jumping direction</li> <li>• The leading partner is responsible for changing the direction of hopping according to the given instruction when the whistle blows</li> <li>• The 2 partners perform the following hops on their dominant leg               <ol style="list-style-type: none"> <li>1. Forward hop</li> <li>2. Backwards hop</li> </ol> </li> </ul> <div data-bbox="795 598 1335 1177" data-label="Image"> </div> <p><u>Progression:</u></p> <ol style="list-style-type: none"> <li>1. Left hop (sideways hop to the leading partners left sides)</li> <li>2. Right hop (sideways hop to the leading partners left sides)</li> <li>3. Left hop</li> <li>4. Right hop</li> </ol>

**Tippy toes walk:**

- Children stand in the row formation
- Each child gets a turn to walk from one cone to opposite side on his/her tippy toes
- The walk must be slow and controlled and the heels should not touch the floor
- Children perform a slow and controlled tippy toes walk in the following directions, from one cone to the next:
  - Forward
  - Backwards

*Progression:*

1. Left (sideways walk to the with the left side facing the direction the child is walking in)
2. Right (sideways walk to the with the right side facing the direction the child is walking in)
3. Perform a tippy toes walk on a rope in the above directions

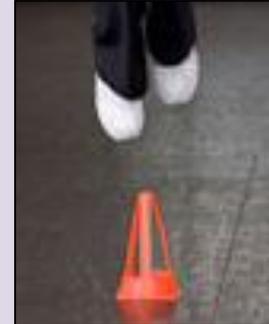
**Roped cones:**

- Children stand in the row formation
- Rope is placed in a straight line on the floor between the 2 traffic cones
- 10 flat cones are spaced out along the top of the rope as obstacles that the children now have to step over
- Each child gets a turn to walk on the rope and step over each of the flat cones
  1. Forward
  2. Backwards
  3. Left
  4. Right

*Progression:*

1. Replace flat cones with taller traffic cones

2. Perform a 2-feet hop over the cones, landing with both feet on the rope



**Cone dribble & shoot (soccer):**

- Children stand in the row formation
- 10 cones are placed in a straight line between two groups, with  $\pm 50\text{cm}$  between each cone,
- 2 cones are placed in front of each group to serve as a shooting target
- Each child gets a turn to dribble a soccer ball through the cones and then shoots the ball between 2 cones (the next person in line receives the ball once it passes through the target cones)
  1. Left foot only
  2. Right foot only

Progression:

1. Using the both feet alternatively
2. Perform using the dribble hop (1 foot remains on top of the ball, controlling and rolling it forward, other leg hops next to the ball)

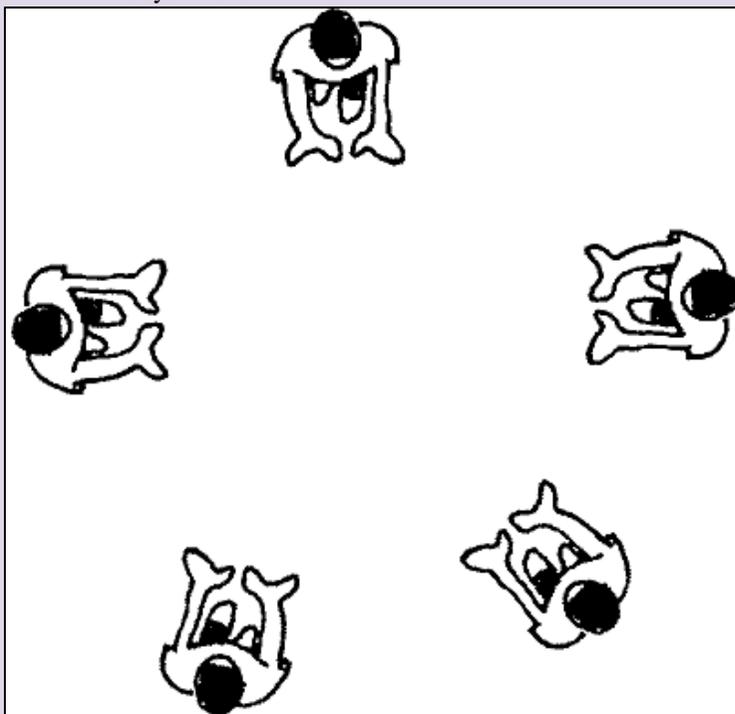


**Pass around:**

- Children divide themselves into smaller groups (not more than 10 children) and stand in circle formation 1
- The ball is passed around using both hands together (to the left/right)
- When whistle blows, children stop passing ball around and balance according to the given instruction (eyes open)
  1. Heel-to-toe stance
  2. Left leg
  3. Right leg

Progression:

1. Perform the balances with the eyes closed



ACTIVITY:	INSTRUCTIONS:
<p><b>Skiing:</b></p>	<ul style="list-style-type: none"> <li>• Jog in a large circle formation 2 (left/right)</li> <li>• Children stop jogging when the whistle blows and perform only the leg movements of the ski (alternate jumping with one leg to the front and the other to the back)</li> </ul> <p><u>Progression:</u></p> <ol style="list-style-type: none"> <li>1. Progress to performing the arm and leg movements of the ski (alternate same arm and leg to the front and the other to the back)</li> </ol> <div data-bbox="797 544 1877 1061" data-label="Image"> </div> <p>Source: Adapted from BOT-2 Administration easel (Bruininks &amp; Bruininks, 2005:45)</p>
<p><b>Line passing drills:</b></p>	<ul style="list-style-type: none"> <li>• Children stand in the row formation</li> <li>• Children must be arms-distance apart in 2 rows opposite and facing each other (rows are ±2m apart)</li> <li>• A ball is passed/thrown back and forth, using both hands, between the 2 rows from one end of the line to the opposite end and then back to the start (zig-zag pattern)</li> </ul> <p><u>Progression:</u></p> <ol style="list-style-type: none"> <li>1. Throw with one hand, but catch with both hands</li> </ol>



2. Bounce ball to opposite child instead of throwing it
3. Use smaller ball and/or add more balls
4. Throw smaller ball and bounce bigger ball

**Midline crossing:**

- Children stand in the row formation
- Mats are laid out in a long row between 2 cones
- Ropes are placed a line along the middle on top of the mats
- Children perform the following activities to the opposite cone and join the back of the line
  1. **Hands:** Crawl with rope between knees, alternately crossing hands from one side of the rope to the next

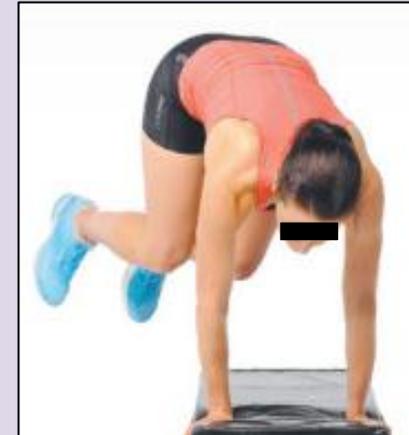


2. **Feet:** Walk alternately crossing feet over from one side of the rope to the opposite side, hands on hips and not looking at feet



Progression:

1. **Bunny hop:** start on haunches on 1 side of the rope, place hands together diagonally on the opposite side of rope, then jump forward over towards hands landing on both feet



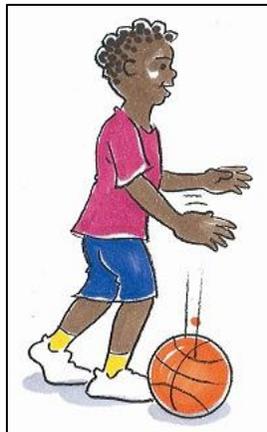
2. **Criss-cross jump:** standing with 1 foot on either side of rope, jump forward crossing feet to opposite sides (dominant foot in front), jump forward opening feet up again (alternating crossing and opening)



- a. Jump with non-dominant leg crossing in front
- b. Jump with alternating feet in from (left-right-left-right)

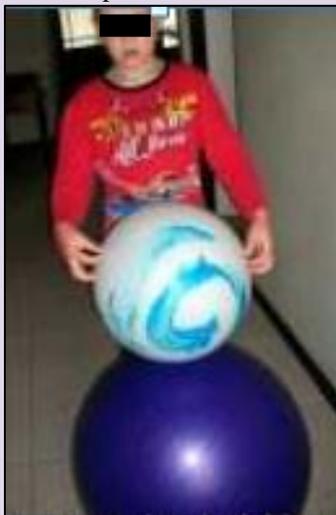
**Dribbling  
(basketball):**

- Children stand in the row formation
- Children walk from one cone to the opposite side whilst dribbling the ball in the following manners:
  1. 2 hands together
  2. Left hand
  3. Right hand
  4. Alternating hands



**Double-ball walk:**

- Children stand in the row formation
- Place a smaller ball on top of a large swiss ball
- Roll the smaller ball in a backwards (towards the body) using only the fingers and walk forwards to the opposite cone
- The 2 balls must always remain in contact and only the fingers are allowed to be contact with the small ball
- Balls are given to the next person in line and the child then joins the back of the opposite group



Source: Adapted from Le Roux (2011:16)

Progression:

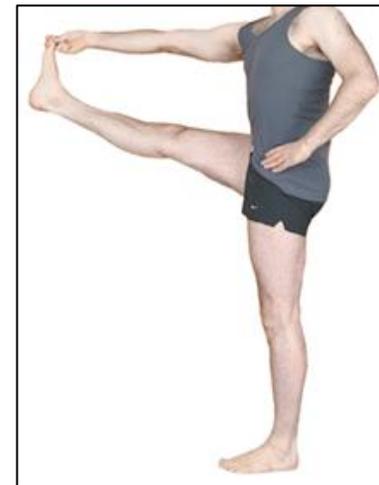
1. Roll the smaller ball forwards (away from the body) and perform activity walking backwards

ACTIVITY:	INSTRUCTIONS:
<p><b>Hop around:</b></p>	<ul style="list-style-type: none"> <li>• A hopping area is marked out with cones</li> <li>• Children are spaced out in the marked area and hop with 2 feet together</li> <li>• Children hop in the following directions, when the whistle is blown                             <ol style="list-style-type: none"> <li>1. Forward</li> <li>2. Backwards</li> <li>3. Left</li> <li>4. Right</li> </ol> </li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p><i>Progression:</i></p> <ol style="list-style-type: none"> <li>1. Perform this activity in the same directions by hopping only on the left- and then on the right leg</li> </ol>
<p><b>Connecting self:</b></p>	<ul style="list-style-type: none"> <li>• Children are spaced far enough apart from one another</li> <li>• Children are given instructions to touch the following body parts together:</li> <li>• (Hold each position for 10-15 seconds)</li> </ul>

1. Elbow to knee



2. Hand to foot



3. Foot to foot



4. Head to hand

5. Knee to ankle



6. Foot 2 head

Progression:

1. Perform all the above balance positions with the eyes closed

**Connecting pairs:**

- Children work in groups of 2
- Children are spaced far enough apart from one another and touch the following instructed body parts together:
- (Hold each position for 10-15 seconds)
  1. 2 feet



2. 2 hands, 1 foot and 1 knee
3. 1 shoulder and 1 head
4. 1 elbow and 1 hip
5. 1 ankle and 1 knee
6. Knee to knee

Progression:

1. Perform all the above balance positions with the eyes closed

**Body part balance:**

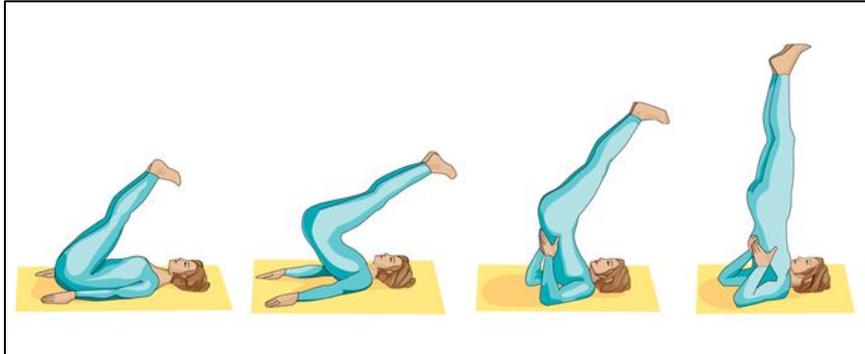
- Children are spaced far enough from one another and balance using only the instructed body parts (hold each position for 10-15 seconds)
  - 10 toes



- 1 foot and 1 knee



- 2 shoulders and 2 elbows



- Bum and 2 hands



- 2 feet, 2 hands and 1 head



- 2 feet and 2 elbows



Progression:

1. Repeat the above balances with the eyes closed

**Group balance:**

- Children divide themselves into smaller groups of not more than 10
- Standing in circle formation, children place their arms around each other's shoulders
- Children stand in the heel-to-toe stance for 10-15 seconds and then close their eyes, on instruction, for another 10-15 seconds
  1. Heel-to-toe stance left leg in front
  2. Heel-to-toe stance right leg in front

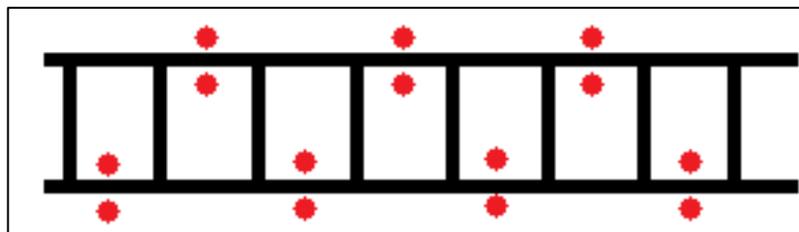
Progression:

1. Children balance on 1 leg for 10-15 seconds and then close their eyes, on instruction, for another 10-15 seconds
  - Left leg
  - Right leg

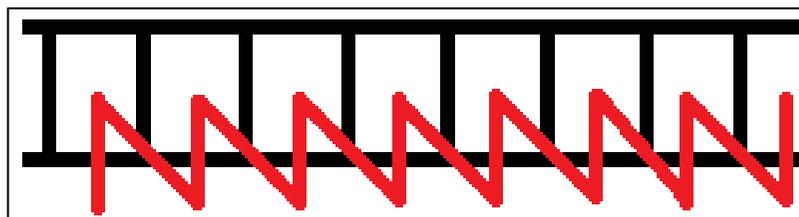
ACTIVITY:	INSTRUCTIONS:
<p><b>Skiing:</b></p>	<ul style="list-style-type: none"> <li>• Jog in a large circle formation (left/right)</li> <li>• Stop when whistle blows and perform same side skiing movements (arm and leg on same sides move together in same direction)</li> </ul> <div data-bbox="792 437 1509 778" data-label="Image"> </div> <p>Source: Adapted from BOT-2 Administration easel (Bruininks &amp; Bruininks, 2005:45)</p> <p><u>Progression:</u></p> <ol style="list-style-type: none"> <li>1. Perform opposite side skiing movements (arm and leg on opposite sides of the body move together in the same direction)</li> </ol> <div data-bbox="792 922 1480 1315" data-label="Image"> </div> <p>Source: Adapted from BOT-2 Administration easel (Bruininks &amp; Bruininks, 2005:47)</p>

**Ladder drills:**

- Children stand in the row formation and perform the following ladder drills:
  1. Jump with 2 feet together, straddling the outsides of the ladder

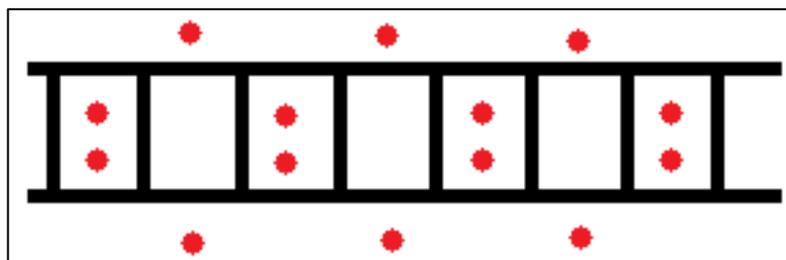


2. Jump with 2 feet together, inside the ladder and back out (zig-zag pattern)

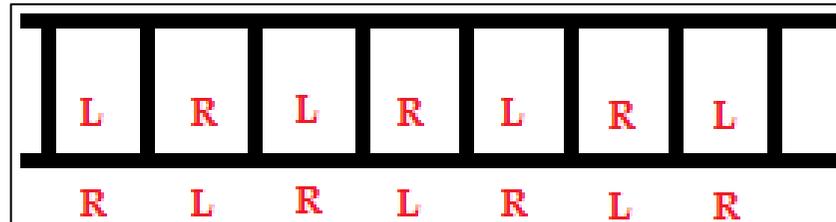


Progression:

1. Jump with 2 feet inside the ladder, and the outside straddling the ladder



2. Jump with 1 foot inside and other outside the ladder, alternate feet with every block



### Hoop push:

- Children stand in the row formation
- Child places both hands flat on hoop with outside borders of hands facing away from body
- Not allowed to grip the hoop with fingers
- Alternate hands in the direction you are moving to roll the hoop
- 1 hand must be on the hoop at all times
  1. Forward
  2. Backwards



### Progression:

1. Left
2. Right

### Hoop skip:

- Children stand in the row formation
- Child holds the hoop in front of the body and jumps through leading with the dominant leg
- Child lifts the non-dominant leg at the back as hoop passes to the back and over top of the body
- Bring hoop over the head and back to front of the body to perform next skip



### Progression:

1. Perform with non-dominant leg
2. Perform backwards
3. Jump with 2 feet together



**Travelling hoop:**

- Children stand behind each other in a line person in front starts with hoop
- Hoop is moved backwards going down over one child's head and then from the feet upwards over the next
- Must keep two hands on the hoop at all times
- Bring hoop forward again in the same manner

Progression:

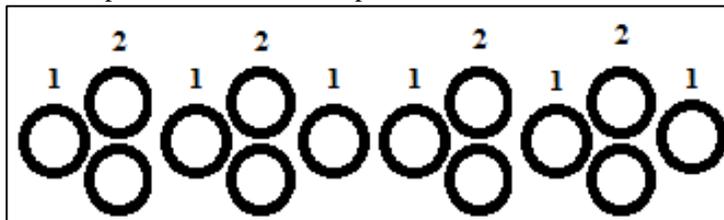
1. Add a fun competition between groups and instruct the child at the back of line to run forward to the front and start the activity again
2. Add more hoops



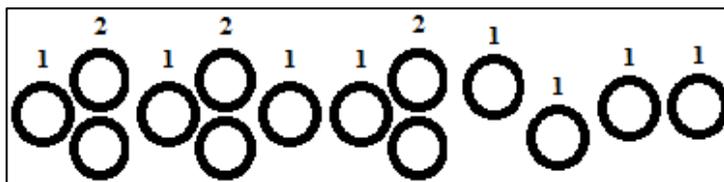
ACTIVITY:	INSTRUCTIONS:
<p><b>Bean bag balance:</b></p>	<ul style="list-style-type: none"> <li>• The walking area is marked off with cones</li> <li>• Children are spaced out in the marked area and walk around balancing a bean bag on their heads</li> <li>• Children have to freeze like a statue when the whistle is blown</li> <li>• Children must try not to bump into other each other when moving around</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p><i>Progression:</i></p> <ol style="list-style-type: none"> <li>1. Freeze and balance in a heel-to-toe stance</li> <li>2. Decrease the size of the moving area to increase difficulty of moving around</li> <li>3. Alternate the directions of movement:             <ul style="list-style-type: none"> <li>○ Forward</li> <li>○ Backwards</li> <li>○ Left</li> <li>○ Right</li> </ul> </li> <li>4. Freeze on 1 leg</li> <li>5. Limit the children to dropping the bean bag twice before being eliminated from the game             <ul style="list-style-type: none"> <li>○ Eliminated children stand around the marked area their balancing bean bag on their heads until the end of the game</li> </ul> </li> </ol>

### Hop scotch:

- Children stand in the row formation
- Children complete the hop scotch pattern 1 at a time and fall in at the back of the opposite group
  1. Hop with 2 feet for the first round (2 feet in the hoops marked 1 and 1 foot in each hoop where marked 2)
  2. Hop with 1 foot in the hoops marked 1 and with 1 foot in each hoop that is marked 2



#### Progression:



1. Throw a bean bag in a specific hoop and instruct the children that this hoop may not be jump in
2. Hop with the non-dominant leg in all the hoops that are marked 1

### Crossing the river:

- Sponge blocks are spaced out in a line along the floor (river rocks)
- Children have to walk over the rocks, 1 at a time, without falling into the river
  1. Step with 1 foot and bring other foot onto the rock before stepping onto the next rock
  2. Only step with 1 foot on each rock (2 feet are never allowed on the same rock)
  3. Leap from rock to rock (2 feet don't have to land together)

#### Progression:

1. Rocks are arranged so that they do not form a straight line any longer (slightly zig-zag)
2. Space selected rocks further apart so that children have to perform a slight hop onto those rocks
3. Jump with 2 feet from rock to rock
4. A child from each side of the river performs the activity at the same time and will have to pass each other in the middle (Children are allowed to hold onto each other when crossing in the middle)
  - Progress further by not allowing children to touch each other when crossing in the middle

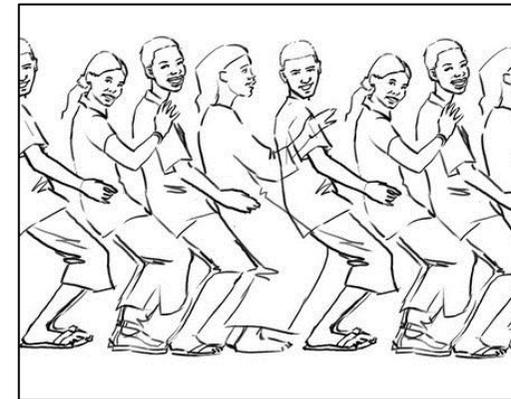


**Group sit:**

- Children work in smaller groups of not more than 10
- Stand behind and relatively close to each other in a straight line
- All children in the group have to sit slowly and at the same time
- Children sit backwards onto the knees of the child behind them (except person at back of row)
- Helps if someone in the group counts to ensure that every one sits and stands-up together

Progression:

- Increase the group sizes
- Perform the same activity in a circle formation



**Team stand-up:**

- Children work in smaller groups of not more than 10
- Sitting in the circle formation, facing inwards, children link arms together to form a chain
- It would be helpful if a designated person in the group counts to ensure that every one sits and stands-up together and doesn't fall
  1. Everyone now stands up at same time without using arms and without breaking chain
  2. Stand-up and sit down according to the given instructions

Progression:

1. Increase the group sizes



ACTIVITY:	INSTRUCTIONS:
<p><b>Jacks &amp; skis:</b></p>	<ul style="list-style-type: none"> <li>• Children jog in circle formation 2 (left/right)</li> <li>• Children stop when the whistle is blown and perform jumping jacks or same side skis, depending on instruction</li> </ul> <div data-bbox="598 437 1137 820"> </div> <div data-bbox="1196 437 2002 820"> </div> <p><i>Progression:</i></p> <ol style="list-style-type: none"> <li>1. Children perform jumping jacks or opposite side skis, depending on instruction</li> </ol> <div data-bbox="790 919 1552 1353"> </div>

**Rolling snow balls:**

- Children stand in the row formation
- Each child get a chance to roll the swiss ball forward through the cones from one end to the opposite side in the following manner:
  1. Left hand only
  2. Right hand only
  3. Both hands together
  4. Alternating hands



**Rope skip:**

- Children stand in the row formation
- The child holds rope behind the body, swings the rope forward over the body and jumps through leading with the dominant leg
- Child lifts the non-dominant leg at the back as rope passes to the back and over the top of the body
- Child brings the rope over the head and back to front of the body to perform next skip



*Progression:*

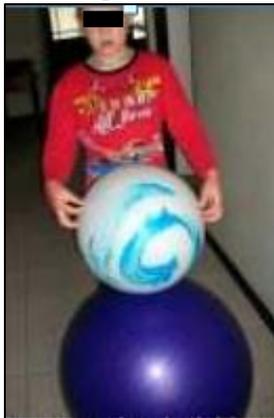
1. Perform leading with the non-dominant leg
2. Perform backwards

3. Repeat all the above steps jumping and landing with 2 feet together



**Double-ball walk maze:**

- Children stand in the row formation
- Place a smaller ball on top of a large swiss ball
- Roll the smaller ball in a backwards (towards the body) using only the fingers and walk forwards to the opposite cone
- The 2 balls must always remain in contact and only the fingers are allowed to be contact with the small ball
- Balls are given to the next person in line and the child then joins the back of the opposite group



Source: Adapted from Le Roux (2011:16)

Progression:

1. Roll the smaller ball forwards (away from the body) and perform activity walking backwards

ACTIVITY:	INTRUCTIONS:
<p><b>Skip around:</b></p>	<ul style="list-style-type: none"> <li>• A skipping area is marked out with cones</li> <li>• Children skip around in marked area and freeze when whistle blows</li> </ul>  <ul style="list-style-type: none"> <li>• Balance on the dominant leg, and lift the non-dominant leg and place opposite arm under the lifted leg and pinch the nose</li> </ul> <p><u>Progression:</u></p> <ol style="list-style-type: none"> <li>1. Balance on non-dominant leg and pinch nose under dominant leg</li> <li>2. Perform a buddha balance on dominant leg, lift non-dominant leg, bent at the knee and place ankle on knee of the dominant leg (that is also slightly bent) arms are held out to the sides</li> </ol>  

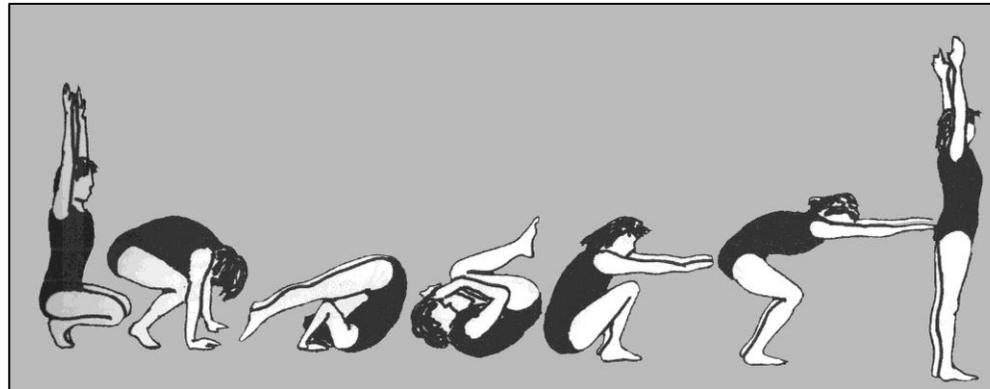
**Roly poly:**

- Children stand in the row formation
- Mats are packed out in a long line so that children can perform consecutive rolls
  1. **Log roll** (the arms and legs are straight and stretched out, rolling over the left/right sides of the body)
  2. **Egg roll** (child pulls the knees to the chest and holds them with the arms, rolling over the legs and back)



Progression:

1. Perform these activities with the eyes closed and try to roll in a straight line
2. **Forward roll** (8 steps):
  - stand up straight, arms up in the air (next to ears)
  - bring arms down to shoulder level in front of the body
  - squat with arms out in front
  - places hands on mat
  - buttocks in the air, chin to chest
  - kick & roll
  - squat with arms out in front
  - stand up



**Advanced bean bag balance:**

- Children stand in the row formation
- Children perform the following activities while balancing a bean bag on the head
  1. Walk through 10 cones
  2. Walk on a rope



Progression:

1. Slowly dribble a ball through cones
2. Walk on a rope with a bean bag on each shoulder (as well as 1 on head)

**Crab soccer:**

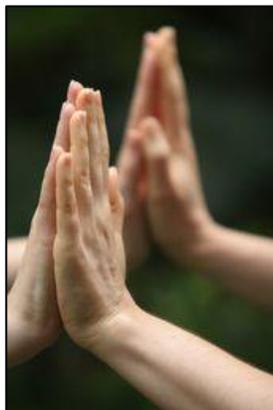
- Children are divided into smaller teams (not more than 10 children per team)
- All children assume crab walk position with the hands and feet flat on the floor and the bum lifted to form a table top
- The instructor tosses the ball up in the middle of the 2 teams to start the game
- Children try to kick the ball without losing the crab walk position and score between 2 cones



ACTIVITY:	INSTRUCTIONS:
<p><b>Cross crawl:</b></p>	<ul style="list-style-type: none"> <li>• Cross crawl area is marked out with cones and children are spaced far enough apart</li> <li>• While walking forward lift 1 leg and tap hand/elbow on knee</li> <li>• Right hand to right knee / left hand to left knee</li> <li>• Right elbow to right knee / left elbow to left knee</li> </ul> <p><u>Progression:</u></p> <ol style="list-style-type: none"> <li>1. Right hand to left knee / left hand to right knee</li> <li>2. Right elbow to left knee / left elbow to right knee</li> <li>3. Perform all of the above in a backwards direction</li> </ol> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>

**Mirror hands & feet:**

- Children divide themselves into smaller groups of 2, children sit facing each other
- Partners place both their hands/feet flat against each other's
- 1 Child takes the lead in direction of movements



- Children make circular motions as if cycling with hands/feet (both hands or feet move in same direction and at the same time)
  1. Forward
  2. Backward
  3. Left
  4. Right

**Newspaper fun:**

- Each child received 1 page from an old newspaper, this page is halved
- 1 hand is place on each ½ newspaper page and both hands move together in the instructed direction:
  1. Up and down
  2. Side to side (left and right)
  3. Circles left
  4. Circles right

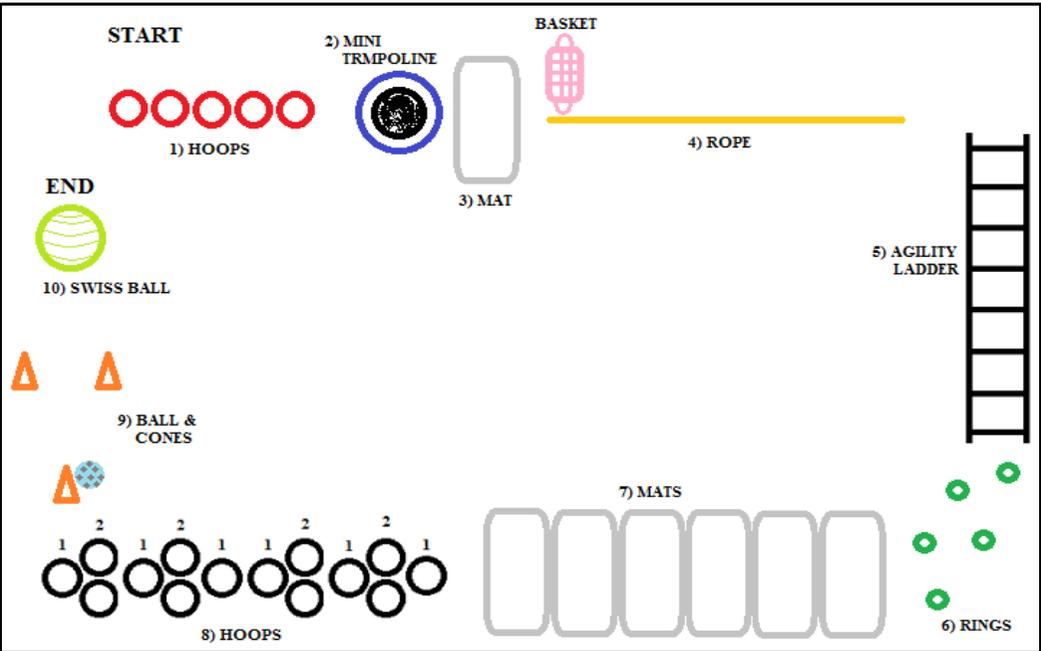
Progression:

1. Alternating up and down
2. Criss-cross (left above right, open, right above left etc.)
3. Circles outward
4. Circles inward

**Crumple dribble:**

- Each child received 1 page from an old newspaper, this page is halved
- 1 hand is placed on each newspaper page, individually crumple both pieces at the same time
- Squeeze newspaper as hard as possible to make it turn into 2 small balls
- Children now get into the row formation
- Dribble the newspaper balls through the cones, pick it up and throw in basket



ACTIVITY:	INSTRUCTIONS:
<p><b>Extreme balance:</b></p>	<ul style="list-style-type: none"> <li>• Use cones to mark out the moving area</li> <li>• Children skip around in the marked area and freeze when the whistle is blown</li> <li>• The following balances are performed according to the given instruction:               <ol style="list-style-type: none"> <li>1. Heel-to-toe stance</li> <li>2. 1 leg stationary hop</li> <li>3. 1 leg balance</li> <li>4. Pinch nose under leg</li> <li>5. Buddha sit</li> </ol> </li> </ul> <p><u>Progression:</u></p> <ol style="list-style-type: none"> <li>1. Balance on the non-dominant leg</li> </ol>
<p><b>Obstacle course:</b></p>	

- All children stand in 1 long line and await their turn to enter the obstacle course to complete the following:
  1. Hoops are held at hip height (assign assistants) and the child climbs through without touching the hoop with the body



2. Perform 10 jumps with a heel-to-toe foot placement



3. Land with 2 feet together and then perform a balance on 1 leg (dominant) in the aeroplane position



4. Walk heel-to-toe on a rope while balancing a bean bag on the head, turn back and throw the bean bag in the basket while standing heel-to-toe

5. Run through the ladder with high knees (tapping the hands on the knees at hip-height)



6. Walk over the rubber rings with only 1 foot stepping on each ring



7. Perform log rolls along the mats
8. Jump through the hoops using 2 feet with every hop
9. Perform a stationary kick between 2 cones
10. Sit on the swiss ball, with the hands on placed on the hips, feet together on the floor and bouncing up and down for 15 seconds

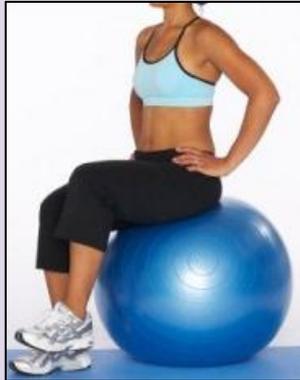


- Progression: Work in groups of 2: partners guide and assist each other to complete the obstacle course blindfolded

Progression:

1. Hoops are held at various heights as the child climbs through without touching any hoop with the body

2. Child performs 10 jumps on the trampoline, bouncing on 1 leg (dominant)
3. Jump off the trampoline and land with 2 feet together and balance on 1 leg (non-dominant) in the aeroplane position
4. Walk on the tippy toes on a rope while balancing a bean bag on the head, turn back and throw the bean bag in the basket while standing on 1 leg (dominant)
5. Child hops through the ladder with 2 feet inside and then 1 on either side of the ladder (lesson 11)
6. Walk over the rubber rings with both feet stepping and meeting on top each ring
7. Perform forward rolls along the mats (8 step lesson18)
8. Jump through the hoops using 1 foot where marked 1 and 2 feet where marked 2
9. Perform a stationary kick at 1 cone
10. Sit on a swiss ball, place the hands on the sides of the ball, balancing on the dominant leg and the other foot lifted off the ground, keep balance for 15 seconds



- Progression: Work in groups of 2, partners guide and assist each other to complete obstacle course blindfolded
- Progression: Station (5) - Hop with 2 feet together only when blindfolded

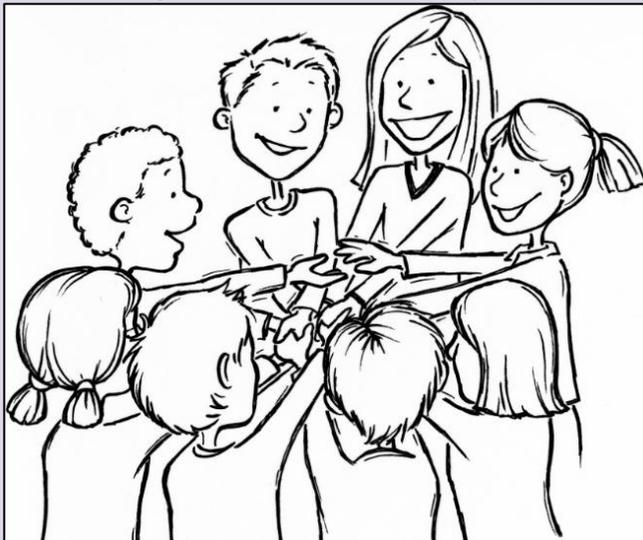
**Hovering hoop:**

- Children stand in circle formation 3, with every one holding hands
  - 2 Children hold hands through the hoop and begin the game
  - Children must move the hoop around the circle without letting go of the hands (thus, climb through)
- Progression:
1. Add more hoops with succeeding rounds



**Human knot:**

- Children divide themselves into smaller groups of not more than 10 children
- Children stand in circle formation 1, facing each other
- Everyone in the group puts their hands into the circle and joins hands with 2 other members (never 2 hands of the same person)
- Children have to untangle the 'knot' to create 1 big circle with everyone holding hands
- Children are not allowed to let go of each other's hands at any time



ACTIVITY:	INSTRUCTIONS:
<p><b>Cross crawl:</b></p>	<ul style="list-style-type: none"> <li>• Cross crawl area is marked out with cones</li> <li>• Children move around the marked area using cross crawl technique (right hand to left knee / left hand to right knee),</li> <li>• Children freeze when the whistle is blown and the perform 1 of the following, as instructed:               <ol style="list-style-type: none"> <li>1. 1 whistle blow = jumping jacks</li> <li>2. 2 whistle blows = same-side skiing</li> </ol> </li> </ul>
<p><b>Drum beats:</b></p>	<ul style="list-style-type: none"> <li>• Each child is given 2 strips of paper ± 20 cm long</li> <li>• Children sit spaced out on the floor, with their strips of paper placed in front of them</li> <li>• Children perform the drum beats individually following the instructor:</li> </ul> <p><u>HANDS:</u></p> <ol style="list-style-type: none"> <li>1. <b>2 hands up and down tap:</b> Both hands are tapped on the floor, on either side of the strip, at the same time</li> <li>2. <b>Alternating up-down tap:</b> Hands are tapped alternatively on either side of the strip (e.g. left up-right down)</li> <li>3. <b>Criss-cross tap:</b> Hands cross from either side to tap on the opposite side of the strip and then back (cross-open-cross-open...)</li> <li>4. <b>2 handed line cross tap:</b> Both hands start on 1 side of the strip and tap together on the opposite side and back again (L-R-L-R...)</li> <li>5. <b>Hand clap:</b> Hands start on either side of the strip, both tap on the floor and then clap in the air above the strip (tap-clap-tap-clap...)</li> </ol> <p><u>FEET:</u></p> <ol style="list-style-type: none"> <li>1. <b>2 feet up and down tap:</b> Both feet are tapped on the floor, on either side of the strip, at the same time</li> <li>2. <b>Alternating up-down tap:</b> Feet are tapped alternatively on either side of the strip (e.g. left up-right down)</li> <li>3. <b>Criss-cross tap:</b> Feet cross from either side to tap on the opposite side and then back again (cross-open-cross-open...)</li> <li>4. <b>2 feet line cross tap:</b> Both feet start on 1 side of the strip and tap together on the opposite side and back (L-R-L-R...)</li> </ol>

	<p>5. <b>Foot clap:</b>          Feet start on either side of the strip, both tap on the floor and then clap in air above the strip (tap-clap-tap-clap...)</p> 
<p><b>Consecutive drum beats:</b></p>	<ul style="list-style-type: none"> <li>• Once children are able to perform each individual drum beat 10 times without any extended pauses and mistakes, they can start performing them consecutively</li> <li>• Perform 10 repetitions of each drum beat and follow with the next beat straight away</li> <li>• Follow this procedure for the hands and then for the feet</li> </ul> <p><i>Progression:</i></p> <ol style="list-style-type: none"> <li>1. Once children are able to perform each individual drum beat 5 times without extended pauses and mistakes, start performing them consecutively</li> <li>2. Perform 5 repetitions of each drum beat and start with the next beat straight away until all the beats are performed sequentially</li> <li>3. Do this 5 times consecutively for the hands and then for the feet</li> <li>4. Further progress this activity by alternating the hands and feet with each drum beat</li> </ol>
<p>5. Create-a-beat</p>	<ul style="list-style-type: none"> <li>• Children are divided into smaller groups of not more than 5 children</li> <li>• Groups sit in circle formation 1</li> <li>• Groups have 10 minutes to create their own drum beat, using at least 3 different beats</li> <li>• Each group then has a chance to perform their drum beat to the rest of the groups</li> </ul> <p><i>Progression:</i></p> <ol style="list-style-type: none"> <li>1. Increase the amount of beats that groups have to use</li> <li>2. Instruct groups that they are not allowed to use more than 1 beat the instructor used during this lesson</li> </ol>

## **APPENDIX E**

# **RESEARCH APPROVAL LETTER FROM THE WESTERN CAPE EDUCATION DEPARTMENT (WCED)**



# WESTERN CAPE Education Department

Provincial Government of the Western Cape

## RESEARCH

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[wced.wcape.gov.za](http://wced.wcape.gov.za)

**REFERENCE:** 20120104-0018

**ENQUIRIES:** Dr A T Wyngaard

Miss Riana Breytenbach  
2 Mon Desir  
Die Laan  
Stellenbosch  
7600

**Dear Miss Riana Breytenbach**

### **RESEARCH PROPOSAL: A MOTOR SKILLS DEVELOPMENT PROGRAMME FOR NINE TO 12 YEAR OLD CHILDREN**

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 **16 January 2012 till 30 September 2012**
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: Audrey T Wyngaard

for: **HEAD: EDUCATION**

**DATE: 05 January 2012**

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MELD ASSEBLIEF VERWYSINGSNOMMERS IN ALLE KORRESPONDENSIE / PLEASE QUOTE REFERENCE NUMBERS IN ALL CORRESPONDENCE /  
NCEDA UBHALE IINOMBOLO ZESALATHISO KUYO YONKE IMBALELWANO

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GRAND CENTRAL TOWERS, LOWER PARLIAMENT STREET, PRIVATE BAG X9114, CAPE TOWN 8000

WEB: <http://wced.wcape.gov.za>

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