

**AN ASSESSMENT OF THE MOTOR ABILITY OF LEARNERS IN
THE FOUNDATION PHASE OF
PRIMARY SCHOOL EDUCATION,**

by

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Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and has not previously in its entirety or in part been submitted at any university for a degree.

M. A. M. A.

Signature

24-11-2006

Date

DEDICATION

To Mom, Dad, Darren and Morne'

ACKNOWLEDEMENTS

I would like to thank the following individuals for their help and support throughout this research project.

Dr GK Longhurst

Prof ES Bressan

&

Miss Judith Bulman, for proof reading this study

SYNOPSIS

TITLE	An assessment of the motor ability of learners in the Foundation Phase of primary school education.
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CO-SUPERVISOR	Prof ES Bressan
DEGREE	MSc (HMS)

The development of gross motor skills is a process of maturity in movement proficiency, which is fulfilled by the age of eight years. The purpose of this study was to examine the contributions of age, gender and physical activity on the levels of motor proficiency in learners. The subjects (N=366) aged seven years six months to eight years were assessed using eight subtests including tasks for running, balance, bilateral and upper-limb coordination from the Bruininks-Oseretsky Test Battery. There was a significant difference in the relationship between girls and boys: Girls fared better in balance and bilateral coordination skills while boys performed better in strength and running skills ($p < .05$). The results also indicated a positive correlation between increasing age and motor ability in most areas, except for balance which was performed better by younger age groups. The influence of the physical education curricula showed better scores for learners who participated in physical activity on a daily basis in comparison to learners who only participated in one lesson per week. Learners living in a rural environment outperformed their counterparts in three areas of motor proficiency. This can possibly be attributed to the leisure activities experienced by low socio-economic school learners during pre-primary years, and may offer evidence to the negative effects of modern society on the movement development of youth. This raises questions regarding the proficiency

in motor performance, of the children of KwaZulu/Natal and the influence of our modern society and its advancing change in leisure time activities, as well as the structure of physical education classes at school.

SINOPSIS

TITEL	An assessment of the motor ability of learners in the Foundation Phase of primary school education.
KANDIDAAT	N. Portela
STUDIELEIER	Dr GK Longhurst
MEDE STUDIELEIR	Prof ES Bressan
GRAAD	MSc (HMS)

Die ontwikkeling van groot motoriese vaardighede is 'n rywordings proses van beweging wat teen die ouderdom van 8 jaar reeds ontwikkel is. Die doel van hierdie studie was om die effek van ouderdom, geslag en fisieke aktiwiteit op die leerders se motoriese ontwikkeling vlakke te bepaal. Die teikengroep is (366), vanaf die ouderdomme 7jaar en 6 maande tot agt jaar en was geëvalweer. Net agt toetse van die bruininks-Oseretsky Toets Battery, is vir hierdie studie gebruik. Die dogters het beter as die seuns in balans en bilaterale koördinasie gevaar en die seuns het weer beter in die krag oefeninge en hardloop toetse gevaar ($p < 0.05$). Die resultate toon ook dat daar 'n positiewe verband tussen toename in ouderdom en motoriese ontwikkeling is, behalwe in die balans afdeling. Die invloed van 'n daaglikse deelname aan liggaamlike oefening het beter toets resultate getoon as vir diegene wat net een keer per week deelgeneem het. Leerders wat woonagtig is in die platteland ("rural area") het beter as hul eweknie, van die stedelike gebiede in drie afdelings van motoriese vaardighede gevaar. Dit kan moontlik toegeskryf word aan hul aktiewe leefstyl op die platteland. Die negatiewe effekte van passiewe moderne samelewing was duidelik sigbaar op die bewegings aktiwiteite van die stedelike leerders. Dit laat vrae ontstaan omtrent die verwantskap tussen motoriese vaardighede en ons moderne samelewing

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CHAPTER 1

INTRODUCTION

In this age of high technology, we often find that the motor development of primary school children has not kept pace with their cognitive development and chronological age.

The reasons for this lag in motor development are not difficult to see. With today's lifestyle, many children are driven to school instead of being encouraged or allowed to walk or ride bikes. They do not engage in as many interactive and active neighbourhood games, family chores, and outdoor activities as they once did. Passive television viewing and time spent with computer or video games seem to have replaced children's natural play. (Anonymous, n.d. <http://www.highscope.org/ELEMENTARY/EL-7.htm>)

1.1 PURPOSE OF THE STUDY

Regarding our modern lifestyle one often questions whether we are creating a rainbow nation equipped with future couch potatoes? Other concerns relate to the current educational system and in particular the role physical education plays

in primary schools in developing motor skill proficiency. These concerns form the basis of the researcher's decision for the need of this research.

1.2 STATEMENT OF THE PROBLEM

It is essential for all children to learn motor skills so that they may be able to explore their environment and thus enhance their cognitive and social development. Behaviour in the motor domain has long been judged as a significant indicator of unusual child development, as can be seen from the inclusion of movement tasks in well-known early childhood screening inventories. The adequate development of fundamental movement abilities, fine motor skills and perceptual motor abilities is essential for school beginners, as these provide a child with the necessary basic tools to be a successful scholar (Pienaar, 1994).

Numerous studies have been conducted which have identified the importance of physical activity and sport skill development in the school curricula (Arnold, 1979; Bunker, 1981; Graham, 1987; Pillay & Oosthuizen, 1990; Katzenellenbogen, 1994 and Miller, 1995).

The turn of the century has been characterized by the vast technological progress. Children now find themselves in an environment full of sedentary alternatives such as television and computers. Cycling and walking to school

have become rare conducts as many parents drive their children to school. All of this has contributed to a decline in the motor behaviour of children.

Poor motor proficiency can lead to a vicious cycle of physical inactivity and limited participation in sport. It is known that under-development of such movement skills in children may lead to psychological and social problems in school (Porsteinsdottir & Bogadottir, n.d.).

Movement skills help children develop self-confidence and provide them with the opportunity to be physically fit and participate in recreational activities and games. This physical fitness is the capacity of the heart, blood vessels, lungs and muscles to function at optimal efficiency. Thus, without developing such movement skills efficiently, the body is unable to experience the level of physical activity needed to maintain healthy hearts, lungs and muscles. This could mean more passive, less-fulfilling and less healthy lives (Sanders, 1992).

It is therefore important to assess the extent of motor proficiency in primary school children to prevent the above problems and also to investigate the growing concerns over physical inactivity among children caused by a modern sedentary lifestyle.

1.3 THE MAIN FOCUS AREAS:

- To determine what the average motor performance capabilities of children between the age range of seven years and six months to eight years in Pietermaritzburg are.
- To compare the values collected from primary schools in Pietermaritzburg to those collected in Empangeni, northern KwaZulu Natal.

1.3.1 Secondary focus areas

- To identify the influence of gender on the development of gross motor skills at this age.
- To compare the level of motor proficiency of children from three different demographic categories of primary schools.

1.4 RESEARCH QUESTIONS

1. Will boys achieve better than girls in gross motor performance in the Pietermaritzburg region?
2. Will children from the Pietermaritzburg area have a higher level of motor proficiency than those from the Empangeni area?
3. Will children completing the Foundation Phase at an independent school perform better than children from government schools and low socio-economic schools?

In accordance with the stated purpose of the study and in an attempt to answer the questions the following Hypotheses were formulated:

- a) Boys will perform better than girls in gross motor skills.
- b) Children from the Pietermaritzburg area will perform better than children from the Empangeni area with regards to their motor proficiency level.
- c) Children attending independent schools will perform better than children from government and low socio-economic schools with regards to their motor proficiency levels.

1.5 DELIMITATIONS OF THE STUDY

Foundation Phase learners from primary school, aged seven years and six months up to eight years, of all cultural backgrounds, will form part of the test population.

1.6 LIMITATIONS OF THE STUDY

Testing of learners will be limited to school hours in an attempt to avoid minimizing the number of subjects available for testing and thus variance amongst the subjects. This time allocation will be limited to the morning.

1.7 DEFINITIONS OF TERMS

Gross motor speed - the ability to maintain a high degree of speed during a brief shuttle run (Bruininks, 1978).

Static balance - the ability to maintain body equilibrium while stationary (Bruininks, 1978).

Performance balance - the ability to maintain body equilibrium while moving (Bruininks, 1978).

Coordinated movements - the ability to coordinate the hands and feet in simultaneous or sequential movement patterns (Bruininks, 1978).

Strength - the ability to perform tasks requiring the use of certain arm, leg and abdominal muscles (Bruininks, 1978).

Motor performance - the observable attempt of an individual to produce a voluntary action. The level of a person's performance is susceptible to fluctuations in temporary factors such as motivation, arousal, fatigue and physical condition.

Motor proficiency - is the specific abilities measured by tests of running speed and agility, balance, bilateral coordination, strength, upper-limb coordination, response speed, visual-motor control, and upper-limb-speed and dexterity.

South African schooling - in reference to the South African Schools Act of 1996 two categories of schools are recognized: public and independent. Public schools are state controlled and independent schools are privately governed.

CHAPTER 2

LITERATURE REVIEW

2.1 MOTOR PROFICIENCY

Motor proficiency is multidimensional and is based upon the performance of flexion, extension and rotational movements that lead to the successful performance of loco-motor, balance, and manipulative skills. Rhythm and coordination is evident in performance (Sherrill, 1986). However, motor proficiency is not the same thing as motor performance. The best definition of motor proficiency is the specific abilities measured by tests of running speed and agility, balance, bilateral coordination, strength, upper-limb coordination, response speed, visual-motor control and upper-limb-speed and dexterity (Sherrill, 1993). When evaluating a child's level of motor proficiency, selected tasks are judged to be significant indicators of the level of development of these abilities. Although a variety of movement abilities have been proposed to be fundamental to motor skill performance, there is general agreement in the literature that the ability to exhibit speed, precision, strength, balance and coordination are critical factors that must be tested in order to assess any individual's level of motor proficiency.

2.2. FACTORS THAT INFLUENCE MOTOR PROFICIENCY

As humans, we learn to exist within our environment. Throughout our life span, we constantly develop or adapt our abilities and skills to live our lives in a satisfying and meaningful manner. The capacity to exist within the environment is influenced by our ability to function, and the quality of our functional ability is related to all aspects of development. During the process of motor development, children change in size, shape, maturity, physical activity and motor proficiency. These changes are driven by two factors namely *biological factors* which include genetics, gender and maturation and *environmental factors* which include experience, opportunity, encouragement, demographics and social factors (Gallahue 1982 & Thomas, 2001).

According to Newell (1986), the ability to perform a motor skill depends on the interaction between the learner and the environment. The personal characteristics of the child, motivation and previous motor skill experience, all influence motor skill performance. Newell (1986), also states that motor skill ability also depends on physical characteristics such as body size, strength, balance and brain maturation. The extent, to which children develop their genetic potential for motor skills, depends on temperament and personality factors such as energy levels, adventuresome-ness, aggressiveness and persistence. As well as their attitude towards their body, their build and their eagerness to participate in group activities and competition. Shy children or children with low self-esteem will have difficulty competing with other children,

and since motor skills are developed primarily in the context of the peer group, these children will miss out on the opportunity to acquire and develop such skills (Edward & Finn-Stevensen, 1987).

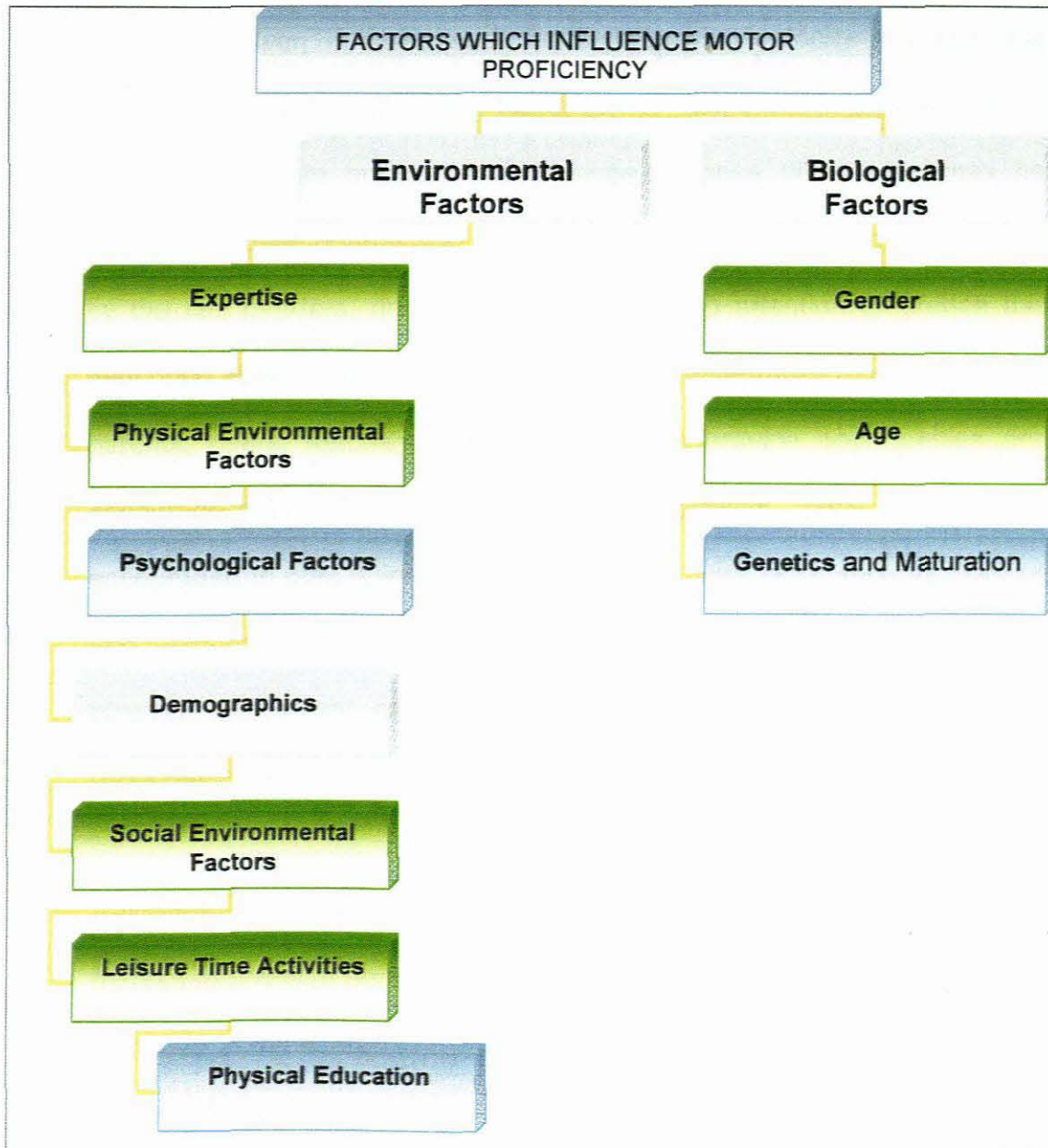


Figure 2.1. Factors which influence motor proficiency in children. (adapted by Portela, 2006)

2.2.1 Biological factors

a. Gender differences

Prior to puberty, gender differences in motor proficiency of children are generally small. These differences tend to increase across the high school years. These slight differences favour boys in direct and straight forward shows of power; in tasks such as ball-throwing velocity and standing broad jump. Girls on the other hand, sometimes, excel in precise actions involving accurate hopping and balance. These differences may be caused by subtle contrasts in the rate of neurological maturation exhibited by the two genders, and by the accompanying attention difference this may bring about. Research suggests that the differences found are due to parents, peers, teachers and coaches, who provide opportunities and encourage girls and boys toward different activities. Girls are generally encouraged to play quietly and practice fine motor skills such as drawing and colouring in whilst boys are encouraged to participate in more vigorous movement activities such as running, chasing and jumping (Bouchard et al., 1994).

Research by Govatos (1959) and Krombholz (1997) shows that with respect to physical performance of motor skills, significant differences are identified in the scores between girls and boys, where boys exceeded on some items and girls on others. Boys and girls of similar growth status seemed to be equally effective in activities involving running and jumping. However, boys appear to excel more than girls in throwing and kicking.

In terms of specific skills, significant relationships exist between specific physical skills, such as the 40-yard dash, standing broad jump and throwing distance and various growth measurements such as height, weight and carpal development of children in the primary grades (Govatos, 1959). In terms of developmental sequences regarding the specific action of throwing, research has shown boys to achieve mature throwing patterns at an earlier age compared to girls (Butterfield & Loovis, 1993).

b. Age

The shaping of human development is demonstrated by an orderly sequence of events, which occur throughout an individual's development process. Muscular strength and the proficiency of gross motor skills improve with advancing chronological age throughout childhood and adolescence, with the gender difference in performance tending to favour that of males (Rarick, 1980).

Literature by Rudisill et al. (2002) shows that motor activity, defined as a combination of perceptions in new motor patterns, is often influenced by intellectual, affective and cultural factors and also varies with age. It is recognized that with a steady and sustained growth, an increased ability to execute motor skills and master more complex and elaborate motor tasks is very apparent. Not only do children of the same age grow at different

rates, children today are taller than they were in previous generations, and they also mature at an earlier age, a phenomenon known as the secular trend (Edward & Finn-Stevensen, 1987). School age children, who are not going through the rapid growth spurts of childhood are quite skilled at controlling their body movements and coordination. They are also able to complete a wide variety of physical activities well, although their ability varies according to their maturation level and physical stature (Encyclopedia of Nursing and Allied Health, n.d.). Research by Krombholz (1997) showed that an increase in physical growth increases physical performance as well as cognitive performance. Measurements of physical fitness and body coordination also increased with increasing age.

c. Genetics and Maturation

Genetics and maturation contribute to and control the body's internal environment. The body's internal chemistry must be balanced to support growth, development and functional activities such as movement. Hormones play a major role in controlling physical growth, initiating puberty, regulating the body's metabolism and the body's ability to utilize chemistry sources of energy for growth, maturation, adaptation and learning. Few maturation differences are observed between boys and girls before puberty. However, following puberty, girls are typically smaller and have less muscle than boys (characteristics that are likely to impact on motor and sport performance). Thomas (2001) states that late

maturing children, while not as large at the time (or often as skilled), will on average be larger than early maturing children. If early maturing children are selected for youth sport teams because of their size and skill, later maturing children often drop out even though their potential may be greater for high school sports.

2.2.2. Environmental factors

a. Expertise

The development of expertise goes hand in hand with the process of growth and maturation. Older children, on an average, perform motor skills better than younger children. However, practise to develop expertise has consistently been shown to overcome age with more expert younger children performing better than less experienced children (McPherson & Thomas, 1989). Research by Thomas and Thomas (1988) proves that practice alone does not assure expertise and suggests that the quality of practice is what is essential. They encourage children to practise correctly, practise the “right” things, practise a lot and practise as they will perform.

b. Physical factors

Malnutrition, season of birth, and number of people living in a household are examples of physical factors that influence the motor development of young children (Cintas, 1995). Malnutrition may affect motor development by affecting the stature or physical growth and energy levels of children. The season of birth may be associated with the onset of children's

locomotion. It is Hypothesised that heavier clothing or the absence of floor experience during the cold season may delay the onset of locomotion in some infants. In environments where chaotic or crowded conditions exist, opportunities for motor skills development may be restricted for the young child (Loucaides et al., 2004).

Seasonal and geographical influences are also examples of physical environmental factors which influence motor proficiency. According to data from the National Children Youth and Fitness Study (NCYFS), physical activity levels are highest in summer, drop during the autumn to reach a lowest point during the winter months and increasing again during the spring season (Kohl & Hobbs, 1998). Geographical variations in physical activity are not available, but it logically follows that children who reside in regions with a milder winter season can be more active during these months. The outdoor environment is closely related to physical activity, as this is where this behaviour needs to take place, in an appropriate setting with available space. The dependent nature of a child forces them to rely on their parents in terms of the exposure to a safe outdoor playing space within their home environment. Secondly, if a child does not have an outside garden or play area, he or she often has to rely upon an adult for transport to an area where they can be physically active. Research shows that a limited availability of outdoor playing areas during the after school hours, is related to children spending 72.4% of their time

sitting or laying down and only 10.4% of their time being physically active (Loucaides et al., 2004).

c. Demographics

There are a number of environmental differences between urban and rural schools which are determinants of motor proficiency. Research by (Loucaides et al., 2004) shows that children who attend rural schools spend more time outside than those children who attend urban schools. This is possibly as a result of more space available outside in the garden and neighbourhood as well as the safety of the neighborhood as reported by parents. Furthermore, children attending urban schools were more likely to attend private lessons not related to physical activity and engaged in more time playing video games than rural school children (Loucaides et al., 2004).

d. Social factors

Children learn certain behaviours by observing others, who serve as models, and by internalizing those behaviours. Role models, especially those significant to the child, can encourage or discourage behaviours. This is done through the role model, by either engaging in certain activities or not, or by how they label certain activities. The process of social learning extends throughout life as other people and situations influence individuals. Social learning involves many types of behaviour including;

social skills, physical skills, traits, values, knowledge, attitudes, and dispositions. Socialisation is critical for motor development. Children who are socialized into motor experiences are more likely to learn motor skills. Increased proficiency in skill performance is enjoyable and rewarding in itself and in turn promotes continued participation. Parents appear to be a strong social influence in physical activity, this can either be via direct support, encouragement and motivation or indirect through modeling or an interaction of the two. Children whose parents are physically active have been reported to be nearly six times more active than those children whose parents are inactive (Kohl & Hobbs, 1998).

e. Psychological factors

Self efficacy, is the confidence an individual has to change or maintain certain actions. Self efficacy is closely linked to intention when describing factors which influence physical activity. However, it is not sufficient just for an individual to intend, but rather to believe that he or she has the capabilities to engage in physical activity. With self efficacy and confidence comes perceived barriers such as lack of time, lack of interest or desire, unfavourable weather or access to equipment and facilities which become potential factors capable of influencing motor proficiency in children. Attitudes and knowledge are two additional avenues which have been tapped as psychological determinants of physical activity. It is

generally thought that children will participate in physical activities to which they have a positive attitude towards (Kohl & Hobbs, 1998).

f. Leisure time activities

A frequently cited determinant of physical activity and motor proficiency is the amount of time children spend watching television and playing video games. Although the hours of viewing per week have not been shown specifically to be related to decreased levels of physical activity, these viewing hours certainly reduce the opportunity to be active. Leisure time variables such as participation in sports clubs and availability of exercise equipment at home have also been found to be significant correlates of physical activity and motor proficiency (Kohl & Hobbs, 1998). A study by Graft et al. (2004), involving an analysis of childrens' leisure behaviour showed that children who are more active (either in organized extramural activities and/or on a regular basis) do have better gross motor development. Similar findings have been reported in research by Kromholz (1997). The study by Graft et al. (2004) also showed that children with a higher weekly television viewing frequency, tended to demonstrate poorer gross motor development.

g. Physical education presented at school

Nearly all children attend school; therefore school can play a noteworthy role in increasing a child's physical activity level and promoting a healthy

fitness behaviour. According to the National Youth Fitness Study (NYFS) (Kohl & Hobbs, 1998), first to fourth grade children, showed that the frequency with which schools conduct physical education classes is related inversely to the amount of time children are given for recess. This suggests that schools use recess to substitute rather than supplement physical activity. In this study (NYFS) it was stated that, 76% of the children never saw a classroom or an appropriately qualified teacher for physical education (Kohl & Hobbs, 1998).

2.3 HOW CHILDREN DEVELOP MOTOR SKILLS

The term motor skills, is used to refer to both fundamental movement skills and also basic sports skills (Graham, 1987).

Motor skills are deliberate and controlled movements requiring both muscle development and maturation of the central nervous system. The skeletal system too, needs to be strong enough to maintain the movement and weight involved in any new activity, once these conditions are met, children are able to learn new physical skills by practicing them until each skill is mastered (Encyclopedia of Nursing and Allied Health, n.d. : 1).

The development of motor skills is important for our daily living, and is a process that involves both inherent abilities and considerable practise during childhood and adolescence. Self selected, unplanned play is important for acquiring motor

skill abilities, as well as structured movement instruction. Without this formalized learning, movement performance and improvement is really left to chance. In an article by Smith and O'Keefe (1999) they purport that, this factor is often not recognized and even some professional educators assume that such essential skills will emerge automatically. However, with many skills young children need to learn and practise these skills until they can proficiently participate in a variety of games and sports. Findings show that when teaching interventions are applied for the learning of fundamental motor skills, children aged four to six years are able to achieve full proficiency (Smith & O'keefe, 1999).

Literature shows that movement skills may be defined as identifiable movement patterns, which are used to accomplish certain tasks. These skills can be categorized into a four level developmental hierarchy. *Level one* is made up of the rudimentary skills of sitting, crawling, creeping, standing and walking. *Level two* consists of what is usually called fundamental motor skills, which emerge from birth to the end of about six or seven years of age. *Level three* represents loco-motor skills, such as running, jumping, hopping, galloping, skipping, and object control skills, such as throwing, catching, striking, kicking, and dribbling. These fundamental motor skills provide the foundation for the learning of other more specialized movement skills. *Level four* is at the top of the hierarchy of specialized movement skills; these are referred to as ontogenic (development of an individual) skills, and specific to the needs and interests of a particular person (Burton, 1992).

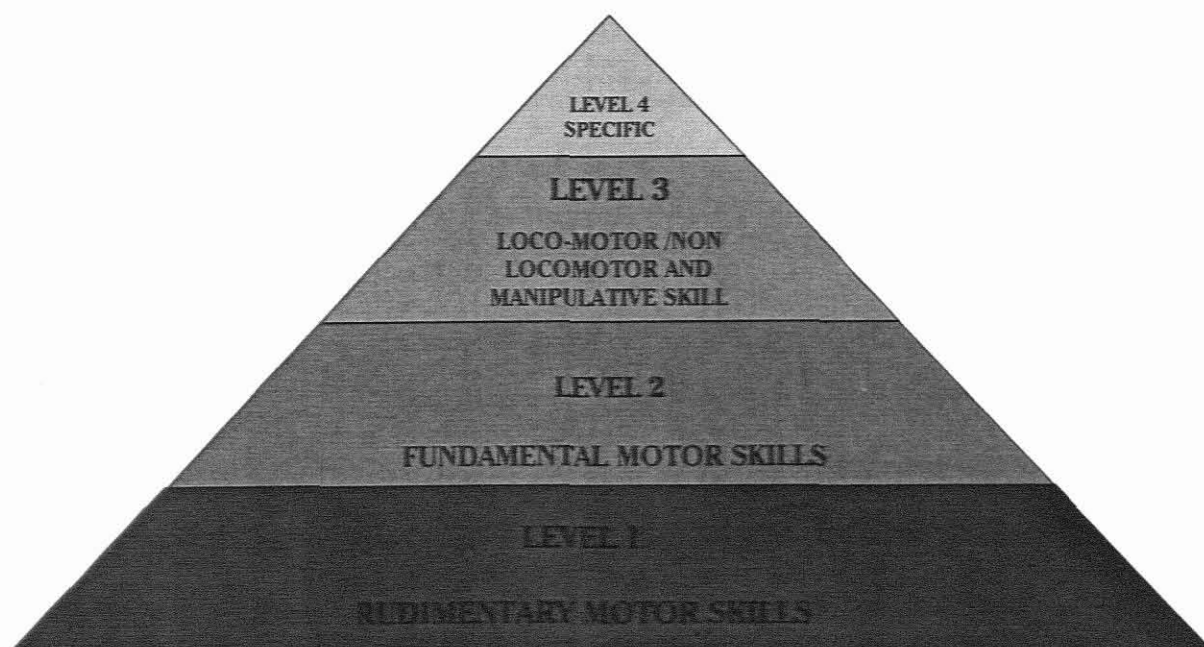


Figure 2.2 Levels of motor skill development.
(adapted by Portela, 2006)

Understanding the various levels of skills that children need to learn is important. These skills set the foundation for adult activity and when learned correctly, performers move with confidence and style. All individual, dual and team sport activities, use fundamental and specialised skills of one type or another (Dauer & Pangrazi, 1989).

2.3.1. Rudimentary motor skills

During early childhood, discovering and exploring movement, provides children with many exciting and thoughtful learning experiences. Young children are delighted with their emerging capabilities and find opportunities to learn, play and practise. It is during this age bracket that children develop a foundation for body management abilities, needed in games, recreational activities and for sport

specific skills. Research also shows that early and appropriate movement experiences help to create and extend neural networks in the developing brain. Constructive and well planned lessons are required to enhance these areas and others like cognitive, social and emotional aspects (Carson, 2001)

A child's motor development depends on its total physical development. In order to crawl, walk, climb and grasp, the infant must first have reached a certain level of skeletal, neural and muscular development (Louw, 1995). At birth, infants have a repertoire of movements that can be used in their new environment. The collection of movement responses, exhibited by the infant and young child, are used to build later movement patterns. When a child starts to be mobile, they go through a series of movement patterns performed with all limbs. They will typically progress from homologous to homolateral movements and then to cross-lateral patterns during creeping and crawling (Louw, 1995).

2.3.2. Fundamental movement skills

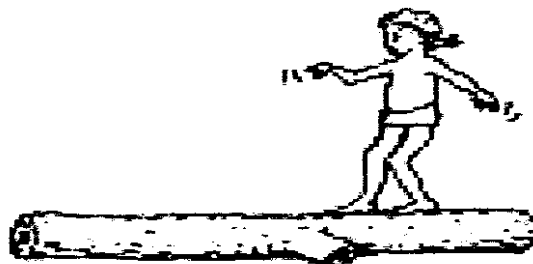
Fundamental motor skills are the ABCs of movement. These basic skills are divided into two categories: locomotive skills, which involve moving the body from one point to another and manipulative skills, which involve moving objects with hands and feet (Goodway & Robinson, 2006). Fundamental skills are those that involve the projection and reception of the body and are used during both work and leisure activities by most individuals. They are seen as universal in the motor pattern range. These skills include basic movements such as walking,

running, hopping, twisting, throwing, catching and striking an object. Walking and running retain their importance in the achievement and continuation of physical fitness throughout life. Other skills, such as skipping and rolling also have a significant contribution during childhood. Development of such skills is emphasized during elementary school (Seefeldt, 1984).



Fundamental motor skills are prerequisites to the learning of sport specific skills such as the skills used in soccer, basketball, hockey, etc.

Balance, is considered to be a fundamental gross motor skill, since all gross motor skills require some element of balance. Proper development of static and dynamic balance skills is thus considered as essential in the development of gross motor skills (Du Toit & Pienaar, 2001).



To define Dynamic and static balance, Knight and Rizzuto (1993: 1296), offer the following;

“Dynamic Balance: The ability to maintain a balanced position, while moving through space –the centre of gravity is shifting constantly to remain inside the base of support.”

“Static Balance: The ability to maintain a stationary position, for a specified period of time –the centre of gravity remains the base of support.”

2.3.3. Loco-motor and non-loco-motor Skills

Locomotor skills are used to move the body from one place to another or to project the body upward, as in jumping and hopping. These skills form the foundation of gross motor coordination and involve large muscle movement (Goodway & Robinson, 2006).

Non-locomotor skills are performed without appreciable movement from place to place. These skills are not as well defined as locomotor skills. They include bending and stretching, pushing and pulling, raising and lowering, twisting and turning, shaking, bouncing and circling (Goodway & Robinson, 2006).

2.3.4. Specific movement skills

Specific skills are those used in various sports and in other areas of physical education including; apparatus activities, tumbling, dance, and specific games. In developing specific skills, progression is attained through planned instruction and drills. Specific skills are usually a combination of locomotor, non-locomotor, and manipulative skills. Specific skills are situation-specific and involve a high level of refinement. Basic sports skills are a combination of the fundamental skills such as throwing a ball in a game of cricket, dribbling a ball in a game of soccer or running and jumping such as in gymnastics (Graham, 1987). These sport specific skills are composed of variations of these fundamental skills. Thus, it is difficult to achieve proficiency of such skills unless the fundamental skills are mastered (Smith & O'Keefe, 1999).

2.4 MOVEMENT AWARENESS

Carson (2001) identified four categories of awareness which constitute a child's movement awareness. These categories refer to a knowledge base that allows the child to select movements that meet a respective demand of a specific task or circumstance.

The four categories of movement awareness:

1. Action awareness
2. Effort awareness
3. Space awareness
4. Relational awareness

Action awareness comprises of three categories of movement actions that a child is able to do with their body. They are traveling, manipulating and stabilizing. Initially, children should be allowed maximum time to practise basic components of awareness, commonly known as fundamental skills. These are the foundation for more complex specialised skills like those needed in games and sports. Most skills develop in a predictable developmental sequence, and competence of such ability is dependent on maximum appropriate practise of basic skills and actions. There are an infinite number of possibilities of how movement concepts can adjust actions and as a result, an action or movement awareness is developed. Various practise opportunities allow children an opportunity to master basic skills and then refine and combine these skills into specialised actions (Carson, 2001).

Effort awareness is an understanding of how the body moves, and that muscular effort is required to produce, maintain, stop and regulate movement. A time component of “effort awareness” is related to the speed and rhythm of a particular movement. Therefore, children need to be able to control the speed of

a specific movement, including acceleration and deceleration. A second component of effort awareness is force, the amount of muscular effort and energy required to perform a task. The categories of a creating force and an absorbing force allow children to recognize how much muscle tension is needed to start, maintain or stop various movements. The absorbing force is what happens when one catches a ball and how muscles react to the receiving force. The last component of effort awareness is control or the coordination of movement, which is essential in learning how to regulate a movement (Carson, 2001).

Space awareness is the understanding of where the body can move, and knowing how it should move (Carson, 2001).

Lastly, **relational awareness** is understanding the relationship your body creates. The relationship created by the body to either its segments or to other movers or objects (Carson, 2001).

2.5. MOTOR SKILLS THAT LAY A FOUNDATION FOR LEARNING

a. Body awareness

Body awareness skills, such as rope climbing, facilitate the understanding of one's own body, its parts and how it works. Body awareness is the root skill of organisation. It affects how a child organizes himself, his belongings and his thoughts. Children who have difficulty getting projects

or tasks started without assistance, generally reflect disorganization (<http://www.theteacherspot.com>, n.d.).

b. **Spatial Awareness**

Spatial awareness is the ability to work within one's own space – an area one arms length around in all directions. This skill affects handwriting and all graph and fine motor work. It combines with eye-hand coordination and centre-line skills to influence all copy work

(<http://www.theteacherspot.com>, n.d.).

c. **Balance**

Balance is the ability to control your body when it is contact with Mother Earth or one of her substitutes. Long term memory grows out of balance

(<http://www.theteacherspot.com>, n.d.).

d. **Dynamic balance**

Short term memory skills flow out of dynamic balance. How one controls one's body when suspended in the air for any length of time affects the proficiency of dynamic balance. Children who have difficulty following a series of directions tend to be weak in this skill area

(<http://www.theteacherspot.com>, n.d.).

e. **Laterality**

The ability to use one side of the body smoothly and evenly and to distinguish between the left and right sides of the body. Laterality affects the ability to understand words (<http://www.theteacherspot.com>, n.d.).

f. **Bi-laterality**

The ability to use the upper and lower parts of the body independently. Bi-laterality affects the ability to conceptualise ideas (<http://www.theteacherspot.com>, n.d.).

g. **Cross laterality**

The ability to use opposite sides of the body at the same time in a smooth, rhythmic manner. Cross-laterality affects the ability to read, sequence and prioritise items (<http://www.theteacherspot.com>, n.d.).

h. **Tracking**

Tracking is the ability to deal with objects and people outside of our own space. Tracking affects copying information from outside one's own space. It allows for the transfer of information from far to near (<http://www.theteacherspot.com>, n.d.).

i. Centre-line

This is the ability to perform tasks directly centred on our mid-line. It is the ability to work efficiently from left to right, such as reading test questions and writing the answers on an answer sheet

(<http://www.theteacherspot.com>, n.d.).

j. Eye-foot coordination

Eye foot coordination requires that the eyes and feet work together to achieve a given result. It works best when the focus eye (the dominant eye) matches the dominant foot, so that the eye and foot can work together to accomplish a given task (<http://www.theteacherspot.com>, n.d.).

2.6 THE IMPORTANCE OF MOTOR PROFICIENCY

“According to epidemiological studies, about 6% of all school age children are described by experts and parents as uncoordinated in their fine and gross motor skills” (American Psychiatric Association, 1994:).

Each milestone achieved by the child in terms of motor skills has implications for other developmental domains. Motor skills and “play” are important precursors of the more formal and stylized elements of what are referred to as cognitive or intellectual development (Wade, 1992). For many years there has been a link between movement and successful learning. Theorists believe that movement reflects neural organization and provides stimulation to the neurological systems

necessary for their development and optimal functioning. Today, these views are reflected in research by Pica (1998) and De Jager (2001), who agree in considering the brain and body as a united whole. Interplay of the human brain and body allows us to clearly see that movement is an integral part of all mental processing, and that every movement is a sensory-motor experience which is linked to our understanding and interpretation of our physical world from which all our learning originates (Fredericks et al., 2006). Furthermore, movement remains a significant medium for cognitive, social, emotional and motor development through the child's pre-school and early primary school years (Luebke, 1981).

A view from Goddard-Blyth (2000) suggests that attention, balance and coordination constitute the primary ABC upon which all later learning depends. If these skills are not developed at the time that children enter school, children run the risk of later developing specific learning difficulties, not only because they lack intelligence, but because the basic systems fundamental to learning are not fully developed when these children start school. The development of these fundamental skills plays an important role in a child's school readiness development, since a child's gross motor skills are closely related to his/her fine motor, cognitive and perceptual development (Gallahue & Ozmun, 1998). Thus, movement which is meaningful for development, will ensure that these skills develop in the holistic growth of a child.

Perceptual motor skill development is directly related to the central nervous system and the processing of information received via the sensory organs. There are four areas within perceptual motor development that are supportive to the complete development of a child. These are bilateral proficiency, throwing and catching, balance and acceleration and deceleration.

Bilateral proficiency is trained through cross lateral activities, while catching helps children to practise reacting to information provided by proprioceptive organs and the eyes. The skill of acceleration and deceleration teaches a child the principles of motion and the inter-relationship that exists between stability and mobility (Gallahue & Ozmun, 1998).

Spatial awareness, earlier referred to as a motor skill which lays a foundation for learning, is reported by Corso (1993), to be reliant on a healthy gross motor development and movement awareness. Spatial awareness is the term given to a person's conscious awareness of their place in time. However, without balance, spatial awareness is impossible. Children need to first have gained experience and practice in orientating their bodies in space, by moving up, under, over and in front of objects, in order to attain spatial and directional awareness. Until then, they may experience difficulty dealing with letter identification and the orientation of symbols on a page (Olds, 1994).

Memory has shown to be correlated to positive movement skills in research by Hager (2000). It is concluded, that movement is necessary to stimulate the ability of the brain, to perceive, process and store information appropriately. Therefore movement is seen as essential in strengthening both long and short term memory (Hager, 2000).

Motor development is a fundamental aspect in the course of human ontogeny. Particularly in later childhood, motor skills play an important role in establishing the child's reputation among peers and the development of self-esteem" (Krombholz, 1997: 1168)

This statement by Krombholz, shows that children who are commonly labelled as clumsy, experience tremendous difficulties in developing adequate movement skills. These problems occur in the absence of general sensory and intellectual impairments and without signs of neurological damage. Children with this kind of problem are less likely to seek out new and exciting experiences because of an associated repeated failure in the movement domain; their interactions in the play ground are limited. As a consequence, they will have a poor knowledge of evaluating, understanding and elaborating information related to movement. Contrary to this, children who are successful at movement patterns, are more likely to become willing learners, motivated by curiosity and will find pleasure in participating. Poorly coordinated children perceive a lowered competence in the motor domain, have reduced social support and interaction from peers, and develop higher levels of anxiety. Consequently, they are less likely to investigate situations for building movement patterns. These children also lack interest in

physical activity and perseverance in challenging situations. According to the competence motivation theory, children who are successful at movement will be intrinsically or self motivated in the motor field. In Contrast to this, children's self-motivation is likely to be reduced if they repeatedly fail at movement tasks (Rose, 1998).

The focus on fundamental motor skill also has implications for health. Many modern day diseases are at least in part due to lack of physical activity. Research shows that physical activity patterns developed in childhood tend to last throughout adulthood and people are more likely to take up or continue sports or some kind of physical activity if they are proficient in the required degree of skill (Smith & O'Keefe, 1999; Janz et al., 2000).

2.7 PHYSICAL ACTIVITY AND PHYSICAL EDUCATION

Physical activity is any bodily movement produced by the contraction of skeletal muscle which increases energy expenditure in the body (Kohl & Hobbs, 1998). Schools use physical education lessons, together with play, to promote physical activity in the school curricula. Physical education is an integral part of the complete education of every child, and aims to increase physical competence, health related fitness, self responsibility and enjoyment of physical activity for all learners. (Buncker, 1981)

2.7.1 The importance of physical education in developing motor skills

Physical education and youth sport provide opportunities for children to acquire skills and to test their abilities. Physical education is designed to develop each child's capacity to function at an optimal level, and by this, children must develop sound body movement skills and good basic skills which produce efficient conscious movements (Bunker, 1981).

Physical education plays a significant role in the pre-school years. Seefeldt (1984) discussed fundamental motor skills versus. fitness in pre-school years, and it is evident that the rudimentary skills which make up the components for our games and sports, can be learned by children in an enriched environment before they are six years of age. These early childhood years are the most opportune time for perfecting the motor skills basic to all subsequent locomotion sports skills and aerobic activities. Findings from research done by Saakslanti et al. (1999), Thomas (1999) and Rudisill et al. (2002), suggest that a physical activity and a pre-school skill development program has a dramatic influence on participants' loco-motor skill and coordination performance and that a lack of such a program, could negatively influence motor development. Even, minimal instruction time of a development specific program has shown significant changes to motor performance. Thus, children who do not have experience of or sufficient exposure to such programs may not develop their loco-motor skills before starting school. Research by Goodway & Branta (2003) shows an agreement with these findings.

Graham (1987) purports that there appears to be a false assumption, in believing that students learn motor skills by playing games. This may be true when children play hours and hours of one particular game, but there aren't hours and hours scheduled for physical education which can be devoted to playing one particular game. With this restriction in mind motor skill acquisition should be considered an essential goal in a physical education program.



A study by Housner et al. (2006) compared the effects of a year-long-daily versus a one-day-a-week physical education program on the proficiency and acquisition of fitness and gross motor skills in K-2 elementary school children. Analysis of gain scores showed a remarkable advantage to the daily physical education lesson in improvements of motor skills and fitness. Although, one could question the influence of such a time loss -to physical education classes- on the academic timetable and academic progress. Research by Shephard (1997), states that when a substantial portion of curricular time (14-26%) is allocated to physical education, learning seems to proceed more rapidly per unit time. Children who received additional physical education classes showed acceleration in their *psychomotor development*, which ultimately resulted in *improved academic skills*. These learners showed no reductions in their grades and standard test scores, many had improved on these parameters. Thus, physical education can be

introduced without compromising academic performance. Black (1995) reports that good physical education programs can boost academic achievement and also feels that children may be learning more in physical education lessons than ever imagined. He concludes that schools which require children to sit all day long deny children an important connection between movement and learning.

2.7.2 Physical activity guidelines for children

In 1998, physical activity guidelines for children (ages 5-12) were developed by both the national Association for Sport and Physical Education (NASPE) and the Health Education Authority in the United Kingdom. In 2004, the NASPE physical activity guidelines for children were revised (see Table 2.1). These guidelines indicate that children should complete at least 60 minutes up to several hours of moderate to vigorous physical activity a day. Dependable with developmental needs, this activity should be characterised as intermittent rather than continuous in nature. Accordingly, the 60-minute standard is a minimum, and for children to achieve the multiple benefits, it would require physical activity exceeding this minimum; thus the stated need for up to several hours of activity per day. Based on patterns of activity for youth, it is apparent that without bouts of activity such as physical education, breaks or sports, children are unlikely to meet activity guidelines. (Corbin et al., 2004).

Table 2.1 Physical activity guidelines for children five to twelve years
Source: NASPE (2004: 5).

Physical Activity Guidelines for Children 5-12.	
1.	Children should accumulate at least 60 minutes, and up to several hours, of age-appropriate physical activity on most if not all days of the week. This daily accumulation should include moderate and vigorous physical activity with the majority of the time being spent in activity that is intermittent in nature.
2.	Children should participate in several bouts of physical activity lasting 15 minutes or more each day.
3.	Children should participate each day in a variety of age appropriate physical activities designed to achieve optimal health, wellness, fitness, and performance benefits.
4.	Extended periods of inactivity (periods of two or more hours) are discouraged for children, especially during the daytime hours.

2.8 PHYSICAL EDUCATION: INFLUENCE ON LOW MOTOR SKILL ACQUISITION

Poor motor proficiency and skill acquisition may be a consequence of the factors which influence physical activity. Further research by Graham (1987), has identified five possible reasons for low motor skill acquisition which can be related to physical education specifically.

Time spent in physical activity. Numerous studies have shown how educators use their time during a physical education lesson, and that children spend a substantial amount of time listening to the teacher talk, or engaging in management activities, or waiting. Ultimately, on average children will spend only a third of the lesson engaged in specific physical activity. Thus, learners don't have many opportunities to learn, practise or play (Graham, 1987).

Refining a motor skill. Qualitative studies of motor skills have identified that children are not performing the skill correctly, which may be because of educators not emphasizing these quality aspects but rather providing a variety of tasks (Graham, 1987).

Specific feedback. Several studies have shown that educators do not provide positive feedback but rather general comments. When learners are given specific guidelines, in terms of feedback, they learn (Graham, 1987).

Games. Research by Ross and Gilbert (1985) has shown that children play more games than actually learning and practising motor skills. Motor skills may be learnt from playing games, but learners would have to play hours and hours of one game, which is obviously not feasible in a child's learning program. Games also allow only a few children the majority of opportunities (Graham, 1987).

Transition. Many children are taught gross motor skills as if they were a closed skill, which occurs in a predictable, static environment, when actually the skill should be used in an open, dynamic environment such as a sport game (Graham, 1987).

2.9. PHYSICAL EDUCATION IN THE SOUTH AFRICAN SCHOOL CURRICULUM

During the post-apartheid period of South African transformation and reform, physical education found itself, as a subject without its own identity. It now functions as only one of the learning outcomes of life orientation (Department of Education, 2002). The majority of schools with this transformation have shifted to more classroom-based and academic-based educational content, which has lead to a respective lack of creative and activity-based learning.

Generally, there are two schools of thought around the status of physical education, the first is that *physical education should be an essential part of the core curriculum* and the second being physical education, while important to a *child's development*, is regarded as being of secondary importance to the core academic curriculum (Gabbard, 2000).

As stated in literature by Hendricks (2004), the life orientation focus, and the area of the physical education curriculum is divided into three phases; the Foundation Phase, the Intermediate Phase, and the Senior Phase.

In the Foundation Phase (Grade R to 3) of the *physical education curriculum*, learning focuses on children discovering, exploring and experimenting with *movement patterns*, in an aim to stimulate gross motor development and physiological growth (Sitzer, 2003). Examples of the physical education focus in

this foundation phase includes learners participating in free play, demonstrations of specific skills, using a combination of body parts, performing basic movements in a sequence or pattern, and exploring expressive movements using contrasts of speed, direction, body shape and position (Department of Education, 2002).

The benefits of physical education include; muscular strength, flexibility and respiratory endurance. Regular movement activities improve motor skills and coordination. Collectively these benefits lead to an improved self confidence in one's abilities ultimately, an increased enthusiasm and will to participate (Hendricks, 2004).

2.10 TESTING TO DETERMINE MOTOR LEVEL PROFICIENCY – THE BRUININKS-OSERETSKY TEST OF MOTOR PROFICIENCY (BOTMP)

After a review of possible and available test instruments, the researcher chose the Bruininks Oseretsky test as it adhered to the testing criteria required to test motor proficiency in children.

Burton and Davis (1992) stated that the Bruininks Oseretsky test battery is the most commonly used multipurpose motor assessment tool. This statement has been proven true in numerous surveys completed for Physical Educators (Sherrill, 1986) and Pediatric, Occupational and Physical, therapists (Crowe, 1989; Yack, 1989; Gowland et al., 1991; Rodger, 1994). This test has wide clinical and educational acceptance because it measures skills important to

childrens' development and it is perceived to have good psychometric properties. Until recently, few other tests existed for the school age child (Wilson et al., 2000).

The Bruininks-Oseretsky test is an individually administered test designed to assess motor skills in children aged from four and a half to fourteen and a half years of age (Bruininks, 1978).

It has been described as the most outstanding instrument of its kind, and one which fills a clinical void (Sabatino, 1987). Sattler (1992), concludes that the test is useful in assessing gross and fine motor skills.

The BOTMP was developed for use by clinicians, educators and researchers. Recommended uses include making decisions about educational placements, screening as part of psychological test batteries, and for assessing neurological development (Wilson, et al., 2000).

The original form of this test was developed by Oseretsky in Russia in 1923, after extensive observations in children. The tests underwent revisions resulting in the Lincoln-Oseretsky Motor Development Scale (Sloan, 1995), and finally the Bruininks–Oseretsky Test of Motor Proficiency (Bruininks 1978) which was based on the original Oseretsky test.

This individually administered test includes 46 items, compromising of eight sub tests. These include: running speed and agility, balance, bilateral coordination, strength, upper-limb coordination, response speed, visual-motor control and upper-limb speed and dexterity. Items are arranged into three categories and produce a detailed index of motor proficiency as well as a separate rating of fine and gross motor skills. Normalised standard scores are available for each of the composites and age equivalents are also available for the sub-test scores. The entire battery takes about an hour to administer, while the short form takes 20minutes (Bruininks, 1978).

CHAPTER 3

METHODOLOGY

The aim of this study was to investigate the current status of motor performance among children completing the Foundation Phase of primary school. Age and gender differences, differences in motor performance competency between different demographic school categories and the impact of various physical education structures were also addressed.

3.1 RESEARCH DESIGN

1. Type: This research is quantitative and comparative.
2. Independent variables: These include variables which you are unable to control, such as previous exposure to movement and motor skill based programs.
3. Dependent variables: These include the test battery being used in the assessment of the subject.
4. Categorical variable: These include variables such as gender, the subject's home language, age and any after-school activities which he/she may participate in.

These variables were measured using the Bruininicks-Oseretsky Test of Motor Proficiency.

3.2 PILOT STUDY

A pilot study, *“Motor proficiency levels of children in the Empangeni Region”* was completed in 2004. The procedure of testing followed a similar pattern to the primary study of gross motor proficiency in Pietermaritzburg. In the pilot study six schools in the Empangeni region were involved. Results of the study compared differences in motor skill ability between the various age groups as well as differences between genders and the schools involved in the pilot study. A total of 123 children were tested, which included girls and boys of many cultural backgrounds.

3.3 PROCEDURE OF THE PRIMARY STUDY

3.3.1 Subjects and sample selection

The sample of participants was selected from 17 primary schools in the Pietermaritzburg region, of KwaZulu Natal Midlands. This number accounted for 60% of the primary schools in the greater Pietermaritzburg area, which is regarded as the educational core of Natal and included schools of a wide demographic range. These 17 schools constituted seven private schools, and nine government schools and one low socio-economic government school. All children of the grade 1 and 2 classes, which were in the age category seven

years and six months to eight years on the date of testing, were selected to complete the test battery. This sample selection N=366 (Table 3.1). included both girls and boys and children of various cultural backgrounds. This particular age group was selected since pilot study completed in 2004, showed that this age group was one with the most variance regarding motor skill performance and gross motor level scores. The number of children tested at each school varied in accordance with the type of school. Private schools had smaller classes ranging from eight to 18 learners per class and two classes per grade thus, fewer children were tested from these schools. While government schools had a larger number of learners per class [25 – 40] and three to four classes per grade. Thus, there were a greater number of children in the subject age-group from these schools.

Table 3.1 Total Number of Subjects tested

Total number of learners tested		366
Boys versus girls	Boys	180
	Girls	186
Number of learners in each age-group	7years-6months	50
	7years-7months	62
	7years-8months	72
	7years-9months	69
	7years-10months	64
	7years-11months	49
Number of subjects tested from a low socio-economic government school in Pietermaritzburg		21
Number of subjects tested from government schools in Pietermaritzburg.		270
Number of subjects tested from independent schools in Pietermaritzburg.		75

3.3.2 Informed consent

Firstly, a letter was forwarded to the Department of Education (see Appendix A) requesting their permission to conduct research in the Foundation Phase of selected schools. Secondly the schools were required to give their consent and lastly informed consent from the parent or guardian of each subject selected for testing was required (see page letter on p. 95).

3.3.3 Assessment Test Battery

Key elements of the Bruinincks-Oseretsky Test (BOT) of Motor Proficiency were used to assess the gross motor skill development of the participants. This standardised procedure permits replication and comparison between and within individuals in the study. Extensive validity and reliability evidence is reported for both the complete battery and short form. This test has been normed on children whose gross motor skills are considered to be within a normal range (Bruininks, 1978). The 8 tests included, took a time of 15 – 20 minutes to administer per child. This shortened version of the test battery was used to accommodate time constraints and the gross motor skill limitations of the research project. The BOT was individually administered. The test began with a pre-test to determine the child's arm and leg preference. Performance scores for each item were converted to point scores on the appropriate scales given in the test manual.

3.4 PRE-TEST PROCEDURES

An informative letter bearing details of the study was forwarded to the relative Department of Education seeking permission to continue with the assessment procedure. Following positive confirmation by the Department of Education the researcher approached the principles of all the identified schools. A full discussion that entailed an explanation of the purpose of the study as well as the assessment procedure was held. An Informative notice was then forwarded to the necessary parties for perusal and approval (Appendix A). Once permission was granted by all those involved, testing dates for each school were scheduled. Subjects were selected according to the age group specified [7years 6months to 8years] from class lists provided by the school. These identified learners were given informative notices and consent forms (Appendix B) which were completed by their parent/guardian and returned to the school prior to the scheduled testing date. No child was forced into the testing procedure, and only the learner who presented an informed consent undertook the assessment procedure.

3.5 TEST BATTERY PROCEDURES

The assessment was undertaken at each of the respective schools in Pietermaritzburg and included a test battery of eight sub-tests. Testing took place in the morning at each of the schools and was completed in a covered venue such as the hall or other such location. This was done to minimize environmental factors such as the weather and availability of facilities.

On the scheduled day of assessment, the tester set up the required testing stations in the order of 1)the timed sprint, 2)balancing on his/her preferred leg, 3)walking heel-toe on the balance beam, 4)test for bilateral coordination; tapping feet alternately while making circles with fingers, 5)jumping once while clapping hands as many times as possible, 6)standing long jump, 7)catching a tossed ball with the preferred hand and 8)throwing ball at a target with the preferred hand.

A maximum of four subjects were assessed at one time on an individual basis. They accompanied the tester to the venue for testing. The tester prior to assessment of the subjects informed all the subjects verbally that either, their Mom, Dad or Guardian had said it was okay for them to complete these activities. Subjects were also informed that they needed to try to complete each exercise to the best of their ability and that if they wanted to, they could stop at any time and wouldn't get into trouble. Following this, each candidate commenced with the physical assessment beginning with the pre-test to determine arm and leg preference. The candidates then followed the testing procedure as in the order set out by the tester [as mentioned above] which the tester explained in detail what was expected of the learner at each activity. The subject was encouraged at all times to complete each task to the best of his/her capability.

The learners were not required to change into physical education kit and were able to complete the assessment in there school clothing. They were required to remove shoes and socks and undertook the assessment barefoot.

❑ **Sub-test 1: running speed and agility**

Two lines 16 yards (14.5m) apart are marked; a block is placed on the far line. A short line, the "timing line", is marked 1 yard (90cm) in front of the first line. The child begins at the first line, runs to the far line, picks up the block, and then runs back across the first line as fast as possible. The child is timed to the nearest 0.2 second between the first and the last crossings of the timing line. Two trials are taken and the best score is recorded.

❑ **Sub-test 2: balance**

Standing on the preferred leg on balance beam. The child stands on the preferred leg on the balance beam, looking at a wall target, with hands on hips, and free leg held with thigh parallel to the floor. The score is made up of the time the child can maintain the balance position to a maximum of 10 seconds. A second trial is given if the child does not score the maximum on the first trial.

Walking forward heel-to-toe on balance beam. The child walks forward on the balance beam heel-to-toe, with hands on hips. The recorder keeps track of the correct and incorrect steps on six steps. The child must make six consecutive steps correctly to achieve maximum score. A second trial is given if the child does not score the maximum on the first trial.

❑ **Sub-test 3: Bilateral Coordination**

Tapping feet alternately while making circles with fingers. The child sits on a chair and attempts to tap feet alternatively while simultaneously making inward to outward circles with the index fingers. This item is scored pass-fail. The child is given 90 seconds to complete 10 consecutive foot taps correctly.

Jumping up and clapping hands. The child jumps as high as possible before landing. The score is the number of claps; a maximum score is five. A second trial is given if the child does not score the maximum on the first trial.

❑ **Sub-test 4: Strength**

After warming up, the child assumes a bent-knee position, and then does a standing long jump. The child's score is the longest jump of three trials, recorded to the nearest number on the test kit measuring tape.

❑ **Sub-test 5: Upper-limb Coordination**

Catching a tossed ball with the preferred hand. The child stands on the mat and the assessor slowly tosses the ball underhand from the 3 m tape mark towards the child. The child is given one practise trial. The number of correct catches made in five trials is recorded.

Throwing a ball at a target with the preferred hand. With the preferred hand, the child throws a tennis ball overhand at a target from a distance 1.5 m. The child is given one practice trial. The number of correct throws (that hit the target) in five trials, is recorded.

3.6 STATISTICAL ANALYSIS

The research is quantitative in nature and comparative when examined in relation to norms. The outcomes were converted into standardised scores, and the mean score was calculated for each of the five areas of motor proficiency tested. ANOVA was used to assess comparisons between the data collected in Pietermaritzburg, of the three demographic categories of the schools tested. T-test was used to evaluate the differences in the respective values of gross motor skill scores of children in Pietermaritzburg and Empangeni also to identify significant differences in the two gender scores, as well as the difference in the scores of the independent schools and those of the low socio-economic school.

CHAPTER 4

RESULTS AND DISCUSSION

In this chapter many different angles and aspects of the collected data are analyzed and compared, in answering the research questions. Firstly the Pietermaritzburg data is described in respect to gender and age, followed by a comparison of the motor proficiency scores with the Empangeni region. Lastly, comparisons are made between the three types of schools tested in the Pietermaritzburg region, with respect to their physical education structure and the influence such has, on motor performance scores.

4.1 LEVELS OF MOTOR PROFICIENCY IN PIETERMARITZBURG

4.1.1. Boys versus girls

Figure 4.1 shows the respective scores of boys versus girls in the Pietermaritzburg region for the respective five areas of gross motor skills. Table 4.1 refers to the t-values where boys performed significantly better on their tests of running speed and agility ($t=7.12$), strength ($t=6.07$) as well as upper limb

coordination ($t= 4.88$). Girls scored significantly higher on the tests of balance ($t=2.00$) and bilateral coordination ($t=1.72$). The boys performed 12% ($\omega^2 = 0.12$) better than the girls in running, 8.9% ($\omega^2 = 0.089$) and 5.9% ($\omega^2 = 0.059$) higher than the girls in strength and upper limb coordination tasks respectively. Balance and bilateral coordination skills favoured the girls, although they only performed 0.8% ($\omega^2 = 0.008$) and 0.5% ($\omega^2 = 0.005$) respectively, better than their male counterparts

Table 4.1 Mean scores, standard deviations and t values of sub-test items for boys versus girls in Pietermaritzburg

Sub Test Items	Boys (n=180)		Girls (n=186)		t values Girls Vs Boys	Omega squared
	Mean	SD	Mean	SD		
Running	12.19	1.54	10.90	1.92	7.12 ■	0.12
Balance	7.31	2.53	7.84	2.56	-2.00 ■	0.008
Bilateral Coordination	2.92	0.92	3.09	0.96	-1.72 ■	0.005
Strength	7.26	1.63	6.22	1.65	6.07 ■	0.089
Upper limb Coordination	3.76	1.26	3.12	1.31	4.88 ■	0.059

ω^2 = omega squared

■ significant at $p<.05$

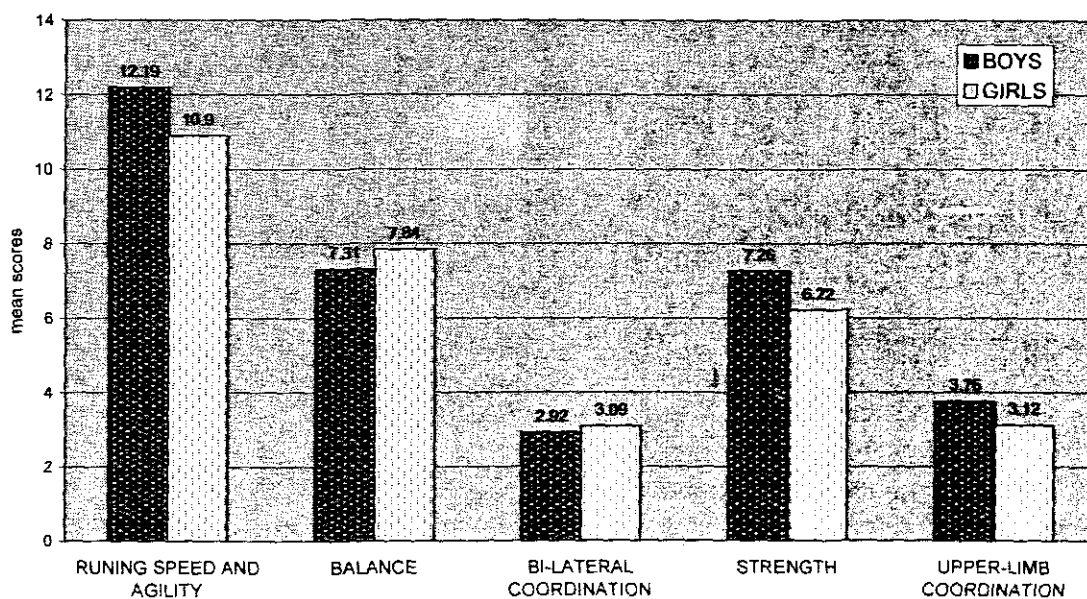


Figure 4.1 Mean score for boys vs girls in the five areas of motor proficiency (Pietermaritzburg).

The observations regarding the differences in motor proficiency between girls and boys, can be associated with a number of explanations. The days are gone where boys spend the majority of their childhood outdoors. Currently both girls and boys are exposed to equal amounts of physical activity during their school time and minimal outdoor exposure after these hours. The results show girls significantly stronger in balance, although this may not necessarily be as a result of the modern environment in which children develop but rather due to genetic differences regarding balance which has been identified between girls and boys. These results are in agreement with research by Rarick (1980); Butterfield & Loovis (1993) and Krombholz (1997); which have shown the differences in motor proficiency between girls and boys to be significant, where girls exceed on some

items (balance and bilateral coordination) and boys on others (running speed and agility, strength and upper limb coordination).

4.1.2 Age Group Categories

Figure 4.2 - 4.6 show the mean scores of the chosen areas of gross motor skills with respect to various age groups. The age groups range from seven years and six months to seven years and 11 months. The older learners exhibited overall better gross motor skill performance scores than younger learners. The older children showed higher scores in four of the five chosen areas of motor proficiency which include running speed and agility, bilateral coordination, strength and upper-limb coordination. A higher score for the fifth area of motor skill performance (balance) was attained by children aged seven years and nine months, with the lowest scores for this skill being claimed by learners in the seven years and seven months age range. These learners also scored lowest in bilateral coordination. Scores for bilateral coordination were consistently higher in the older age groups from seven years and eight months. Performance scores in the test of strength were consistently lower in the younger age groups but these scores for strength did increase in the older age groups with the 7 years and 11 months scoring uppermost. Scores for upper limb coordination throughout the age-groups was the most consistent of all the major areas of motor skills discussed.

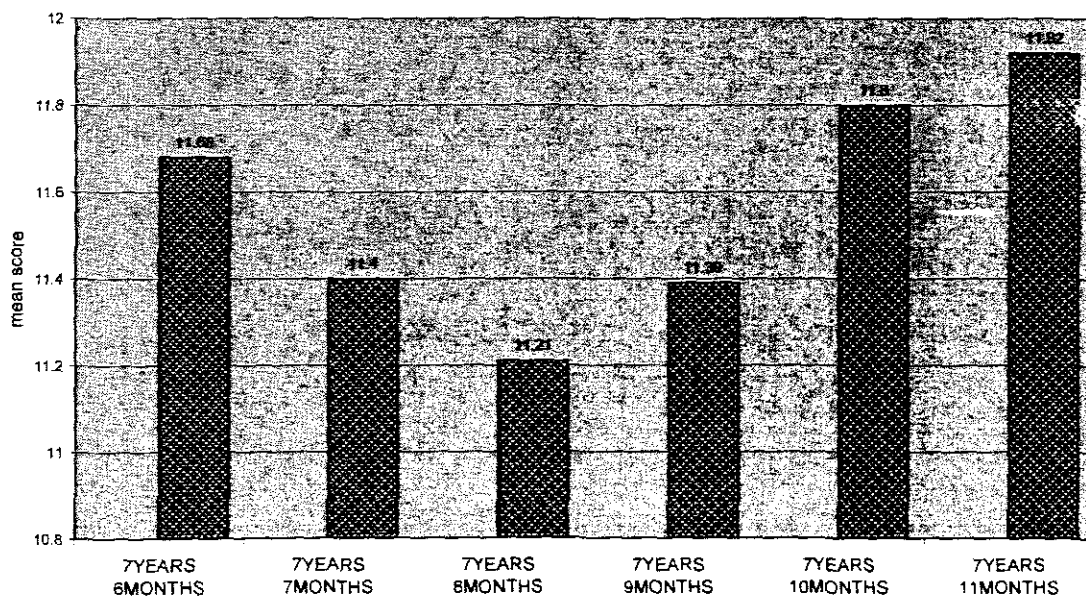


Figure 4.2 Mean score for age group differences in running speed and agility.

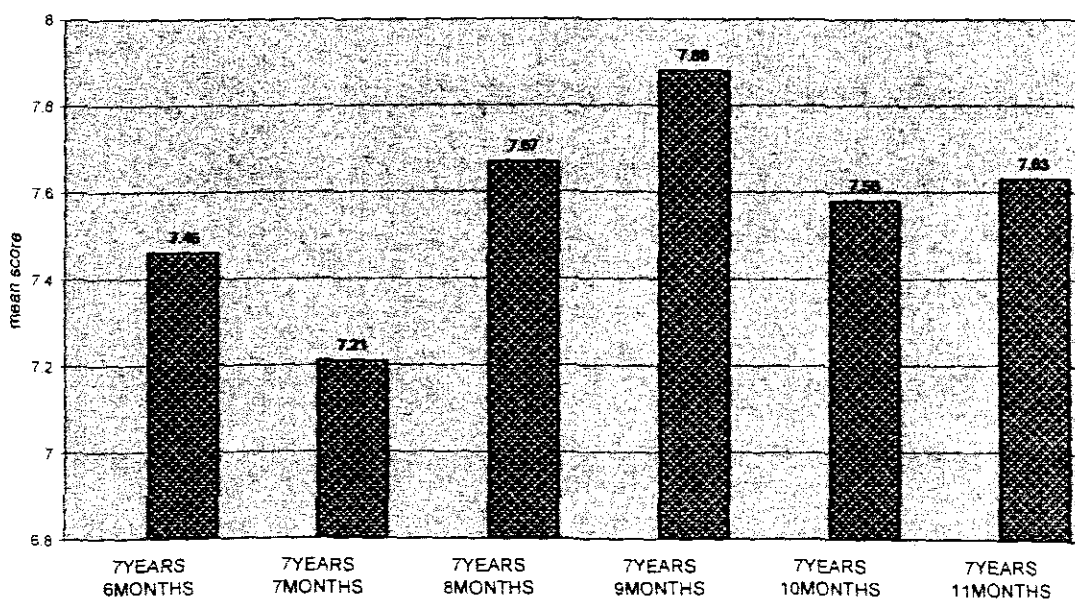


Figure 4.3 Mean score for age group differences in balance.

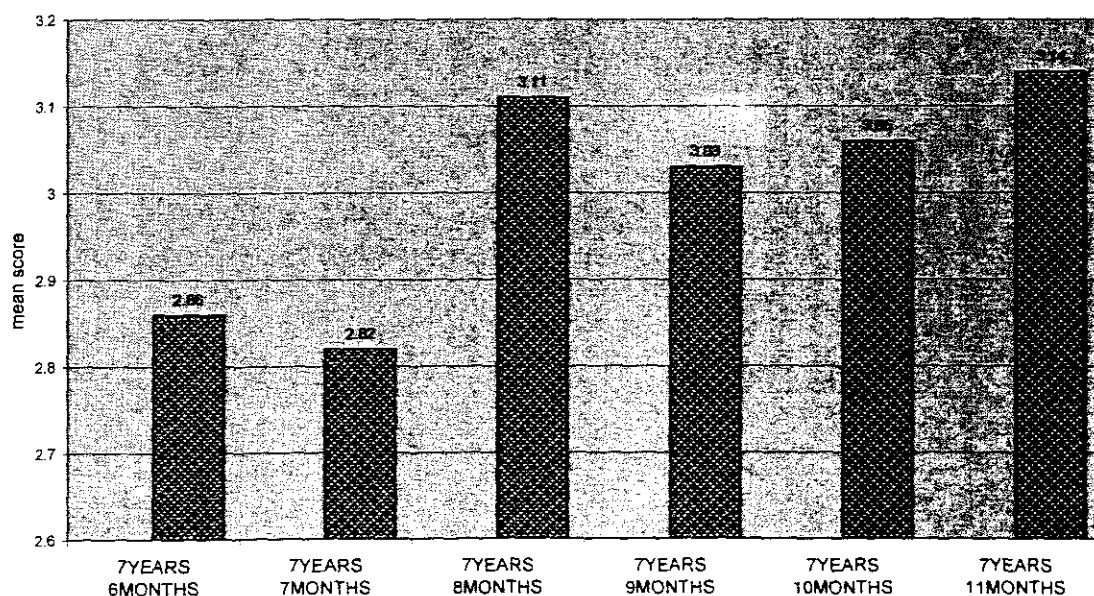


Figure 4.4 Mean score for age group differences in bilateral coordination.

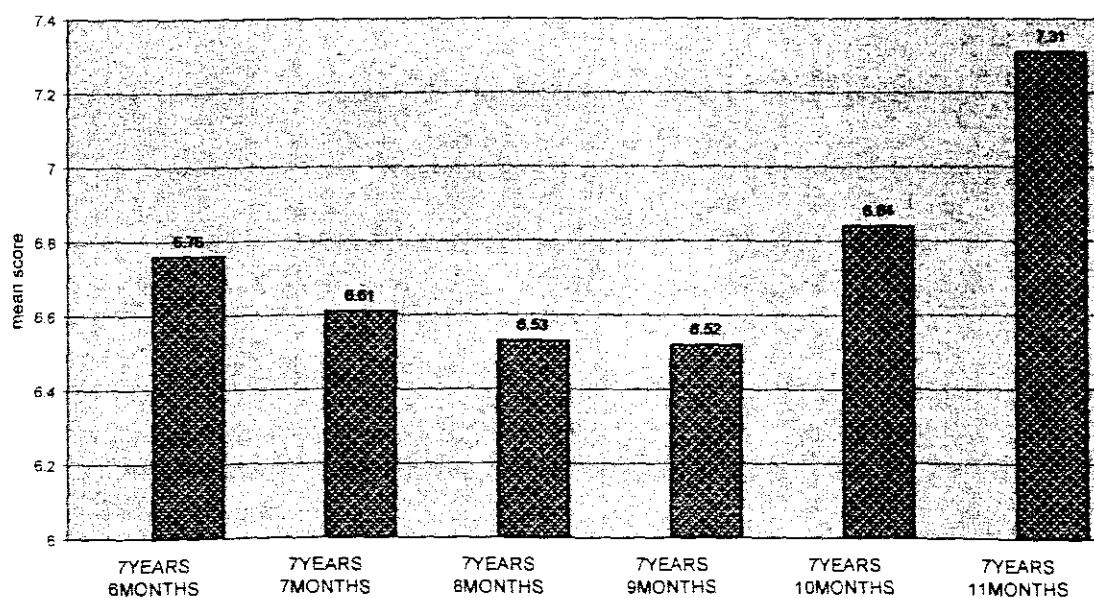


Figure 4.5 Mean score for age group differences in strength.

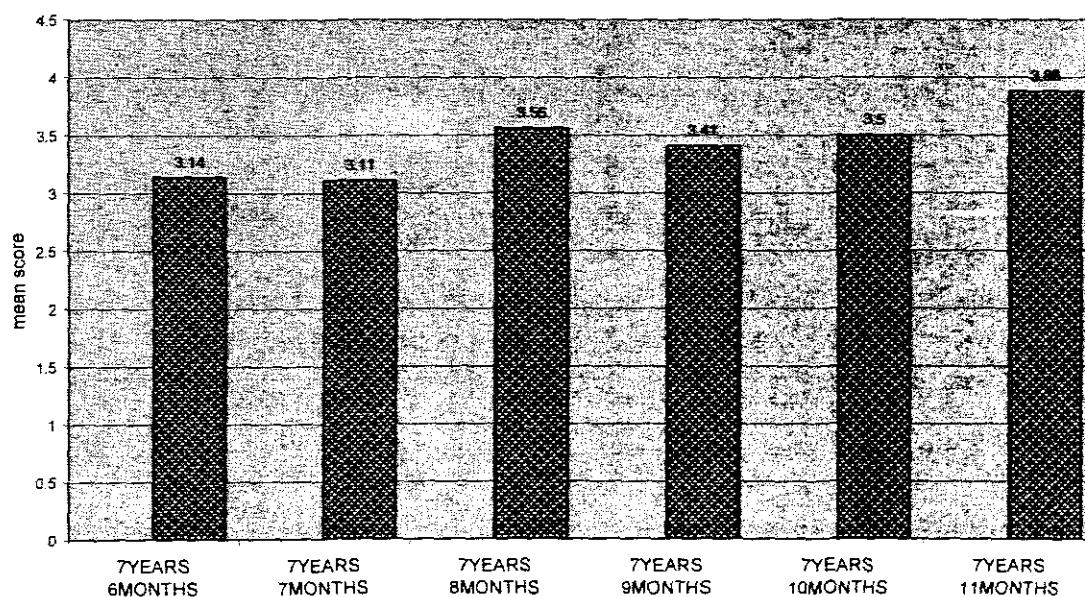


Figure 4.6 Mean score for agegroup differences in upper-limb coordination.

This pattern of higher scores and better performances found in the older children confers with literature. As children grow older, they will show improved motor proficiency (Govatos, 1959; Rarick, 1980; Krombholz 1997).

4.2 COMPARISON OF MOTOR PROFICIENCY SCORES FOR THE LEARNERS FROM THE PIETERMARITZBURG AND EMPANGENI REGIONS.

4.2.1 Compositive result scores (Empangeni versus Pietermaritzburg)

Compositive score results for boys and girls represent the differences in the five areas of motor proficiency between the Empangeni and the Pietermaritzburg areas of KwaZulu- Natal. The differences between these two regions in all five of

the areas of motor proficiency represented by skills for running speed and agility ($t=1.60$), balance ($t=0.66$), bilateral coordination ($t=0.18$), strength ($t=3.55$) and upper limb coordination ($t=1.69$), are significant at $p < .05$ (Table 4.2).

Table 4.2 Mean scores, standard deviations and t values of sub-test items for all subjects tested in Empangeni and Pietermaritzburg

Sub Test Items	Empangeni Composite scores (n=123)		Pietermaritzburg Composite scores (n=366)		t values Empangeni vs PMB	Omega squared
	Mean	SD	Mean	SD		
Running	11.22	1.93	11.54	1.85	-1.60 ■	0.002
Balance	7.75	2.39	7.58	2.56	0.66 ■	-0.001
Bilateral Coordination	2.99	0.84	3.01	0.94	-0.18 ■	-0.002
Strength	7.29	1.44	6.73	1.72	3.55 ■	0.023
Upper limb Coordination	3.63	1.10	3.43	1.32	1.69 ■	0.004

ω^2 = omega squared

■ significant at $p < .05$

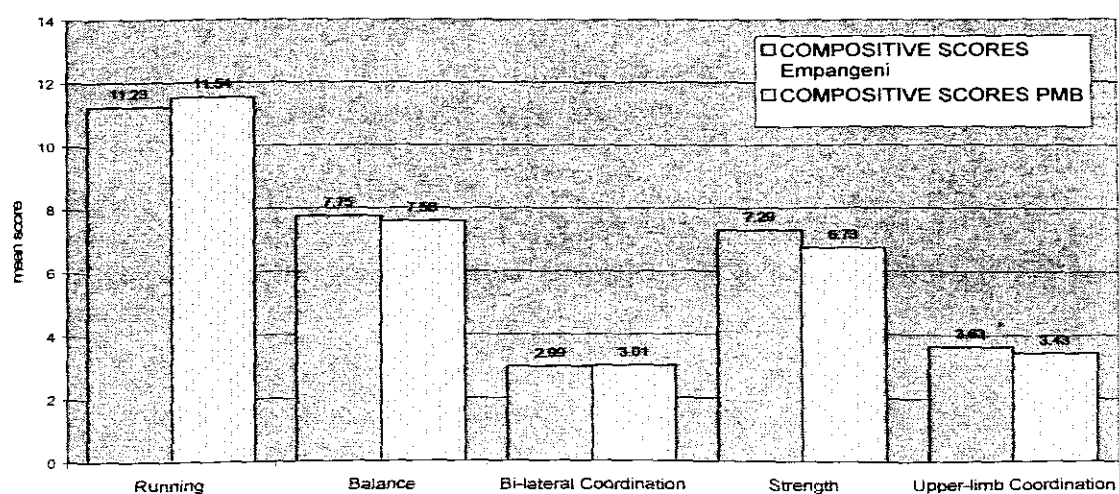


Figure 4.7 Mean score of motor proficiency for all the learners from Empangeni and Pietermaritzburg.

These results show that the greatest significant differences fall in the area of strength ability. Here, learners from the Empangeni region scored 2.3% ($\omega^2 = 0.023$) higher than the learners from Pietermaritzburg. This difference in strength scores can be attributed to the differences in the constructive nature of play within the two regions. Children in the small town of Empangeni might find themselves more inclined to engage in physical activities outside (farm-like activities) which would possibly include actions such as moving, pushing and carrying heavy objects. Children from the Empangeni region also scored higher in tests for balance, strength and upper limb coordination. These superior scores may also be attributed to the difference in weather conditions experienced in the separate towns. Empangeni experiences a considerably milder winter compared to Pietermaritzburg. These findings are in agreement with literature by Kohl and Hobbs (1998) and the National Children Youth and Fitness Study (1987). These studies show that activity levels are higher during the warmer months and drop during the colder months. As Empangeni does not experience a terribly cold wintry season, children in this region are able to play outside for a much longer duration of the year, thus, increasing their accessibility to physical activity.

4.2.2 Comparison of boys' motor proficiency scores between the two regions

Scores for the five areas of motor proficiency in Table 4.3 represent the differences between the scores for male learners from Empangeni and Pietermaritzburg. The male learners from Pietermaritzburg performed better in

the running speed and agility tests ($\omega^2 = 0.0015$), balance ($\omega^2 = 0.0004$) and upper limb coordination ($\omega^2 = 0.0032$), while the male learners from Empangeni scored higher on the bilateral coordination ($\omega^2 = 0.0038$) and strength tests ($\omega^2 = 0.0051$). However, none of the differences in scores for the learners from the two regions were significant. Figure 4.8 represents the mean scores of the sub-tests between the male learner from Empangeni and Pietermaritzburg

Table 4.3 Mean scores, standard deviation and t values of sub test items for boys from Empangeni and Pietermaritzburg

Sub Test Items	Empangeni Boys (n=58)		Pietermaritzburg Boys (n=180)		t values Empangeni vs PMB	Omega squared
	Mean	SD	Mean	SD		
Running	11.88	1.87	12.19	1.54	-1.16	0.0015
Balance	6.95	2.53	7.31	2.53	-0.95	-0.0004
Bilateral Coordination	2.97	0.94	2.92	0.92	0.31	-0.0038
Strength	7.60	1.49	7.26	1.63	1.49	0.0051
Upper limb Coordination	3.67	1.15	3.76	1.26	-0.50	-0.0032

ω^2 = omega squared

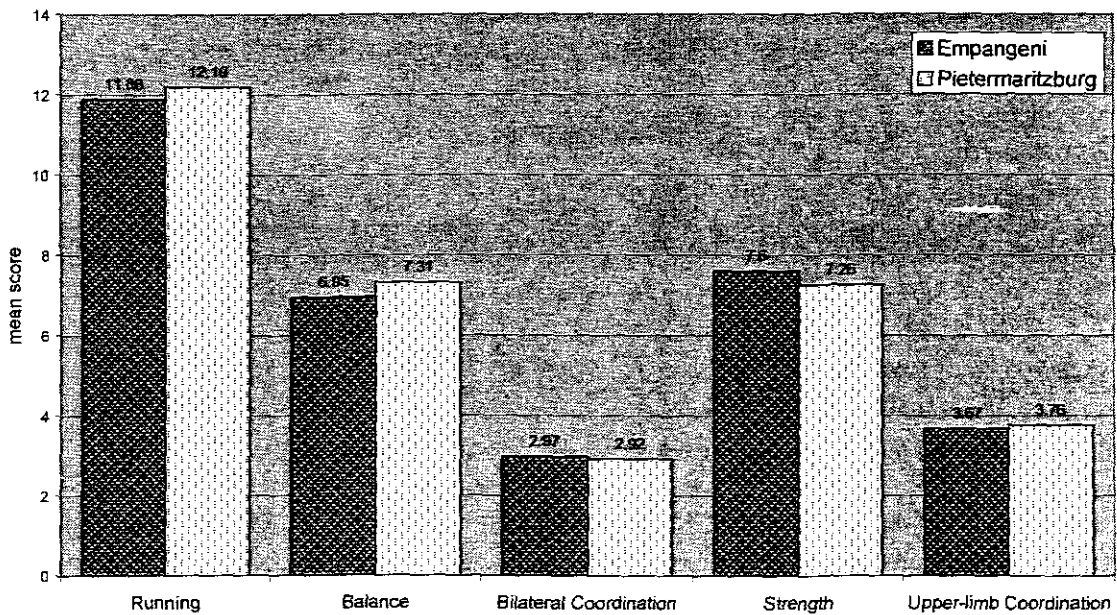


Figure 4.8 Mean score of motor proficiency for boys from Empangeni and Pietermaritzburg.

4.2.3 Comparison of girls' motor proficiency scores between the two regions

Motor skill ability scores for female learners from Empangeni and Pietermaritzburg presented significant differences at $p < 0.05$ for four of the five areas of gross motor proficiency. These skills included balance ($t=1.97$), bilateral coordination ($t=0.65$), strength ($t=3.84$) and upper limb coordination ($t=3.00$). Scores for balance and strength tests were performed 1.13%, 5.19% higher respectively, while upper limb coordination was performed 3.08% better by the female learners from Empangeni. Running speed and agility as well as bilateral coordination test scores for girls presented more proficient in the Pietermaritzburg area.

Table 4.4 Mean scores, standard deviation and t values of sub test items for girls from Empangeni and Pietermaritzburg

Sub Test Items	Empangeni Girls (n=65)		Pietermaritzburg Girls (n=186)		t values Empangeni vs PMB	Omega squared
	Mean	SD	Mean	SD		
Running	10.63	1.79	10.90	1.92	-1.04	0.0003
Balance	8.46	2.02	7.84	2.56	1.97 ■	0.0113
Bilateral Coordination	3.02	0.76	3.09	0.96	-0.65 ■	-0.0023
Strength	7.02	1.35	6.22	1.65	3.84 ■	0.0519
Upper limb Coordination	3.6	1.07	3.12	1.31	3.00 ■	0.0308

ω^2 = omega squared

■ significant at $p < .05$

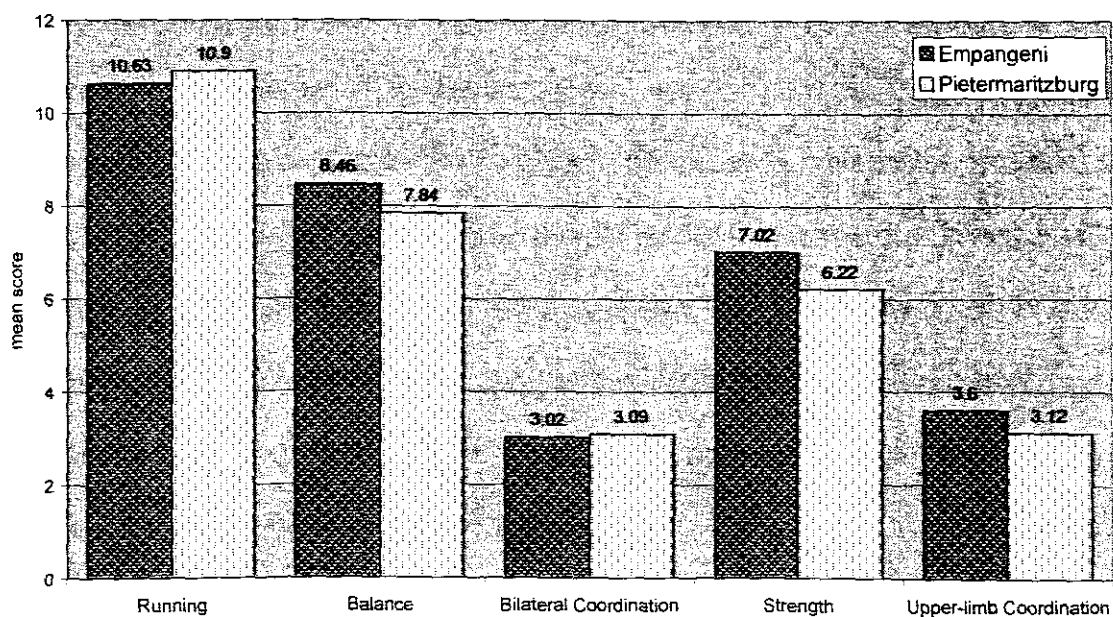


Figure 4.9 Mean score of motor proficiency scores for girls from Empangeni and Pietermaritzburg.

The differences seen in their test scores of balance, strength and upper-limb coordination may be attributed to the possibility that girls in the Empangeni area may have an increased exposure to physical activity and that a significant total time of this play takes place outdoors, where balance, strength and upper-limb coordination have a greater prevalence to develop as opposed to their Pietermaritzburg counterparts who may not be inclined to play outdoors as often. Although girls from Pietermaritzburg excelled at bilateral coordination which is associated more with games, dance and specific activities completed indoors.

The composite scores discussed in 4.2.1 rely highly on the significant differences identified in the girls' scores between the two regions. Four of the five areas of motor proficiency were proven significant in the girls scores compared to only one area in the scores of the boys. Thus, the girls in the Empangeni and Pietermaritzburg region display noteworthy differences in their motor proficiency. The girls from Empangeni show better overall performances in the physical skills compared to the Pietermaritzburg subjects tested. The possible cause of such findings may be as a result of the girls in the Empangeni region possibly being more inclined to play outdoors and participate in more of the "tom-boy" like activities compared to the girls from the city.

4.3 MOTOR PROFICIENCY SCORES AND GENDER DIFFERENCES

Table 4.5 and its corresponding Figure 4.10, represent the results of the comparative scores of girls versus boys. The results are composite scores of both the Empangeni and the Pietermaritzburg subjects tested. The *t* scores for all five areas of motor proficiency have a significant difference at $p < .05$. The boys performed significantly better on their sub-tests of running speed and agility ($t=8.08$), strength ($t=6.31$) and upper-limb coordination ($t=4.47$). The girls scored favourable results on their tests of balance ($t=-3.47$) and bilateral coordination ($t=-1.67$). The biggest differences in scores were seen on the test of running speed and agility and strength where the boys scored 11.6% and 7.4% better than the girls respectively.

Table 4.5 Mean scores, standard deviation and *t* values of sub test items for boys versus girls (composite scores of the two regions tested)

Sub Test Items	BOYS (n=238)		GIRLS (n=251)		<i>t</i> values Boys vs Girls	Omega squared
	Mean	SD	Mean	SD		
Running	12.12	1.63	10.83	1.89	8.08 ■	0.116
Balance	7.22	2.53	8.00	2.45	-3.47 ■	0.022
Bilateral Coordination	2.93	0.93	3.07	0.91	-1.67 ■	0.004
Strength	7.34	1.60	6.43	1.62	6.31 ■	0.074
Upper limb Coordination	3.74	1.23	3.24	1.27	4.47 ■	0.037

ω^2 = omega squared

■ significant at $p < .05$

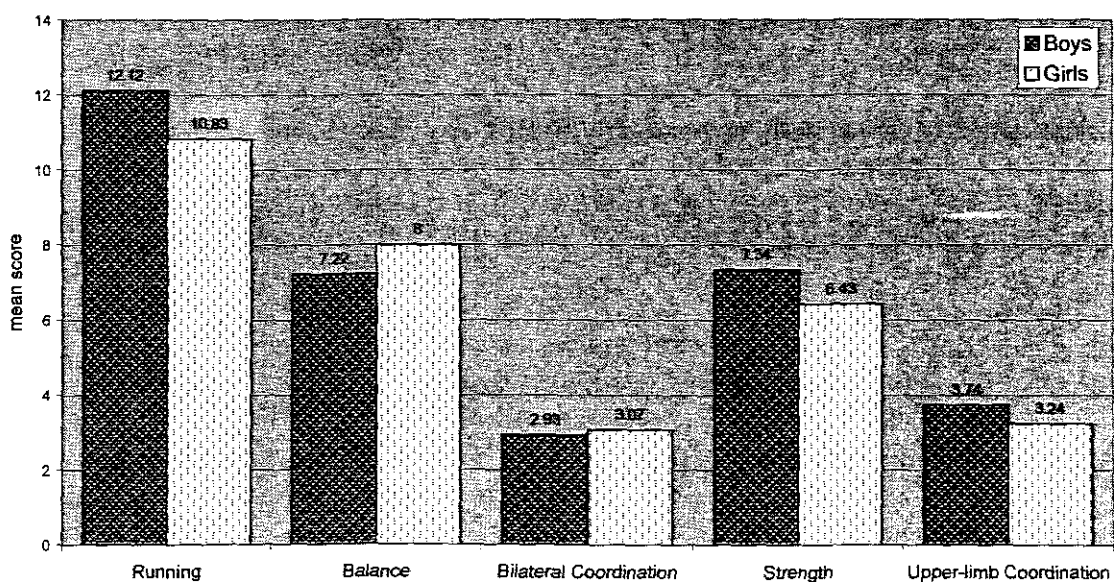


Figure 4.10 Mean score of motor proficiency for boys versus girls (Compositive scores from Empangeni and Pietermaritzburg).

Although it is generally expected that little difference in motor proficiency scores between genders will be seen in the early elementary school years, some doubt has been cast on this generalization. Numerous research by Rarick (1980); Butterfield *et al.* (1993) and Krombholz (1997) has shown the differences in motor proficiency between girls and boys to be significant, where girls exceed on some items and boys on others. Reasons for these gender differences, may be attributed to the fact that parents, peers, teachers, and coaches, who provide opportunities, encourage girls and boys toward different activities. Girls are generally encouraged to play quietly and practise fine motor skills such as drawing and colouring in, whilst boys are encouraged to participate in more vigorous movement activities such as running, chasing and jumping (Bouchard *et al.*, 1994).

4.4 MOTOR PROFICIENCY AND THREE DEMOGRAPHIC SCHOOL CATEGORIES

4.4.1 Differences in motor proficiency between the three demographic classes of schools tested in the Pietermaritzburg region

ANOVA was completed to determine the differences between motor proficiency levels within the three demographic groups of the schools tested in Pietermaritzburg. These groups included independent schools (n=75), government schools (n=270) and low socio-economic government schools (n=21).

This ANOVA analysis was completed for each of the five areas of motor proficiency assessed and the meaningfulness of these results was determined by omega squared. The results show significant differences between the categories of schools for performances in all of the five areas assessed, and can be expressed as follows (Table 4.6). F is significant for running speed and agility and may be described as, $F(2,807) = 560.10052p < 0.5$. F is significant for balance skills between the 3 demographic school categories $F(2,807) = 333.2691p < 0.5$ as well as for bilateral coordination $F(2,807) = 381.9516p < 0.5$. Lastly, significant differences are also seen between the three school categories on their tests of strength and upper-limb coordination, F may be described as $F(2,807) = 462.4185p < 0.5$ and $F(2,807) = 304.0145p < 0.5$ respectively.

Table 4.6 Degree of freedom and F values of the sub test items for the 3 different demographic categories of schools in Pietermaritzburg

Subtest Item	Degree of Freedom		F-Value
	Between Groups	Within groups	
Running	2	807	560.10■
Balance	2	807	333.27■
Bilateral Coordination	2	807	381.95■
Strength	2	807	462.42■
Upper-limb Coordination	2	807	304.01■

■ significant at $p < .05$

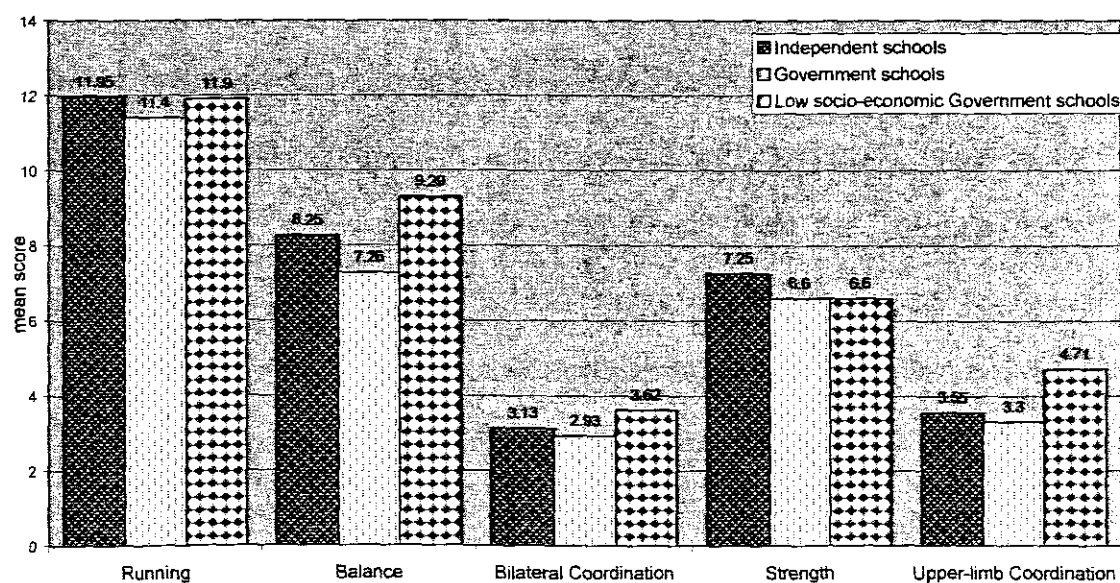


Figure 4.11 Mean score of motor proficiency for the different demographic categories of schools tested in Pietermaritzburg.

4.4.2 Motor proficiency scores for independent versus low socio-economic schools

Interesting results are shown in the comparison of the independent school and the low socio-economic school, motor proficiency scores in the Pietermaritzburg region. Three of the sub-categories for motor proficiency show favourable results by low socio-economic schools. These skills include balance, bilateral coordination and upper-limb coordination. The other two remaining areas of motor proficiency running and strength exhibited superior scores performed by independent school learners.

The most prevalent and significant difference in scores, was seen in the scores related to upper-limb coordination ($t=5.17$), which was performed 24.8% better by the learners from a low socio-economic school than the learners from an independent institution. On the test of running speed and agility independent school learners narrowly beat their lower socio-economic counterparts by 1%. The tests of balance and bilateral coordination expressed 4% and 5% differences respectively, favouring the low socio-economic school learners. Lastly independent school learners performed 3% better on their test of strength.

Table 4.7 Mean scores, standard deviation and t values of sub test items for learners from Independent and Low socio-economic schools

Sub Test Items	Independent School Scores (n=75)		Low Socio-Economic School Scores (n=21)		t values Independent Vs Low Socio-Economic Schools	Omega squared
	Mean	SD	Mean	SD		
Running	11.94	2.04	11.90	1.26	0.12	-0.01
Balance	8.25	2.23	9.29	1.62	-2.36	0.05
Bilateral Coordination	3.13	0.92	3.62	0.74	-2.51	0.05
Strength	7.25	1.59	6.57	1.25	2.07	0.03
Upper limb Coordination	3.55	1.29	4.71	0.64	-5.17 ■	0.25

ω^2 = omega squared
 ■ significant at p<0.05

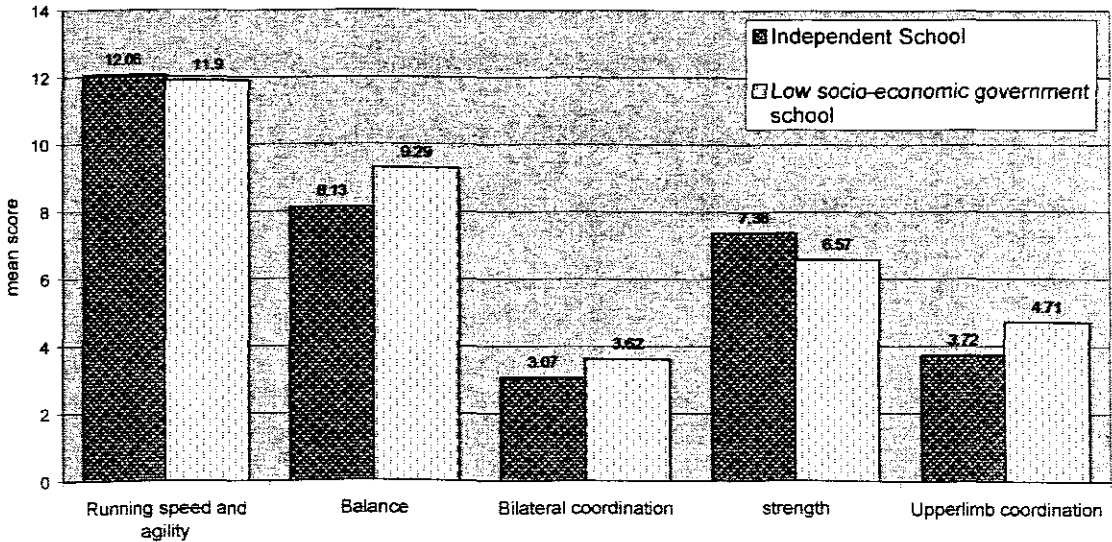


Figure 4.12 Differences in mean scores of motor performance between independent school learners, and low socio-economic government school learners from Pietermaritzburg.

Results of this nature have not been readily written in literature to-date, only an article by Krombholz (1997) showed contradictory findings to these, stating that children of a higher socio-economic status performed better than children of a lower status. A possible reasoning for findings of such a study would be the effect of leisure activities during the pre-primary years (3-5years) of development.

Children attending low socio-economic schools may not be exposed to as strict a physical activity program as children attending independent schools, or have state of the art equipment, facilities and trained educators. Yet on some tasks these children scored higher than those attending school with such amenities. There are two possible explanations for such findings; which involves previous exposure to physical activities and leisure activities during pre-school and foundation school years. According Krombholz (1997) and Graft *et al.*, (2004), an analysis of children's leisure behaviour showed that children who are more active-either in organized extramural activities and/or on a regular basis do have better gross motor development, and that, children with a higher weekly Television viewing frequency tended to demonstrate poorer gross motor development.

Children attending independent schools are often exposed to a busy afternoon of extramural activities which may possibly take away from their outdoor play time. The parents of these children are also more conservative in terms of safety, and often restrict playing outdoors and interacting in neighbourhood activities. On the

other end of the scale children attending the low socio-economic schools are most likely to grow up out of town, perhaps on a farm in the hills where toys are not much other than a ball and rope, or possibly a home-made bat, and whatever else their imagination can come up with. These children have limited access to things like a television or computer, they experience hours of unstructured play outside, where imagination is the only educator and the environment their endless room of equipment. Isn't this the time these subjects invest in developing gross motor skills? This rural world has been compared to the world of a child attending an independent school, with many amenities plus a television, a DVD player, and a computer. A media world at their finger tips (many from a young age), with little will to experience real play or encouragement to experience the outdoors. This comparison agrees with research by Loucaides et al., (2004) which shows that children who attend rural schools or grow up in a rural environment, spend more time outside than those children who attend urban schools.

Finally, the task which tested strength was scored higher by those attending independent schools. This may possibly be attributed to malnutrition and a lack of protein in the diet of the children attending a low socio-economic school, who currently may or may not have a feeding scheme in place.

4.5 MOTOR PROFICIENCY AND PHYSICAL EDUCATION

The discussion in 4.4 relates to the three demographic categories of schools assessed, to which various patterns regarding their physical education class structure can be assigned. The independent schools encompass a high standard of physical education where classes are presented twice per week for learners (Grade 1 & 2) for a duration of 45 minutes each, and are constructively planned and coordinated by an adequately qualified teacher. The classes mostly include the learning and practising of basic gross motor skills required for particular sporting games. These schools also include compulsory afternoon sport sessions where these learners engage in learning, practicing and playing a particular sport code. It was established that physical education classes in the government and low socio-economic government schools, take place on average only once per week in the majority of these schools. Most often these classes are presented by the class teachers themselves and often involve the children playing specific sports, where most of the learners are unable to perform basic gross motor skills required for the different sports. At these schools there is no regular compulsory afternoon sporting activities. These activities are offered on a voluntary basis only. This set-up, where after-school sport is not compulsory for the learners, allows those who are less confident to shy away from sport at a young age, and most often never to participate in sport again possibly not even in their high school career.

Possible causes of such findings may again be further explained in literature by Saakslähti et al., (1999); Thomas (1999); Rudisill et al., (2002) and Graft et al., (2004) who have discussed the negative influences of the lack of physical activity and, the fact that children, who are more active, –either in organized extramural activities and/or on a regular basis- have better gross motor development. These observations made may also be attributed to how time is spent during the different physical education classes, to what extent the refining of motor skills has been expressed and the extent of the quality of the feedback given; a phenomenon for low motor skill acquisition (Graham, 1987). For example, physical education lessons completed at an independent school take place more often than at a government school, and there is also compulsory after-school sport at these schools which most often the government schools don't inflict. The physical education lessons at such schools include extreme refining of motor skills, positive specific feedback and limited time for games. Whereas, at a government school, and this is possibly also associated with an increase in the number of children per class, most classes are more often games and specific sports codes with relative feedback comments, little refinement of basic motor skills and no individualized attention. This influence of a physical education trend shows remarkably in the results.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

Findings from this study show that motor proficiency trends in today's children vary according to age and gender. The type and amount of physical education children are exposed to before and during their elementary school years also influences motor performance.

5.1 CONCLUSIONS

1. Gender differences in motor proficiency scores were significant. Boys are no longer significantly stronger than girls in all motor skills. Girls show strength in skills such as balance and bilateral coordination.
2. An increase in chronological age is associated with an improved performance of motor skills.
3. Learners attending independent schools scored superior levels of motor proficiency, in contrast to government school learners who scored lower.

4. Physical education structures between the schools shows an influence on motor performance, as well as a child's previous exposure to physical activity during pre-primary years.

5.1.1 Gender and motor proficiency

The results of this study agreed with research by Krombholz (1997), who stated that girls fare better in some skills while boys perform better in others. In this specific study the differences are statistically significant. Girls out performed boys in tests for balance and bilateral coordination, while boys were significantly stronger in tests of running speed and strength. Upper-limb coordination was closely contested with the girls being narrowly defeated. Since physical characteristics of girls and boys are very similar prior to puberty, it would seem probable that differences in motor performance may be environmentally encouraged and attributed to the preferential motor activities of girls and boys Krombholz (1997). Also, as a result of our modern society, girls are brought-up and encouraged to participate in physical activity more now than ever before. *With such gender equality, in respect to physical activity, gender differences in motor skill performance will soon be closely marginalized.*

5.1.2 Age and motor proficiency

Motor proficiency commonly improves with age, but there are some skills in which older learners, possibly because of a proportionate increase in physical growth will be outperformed by a younger counter-part. These outcomes are in

agreement with research by Govatas (1959); Rarick (1980) and Krombholz (1997). Results demonstrated in the study, show improved motor performance by the older learners in four of the five areas of motor proficiency. Balance being the only task which is performed better by the younger learner. This result is possibly because older learners have experienced an unbalanced growth in stature and seem to be clumsy in terms of body control. A stronger, core stability may counteract the awkward body control associated with a disproportionate growth experienced during child development. However, further investigations of this topic would be necessary.

5.1.3 Motor proficiency and the three demographic classes of schools assessed

Children who are growing up in a rural environment and who attend a Low socio-economic government school, showed better acquisition in three of the five areas of motor skill performance (balance, bilateral and upper-limb coordination) possibly as a result of leisure activities they were exposed to during the important (pre-primary) fundamental development years. Such scores also verify the negative effects modern society and technology is initiating with regards to movement patterns and basic gross motor skills, which should be developed during childhood.

5.1.4 Physical education and motor proficiency

Participation in a physical education program can result in significant improvements in motor proficiency (Light et al., 2000). The structure and number

of these physical education classes contribute to overall motor performance. The independent schools curriculum allows for physical education classes to be presented twice per week as well as a structured compulsory after-school sporting program which is in place. In contrast, government schools only allow for on average one class per week, without any compulsory after school activity plan in place. The structure and nature of these physical education classes, regardless of number, is also very important. At this young developing age (under 8 years), fundamental motor skills need to be practised and mastered in order for these skills to become autonomous in sports specific situations. It has been the experience of this author that when physical education is assigned to a time period during the school day in a government organization, that children often spend the time in an unstructured environment or are “taught” to play specific sports such as soccer, hockey, etc. Again this is in contrast to the independent school set-up, where these lessons are prepared and the aim is for the learners to refine and master fundamental tasks in dynamic situations.

In despair to low motor proficiency scores by learners, literature by Smith and O’Keefe (1999), shows that low motor performance levels can be improved through appropriate and disciplined Physical Education lessons and learners up to the age of 12 years can catch up to achieve full development. Sufficient time in the elementary school curricula should be devoted to physical activity, as it has been stated by Shepard (1997) that added time for physical activity, has shown

no reduction in grades, many learners contrarily demonstrated improvement in their grades.

The relationship between gross motor performance and previous exposure to movement programs during the elementary school years of a child (4 -7years) - which are most prevalent for initial fundamental motor skill development (Burton 1992) - is a topic that requires further investigation.

5.2 RECOMMENDATIONS

The results of this study also lead to recommendation of topics for further research.

- *A continuation of such research is necessary to establish norm values of gross motor skills for South African children at various developmental stages of childhood. Gross motor skills should be concentrated on, as these are skills required to develop movement patterns for every day living and promote better social interactions.*
- *The issue of pre-primary exposure to physical activity should also be taken into consideration in a study of a child's experience in motor learning at pre-school, or what is now known as grade R. This may be where the learning phase is most predominant and experience will be most beneficial.*

- The importance of physical education in the South African school curricula should be reconsidered.
- Finally, it would be interesting to continue to compare and investigate the difference in motor competency of higher socio-economic and lower socio-economic learners.

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APPENDIX A

Letter to Department of Education –KZN: Requesting Permission to Conduct Research

University of Zululand
Private Bag X 1001
3886
7 March 2006

Superintendent-General
Department of Education
Private Bag X9137
Pietermaritzburg
3200

Attention: Dr R C Lubisi.

**RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH
IN PRIMARY SCHOOLS IN THE PIETERMARITZBURG
REGION**

Background

I, Nicola Portela, am currently completing my Masters in Human Movement Science through the University of Zululand and have chosen to complete my project in the area of physical education and the proficiency of gross motor skills in Primary School learners.

Purpose

The purpose of my study is to determine the average gross motor capabilities of primary school learners and to compare these values with others, as well as to identify the importance of a movement program on a regular basis in the class time table. Value of this research too lies in turn, with the end results being forwarded to a collection of data necessary for the development of a National Data-base of Motor Proficiency in Children.

Research methodology

The sample of participants will be selected from 17 Primary Schools in the Pietermaritzburg region of Kwazulu-Natal, which is regarded as the educational core of this respective province, and includes schools of a wide demographic range. Within each of the 17 schools all the learners of Grade One and Grade Two aged seven years and six months to 8 years at the time of the arranged assessment date will undergo motor proficiency assessments.

The Participation of both the school and the learner in this project would be on a voluntary basis. I, the researcher will personally confer with the school to negotiate a date and time, which would not compromise the learning schedule. Confidentiality of the school as well as the learner will be respected. Each child selected for assessment will need to have a consent form completed by his or her guardian prior to testing.

Key elements of the Bruininks–Oseretsky test (BOMPT) of motor proficiency will be used to assess the development of gross motor skills of learners. This test battery is comprised of 8 Subtests; these include an assessment of Running Speed and Agility, Balance, Bilateral Coordination, Strength and Upper Limb Coordination. The subjects will be encouraged at all times to complete each task to the best of his/her capability.

On Completion of this study both the Department of Education as well as each of the participating Schools will have a copy of the research available to them.

I will greatly appreciate if you could grant me the opportunity to carry out my study at schools within the Pietermaritzburg region as this would help me to further my education and knowledge of the related subject as well as facilitate research in the Motor Proficiency field

Thanking You,

Nicola Portela

Contact Details:

nportela901@yahoo.com

082 330 2718

033 394 3662 (fax)



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ISIFUNDAZWE SAKWAZULU-NATALI
PROVINSIE KWAZULU-NATAL

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INFLOKHOHOVISI

HEAD OFFICE

PIETERMARITZBURG

Enquiries:
Imibuzo: R. Cassius Lubisi PhD
Nevyazi:

Reference:
Inkomba: Verwysing: RESEARCH

Date:
Usuku: 07/04/2006
Datum

Ms Nicola Portela
University of Zululand
Private Bag x1001
3886

Dear Ms Portela,

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN PRIMARY SCHOOLS IN THE PIETERMARITZBURG REGION

Your request for permission to conduct research in the Pietermaritzburg Region in the area of physical education and the proficiency of gross motor skills in Primary School learners is granted subject to the following conditions:

- o Principals and educators are under no obligation to assist you in your investigation.
- o Principals, educators and schools should not be identifiable in any way from the results of the investigation.
- o You make all the arrangements concerning your investigation.
- o Teaching and Learning programs are not to be interrupted.
- o A photocopy of this letter is submitted to the principal of the school/institution where the intended research is to be conducted.
- o Your research will be limited to the identified educators/learners.
- o A brief summary of the content, findings and recommendations are provided to the Superintendent-General of this Department.
- o The Department receives a copy of the completed report/dissertation/thesis.

It is hoped that you will find the above in order.

Best Wishes.

R CASSIUS LUBISI, PhD
SUPERINTENDENT-GENERAL

Letter to all the schools involved in the assessments

Date

To The Principle of

I, Nicola Portela, am currently completing my masters in Human Movement Science at the University of Zululand and have chosen to complete my project in the area of physical education, and the proficiency of gross motor skills in primary school children.

The purpose of my study is to determine the average gross motor capabilities of the children and to compare these values with those I collected from a study in Empangeni during my honours year [2004]. This study will help to identify the importance of a movement program on a regular basis in the class timetable. Through this study I will be assessing 17 schools in the Pietermaritzburg region and will be able to provide you with feedback regarding the motor skill abilities of your learners.

I hereby ask permission to conduct a gross motor skill proficiency assessment on the Foundation Phase learners [between the ages of 7 years 6months and 8 years], of your School. The test will be individually administered and 4 children can be accommodated every half hour.

The assessment procedure will consist of eight sub-tests related to running speed and agility, bilateral coordination, balance, strength, and upper limb coordination, and will be conducted by myself. In order to avoid variance in the availability of the subjects I would appreciate it if the tests could be completed during school time and in an indoor facility at your school. All information used in this regard will remain confidential, and neither the name of the school or any of the subjects tested will be mentioned in the document.

I would appreciate it if you could grant me the opportunity to carry out my study at your school as this will help me successfully complete my masters project and thus further my education and knowledge of the related subject.

Your positive confirmation in this regard will be highly appreciated.

Thanking you,

Nicola Portela

Letter to the parents of the learners selected for testing

Date

Dear Parent/ Guardian,

I Nicola Portela am currently completing my Masters in Human Movement Science at the University at Zululand. I have chosen to direct my research in the field of motor development in children and the project is entitled *"Motor skill proficiency levels of foundation phase primary school children in the Pietermaritzburg area"*.

I require subjects both boys and girls currently completing Grade 1 or 2 within the age bracket 7 years and 6 months to 8 years. The test battery to be completed consists of 8 subtests aimed at evaluating gross motor skills, from which my data will be recorded. These tests include activities such as running, jumping, throwing, kicking and balancing, which the child will be encouraged to complete to the best of his/her ability.

All testing will be administered during school hours allocated by the school and at the school premises. Children will be required to wear PE kit during the testing period. Please be assured that neither the name of the school nor the candidates, being assessed will be mentioned in the document.

SCHEDULED TESTING DATE:

Any further questions may be directed to the respective class teacher who will confer with me.

With this I ask you to kindly complete the attached consent form and return it to your child's class teacher as soon as possible prior to the testing.

Your cooperation in this regard is greatly appreciated,

Thank you,
Nicola Portela

INFORMED CONSENT FORM

I,, having been fully informed of the nature of the research entitled *Investigation of the proficiency of motor skills in primary school children in Pietermaritzburg*, do hereby give my consent for my child.....to act as a subject in the above mentioned research.

I agree to any relevant finding being passed on to members of the research team, and to the use of this information in publication for research purposes with the name of the participant remaining confidential.

I realize that it is necessary for my child to promptly report any signs or symptoms indicating any *abnormalities to the researcher*.

I am aware that I may withdraw my consent and that my child can withdraw from participation in the research at any time.

I have read the above and understand it, any questions which may have occurred have been answered to my satisfaction.

.....
[Print name] [Signature] [Date]

PARENT OR GUARDIAN OF THE SUBJECT

.....
[Print name] [Signature] [Date]

PERSON ADMINISTRATING INFORMED CONSENT

APPENDIX B

Evaluation sheet for each assessment

NAME

GIRL ☐ BOY ☐

SUBTEST 1: RUNNING SPEED AND AGILITY

1. Running Speed and Agility

Trial 1: seconds
Trial 2: seconds

SCORE:

SUBTEST 2: BALANCE

1. Standing on Preferred Leg on Balance Beam (10 seconds max per trial)

Trial 1: seconds
Trial 2: seconds

SCORE:

2. Walking Forward Heel-to-Toe on Balance Beam

Trial 1: steps
Trial 2: steps

SCORE:

SUBTEST 3: BILATERAL COORDINATION

1. Tapping Feet Alternately While Making Circles with Fingers (60 seconds max)

Pass
Fail

SCORE:

2. Jumping Up and Clapping hands

Trial 1: claps
Trial 2: claps

SCORE:

SUBTEST 4: STRENGTH

1. Standing Broad Jump (second distance from tape measure)

Trial 1:
Trial 2:
Trial 3:

SCORE:

SUBTEST 5: UPPER-LIMB COORDINATION

1. Catching a Tossed Ball with the Preferred Hand (5 trials)

Handedness: ☐ Right ☐ Left

SCORE:

2. Throwing a Ball at a Target with Preferred Hand (5 trials)

Handedness: ☐ Right ☐ Left

SCORE:

OBSERVATIONS:

DATE OF BIRTH

DATE TESTED

Point Score Table

Table 1: Point scores for test 1 Running speed and agility

<u>RAW SCORE</u> <u>(seconds)</u>	<u>POINT SCORE</u>
10.9 – 11	1
10.5 – 10.8	2
9.9 – 10.4	3
9.5 – 9.8	4
9.4 – 8.9	5
8.8 – 8.5	6
8.4 – 7.9	7
7.8 – 7.5	8
7.4 – 6.9	9
6.8 – 6.7	10
6.6 – 6.3	11
6.2 – 6.1	12
6.0 – 5.7	13
5.6 – 5.5	14
<5.5	15

Table 2: Point scores for test 2 Balance (standing on the preferred leg on a balance beam)

<u>RAW SCORE</u> <u>(seconds)</u>	<u>POINT SCORE</u>
1 – 2	1
3 – 4	2
5 – 6	3
7 – 8	4
9	5
10	6

Table 3: Point scores for test 2 Balance (walking forward heel-to-toe on a balance beam)

<u>RAW SCORE</u> <u>(steps)</u>	<u>POINT SCORE</u>
0	0
1 – 3	1
4	2
5	3
6	4

Table 4: Point scores for test 3 Bilateral Coordination (tapping feet alternately while making circle with fingers)

<u>RAW SCORE</u>	<u>POINT SCORE</u>
Pass	1
Fail	0

Table 5: Point scores for test 3 Bilateral Coordination (jumping up and clapping hands)

<u>RAW SCORE</u>	<u>POINT SCORE</u>
0	0
1	1
2	2
3	3
4	4
>4	5

Table 6: Point scores for test 4 Strength

<u>RAW SCORE</u>	<u>POINT SCORE</u>
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15

Table 7: Point scores for test 5 Upper-Limb Coordination (catching a tossed ball with the preferred hand)

<u>RAW SCORE</u>	<u>POINT SCORE</u>
0	0
1 – 2	1
3 – 4	2
5	3

Table 8: Point scores for test 5 Upper-Limb Coordination (throwing a ball at a target with the preferred hand)

<u>RAW SCORE</u>	<u>POINT SCORE</u>
0	0
1 – 2	1
3 – 4	2
5	3