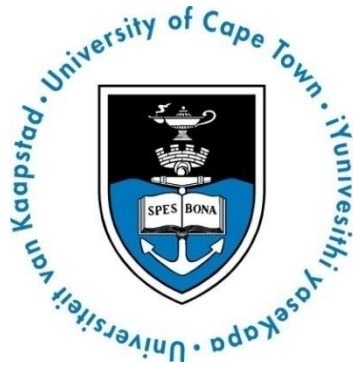




The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learners' Health-Related Quality of Life, Body Mass Index, and Physical Fitness: A Randomised Control Trial

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ABSTRACT

Background:

Childhood obesity, a rising problem world-wide and within South Africa, has been negatively linked with both physical fitness (PF) and health-related quality of life (HRQoL). The school environment is the ideal setting for children to obtain the skills and knowledge to increase physical activity (PA) levels and healthy diets. PA and school-based nutrition intervention programmes have been shown to have positive effects on diet and PA behaviours in children. However, there is minimal literature reporting on the effectiveness of school-based interventions in a South African setting.

Aim:

The primary aim of the first phase of the study was to provide a contextual background regarding the provision of PA in school-based PE programmes within a small sample of schools from which the learners in the intervention study were drawn. The primary aim of the second phase of the study was to determine the effect of a teacher-based intervention programme after six weeks for primary schools with less than the mandated amount or no specific amount of PE on learner's HRQoL, Body Mass Index (BMI) and PF.

Methodology:

Ten schools were randomly selected from the circuit lists within the Port Elizabeth Education District. Ten staff members from the selected schools completed the School Environment Questionnaire in order to provide a situational analysis regarding the provision of PA in school-based PE programmes.

A sample of 300 learners (aged nine to eleven) from four randomly selected schools participated in the pre-testing measures in order to establish the weight status (using BMI and waist circumference (WC)), HRQoL (using the EQ-5D-Y), and PF (using the Eurofit test battery). Class teachers, from schools with less than the mandated amount of PE or no specific amount of PE, who were part of the experimental group, implemented the intervention. In order to implement the intervention, they received training and were given a PE programme booklet. The PE intervention programme was in line with the Curriculum and Assessment Policy Statement teaching plan for life skills, and was based on targeting the deficiencies found in the pre-testing fitness measurements. Post-testing measures, using the same learners, were conducted six weeks later. The obtained results were analysed using STATISTICA version 12.

Results:

Phase one of the study revealed that PE was provided at all schools. The curriculum was followed by 90% of schools, but only 30% had teachers with PE qualifications. PE policies and practices were being developed and/or implemented in 70% of schools, and 50% had no specific amount of time mandated to PE, or less than the mandated amount. Soccer was offered at all schools, and 80% of schools had access to an outdoor sports field and an outdoor paved area.

Phase two of the study found that the control and experimental groups were not equivalent at baseline with regard to gender distribution, BMI Z-scores and interpretations, the EQ-5D-Y “looking after myself” variable, and the sit-up test. No positive significant differences were noted in BMI Z-scores, WC, HRQoL, or PF components in the experimental group after the six-week intervention.

Discussion:

The average duration of PE at 70% of the participating schools was longer than the national average, despite half of the schools not implementing the mandated amount of PE. Gaps in the curriculum content and unqualified PE teachers may have prevented learners from developing the necessary skills associated with PE, including the various components of PF.

The six-week teacher-based intervention was found to be ineffective. Similar results were seen in other South African studies. Insignificant intervention findings may be the result of poor intervention implementation or compliance, time constraints experienced by participating teachers, and the short six-week duration of the intervention. Teachers mainly commented on the enjoyment of the intervention programme by the learners.

Conclusion:

This study concludes that the effects of the six week teacher-based intervention, on primary school learners’ HRQoL, BMI, and PF, was insignificant. Nevertheless, all schools provided PE, despite half of the schools not implementing the amount mandated. This study provides a platform for future studies in the attempt to reduce the occurrence of obesity in school children; thereby reducing its increasing national burden on health and the economy.

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ABBREVIATIONS

BMI	body mass index
CAPS	Curriculum and Assessment Policy Statement
CDC	Centers for Disease Control and Prevention
CIM	core indicators and measures
cm	centimetres
EC	Eastern Cape
ECDoE	Eastern Cape Department of Education
HREC	Human Research Ethics Committee
HRQoL	health-related quality of life
kg	kilograms
LO	Life Orientation
LS	Life Skills
NCD	non-communicable diseases
NCS	National Curriculum Statement
PA	physical activity
PE	physical education
PedsQL	Pediatric Quality of Life Inventory
PEED	Port Elizabeth Education District
PF	physical fitness
SEQ	School Environment Questionnaire
SES	socioeconomic status
SHAPES	School Health Action, Planning and Evaluation System
SHES	School Health Environment Survey
UCT	University of Cape Town
USA	United States of America

VAS	visual analogue scale
WC	waist circumference
WCPT	World Confederation for Physical Therapy
WHO	World Health Organisation
WHR	waist-to-hip ratio

1 CHAPTER ONE: INTRODUCTION

1.1 Introduction

Obesity is a rapidly rising global problem, which has more than doubled between 1980 and 2014 (World Health Organisation [WHO], 2016a; Caballero, 2007). The WHO (2016a) determined that 600 million adults, of the 1.9 billion who were overweight, were obese. The fast-growing prevalence of children under the age of five (42 million recorded in 2005) being either overweight or obese, is of particular concern as childhood obesity will often continue into adulthood (Nemet *et al.*, 2005). In order to highlight the problem locally, a sample of South African children showed that 11.9% and 8.1% were overweight and obese, respectively (Armstrong *et al.*, 2006). A study conducted in Port Elizabeth, in the Eastern Cape (EC), reported that the prevalence of overweight and obese individuals is increasing among urban children from economically advantaged backgrounds (McKersie & Baard, 2014), indicating that this problem transcends socio-economic backgrounds, and contributes to the global childhood epidemic.

Overweight body conditions and obesity contribute to premature medical complications and the increasing risk of chronic non-communicable diseases (NCD) such as cancer, ischaemic heart disease (WHO, 2009), orthopaedic complications, type two diabetes, hypertension, compromised immune function, skin impairments, sleep disturbances, cardiovascular disease, and impaired mobility (Doak *et al.*, 2006). Obesity is also negatively associated with psychosocial well-being (Schwimmer, Burwinkle & Varni, 2003), such as decreased levels of self-esteem associated with loneliness, unhappiness, anxiety, high risk behaviours (Pinhas-Hamiel *et al.*, 2006), healthy diets (WHO, 2016h), and poor health-related fitness (Truter, Pienaar & Du Toit, 2010). Truter, Pienaar & Du Toit (2010) concluded that health-related fitness may prevent the risk of obesity and obesity-related diseases in adulthood. In South Africa, physical fitness (PF) in urban youth appears to be declining (Healthy Active Kids, 2007). WHO (2016h) states that healthy eating decreases the risk of childhood obesity and improves the wellbeing and learning potential of children.

Considering the childhood obesity epidemic, the school environment is the ideal setting for children to obtain the skills and knowledge to increase their physical activity (PA) levels, and to maintain a healthy diet as this is where children spend the majority of their time (WHO, 2016c). The WHO states that children should participate in “at least 60 minutes of moderate-to-vigorous intensity PA daily”, and that vigorous-intensity activities should be included at

least three times per week (WHO, 2011b: 7). In South Africa, in 2004, physical education (PE) was integrated into the life skills (LS) curriculum (Draper *et al.*, 2010), where one hour per week (40 hours per year) was allocated to PE (Department of Basic Education, 2011). However, there were problems associated with this change in curriculum (Draper *et al.*, 2010). Problems in PE were identified as policy shortfalls in curriculum content, implementation, time allocation, teachers' attitudes towards PE delivery, and the number of qualified PE teachers (Hardman & Marshall, 2000).

Extensive research in various settings has been conducted on PA and school-based nutrition intervention programmes, such as *The Child and Adolescent Trial for Cardiovascular Health* and *Action Schools! BC*, which were both shown to have positive effects on diet and PA behaviours in children (Draper *et al.*, 2010). However, there is minimal literature reporting on school-based interventions in an African setting (Draper *et al.*, 2010). Intervention programmes that target obesity should focus on targeting behaviours related to the energy content of the diet and an increased sedentary lifestyle (Brown & Summerbell, 2009). Obesity intervention programmes included within existing classes in schools have shown to decrease costs and improve reproducibility (Gortmaker *et al.*, 1999). Gortmaker *et al.* (1999) concluded that a school-based approach is a promising method to reduce obesity among children. School teachers have direct contact with large numbers of learners in a setting that has the potential to have a positive influence on the delivery of health promotion programmes and support healthy behaviours (Sahota *et al.*, 2001). Their continued professional development is a sustainable and accessible teacher-directed strategy for executing multicomponent, school-based PA (Castelli, Centeio & Nicksic, 2013). In order to test the feasibility of a school-based programme for obesity prevention amongst adolescent girls, school intervention staff participated in training and received a detailed handbook to guide them in implementing the programme. The programme, measured by body mass index (BMI), a self-report on PA, and numerous other variables, was well received and was suitable within school PE programmes (Neumark-Sztainer *et al.*, 2003).

A number of studies have focused on childhood obesity and its contributors (Ende, Twisk & Monyeki, 2014; Pienaar, 2015; Muthuri *et al.*, 2014a). This study explored the effects of a teacher-based intervention programme after six weeks, for primary schools with little (less than the mandated amount) or no stipulated amount of PE compared to the National Curriculum and Assessment Policy Statement (CAPS), on learners' health-related quality of life (HRQoL), BMI, and PF. It also provided a contextual background for the provision of PA in school-based PE programmes. The study's findings contribute to the knowledge of PA

implementation in schools, and inform the development of programmes to address any deficiencies in PA implementation that may arise from the study; in order to improve the health status of all children.

Information for the purpose of this study has been sourced from the following search engines: PubMed, Medline, CINAHL, Health Source: Nursing/Academic Edition and Consumer edition, Google Scholar, Science Direct, PEDro, and the WHO Global Database.

1.2 Justification/rationale of study

Childhood obesity is recognised by the WHO and the World Confederation for Physical Therapy (WCPT) as an international epidemic (WHO, 2016c; WCPT, 2016). Studies show that obesity during childhood may increase the likelihood of adult morbidity and mortality (Dietz, 1998). The school environment has been shown to be the most ideal setting for PA interventions (Kriemler *et al.*, 2011). Brown & Summerbell (2009) remark that the school setting has been shown to offer constant contact with the learners as well as the school facilities and resources, policies, syllabus content, and the teachers who have the potential to influence the health of the children in a positive manner. Previous studies on the relationships between PA and obesity (Pereira *et al.*, 2010), PF and obesity (Brunet, Chaput & Tremblay, 2007), and HRQoL and obesity (Schwimmer, Burwinkle & Varni, 2003) found negative relationships. However, global and local (in South Africa) research is limited in determining the relationships between these factors. Similarly, minimal research has been conducted on obesity prevention or intervention programmes with children in a South African context. The findings could facilitate the development of strategies to address overweight and obesity in children. In addition, these strategies can aid in promoting a healthy, active lifestyle that could be recommended for implementation at all schools.

1.3 General aims of the study

Phase one:

The primary aim of the first phase of the study was to:

- Provide a contextual background regarding the provision of PA in school-based PE programmes in the Port Elizabeth Education District (PEED) of the EC within a small sample of schools from which the learners in the intervention study were drawn.

Phase two:

The primary aim of the second phase of the study was to:

- Determine the effect of a teacher-based intervention programme after six weeks for primary schools within the PEED of the EC with less than the mandated amount or no specific amount of PE mandated on learners' HRQoL, BMI, and PF.

The secondary aim of the second phase of the study was to:

- Determine any association between obesity, HRQoL, PF and the extent of PA implementation in school-based PE programmes in selected primary schools in circuits within the PEED of the EC.

1.4 Specific objectives

Phase one:

To provide a profile of randomly-selected schools within the circuit from which the sample for phase two was drawn. The profile concerned the extent of PA implementation in school-based PE programmes in primary schools in the PEED with regards to time allocation, policy implementation, teachers' attitudes towards PE, qualifications to teach PE, equipment and facilities, and extramural activities.

Phase two:

To determine:

- The effect of a teacher-based intervention programme on the HRQoL, BMI, and PF of school learners between the ages of nine and eleven.
- Whether there are any relationships between obesity, HRQoL, extent of PA implementation in PE programmes, and PF in these school learners in grades four and five, between the ages of nine to eleven.

1.5 Hypothesis and null hypothesis

Hypothesis:

There is a significant difference in the HRQoL, BMI, and PF of learners who participated in a six-week teacher-based intervention programme consisting of a suggested PE programme, and learners who have not been exposed to the suggested PE programme during this time.

Null Hypothesis:

There was no significant difference in HRQoL, BMI, or PF in learners who have participated in a six-week teacher-based intervention programme consisting of a suggested PE programme, and learners who have not been exposed to the suggested PE programme during this time.

1.6 Definitions and terms

The following concepts will be referred to throughout this dissertation; therefore, classification by definition is deemed necessary.

1.6.1 Teacher-based intervention programme

Intervention programmes focussing on minimising the prevalence of obesity in children and improving PA or PF (Thivel *et al.*, 2011). Teacher-based or school-based interventions are conducted at schools with teachers implementing the intervention with the learners (Lonsdale *et al.*, 2013).

1.6.2 Health-related quality of life

“HRQoL can be viewed as a psychological construct, which describes the physical, mental, social, psychological, and functional aspects of well-being and function from the patient’s perspective” (Ravens-Sieberer & Bullinger, 1998: 399).

1.6.3 Body mass index

BMI is a simple measure of weight-for-height (WHO, 2016a), which is used to determine overweight and obesity in adults and children, for the latter taking age and gender specific changes into consideration (Centers for Disease Control and Prevention [CDC], 2015a). BMI is defined as an individual’s weight (kilograms (kg)) divided by the square of their height (meters) (WHO, 2016a).

1.6.4 Physical fitness

The American College of Sports Medicine (2013) defines PF as a set of features people have or achieve, which relate to their capability to engage in PA. PF is described as being skill-related and health-related. Skill-related fitness is associated with motor performance or sport (balance, agility, co-ordination, reaction time, power, and speed), whereas health-

related fitness is linked to body composition, muscular strength and endurance, flexibility, and cardiovascular endurance.

1.6.5 Physical activity

The WHO defines PA as “any bodily movement produced by skeletal muscles that requires energy expenditure” (WHO, 2016e: 1). PA for children includes play, games, household tasks, sports, transportation, leisure activities, planned exercise, and PE in the milieu of community, school and family activities (WHO, 2011b).

1.6.6 Obesity

The WHO (2016a: 1) defines overweight and obesity as “abnormal or excessive fat accumulation that may impair health.”

1.6.7 Physical education

PE is a part of the school curriculum that focuses on developing learners’ physical confidence and competence, and their ability to use these to execute a variety of activities (Bailey, 2006).

1.7 Outline of the dissertation

This dissertation is presented in four further chapters:

- In Chapter two, the literature review pertaining to the background on childhood overweight and obesity internationally, and in the South African context is presented;
- Chapter three presents the school environment (phase one), which provides a contextual background regarding the provision of PA in school-based PE programmes during school hours;
- Chapter four reports on the results of the intervention study (phase two) on the effect of a teacher-based intervention programme for primary schools; and
- Chapter five includes the discussion and conclusions drawn from phases one and two.

2 CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Childhood obesity and physical inactivity are on the rise globally. Non-communicable disease-related deaths can be attributed to physical inactivity, whereas childhood obesity is associated with the risk of obesity, physical morbidity, and early mortality in adulthood (Lee *et al.*, 2012). Regular PA promotes the development of the cardiovascular system, neuromuscular awareness, and musculoskeletal tissues and assists in the maintenance of a healthy body weight (WHO, 2011b). It is also linked to psychological benefits such as social growth (WHO, 2011b), and improvements in general quality of life (Allender, Cowburn & Foster, 2006). The WHO (2011b: 7) states that children should participate in “at least 60 minutes of moderate to vigorous intensity PA daily”, and that vigorous intensity activities should be included at least three times per week.

Due to the fact that obesity is related to an increase in sedentary behaviour as well as the energy content of one’s diet, it is important that intervention programmes target these behaviours (Brown & Summerbell, 2009). Schools play a vital role in promoting healthy behaviour and identifying children at risk (Muthuri *et al.*, 2014b). Interventions that use multiple components within the school environment have been shown to be effective in increasing PA and PF levels, and reducing adiposity in children (Kriemler *et al.*, 2010b). This chapter explores the problem of obesity and physical inactivity globally and within South Africa. It also identifies the determinants of obesity, the effects of obesity on HRQoL, the benefits of PA and PF, and recommendations from the WHO. Furthermore, it summarises findings of interventions targeting obesity and improving PA and PF, and reviews related literature.

2.2 Physical activity and physical education

2.2.1 Prevalence of physical activity and physical education

Physical inactivity has been identified as the fourth leading risk factor for global mortality (WHO, 2011b). Levels of physical inactivity are rising in many countries, with major implications for the general health of people worldwide and for the prevalence of NCD and their risk factors (WHO, 2011b). According to Kohl *et al.* (2012), in 2009, the worldwide prevalence for physical inactivity was 17%, with 31% of the global population not meeting

the minimum recommendations for PA. Evidence suggests that six to ten percent of non-communicable disease-related deaths globally can be attributed to physical inactivity (Lee *et al.*, 2012). This percentage increases for specific conditions; for example, these figures increase to 30% for ischaemic heart disease (Lee *et al.*, 2012). The *Health Behaviour in School-Aged Children* study, undertaken in 41 countries, showed that the prevalence of physical inactivity, on average for all countries, was 75% for boys and 85% for girls (World Health Organization Regional Office for Europe, 2008). A study conducted in Nairobi, Kenya, showed that only 12.6% of children achieved the recommendation of more than, or equal to 60 minutes of daily moderate to vigorous PA, indicating that this global challenge needs to be addressed (Muthuri *et al.*, 2014a).

The 2002 National Youth Risk Behaviour Survey suggested that more than one-third of South African children participated in insufficient or no PA weekly (Reddy *et al.*, 2003). The Healthy Active Kids (2014) report stated that although South African children scored 40-59% for overall PA in 2010, this has decreased to 20-39% in 2014. In 2016, the overall PA had increased to 41-60% (Uys *et al.*, 2016). Most children get less than one third (20 minutes) of the daily amount of PA; the average time spent being moderately to vigorously active was 100 to 200 minutes per week (Healthy Active Kids, 2014). Almost three hours per day were spent watching television (Healthy Active Kids, 2014). Participation in sport was higher in urban areas (66%) compared to rural areas (50%) (Healthy Active Kids, 2014). The report also stated that less than 66% of South African children participated in weekly PE classes, with 30 - 40 minutes per week being the average time spent in PE (Healthy Active Kids, 2014).

An international study conducted in 126 countries established the state and status of PE in schools with semi-structured questionnaires and an extensive literature survey (Hardman & Marshall, 2000). Results indicated that in 29% of cases globally, PE was not implemented in accordance with the policy guidelines. Africa had the most shortfalls in policy implementation, with 75% of PE not being implemented. A study conducted in four provinces in South Africa, using questionnaires, established that high-quality PE was not being provided within primary schools, partly due to LS teachers not being qualified to teach PE (van Deventer, 2011). Limited research has been conducted within a South African setting, specifically within the PEED, to establish the state and status of PE programmes, if an intervention is necessary, and whether it would be beneficial.

2.2.2 Benefits of physical activity and physical education

As previously mentioned, regular PA promotes the development of the neuromusculoskeletal and cardiovascular system, and supports the management of a healthy body weight. It is also linked to psychological benefits, and assists in social growth (WHO, 2011b) as well as improvements in general quality of life (Allender, Cowburn & Foster, 2006).

Health and PE can play a vital role in enabling children to enhance their PA (ACARA, 2014). A concept fundamental to PE is movement and its varying components, which allows children to competently participate in a range of physical activities. Movement is viewed as an excellent tool, aiding the development of social, behavioural, cognitive, and personal skills (ACARA, 2014). Learners begin to realise the importance of PA and sports from a young age as they acquire proficiency in movement skills and concepts as well as physical activities; all of which provide a solid foundation for lifelong PA participation (ACARA, 2014). Academic performance has also shown to improve with added PE time to the syllabus, even when time assigned to other academic subjects is decreased (Strong et al., 2005).

2.2.3 Reasons for physical inactivity

According to Allender, Cowburn and Foster (2006), gender, social class, ethnicity, socio-economic status, and intra-personal, social and environmental factors influence participation in PA. Few types of sports and PA demonstrated reduced participation levels in children (Allender, Cowburn & Foster, 2006). The role and support of parents was also shown to be significant in the involvement of children in PA. Environments that are perceived as unsafe also contribute to physical inactivity levels (Allender, Cowburn & Foster, 2006). A study conducted by Porter (2002) showed that parents were more willing to support physical activities that were easily accessible and had a safe playing environment.

Goedecke, Jennings and Lambert (2006) attributed decreased levels of PA in South Africa to poverty and increasing urbanisation. There is also a racial disparity in the PA levels in South Africa (McVeigh *et al.*, 2004). McVeigh, Norris and de Wet (2004) found black children to be less physically active and less likely to participate in school PE classes than white children.

2.2.4 Recommendations for physical activity and physical education

The WHO (2016c) recommends that schools offer daily PE classes with a variety of activities in order to accommodate the majority of learners' interests, needs, abilities, and

extracurricular activities such as school sports. They further state that children should participate in “at least 60 minutes of moderate to vigorous intensity PA daily” and that vigorous-intensity activities should be included at least three times per week (WHO, 2011b: 7). Schools should be the primary environment for allowing children to meet these recommendations because, since the time of Apartheid, previously-disadvantaged areas continue to lack adequate physical opportunities, recreational facilities, and community sport (Walter, 2011).

The current CAPS for LS allocates one hour per week (40 hours per year) to PE in the intermediate phase, for grades four to six (Department of Basic Education, 2011). Creative arts, and personal and social well-being are other study areas within the LS syllabus, both of which are allocated more time (one and a half hours per week) than PE. The statement also provides a teaching plan for PE in specific grades within the intermediate phase (Appendix 1), as well as the breakdown of the teaching plan across the four terms of the year.

2.2.5 Problems in physical education

According to Draper *et al.* (2010), prior to 2004, PE was a subject on its own. It was then integrated into the life orientation (LO) curriculum as one of its four learning outcomes. This integration resulted in multiple challenges arising, and the need for quantity and quality development in PE has been recognised. In a follow up study by de Villiers *et al.* (2012), the most significant barriers for successful PE programmes were a lack of financial resources, and lack of time. Another barrier for successful PE programmes in South Africa has been the qualification of LO teachers, where 51% of teachers in the foundation phase and 49% in the intermediate phase were not qualified to teach PE (van Deventer, 2011). An international study evaluating the state and status of PE programmes established that Africa had the most gaps in policy implementation compared to other continents (Hardman & Marshall, 2000). The authors identified problems relating to PE in South Africa due to the shortfalls in the policy of curriculum content and implementation, time allocation, head teachers’ attitudes towards the delivery of PE, and a shortage of trained PE personnel (Hardman & Marshall, 2000).

2.2.6 Measures of physical activity and physical education

There are several studies to support the use of various instruments to measure PA levels in children, namely: pedometers, heart rate monitors, direct observational systems,

accelerometers, and self-report methods (Pate, O'Neill & Mitchell, 2010); however, this particular study focuses on assessing PE programmes within schools.

According to the WHO (2008:1), a situational analysis will provide a baseline evaluation of the current school environment in order to “better understand the needs, resources and conditions” of the school. This information can be used quantitatively to determine the *status quo* of PE programmes in schools in order for future appropriate PF and PA interventions to be developed. A questionnaire has been developed to assess PA and PE interventions at schools, and the extent to which they are implemented; it is informed by the School Health Environment Survey (SHES) used in the Canadian School Health Action, Planning and Evaluation System (SHAPES) (Wong, Leatherdale & Manske, 2006). The Physical Education Curriculum Analysis Tool (PECAT) developed by the CDC (2015b) and the System for Observing Fitness Instruction Time (SOFIT) (McKenzie, 2006), are other measurement tools that have been developed to assess PE programmes.

2.3 Obesity

2.3.1 Prevalence of obesity

The majority of the global population resides in countries where overweight and obesity are responsible for more deaths than underweight body conditions (WHO, 2016a). In 2014, 39% of adults, globally, were overweight, and 13% were obese (WHO, 2016a). The prevalence of childhood obesity worldwide increased by 47.1% between 1980 and 2013 (Ng *et al.*, 2014). During that same period, Ng *et al.* (2014) also stated that the prevalence of childhood obesity in developing countries increased from 8.1% to 12.9% in boys, and 8.4% to 13.4% in girls. Obesity is a major problem, as depicted in a study by de Onis, Blossner and Borghi (2010), where 43 million children worldwide were estimated to be overweight or obese, with 35 million of them living in developing countries. Furthermore, 92 million children were at risk for becoming overweight (de Onis, Blossner & Borghi, 2010). Between the 1980s and 1990s, the prevalence for childhood overweight and obesity increased from two to five times in developed countries such as Canada (from 11% to 30%) and developing countries such as Brazil (from four percent to 14%) (Flynn *et al.*, 2006). In Africa, the prevalence was 8.5% in 2010 and it is predicted to reach 12.7% by 2020 (de Onis, Blossner & Borghi, 2010). This increase was echoed in a study conducted in Nairobi, Kenya, where 3.7% of children were underweight, 14.4% were overweight, and 6.4% were obese (Muthuri *et al.*, 2014a). Similarly in Botswana, 5% of children were underweight and 16.7% of children were overweight or

obese (Malete *et al.* (2013), as cited by Muthuri *et al.* (2014b)); and Ghana, where 6% of children were underweight and 19.3% of children were overweight or obese (Opare-Addo *et al.* (2012), as cited by Muthuri *et al.* (2014b)).

South Africa has one of the highest obesity rates in Africa (Muthuri *et al.*, 2014b; Reddy *et al.*, 2009). It is important to consider that overweight and obesity vary between ethnic groups, geographical areas, gender and age groups (Rossouw, Grant & Viljoen, 2012). To highlight the problem of overweight and obesity locally, a study conducted over three years demonstrated that overall obesity increased from 12.5% at baseline to 16.7% at follow-up, in both white and black children (Pienaar, 2015). The overall prevalence of obesity doubled in white children (27.3%) in comparison to black children (13.3%) during the final year, with the prevalence increasing more in boys than girls, despite girls showing a higher overall prevalence (Pienaar, 2015). Various measures for body composition were found to be higher in people living in an urban environment and those with a higher socioeconomic status (SES), compared to people living in rural environments and those with a lower SES (Muthuri *et al.*, 2014b). These statistics illustrate the challenge of breaking the cycle of obesity once it begins (Pienaar, 2015). A limited number of studies have been conducted in the EC province of South Africa regarding the prevalence of overweight and obesity.

Childhood obesity has a significant effect on health, and the statistics indicate a pressing need for the issue to be addressed (Dietz, 1998; Ng *et al.*, 2014; de Onis, Blossner & Borghi, 2010). Children in less-resourced countries such as South Africa are affected by poor nutrition, leading to obesity as well as under-nutrition (Kelishadi, 2007). This was reiterated in a study by Muthuri *et al.* (2014b), where trends demonstrated that the prevalence of overweight and obesity have been increasing over time in school-aged children as well as the continuous challenge of correcting underweight body conditions. Both extremes should be considered as they are both critical issues (Mendez, Monteiro & Popkin, 2005). The National School Nutrition Programme is in place to tackle the problem of under-nutrition in South Africa (Department of Basic Education, 2016), whereas the problem of obesity is yet to be adequately addressed. These studies show that the prevalence of overweight and obesity in children is of concern within South Africa, even while the issue of children being underweight prevails.

2.3.2 Determinants of obesity

Pienaar (2015:2) stated that “globalisation, improving economic conditions and changing dietary habits in developing countries are purported as responsible for the rapid increase in

obesity". These factors are related to the absence of supportive policies within various sectors of the economy such as transport, education, health, and agriculture (WHO, 2016a). The issue of overweight and obesity has not been made a priority in South Africa due to the government's focus on poverty and related illnesses (Reddy *et al.*, 2012). Within an African cultural context, overweight is seen as a sign of health, affluence, prestige, and beauty, whereas underweight conditions are linked to poverty and ill health (Kruger, Kruger & Macintyre, 2006; Muthuri *et al.*, 2014b). In contrast, white girls appear to be more heavily influenced by Western beauty ideals, which shun being overweight or obese (Armstrong *et al.*, 2006). O'Dea (2003) also found BMI to be significantly higher among low socio-economic groups. Furthermore, Zellner *et al.* (2006) suggested that psychological status can influence eating habits, causing an eating response to negative emotions. According to Muthuri *et al.* (2014a), a large contributor to the obesity epidemic is a rise in the consumption of calorie-dense foods, together with a decrease in PA, and a sedentary lifestyle. An example of this in urban settings can be seen in the past, where walking long distances and physical labour were routine; however these have largely been replaced by motorised transport, and more sedentary activities such as watching television (Muthuri *et al.*, 2014b). Healthy lifestyle behaviours are particularly important as they develop during childhood and lay the foundations for adult health (Healthy Active Kids, 2010). Thus, alterations of these habits through education can reduce or prevent childhood obesity (WHO, 2016c), and reduce its prevalence in adulthood (Healthy Active Kids, 2010).

2.3.3 Measures of obesity

BMI is "a simple index of weight-for-height that is commonly used to classify overweight and obesity" (WHO, 2016a: 1). The definition of an individual's BMI is: weight (in kg) divided by the square of his or her height (in metres). BMI offers a valuable population-level measure of overweight and obesity (WHO, 2016a). The WHO's growth reference tables and charts for children between the ages of five and 19 are available in order to classify children as overweight or obese (WHO, 2016g). The WHO's BMI for age cut-offs have been developed and should be interpreted as below (WHO, 2016f) (Table 2.1). The various BMI-for-age cut-offs are two standard deviations from the mean BMI Z-score. Cole *et al.* (2000) proposed a BMI cut-off point of 30kg/m² for overweight and obesity in children.

Table 2.1: Weight category and respective WHO cut-off points

Weight category	WHO BMI-for-age cut-offs	BMI percentiles for children
Obese	> +2 SD	> 97th percentile
Overweight	> + 1SD	> 85th percentile
Thinness	< -2 SD	< 15th percentile
Severe Thinness	< -3 SD	< 3rd percentile

Other measures are required to supplement the BMI measurement to identify people with an “increased risk of obesity-related morbidity due to accumulation of abdominal fat” (WHO, 2011a). Waist circumference (WC) and waist-to-hip ratio (WHR) are both measures of adiposity distribution (WHO, 2011a). The WHR provides a guide to both subcutaneous and intra-abdominal adiposity (WHO, 2011a). WC is an indicator of abdominal obesity, which is more closely linked with the risk of morbidity and mortality than gluteofemoral obesity (Jaeschke, Steinbrecher & Pischon, 2015). Fredriks *et al.* (2005) concluded that WC can be used to assess abdominal adiposity in children.

Other measures of body fat include: skinfold thickness, and body image assessments (Kriemler *et al.*, 2010a). Skinfold thickness is a measure of subcutaneous fat, which can be useful in an epidemiological environment when a measure more accurate than BMI is required; it is not recommended in children for routine clinical usage (Kriemler *et al.*, 2010a). Body image assessments such as dual-energy X-ray absorptiometry can also be used to determine body composition; that is, body fat percentage (Kriemler *et al.*, 2010a).

2.4 Physical fitness

2.4.1 Prevalence of physical fitness

A systematic review showed that there has been a steep, global decline in PF in children since 1970 (Tomkinson & Olds, 2007). In the last 20 years, PF levels have decreased in many countries (Tomkinson, Olds & Gulbin, 2003; Tomkinson *et al.*, 2003). A study conducted in Switzerland showed that girls were more flexible than boys, but boys displayed more strength and endurance (Michaud *et al.*, 1999).

In South Africa, in 2007, PF in urban youth appeared to be on the decline (Healthy Active Kids, 2007). Similarly, children from disadvantaged backgrounds also showed lower levels of PF four years later (Healthy Active Kids, 2010). The report card further stated that the overall shuttle-run scores were similar to those found in more developed countries (Healthy Active

Kids, 2010). A study conducted by Armstrong, Lambert & Lambert (2011) found that, when establishing normative values for fitness tests, there were no differences in the flexibility scores between ethnic groups, but white children had better scores in most tests compared to black and mixed ancestral origin children. There is minimal research documenting PF prevalence.

2.4.2 Benefits of physical fitness

The benefits associated with PF are closely related to those found in PA; increased PA results in increased PF (Blair, Cheng & Holder, 2001). One study suggested that a decreased level of cardiovascular fitness has been associated with cardiovascular mortality, and even slight increases in cardiovascular fitness may lower mortality (Vanhees *et al.*, 2005). Cardiorespiratory fitness is also associated with improved outcomes in anxiety, depression, self-esteem, mood, academic performance, and total and abdominal adiposity; agility and muscular fitness is shown to have positive results on skeletal health (Ortega *et al.*, 2008).

2.4.3 Reasons for decreased physical fitness

Despite genetic factors playing a role, environmental factors (primarily PA) contribute more towards PF; that is, decreased PA results in decreased PF (Blair, Cheng & Holder, 2001). Figure 2.1 below displays the interrelationships between health outcomes, health behaviours, and different components of PF. Health behaviours affect the various constituents of PF, which, in turn, affect health outcomes (Blair, Cheng & Holder, 2001). Health outcomes as well as genetic, environmental and social factors may also affect behaviours (Blair, Cheng & Holder, 2001).

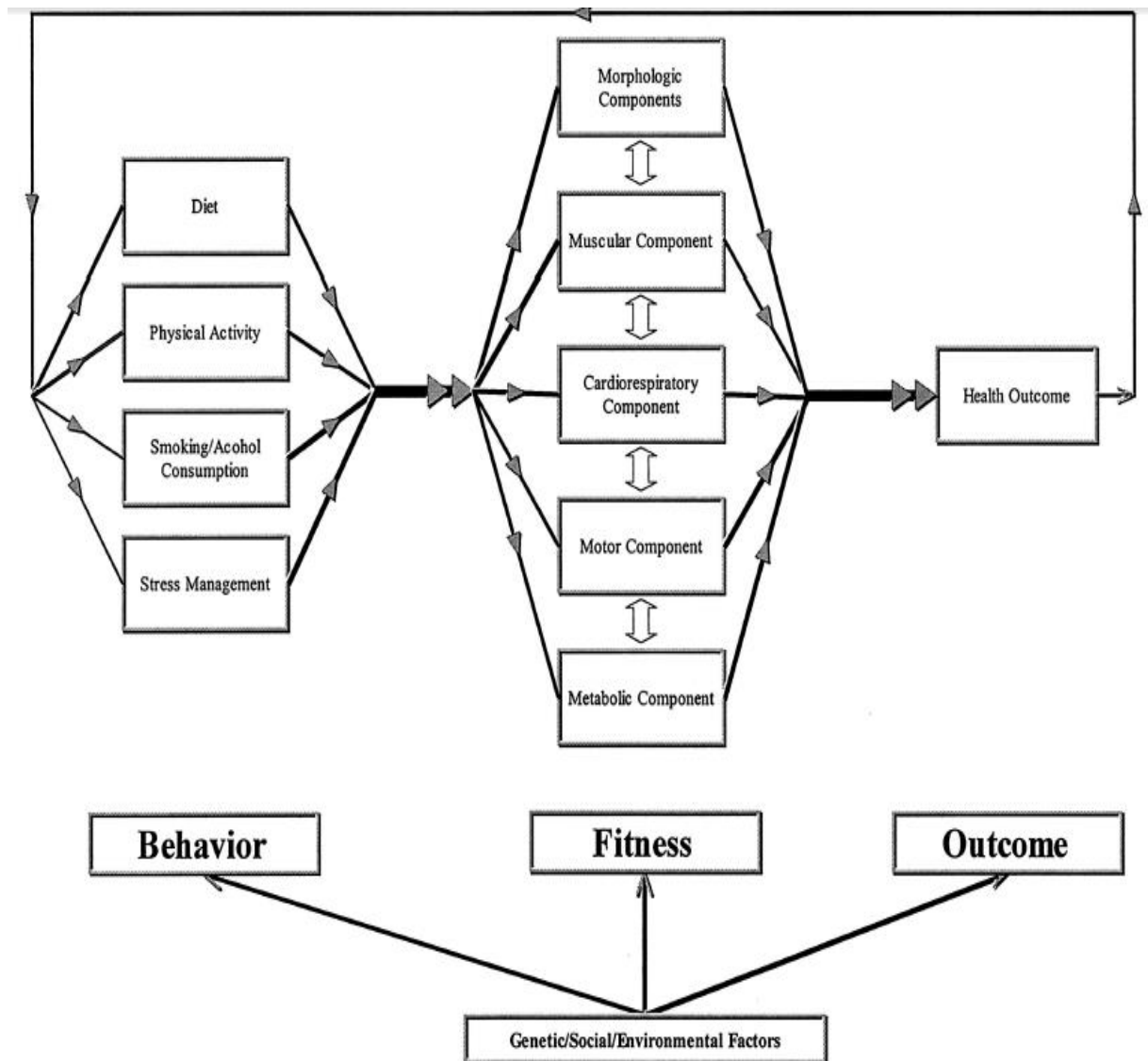


Figure 2.1: Interrelationship between health outcomes, PF, and health behaviours

Source: Blair, Cheng & Holder (2001)

Monyeki *et al.* (2007) noted that muscle wasting and decreased body size contributed to low PF in undernourished children. Due to the legacy of Apartheid, black South Africans generally have a lower SES (Armstrong, Lambert & Lambert, 2011), and thus experience more poverty (Chutgar & Kanjee, 2009). There are differences in the PA habits between the ethnic groups found in South Africa (Birth to Twenty (2002), as cited by Armstrong, Lambert & Lambert (2011)). For example, white children partake in four and a half times more sport activities compared to black children. However, black children spend 17 minutes more time actively commuting to and from school.

2.4.4 Measures of physical fitness

The performance of daily PA comprises various bodily functions (cardiorespiratory, musculoskeletal, endocrine-metabolic, hemato-circulatory and psycho-neurological), which can be measured by PF (Ortega *et al.*, 2008). Thus, PF can be instrumental in predicting health outcomes, specifically with cardiovascular diseases and their causes (Ortega *et al.*, 2008). There are various tools available to measure PF, such as: The Assessing Levels of PA (ALPHA) health-related fitness test battery, which assesses cardiorespiratory and musculoskeletal fitness as well as body composition (Ruiz *et al.*, 2010); the Canadian Assessment of Physical Literacy (CAPL), which is a comprehensive protocol that can measure a wide spectrum of abilities and skills that describe the physical literacy level of a child (Longmuir, 2013); the Fitnessgram, which provides researchers and teachers with indicators of health-related fitness to use in fitness assessments at school (Welk *et al.*, 2011); and the Eurofit test battery, which consists of nine physical tests, of which South African normative values have been developed for four of the test components (Armstrong, Lambert & Lambert, 2011).

2.5 Health-related quality of life

HRQoL is a multidimensional and comprehensive concept (Schwimmer, Burwinkle & Varni, 2003). According to the WHO, health includes a complete state of mental, physical, and social well-being (WHO, 2003). Therefore, HRQoL refers to the standard of happiness and comfort directly related to an individual's health (Oxford University Press, 2016). Factors that influence quality of life include the individual's ability to cope with disability and limitations, and their expectations related to health, which affect their satisfaction with life and their perception of health (Testa & Simonson, 1996).

2.5.1 Health-related quality of life in obese children

As this study is concerned with obesity in children, and quality of life is health-related, prevalence studies of HRQoL in overweight and obese children were reviewed. Schwimmer, Burwinkle & Varni (2003) concluded in their study, conducted in the United States of America (USA), that severely obese children and adolescents had a lower HRQoL than children and adolescents who were healthy, and even had a similar quality of life to those diagnosed with cancer. Furthermore, children who are overweight have an increased risk of low scores for several HRQoL domains (Friedlander *et al.*, 2003). A study conducted in Israel, also showed that obese children had lower HRQoL in the social, physical, and school domains compared to children who had normal weights (Pinhas-Hamiel *et al.*, 2006). Limited HRQoL prevalence

studies have been conducted with obese children and children at risk of obesity in a South African setting.

2.5.2 Measures of health-related quality of life

The measures of HRQoL assess the effect of a health condition on the child's activities of daily living, physical symptoms, and emotional and social wellbeing; that is, vital parts of health that are not usually assessed by clinical and traditional physiological methods (Friedlander *et al.*, 2003). HRQoL is a subjective measure from the child's point of view and should be included in the holistic paediatric assessment (Williams *et al.*, 2005). The most commonly used assessment tools developed to measure HRQoL in children are the EQ-5D-Y (Ravens-Sieberer *et al.*, 2010) and the Pediatric Quality of Life Inventory (PedsQL) (Williams *et al.*, 2005). The data gained from the EQ-5D-Y can be used as a quantitative measure of health outcomes (mobility, self-care, usual activities, pain and discomfort, anxiety and depression as well as a visual analogue scale (VAS) of overall health status), as judged by the individual learners (Van Reenen *et al.*, 2014); it is a feasible, valid and reliable instrument for the measurement of HRQoL in South African children (Ravens-Sieberer *et al.*, 2010). The PedsQL is a validated 23 item questionnaire that assesses emotional, physical, school, and social functioning in children aged two to 18 years old (Williams *et al.*, 2005).

2.6 Intervention

2.6.1 Types of interventions

Multiple interventions have been conducted globally, with some aimed at reducing obesity with a focus on changing dietary intake and improving PA (Brown & Summerbell, 2009), and others aimed at improving PF and PA (Kriemler *et al.*, 2010b; Van Sluijs, McMinn & Griffin, 2007). Due to the fact that obesity is related to an increase in sedentary behaviour as well as the excessive energy content of consumed foods, it is important that intervention programmes target these behaviours (Brown & Summerbell, 2009). In a systematic review, conducted by Brown and Summerbell (2009), nine out of the 20 studies showed significant improvements in the mean BMI in the intervention group compared to the control group. They concluded that "combined diet and PA interventions may help to prevent children becoming overweight in the long term" (Brown & Summerbell, 2009: 138-139). A meta-analysis by Nooijen *et al.* (2017), found that interventions in 33 studies had no effect on the total PA of overweight and obese children. A study conducted in KwaZulu-Natal, South Africa, assessed the effect of a PA and nutrition intervention; they concluded that the programme

had the potential to increase the PA of learners and, to a lesser degree, their nutritional behaviour (Naidoo *et al.*, 2009).

Most interventions targeting childhood obesity are conducted within school settings (Draper *et al.*, 2010; Kriemler *et al.*, 2010b) as they offer constant contact with the learners as well as the “school infrastructure and physical environment, policies, curricula and staff” who have the potential to influence the health of children positively (Brown & Summerbell, 2009: 110). The school setting has been shown to be the most ideal setting for PA interventions (Kriemler *et al.*, 2011). A study conducted by Doak *et al.* (2006), stated that, despite the significant role of parents in the aetiology and prevention of weight related problems in children - as role models within the home environment, limited interventions targeting childhood obesity have been conducted within this context (Doak *et al.*, 2006). Lastly, it is important to consider the role of the community within the obesity epidemic; a community-based environmental change intervention, conducted in Massachusetts, USA, was shown to decrease BMI Z-scores in children at high risk for obesity (Economos *et al.*, 2007). This intervention requires support from multiple stakeholders within the community such as children, teachers, school tuck shops, parents, municipal departments, healthcare providers, restaurants, media, before and after school programmes, national departments, and policy developers (Economos *et al.*, 2007).

2.6.2 School-based interventions

Multiple components within the school environment are utilised in order to increase PA and PF levels and reduce adiposity in children (Kriemler *et al.*, 2010b). These components included adding PE lessons (prepared by PE experts), short activity breaks during academic lessons, and daily PA homework for learners in the experimental group (Kriemler *et al.*, 2010b). The study showed significant results in the sum of four skinfolds ($p=0.009$), aerobic fitness ($p=0.04$), moderate-vigorous PA in school ($p<0.001$), all day moderate-vigorous PA ($p=0.03$), and total PA ($p=0.003$); however, physical and psychological components of quality of life revealed no significant result. A systematic review by Van Sluijs, McMinn & Griffin (2007), of school-based interventions, presented interventions that included a PA or PF component, ranging from 40 minutes one to three times per week, and a dietary component. The duration of these interventions ranged from one month to six years (Van Sluijs, McMinn & Griffin, 2007). Significant differences ($p=0.008$) in moderate-vigorous PA were found following a six week PA intervention (Fairclough & Stratton, 2005). Interventions included education on healthy lifestyles, PA or PF programmes, homework assignments, and

minimising television viewing; also, parents received educational material (Van Sluijs, McMinn & Griffin, 2007). Interventions were either conducted by PE or class teachers, where they received training by an external person; for example, a PE expert (Van Sluijs, McMinn & Griffin, 2007). The interventions that were found to be effective achieved an increased overall PA by up to 283 minutes per week (Van Sluijs, McMinn & Griffin, 2007).

Draper *et al.* (2010) highlighted the importance of educators in implementing a school-based intervention. This importance was echoed in a classroom-based intervention, also conducted in South Africa, where the nutrition and PA intervention was integrated into the school curriculum (Naidoo *et al.*, 2009). The educators were trained to lead intervention activities during a practical workshop; they were also given booklets containing physical activities. The intervention was designed to be implemented by school personnel with minimal external support in order for the intervention to be cost-effective, sustainable, practical, and realistic (Naidoo *et al.*, 2009). A systematic review reported that teacher training programs should be more than or equal to one day, provide comprehensive content, measure teacher satisfaction of the training, and provide ongoing support: this yields more effective results in PA interventions (Lander *et al.*, 2017). Statistically significant results were found, with an increase in PA, in 25 of the 39 studies (Lander *et al.*, 2017).

Breakthrough PA and nutrition school-based interventions include *The Child and Adolescent Trial for Cardiovascular Health* (CATCH) (Luepker *et al.*, 1996), *Pathways* (Stevens *et al.*, 2003) and *Action Schools! BC* (Naylor *et al.*, 2006). These treatment programmes have demonstrated positive outcomes on diet and PA in children (Draper *et al.*, 2010). “SPARK” is a PE programme developed in the USA that has also been shown to be successful at decreasing BMI and improving self-esteem (Prosper *et al.*, 2009) and PA (Sallis *et al.*, 1997). *The HealthKick* is another PA and nutrition intervention, specific to a South African setting (Draper *et al.*, 2010); however, it has not been successful as of yet (de Villiers *et al.*, 2015).

2.6.3 Diet and nutrition

The WHO (2016h) advises that children should increase the amount of fruits and vegetables, nuts, legumes, and whole grains and decrease the amount of total and saturated fats as well as sugar in their diet. There are multiple benefits to healthy eating: it improves the wellbeing and learning potential of children, it decreases the risk of childhood obesity, and enables healthy aging (WHO, 2016h). Healthy eating also assists in preventing the development of NCD and reduces child malnutrition; thus, the revised Food-Based Dietary Guidelines have been developed (Vorster, Badham & Venter, 2013). They are “short, positive, science-based

messages that aim to change the eating behaviour of the general population towards more optimal diets that meet energy and nutrient requirements” (Vorster, Badham & Venter, 2013: S5). While the focus of this study was not on nutrition, interventions that include diet and PA have been shown to yield effective results (Brown & Summerbell, 2009). The revised Food-Based Dietary Guidelines include: enjoying different types of foods; making foods that contain carbohydrates part of most meals; eating lots of fruits and vegetables as well as beans, lentils, and soya; drinking a substantial amount of clean water; limiting sugar intake; using fats sparingly; including proteins in daily meals; being active; and consuming products that contain calcium daily (Vorster, Badham & Venter, 2013). However, it was considered beyond the scope of this study to elaborate on aspects of nutrition.

According to Draper *et al.* (2010), the challenges of promoting healthy behaviours in low SES schools include the accessibility of cheap food, with little nutritional value, from either street vendors or tuck shops, the lack of policy relating to healthy behaviours and limited resources. It is vital that nutrition is addressed in programmes that are aimed at reducing the prevalence of childhood obesity (Brown & Summerbell, 2009).

2.6.4 Physical activity and physical fitness component

Despite what should be included in the curriculum, it is important that PE has health-related as well as skill-related fitness activities (Sallis *et al.*, 1997). Sallis *et al.* (1997) found significant improvements in abdominal strength and endurance ($p < 0.001$) and cardiovascular endurance ($p < 0.001$) after a two-year PE programme where health-related and skill-related activities were included. Verstraete *et al.* (2007) developed a two-year comprehensive PA promotion programme in elementary schools; the programme, based on SPARK PE principles and sample lessons, was designed to increase PA engagement during PE lessons. Results of the study showed that explosive strength in girls, measured with the standing broad jump test of the Eurofit test battery, was significantly higher at post-test in the intervention group (Verstraete *et al.*, 2007). In SA, Naidoo *et al.* (2009) developed a school based nutrition and PA intervention programme which was integrated into the school curriculum. The effects of the intervention on PF showed a significant increase in abdominal muscular endurance ($p < 0.05$) for boys and girls, while the explosive strength and flexibility component remained unchanged. Increases in children’s total physical activity was noted in a meta-analysis, including randomised controlled trials, on the effectiveness of interventions on PA outcomes aiming at prevention and treatment of overweight (Metcalf, Henley & Wilkin (2012), as cited by Nooijen *et al.* (2017)). Subgroup analysis targeting exclusively overweight and obese

children tended to be slightly more effective compared to those targeting all children (Metcalf, Henley & Wilkin (2012), as cited by Nooijen *et al.* (2017)).

2.7 Related studies

According to Puddy and Wilkins (2011: 17), “Randomized control trials are true experiments and are considered to be a highly rigorous research design. They are the strongest research design for establishing a cause-effect relationship”. Randomised control trials have been shown to assess the effect of interventions in various studies (Kriemler *et al.*, 2010b), including those that have assessed body composition (Sahota *et al.*, 2001), PF (Sallis *et al.*, 1997), and body composition and PF (Naidoo *et al.*, 2009; Brown & Summerbell, 2009; Kriemler *et al.*, 2010b). Limited research has been conducted to assess if there is an effect on HRQoL post-intervention, despite its importance. Furthermore, limited research has been conducted within a South African setting to establish the effect of a teacher-based or school-based intervention on learners’ BMI, PF, and HRQoL.

2.8 Conclusion to literature review

Overweight and obesity in school-going children may result in consequences that may impact other aspects of health, which could add to the burden of disease (WHO, 2016a). Physical inactivity is a largely influential risk factor for childhood overweight and obesity (WHO, 2011b). At present, there are few studies with sufficiently rich descriptions that provide insight into targeting the barriers encountered by this group of children in order to influence policy and practice. Research findings highlight the importance of the family environment on self-esteem, PA, self-efficacy, and PF in children who are overweight or obese (Porter, 2002).

Several challenges have arisen to support the need for the development of PE, especially in the school setting. The most significant barriers to successful PE programmes were identified as a lack of or poor resources, time (de Villiers *et al.*, 2012), and trained teachers (Hardman & Marshall, 2000; van Deventer, 2011). It is reasonable to assume that these barriers would have an impact on the PA levels of school-going children. Determining the extent of PE time allocation and the number of trained teachers to implement PE at schools, would provide valuable information regarding the status of PA and PE implementation at schools.

3 CHAPTER THREE: SCHOOL ENVIRONMENT – PHASE ONE

3.1 Introduction

The primary aim of the first phase of the study was to provide a contextual background regarding the provision of PA in school-based PE programmes during school hours. The learners in the intervention study were drawn from the sample of schools within the PEED used in phase one. This chapter presents the details of the methodology used including the research setting, research design, participants, measurement instrumentation, procedure, and data analysis; it also contains the results and discussion of the first phase of the study.

3.2 Methodology

3.2.1 Research setting

The research study took place in the EC within the PEED of the Eastern Cape Department of Education (ECDoE). The school listing was obtained from the ECDoE; this listing indicated which circuit the school belonged to, but did not specify the quintile. Ten schools were randomly selected from circuits' five to nine, where stratified random sampling was conducted, and two schools from each circuit were identified within the primary school grouping of the PEED. South African schools are placed into five different quintiles, depending on a score that reflects the poverty level of the community where it is located (Chutgar & Kanjee, 2009). The regulated amount of funding the schools receive from the government is determined by the poverty score, which is based on a pre-determined formula (Chutgar & Kanjee, 2009). This score takes into consideration the unemployment rate as well as the literacy rate of the community. Schools in quintile one (Q1) are the poorest, while schools in quintile five (Q5) are the least poor (Chutgar & Kanjee, 2009). Schools principals were required to indicate into which quintile the school was allocated, as the circuit list did not stipulate quintiles and no such list was provided by the ECDoE. The research setting involved a key informant (that is, the principal or delegated teacher) from the randomly selected primary schools during a suitable time of the school day.

3.2.2 Research design

The first phase of the study was a descriptive, analytical design.

3.2.3 Participants

3.2.3.1 Subjects

According to the WHO School Policy Framework (2008), school directors, head of departments, and teachers are stakeholders within The Global Strategy for Diet, PA and Health as they have vital information about the current policies and practices. School principals and delegated teachers were selected to determine the extent of PA implementation in school-based PE programmes in primary schools in the PEED.

3.2.3.2 Sampling frame

There are 23 education districts in the ECDoE, which are divided into circuits (ECDoE, 2014). There are eleven circuits in the PEED; circuits one to four include high schools, circuit ten is vacant, and circuit eleven includes special and independent schools (ECDoE, 2015). Primary schools (circuits five to nine) were included in the sample.

Each school within the primary school circuit lists was allocated a number. Stratified random sampling, using Microsoft Excel's random number selection, was used to select the schools; two schools from each circuit. Thus, ten schools within the PEED were randomly selected to participate in the first phase of the study.

3.2.3.3 Eligibility criteria

Inclusion criteria: The school principal, or a designated teacher who met the following inclusion criteria were included in the first phase of the study:

- Public primary school principal or teacher (if elected by the school principal) in the PEED
- Informed consent from school principal or teacher (if elected by the school principal)

Exclusion criteria: None.

3.2.3.4 Sample size determination

The aim of this study was to provide a snapshot of the school environment rather than to provide information that was generalizable. A sample of 118 out of the 182 schools would have been required to establish a true prevalence of .5 in any response (including compliance with mandated guidelines), with a confidence interval of 0.05 and a precision of .1. This was beyond the scope of the study and a sample of five percent of the schools was randomly selected to provide a profile of the schools in the relevant circuits. It was acknowledged from the outset that this sample size was too small to provide generalizable results.

3.2.4 Measurement instrumentation and outcomes

The primary outcome measure for the first phase of the study was the extent of implementation of PE at schools.

3.2.4.1 School Environment Questionnaire

A situational analysis will provide a baseline evaluation of the current school environment to determine the 'status quo' of PE programmes in schools (WHO, 2008). The situational analysis was comprised of a structured questionnaire with key informants (the principal or delegated teacher) at each school. The questionnaire determined the extent of PE implementation. The questionnaire was informed by the SHES used in the Canadian SHAPES (Wong, Leatherdale & Manske, 2006). The SHAPES have developed a measurement tool to assess factors in the school environment that "promote or hinder PA among youth" (Card *et al.*, 2012: 1). The core indicators and measures (CIM) of the *Youth Health PA and Sedentary Behaviour Module: School-Setting Questions* contain indicator measures by various questions about mandates and policies, school characteristic variables, extracurricular activities, and community partnerships. Individuals who could accurately report on a range of aspects of their school environment were required to complete the questionnaire (Card *et al.*, 2012). The school-level CIM was developed to be used in conjunction with any data collection tool, either as an individual measure or combined with other questions corresponding with data collection objectives (Card *et al.*, 2012). Due to the contextual differences, the school-level CIM was adapted to fit in with the South African schooling system. Questions were adjusted to the sample used in this study, irrelevant questions were removed such as the school postal codes, and further demographic questions were included, as well as questions focussing on the barriers to PE in schools mentioned in the study by Hardman and Marshall (2000). The CIM demonstrated fair test-retest reliability and criterion validity during a pilot study (Kroeker *et al.*, 2012). The School Environment Questionnaire (SEQ) used in this study can be seen in Appendix 2.

3.2.5 Procedure

3.2.5.1 General procedure

Ethical approval was obtained from the University of Cape Town's (UCT) Human Research Ethics Committee (HREC) (HREC REF: 731/2015) (Appendix 3). Each school from circuit lists five to nine (primary schools) in the PEED was allocated a number. Two schools were then randomly selected from each circuit, using Microsoft Excel's random number selection. This

equated to ten schools within the PEED, being randomly selected, to participate in the first phase of the study. A letter to the ECDoE was then submitted to request their support to conduct the study in the PEED (Appendix 4). Permission was granted to conduct research in the randomly selected primary schools (Appendix 5). The school principals at the selected schools were contacted and a meeting was arranged to discuss the study and the requirements of schools, teachers, and learners. Principals were given a letter describing and explaining the requirements of the study (Appendix 6, 7 and 8). Following the support and consent from each school principal, the researcher distributed the SEQ. If principals were not able to complete the SEQ, he or she delegated the task to a teacher. An information letter and consent form (Appendix 9 and 10) were given to specified teachers at the various schools who were participating in the study. Signed consent forms were returned to the researcher, prior to completing the SEQ.

3.2.5.2 Pilot

The SEQ was piloted at a school within the PEED. The principal agreed to participate in the SEQ pilot. This school was not one of the ten randomly selected schools to participate in the study. No adjustments were deemed necessary.

3.2.5.3 Recruitment

Principals of the ten randomly selected schools in the PEED were approached for their school's participation in the study. Once consent to complete the SEQ had been obtained from the principal or specified teacher, they were recruited for the study and completed the SEQ.

3.2.5.4 Procedure for the School Environment Questionnaire

The SEQ was given to the principal to complete. The researcher briefly went through the questionnaire with the principal. In some cases, the principal elected a teacher to complete the questionnaire. If the teacher had been elected, the researcher then obtained informed consent and briefly went through the questionnaire with the specified teacher. A brief overview of the questionnaire was conducted with the principal or delegated teacher in their office or classroom at a pre-arranged time. The informant was given an opportunity to ask questions and time to complete the SEQ. The researcher checked the questionnaire for unfinished responses; informants were then given an opportunity to complete the questionnaire. The researcher collected questionnaires once they had been completed.

3.2.6 Statistical analysis

3.2.6.1 Data collection

The researcher was involved with the process of data collection and recording. Data collection was done on specific days, one school per day, during a pre-arranged time, as arranged with the school authorities.

3.2.6.2 Data management

All participants received an identification number on the testing day, which was used for the duration of the study. This ensured that demographic information remained confidential. The data was entered into an Excel spreadsheet which was password protected, and access was limited to the researcher and supervisor. The physical data was stored in a locked room for safety and security.

3.2.6.3 Statistical analysis

Due to the small sample size, analysis was restricted to descriptive and non-parametric statistics. Coding of open ended questions was done by three experts reaching consensus on the codes.

3.3 Results: phase one

3.3.1 Summary of response rates

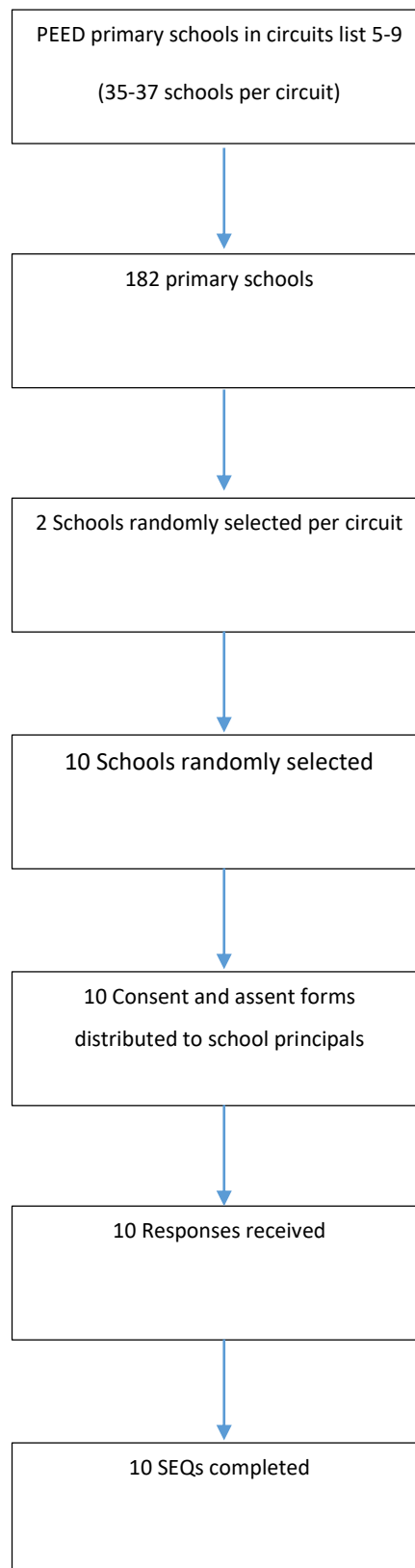


Figure 3.1: Summary of response rates (phase one)

3.3.2 School characteristics

Informed consent was obtained from all of the participating schools; that is, ten principals. The SEQ was completed by five principals, two vice principals, two teachers, and one other staff member. Two schools from each circuit between five and nine were randomly selected to participate in the study. Table 3.1 displays the quintile representation of the schools. Schools in quintile three were over-represented which may have had some influence on the results.

Table 3.1: Sample representation of schools in the quintiles

School Quintile	Number of schools in sample	%
1	0	0
2	1	10
3	6	60
4	1	10
5	2	20

Table 3.2 displays the total number of grade four and five learners per school, the number of PE teachers per school, and the learner to PE teacher ratio. The learner to qualified PE teacher ratio could not be calculated as many of the schools did not have any qualified PE educators. Despite some of the schools having a large number of PE teachers, no deductions could be made.

Table 3.2: Number of PE teachers per school per quintile

School	Quintile	Grade 4	%	Grade 5	%	Total learners	Number of PE teachers	Ratio	Number of qualified PE teachers
1	5	124	51.2	118	48.8	242	8	30.3	0
2	2	51	51.5	48	48.5	99	2	49.5	0
3	5	50	44.6	62	55.4	112	4	28	3
4	3	129	49.8	130	50.2	259	4	64.8	1
5	4	84	51.5	79	48.5	163	20	8.2	12
6	3	73	50.3	72	49.7	145	7	20.7	0
7	3	105	47.5	116	52.5	221	4	55.3	0
8	3	58	54.2	49	45.8	107	5	21.4	0
9	3	224	59.4	153	40.6	377	22	17.1	0
10	3	256	54.1	217	45.9	473	4	118.3	0

PE was provided at all ten schools, all of which considered PE as beneficial and an important subject together with other subjects. Key informants were required to list the aims of PA as seen below in Table 3.3. Six informants emphasised that the aim of PA was to promote a healthy lifestyle. This was followed by improving fitness, and mental and behavioural components.

Table 3.3: Aims of PA

Aim of PA	Skills	Co-ordination	Healthy Lifestyle	Fitness	Weight	Mental	Sport Career	Total
To teach skills, improve co-ordination, promote a healthy lifestyle, improve fitness, and weight control	1	1	1	1	1			5
Learners become attentive, alert, and responsible						1		1
To emphasise “a healthy body, creates a healthy mind”; fitness expands life.			1			1		2
To make learners aware that they have to take care of their physical well-being			1					1
To exercise the kids and give them a balanced education				1		1		2
To promote a healthy lifestyle of learners through physical activities			1					1
To promote health and well-being			1					1
To encourage learners to stay physically fit and healthy			1	1				2
To prepare learners to take up sport as a career; to be lifelong professional coaches							1	1
Awareness of physiotherapy to all								
Total	1	1	6	3	1	3	1	16

N=10

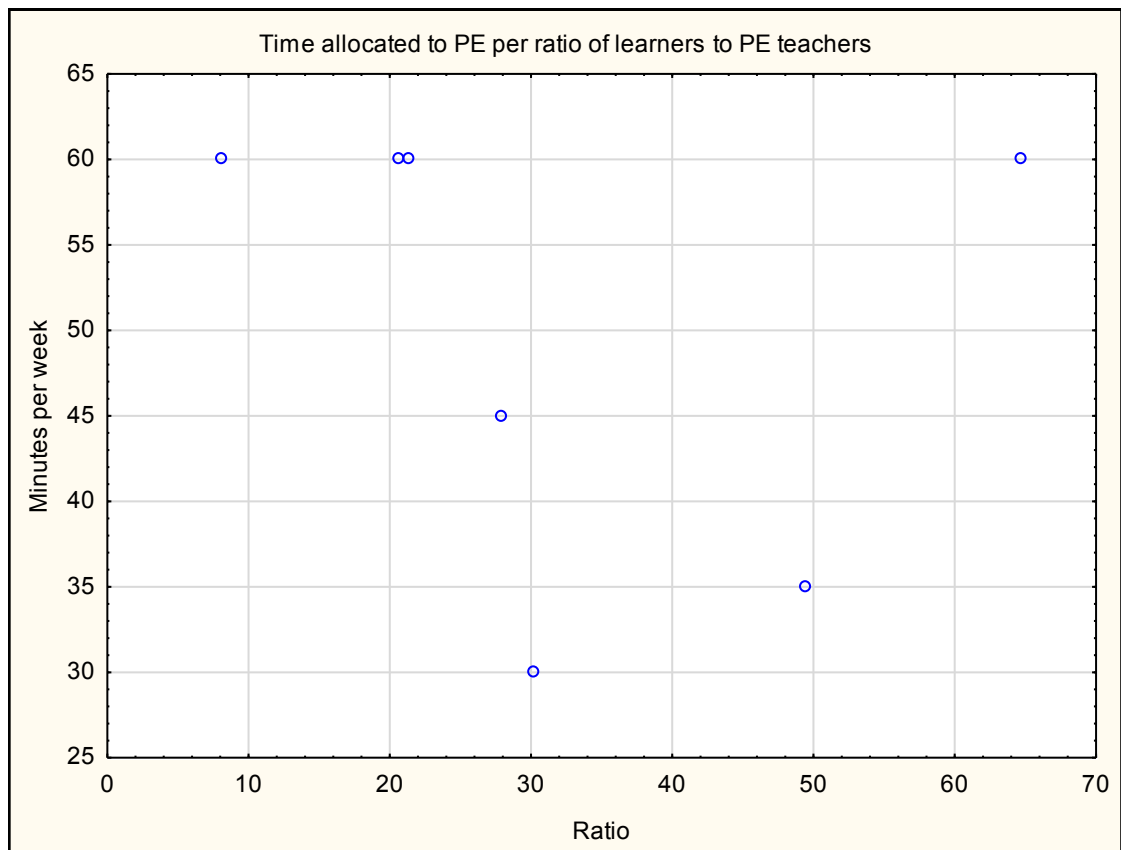
Only one school received funding, outside of the government, from an outside company who supplied equipment and provided workshops for grade four and five learners. The SEQ revealed that the PE curriculum was followed by nine schools. Informants at three schools stated that PE was suspended if there were time constraints with regards to completing the curriculum. Only one school placed PE on hold during the examination period.

3.3.3 Policies and practices

At three schools, there were no PE policies or practices. The other seven schools had policies under development (two schools), written policies (three schools) and PE practices (two schools).

3.3.4 Physical activity

Figure 3.2 displays the minutes per week allotted to PE for learners in grades four and five compared to the ratio of learners to PE educators. Four of the schools reported doing 60 minutes of PE per week; the rest did less than that. Three of the schools that had PE for 60 minutes per week had a lower learner to PE teacher ratio. The average class time spent on PE was 50 minutes (SD=13.23) for seven of the schools; the other three schools did not stipulate the duration of PE.



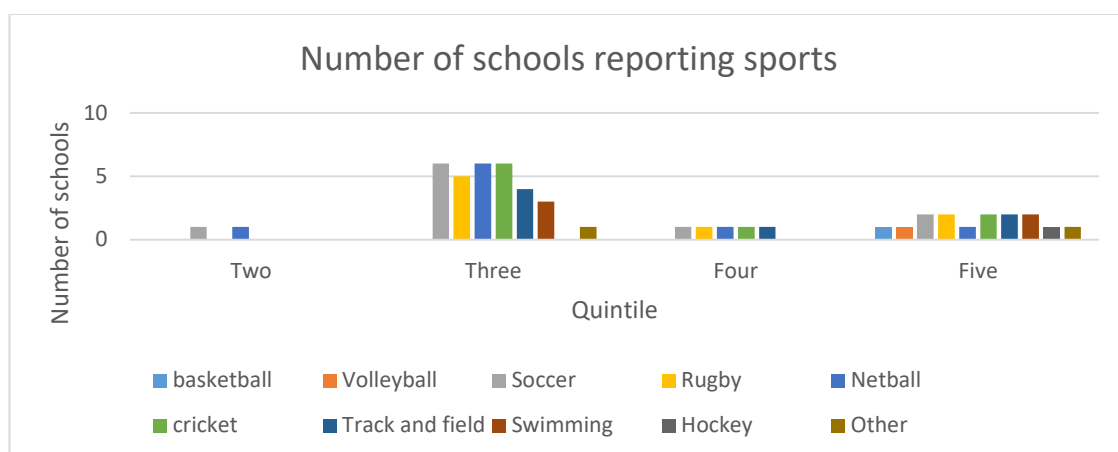
N=7 schools, 3 unable to give specific amount of time

Figure 3.2: Time allocated against total PE educators

Compared to the class time of 40 hours a year (one hour per week) allotted to PE for grades four and five, as specified in the National Curriculum Statement (NCS), five schools had no specific amount mandated to PE (one school) or less than the mandated amount (four

schools). The other five schools had approximately the mandated amount (four schools) or more than the mandated amount (one school) of PE.

Figure 3.3 below shows the number of schools reporting on the various intramural (IM) and interschool (IS) sports.



N=10 schools

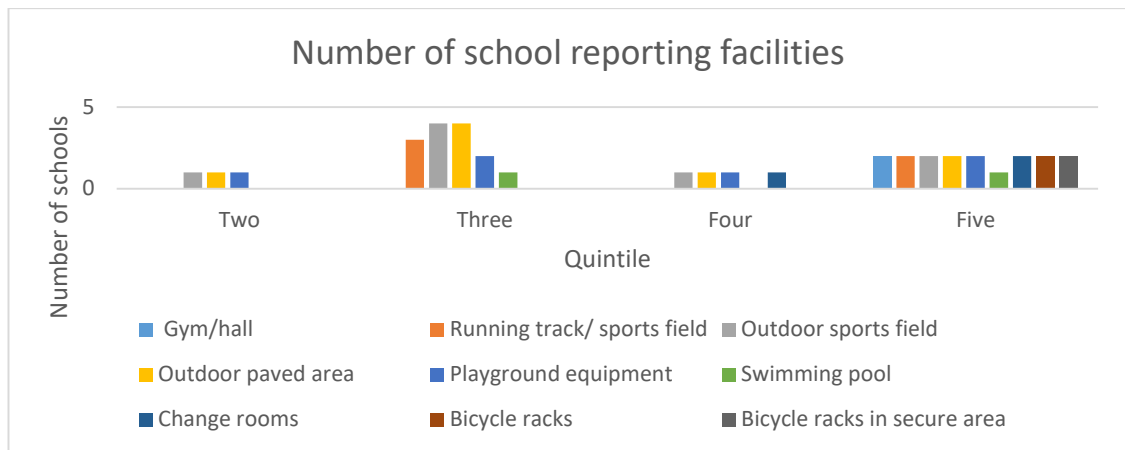
Quintile: Two (1 schools); Three (6 schools); Four (1 school); Five (2 schools)

Figure 3.3: School sports offered

Soccer was offered at all schools, followed by netball, cricket, rugby, and track and field (both IS and IM). The school in quintile two only offered two sports, whereas the schools in quintile five offered up to nine sports.

3.3.5 School facilities

Figure 3.4 shows the facilities that the majority of learners had regular access to during school hours.



N=10 schools

Quintile: Two (1 schools); Three (6 schools); Four (1 school); Five (2 schools)

Figure 3.4: School facilities

The majority of schools had access to an outdoor sport field and an outdoor paved area. Very few schools had access to bicycle racks, a swimming pool, and a gym or gym hall. Schools in quintile five had access to most facilities. The school in quintile two had access to an outdoor sports field, playground equipment, and an outdoor paved area.

3.3.6 Phase one summary

The SEQ was completed by key informants. As schools in quintile three were over-represented, this over-representation may have influenced the results. PE was provided at all of the sampled schools, where it was considered to be beneficial along with other subjects. Informants stated that a healthy lifestyle, followed by improvements in PF and mental and behavioural components were the main aims of PA. The curriculum was followed by nine of the schools. Only three schools had teachers with PE qualifications. PE policies and practices were being developed and/or implemented in seven of the schools. The SEQ revealed that five schools had no specific amount mandated to PE or less than the mandated amount. The other five schools, had approximately the mandated amount or more than the mandated amount of PE. Soccer was offered at all schools, followed by netball, cricket, rugby, and track and field. Most schools had access to an outdoor sport field and an outdoor paved area; while very few schools had access to bicycle racks, a swimming pool, and a gym or hall.

3.4 Discussion

The primary aim of this first phase was to provide contextual background regarding the provision of PA in school-based PE programmes within a small sample of schools from which

the learners in the intervention study were drawn. The primary objective was to provide a profile of the randomly selected schools within the circuit. This profile concerned the extent of PA implementation in school-based PE programmes in primary schools in the PEED with regards to time allocation, policy implementation, teachers' attitudes towards PE, qualifications to teach PE, facilities, and extramural activities. In this section, the results were compared to the findings of other researchers and appropriate recommendations are made in the final chapter. This discussion summarises the first phase of the study.

3.4.1 Sample

To achieve the objectives of the study, ten participants completed the SEQ. The type of respondents that completed the SEQ in this study were aligned with the WHO School Policy Framework, where school directors, head of departments, and teachers are stakeholders within The Global Strategy for Diet, PA and Health. They are vital informants for current policies and practices (WHO, 2008). Limited research was found on the validity and reliability of responses from specific stakeholders regarding the state and status of PE in primary schools. Many studies required the principal, school leader, or teacher to complete their PE questionnaires (Haug *et al.*, 2010; Lee *et al.*, 2007).

3.4.2 School characteristics, policies, and practice

Schools in quintile three were over-represented, with six of the ten schools being from quintile three; this over-representation may have introduced bias towards quintile three schools. As each quintile group has differing resources and government support (Chutgar & Kanjee, 2009), the results were affected regarding school facilities and the sports offered. Despite the schools being randomly selected from the circuit lists, they were not representative of the population and the degrees of SES.

The learner to PE teacher ratio ranged from 118.3 (473 learners per four PE teachers) to 8.2 (163 learners per 20 PE teachers), with 50% being above 30. Three of the schools that had PE for 60 minutes per week had a lower learner to PE teacher ratio. Contrary to this result, Skala *et al.* (2012) found that large class sizes were predictors of decreased PA intensity. As class sizes increase, class time allotted to class management increases and class time allotted to quality content and skills context decreases. Teachers spent 19.5% of class time in management when classes had 20 learners, compared to 28.2% of class time in management when classes had more than 60 learners (Skala *et al.*, 2012). The National Association for

Sport and Physical Education (NASPE) recommends classes consist of no more than 25 learners per teacher (Skala *et al.*, 2012).

Hardman and Marshall (2000: 218) stated that school staff responsible for sport and PE should be suitably qualified, having “adequate levels of specialisation”. In many countries, the classroom teacher is required to teach PE without the necessary knowledge and expertise (Hardman & Marshall, 2000). There is a wide range of countries that had access to specialist PE teachers in primary schools, ranging from 81% in the USA, 69% in Europe (central and eastern), 14% in Asia and nine percent in Africa (Hardman & Marshall, 2000). Shortages of qualified PE teachers were highlighted by respondents in Africa, Asia, and Latin America (Hardman & Marshall, 2000). These results were echoed in this study, where only 30% of schools had access to qualified PE teachers, and classroom teachers were required to teach PE without the necessary skills. It is, therefore, challenging for PE teachers to provide quality, structured, developmentally appropriate, and safe PE classes without the necessary understanding, experience, and resources (DeCorby *et al.*, 2005).

Between 1994 and 1999, 85% of primary schools in the Western Cape of South Africa had no PE due to the fact that PE had a very low status (Hardman & Marshall, 2000). In this study PE was provided at all schools, and nine of them followed the curriculum. These results differs from the results of Hardman & Marshall (2000), where Africa had the most shortfalls in policy implementation, with 75% of the curriculum not being implemented; possibly due to PE developing over the last 17 years. All schools considered PE beneficial and an important subject along with other subjects. This result varies from the global result, where 37% of countries viewed PE as a non-essential part of the curriculum (Hardman & Marshall, 2000). During this study, 60% of respondents believed that the aim of PA was to promote a healthy lifestyle. This was followed by improving fitness, and mental and behavioural components. Teachers should be aware of the aims of PA as it is their role to pass their knowledge and enthusiasm on to their learners (Mawer, 2014).

Only one school placed PE on hold during the examination period, despite evidence showing that academic performance improves with added PE time to the curriculum, even when time assigned to other academic subjects is decreased (Rasberry *et al.*, 2011; Strong *et al.*, 2005). Informants at three schools stated that PE got suspended if there were time constraints with regards to completing the curriculum. This phenomenon was reverberated in the study by Hardman & Marshall (2000), where the PE curriculum was being used for ‘more important’ subjects and/or examinations in many South African primary schools.

Policies, practices and comprehensive staff development at national and provincial levels might enable schools to improve the opportunities for learners to become physically active adults (Lee *et al.*, 2007). In this study various amounts of policy development and implementation were found. To improve PA and PE programmes, a comprehensive approach is necessary. National bodies can provide more direction by requiring schools to provide daily PE and PA opportunities before, during, and after school. They can also enable schools to create health promotion schemes that support PA. Within the school environment, a large focus should be on the development of quality PE and PA policies and programmes in order to give learners the opportunity to live healthy, active lives (Lee *et al.*, 2007).

3.4.3 Physical activity in schools

The average time spent in PE classes was 30 to 40 minutes per week in South African schools (Healthy Active Kids, 2014). Interestingly, this study demonstrated that the average duration of PE was 50 minutes per week in seven of the schools. Despite all schools offering PE and informants stating that PE is important and has many benefits, half of the schools are not implementing the mandated amount of time for PE, which is one hour per week (40 hours per year) (Department of Basic Education, 2011). There was a variance in the reporting on, specific times allotted to PE, and the schools comparison to the NCS mandated amounts of PE.

Only one school received funding for equipment and workshops, outside of government, despite all schools in the lower quintiles requiring more resources. Some non-government organisations contribute to local communities and schools to assist with community development (Burnett, 2010). The lack of school sport facilities and resources cause external agencies to become involved (Burnett, 2010). Benefits to outside funding include: increased opportunities in 'new' sports such as volleyball, rugby, and cricket; participation in festivals, inter-school and inter-class activities; and the sustained participation and development of a 'sporting culture' (Burnett, 2010).

Burnett (2010) suggested that, due to the lack of school sport facilities, soccer is often the only sport offered in low resourced schools. Similarly, the results in this study show that soccer is the most common sport and is offered at all schools. The school in quintile two offered only two sports (soccer and netball), whereas the schools in quintile five offered up to nine sports. Schools with more resources, also have better participation levels in school sports (Healthy Active Kids, 2014). Interestingly, the schools in quintile three offered a wider variety of sports compared to school in quintile four.

3.4.4 School facilities

Within the Western Cape of South Africa, where public schools are generally better equipped compared to other provinces, 80% of primary school principals indicated that school sport facilities needed upgrading (Healthy Active Kids, 2014). The majority of schools in this study had access to an outdoor sport field and an outdoor paved area, whereas very few schools had access to a gym or hall. This occurrence was also revealed in Norway, where the most frequent outdoor facilities for learners were soccer fields, and courts for ball games (Haug *et al.*, 2010). This could be a limiting factor for PE and PA during adverse weather conditions as many of the schools do not have an indoor area to conduct PE. Hence, the school environment is not always conducive to a healthy lifestyle (Healthy Active Kids, 2014). Thus, school facilities impact how physically active learners can be (Haug *et al.*, 2010). A study by Haug *et al.* (2010), showed that outdoor facilities were associated with learners' daily PA participation during school breaks. Thus, developing the outdoor environment should be considered in PA promotion and development programmes. This development has been noted as a school sport investment by the Departments of Basic Education and Sports and Recreation, and is expected to increase by approximately 18% each year (Healthy Active Kids, 2014). They also suggest that 15% of municipal infrastructure grants be directed towards sport and recreation facilities (Healthy Active Kids, 2014). This increase was demonstrated in the 2016 Healthy Active Kids Report Card where government policies scored 61-80% (Uys *et al.*, 2016). If this proves to be true, this additional government support could benefit schools, especially in lower quintiles, by developing the school environment and thus increasing the PA potential of learners.

3.4.5 Phase one summary

In summary, a contextual background of the ten randomly selected schools was provided concerning the extent of PA implementation in school-based PE programmes. Even though the average duration of PE of seven out of the ten schools was higher than the national average, half of the schools were not implementing the mandated amount of PE time. The curriculum was implemented by nine of the schools, despite only three schools having access to teachers with PE qualifications. All respondents considered PE beneficial along with other subjects, and noted the positive aims of PA. Schools in the lower quintiles had fewer sporting opportunities and facilities, which had the potential to impact how physically active their learners could be. Thus, the objective of the first phase of the study was achieved.

3.5 Limitations and recommendations

The limitations and recommendations (for practice and research) of the first phase of the study are discussed in Chapter 5 (Section 5.2 and 5.3) together with the limitations and recommendations for the study as a whole.

4 CHAPTER FOUR: INTERVENTION STUDY – PHASE TWO

4.1 Introduction

The primary aim of the second phase of the study was to determine the effect of a six-week teacher-based intervention programme, for primary schools with less than the mandated amount or no specific amount of PE mandated, on learners' HRQoL, BMI, and PF. The secondary aim of this study was to determine any association between obesity, HRQoL, PF, and the extent of PA implementation in school-based PE programmes in primary schools, from various circuits within the PEED. This chapter presents the details of the methodology used, including: the research setting, research design, participants, measurement instrumentation, procedure and data analysis. The results and discussion of the second phase of the study is also presented within this chapter.

4.2 Methodology

4.2.1 Research setting

The research study took place in the EC, within the PEED of the ECDoE. The ten schools were separated into two groups based on the results obtained in the SEQ. Respondents were required to indicate if learners in grade four and five received: more than the mandated amount of PE (60 minutes per week) (Department of Basic Education, 2011), approximately the mandated amount of PE, less than the mandated amount of PE or no specific amount of PE compared to the National CAPS. The control group consisted of schools with more than, or approximately the mandated amount of PE. The experimental group consisted of schools with less than or no specific amount mandated to PE. Two schools from each group were randomly selected, using Microsoft Excel's random number selection, to participate in the study. The two schools with less than or no specific amount of PE received the teacher-based intervention. It was felt that due to the lack of mandated amount of PE they could benefit more from the intervention programme compared to schools with more than or approximately the mandated amount of PE. The same learners in the experimental and control group were re-tested after the six-week intervention. The research setting involved the head of departments, class teachers, and learners who were enrolled at the selected primary schools. Pre- and post-testing measures took place during break times in order not to disrupt academic learning time for learners.

4.2.2 Research design

The second phase of the study was a cluster randomised control trial. It was pragmatic in that it took place within the schools and was subject to the school timetables and requirements.

4.2.3 Participants

4.2.3.1 Subjects

Children in grades four and five, between the ages of nine to eleven, were selected as they are not undergoing the changes of puberty such as growth spurts (Siervogel *et al.*, 2003). They are also able to understand the instructions of the testing procedures as they are skilled at decomposing morphologically complex words (Carlisle, 2000); they are, therefore, capable of comprehending the informed consent process. Children are also less likely to be influenced by extraneous factors (such as alcohol and smoking) compared to older children (Reddy *et al.*, 2003). According to Pienaar (2015), treatment programmes that target obesity are most effective during the pre-pubertal phase. Class teachers were selected to participate in the study as they are able to sustain overweight and obesity prevention programmes (Doak *et al.*, 2006). They also interact with a substantial number of learners daily, in a setting that allows for discussion and education about weight control, and the implementation of preventative programmes (Yager & O'Dea, 2005).

4.2.3.2 Sampling frame

The ten schools were assigned to the control and experimental group based on the SEQ responses. There were five schools in each group. The second phase of the study involved randomly selecting two schools from each group i.e. two schools with more than or approximately the mandated amount of PE, and two schools with less than or no specific mandated amount of PE compared to the National CAPS. Each school, within the two groups, was allocated a number. Random sampling, using Microsoft Excel's random number selection, was used to select the schools. Thus, four schools within the PEED (two schools from each group) were randomly selected to participate in the second phase of the study.

4.2.3.3 Eligibility criteria

Inclusion criteria for learners: Learners who met the following inclusion criteria were included in the second phase of the study:

- School learners aged nine to eleven, in grades four or five;
- Attending a public primary school in the PEED;

- Informed consent from parents; and
- Assent from learners.

Exclusion criteria for learners: Learners were excluded from the second phase of the study if the following exclusion criteria were met:

- A learner with any cardiac condition, physical injury or impairment, an acute illness, or a pre-existing medical condition or on medication likely to trigger aspects of adiposity that was verified by the parent, child and/or teacher, which may endanger or prohibit participation, or influence the test results.

Inclusion criteria for teachers: Class teachers who met the following inclusion criteria were included in the second phase of the study:

- Grade four or five public primary school teacher in the PEED; and
- Informed consent from class teacher.

Exclusion criteria for teachers: The class teachers were excluded from the second phase of the study if they anticipated leave of absence from the respective school during implementation of the intervention.

4.2.3.4 Sample size determination

If a simple, random sample was used, a sample size of 34 learners per group would have been necessary to establish whether there was any relationship between the variables measured, and to determine significance. This was assuming that an incidence of 14% (Hardman & Marshall, 2000), a p-value of 0.05, a SD of 5, and a power of 90% was found. This calculation was done using STATISTICA version 12 two-means t-test. However, as cluster sampling was to be applied, a design effect was used. A design effect of 2.5 was chosen as the sample size should be increased by an inflation factor of $[1 + (\text{Number of clusters} - 1) \times \text{intra-cluster correlation coefficient}]$. As there was no information regarding the correlation coefficient, it was set at .5. The design effect was therefore $1 + (4 - 1) \times .5 = 2.5$ and the required sample size was 85 per group.

4.2.4 Measurement instrumentation or outcomes

The primary outcome measures for the second phase of the study was the HRQoL, BMI, and PF of school learners.

4.2.4.1 Weight and height

An A12E Micro Digital Physician Scale with Height Rod was used to measure the learner's weight in kg. This was calibrated daily at each data collection setting with a one kg calibration weight in order to confirm the "0" starting point. Digital weight scales measure quantitative, accurate, numerical values; weight in kg up to two decimal points in static weight bearing positions (Kumar *et al.*, 2014). A digital weight scale is a relatively easy instrument to use as in-depth training is not required (Kumar *et al.*, 2014). In addition, it is portable, easily accessible, and time efficient (Kumar *et al.*, 2014).

The Height Rod was attached to the digital physician scale; it was used to measure the learner's height in centimetres (cm), which was then converted to metres. "Stadiometry is precise and reproducible, and can detect true changes in height over one month periods in mid-childhood, and should remain the standard way of observing growth" (Watt, Pickering & Wales, 1998: 1).

4.2.4.2 Body mass index

BMI is a measure of weight-for-height (WHO, 2016a). According to the CDC (2015a), BMI is used to determine overweight and obesity in children. BMI for children is classified as height and weight (BMI), and is standardised for age and gender (WHO, 2016b). Children of the same gender and age at or above the 85th percentile are considered overweight, whereas children at or above the 95th percentile are considered obese (CDC, 2015a). The CDC criteria stated that children 12 years and below are at risk of becoming overweight if their BMI is at or above the 75th percentile (Nader *et al.*, 2006). BMI between the 50th and 84th percentile, according to the WHO criteria for gender and age in children, is a predictor of becoming overweight as an adult (Field, Cook & Gillman, 2005). BMI standard deviation scores are also known as BMI Z-scores which are equivalent to BMI-for-age percentiles (Must & Anderson, 2006). Appendix 11 shows WHO percentile graphs of normal values of BMI for boys and girls, relative to their age. The BMI was determined using the formula: kg/metres².

$$\text{BMI} = \text{weight} / \text{height}^2$$

Height and weight were measured; BMI and BMI Z-scores were calculated using the WHO's AnthroPlus. Cut-off points for BMI were calculated in accordance with international standards of the WHO Growth Reference 2007 (WHO, 2016d). BMI is a valid (Freedman & Sherry, 2009) and reliable measure of obesity (Krebs *et al.*, 2007), and is considered the most appropriate measure for assessing children within a South African population (Monyeki, van Lenthe & Steyn, 1999).

4.2.4.3 Waist circumference

An inelastic tape measure, read in cm, was used to measure WC. Tape measures are easily accessible, simple to use, and inexpensive (Asha & Pryor, 2013). With adequate training and standardised procedures, tape measurement is feasible (Liu & Chen, 2010).

WC serves as a measure of adiposity distribution (WHO, 2011a). WC is a measure of abdominal adiposity, which is more closely linked with the risk of morbidity and mortality than gluteofemoral obesity (Jaeschke, Steinbrecher & Pischon, 2015). WC was the indicator used to supplement the BMI measurement. At least two measures were necessary to ensure objectivity (WHO, 2011a) as well as to ensure that the results were accurate and reliable. In a study by Liu and Chen (2010), WC measures had an acceptable intra-rater reliability.

4.2.4.4 Eurofit test battery

The Eurofit test battery consists of nine physical tests, which measures the different components of PF (Verstraete *et al.*, 2007); it is easily accomplished within 20-30 minutes with minimal resources. Children were assessed in four of the nine Eurofit tests, for which South African normative values have been developed (Armstrong, Lambert & Lambert, 2011); these tests included: the modified sit-and-reach test (flexibility), the standing-broad jump (explosive strength), sit-ups (trunk strength and endurance), and a ten by five metre (50 m) endurance shuttle run (cardio-respiratory endurance). The test battery is a reliable and valid instrument to measure PF in children (Deforche *et al.*, 2003; Haga, 2009). The Eurofit test battery is the most appropriate measure of health-related fitness within a South African context (Armstrong, Lambert & Lambert, 2011). Scores were given for each test component and compared to the South African normative data according to the categories of PF (Table 4.1). Each fitness test was considered separately, and a composite fitness score was not analysed. A detailed description of the procedure and scoring system followed for each of the test components is included in Appendix 12.

Table 4.1: Categories of PF

PF level	Classification
Above normal	A
Normal	N
Below normal	B

Limitations

Practice and motivation levels could influence the scores attained in physical fitness testing.

4.2.4.5 EQ-5D-Y

The EQ-5D is an internationally used standardised measurement tool of HRQoL in adult populations (Wille *et al.*, 2010). It can be used as a measure of health in general health assessments (Wille *et al.*, 2010). Due to the increasing significance of measuring HRQoL in children, a demand arose for a version suitable for younger respondents. Hence, the EQ-5D-Y was developed in order for younger populations to self-report on their health (Wille *et al.*, 2010). According to the multinational study by Ravens-Sieberer *et al.* (2010), the EQ-5D-Y is a feasible, valid and reliable instrument for the measurement of HRQoL in South African children. The tool can be easily administered with minimal resources and time (Van Reenen *et al.*, 2014). The EQ-5D-Y was available to learners in English, Xhosa, and Afrikaans; it is a viable tool in a cross-cultural setting (Ravens-Sieberer *et al.*, 2010). The EQ-5D-Y is comprised of two systems, the descriptive system and the VAS. The descriptive system consists of five components, and uses child friendly vocabulary such as “looking after myself”, “having pain or discomfort” and “feeling worried, sad or unhappy”; the VAS is a self-rated measure of health (Van Reenen *et al.*, 2014). The information gained from the EQ-5D-Y can be used as a quantitative measure of health outcomes, as judged by the individual learners (Van Reenen *et al.*, 2014). A detailed description of the procedure followed for each of the test components as well as the EQ-5D-Y and scoring system are included in Appendix 13.

Limitations

Limited information on the performance of the EQ-5D-Y in specific populations is available (Ravens-Sieberer *et al.*, 2010). The EQ-5D-Y is also subject to information bias (Ravens-Sieberer *et al.*, 2010). Information given to respondents prior to completing the questionnaire could affect the values (Ravens-Sieberer *et al.*, 2010). It is also unknown how much the respondent understood the questions when answering the questionnaire (University of Surrey, n.d.). The EQ-5D-Y may also be subject to response bias as well as biased by how the respondent felt on the day (University of Surrey, n.d.).

4.2.5 Intervention

Once pre-testing measures (BMI or WC, Eurofit test battery, and EQ-5D-Y) with the learners were completed, an intervention was conducted for six weeks by selected grade four and five class teachers from the two schools with less than or no specific amount of PE (compared to the National CAPS).

The intervention and the justification for the choice of intervention methods is given below in Table 4.2.

Table 4.2: Intervention methodology and justification

Duration: 60 minutes for six weeks	The duration of the interventions ranged from one month to six years, as seen in the systematic review by Van Sluijs, McMinn and Griffin (2007), and a six week study was able to yield significant results (Fairclough & Stratton, 2005). Similarly, a six-week PA curriculum programme caused physical activity to increase from less than ten percent of class time at baseline to 40% at post-test in the intervention schools (Salmon <i>et al.</i>, 2007). This was also found in a study conducted in the United Kingdom for five weeks, where learners in the intervention group spent a higher proportion of lesson time in PA compared to learners in the control group, and energy expenditure was eight percent greater (Salmon <i>et al.</i>, 2007). Significantly decreased body image dissatisfaction and improved physical self-perceptions were found after a six week aerobic dance intervention in adolescent school girls (Burgess, Grogan & Burwitz, 2006). The WHO recommends that vigorous intensity activities should be included at least three times per week (WHO, 2011b). The current CAPS for LS allocates one hour per week to PE in the intermediate phase, grades four to six (Department of Basic Education, 2011). Thus, the programme was developed to be implemented once per week, for 60 minutes, for six weeks.
Teacher led	Teachers are important in implementing a school-based intervention (Draper <i>et al.</i>, 2010). They have direct contact with large numbers of learners in a setting that has the potential to positively influence the delivery of health promotion programmes, and to support healthy behaviours (Sahota <i>et al.</i>, 2001). Intervention programmes designed to be implemented by school staff with minimal external support,

	allows for the intervention to be cost-effective, sustainable, practical, and realistic (Naidoo <i>et al.</i> , 2009).
Training of teachers	Lander <i>et al.</i> (2017) reported that teacher training programmes should be more than, or equal to, one day. Their training should provide comprehensive content and ongoing support in order to yield more effective results in PA interventions (Lander <i>et al.</i> , 2017). Teachers were trained for the intervention in a group, after the pre-testing measures had been conducted, during a suitable day and time in order not to interrupt their working day. The training session lasted for up to two hours. During that time, the programme content was covered and teachers were given the opportunity to ask questions.
Use of a booklet	Teachers were also given a six-week PE booklet (Appendix 14), which described the intervention programme as well as their role in detail.
Follow up	During the six-week programme teachers were contacted telephonically once per week, after the programme had been conducted, to address any programme concerns and to ensure compliance. The researcher completed a check list during follow up for quality control and to ensure compliance in each area of the programme i.e. five minute nutritional talk, warm up with the required amount of exercises, the main component of the class consisting of the required amount of exercises and the invasion game and lastly the cool down with the required amount of exercises. If the programme was missed, the researcher suggested another day within the week to complete the programme.
Booklet contents: Introduction	Within the booklet, an introduction to the study was given as well as the WHO's recommendations for PE (WHO, 2008), and safety recommendations (Raising Children Network (Australia), 2016).

Booklet contents: Diet and Nutrition information	Some interventions were aimed at reducing obesity with a focus on changing dietary intake and improving PA (Brown & Summerbell, 2009); hence, the booklet also contained a short section on diet education, where the teacher was required to start every PE class with educating the learners about healthy eating for five minutes. The diet education was based on the revised Food-Based Dietary Guidelines of South Africa (Vorster, Badham & Venter, 2013). This section also forms part of the personal and social well-being study area within the LS CAPS, where the dietary habits of children and healthy eating habits are taught (within the health and environmental responsibility topic for grade four and five) (Department of Basic Education, 2011).
Booklet contents: CAPS inclusion (Skill-related PF)	The PE programme was developed in line with the CAPS term two teaching plan for LS in the intermediate phase (Department of Basic Education, 2011) (Appendix 1), where grade four and five learners were required to participate in invasion and target games, respectively. A series of skill related activities (focussing on invasion and target games) were included in the programme to be done for 20 minutes towards the end of the lesson (Spark, 2016). Permission was granted via email to use the SPARK PE lesson plans during this study. Thus, skill-related activities were included in the programme (Sallis <i>et al.</i>, 1997).
Booklet contents: Health-related PF	Health-related activities (Sallis <i>et al.</i>, 1997) were based on the deficiencies found in the pre-testing fitness measures, taken during the Eurofit test battery (sit-up test, standing long jump test, sit-and-reach test, and shuttle run). The programme was structured in a way that allowed teachers to choose exercises from the exercises provided within the various categories; that is, trunk strength, flexibility, upper limb and lower limb strength, and cardiorespiratory endurance. More exercises were required to be done in the categories where bigger

	deficiencies were found in the pre-testing measures. Categories for which learners scored well were still included in the programme, for maintenance.
Aims of programme	This program was designed to assist teachers in conducting a well-structured, vigorous intensity PE class, for children between the ages of nine and eleven (grade four and five). Teachers were required to adhere to the program as much as possible.
Equipment	Each teacher was given the necessary equipment to conduct the programme effectively.

Six weeks after the teacher-based intervention, post-testing measures (BMI and WC, Eurofit test battery, and EQ-5D-Y) were conducted using the same learners. Appendix 14 presents the six-week PE programme booklet prepared and given to the teachers prior to implementation of the intervention.

4.2.6 Procedure

4.2.6.1 Pilot

The intervention was piloted after the first phase of the study, on a group of ten year-old learners who agreed to participate in the intervention pilot. The learners were not enrolled in any of the schools participating in the second phase of the study. The pilot was conducted for one week by the researcher in order to test the feasibility of the use of the instrumentation. No adjustments were deemed necessary, and the procedure was followed as planned.

4.2.6.2 Allocation

SEQ's were collected one week after distribution. The data was tabulated in Microsoft Excel and analysed. Based on the results, the ten schools were assigned to the experimental or control group; random sampling was done to select two schools from each group. The control group consisted of the two schools with more than or approximately the mandated amount of class time allotted to PE, compared to the national CAPS. The experimental group consisted of the two schools with no specific amount or less than the mandated amount of

class time allotted to PE, compared to the national CAPS. Both schools in the experimental group agreed to participate in the intervention.

4.2.6.3 General procedure

Meetings with the principals and head of departments at the schools were conducted to discuss the second phase of the study, and to arrange where the pre- and post-testing measures could be conducted within the school. The principals identified teachers, in the respective grades (four and five), to assist with identifying children to participate in the study, according to the inclusion and exclusion criteria. A total of 637 information letters and consent forms (Appendix 15 and 16) were given to the parents of learners who met the selection criteria. The parental information letter and consent form were handed to the class teacher to give to learners one month prior to pre-testing. There were 443 signed consent forms (69.54%) returned to the teacher and collected by the researcher two weeks before the study commenced. An information sheet (Appendix 17) about the study and procedures, written using child-friendly language, was given to the learners who received parental consent to participate in the study. A verbal explanation was given and the learners were provided with an opportunity to ask questions. Once all the learners' questions had been answered, and they understood what was required of them, assent was obtained (Appendix 18).

4.2.6.4 Recruitment

Teachers in the respective grade four and five classes, in the four selected schools, distributed the 637 consent forms to the parents of the learners who met the selection criteria. The forms were completed by the respective parties and returned to the researcher, 443 consent forms were collected (69.54% return rate). Learners who received parental consent and who met the eligibility criteria, were recruited for the study once assent was obtained. Teachers participating in the intervention were also recruited for the study, once consent was obtained.

4.2.6.5 Procedure for research assistants

To ensure standardisation and accuracy, all procedures were done by the researcher and five trained assistants with techniques repeated in the same manner for all learners. This procedure ensured inter-rater reliability. The five assistants were all students from the Nelson Mandela Bay Metropolitan University, enrolled in any course, that expressed an interest in the study topic. They received extensive training from the researcher on all the testing procedures (Eurofit test battery, BMI or WC, and EQ-5D-Y) prior to the second phase

of the study. Practical training, and information packs describing their role in the study, were given to the assistants.

4.2.6.6 Pre-testing

Once the signed consent and assent forms had been obtained (Appendix 16, 18 and 20), pre-testing commenced at the four selected schools with the grade four and five learners, in a pre-arranged area and at a pre-arranged time; for example, a school classroom, or field. The learners' HRQoL, BMI, WC, and PF were assessed. The researcher arranged an one to two hour time period, which suited the teachers; for example, after school or during lunch, after the pre-testing measures had been conducted in order to train participating teachers on the intervention programme.

4.2.6.7 Procedure for BMI and WC

Together with the respective teachers, the researcher compiled lists of the learners, in grade four and five from the four randomly selected schools, who received assent and parental consent. These learners were taken in groups of three during first break to a previously identified area or classroom within the school, using screens to ensure privacy of the learners, where the test measures of BMI and WC were conducted (refer to Table 4.3 below).

Table 4.3: Measurement procedures

Measurement	Procedure	
Waist circumference	A non-elastic tape measure was used to measure the WC. The WC was taken at the midline between the last palpable rib and the top of the iliac crest.	All measures were taken twice, and a third measure was done for waist and height if there was a difference of more than 0.5 cm between the first two readings. The average from both measurements (or all three measurements) were taken for the final measurement.
Height	Height was measured with the learner standing upright (without any shoes or socks), looking straight ahead, and with their back against the height rod.	
Weight	Weight was measured using a digital scale set to one decimal place.	

The learners' height, weight, and date of birth were entered into the WHO AnthroPlus software programme (WHO, 2016d); BMI and BMI Z-scores were calculated and compared to the BMI percentiles for boys and girls. The learners' WC measurements were used as is.

4.2.6.8 Eurofit test procedure

Three of the four tests were conducted using a circuit formation (the modified sit-and-reach, standing long jump, and sit-ups) during second break in a pre-arranged area; for example, the quad, field, or classroom. The ten by five metre (50 metre) endurance shuttle run was done as the last test. This method was to ensure that the learners were not fatigued at the start of the testing. There were three stations in the circuit, with the researcher and two field assistants, each at a station. The remaining three field assistants conducted the shuttle test. The learners were divided into groups of three, and each group was given a number representing the order in which they performed the circuit and shuttle test, thereafter. One group at a time performed the circuit. Station one included the standing long jump test; station two, the modified sit-and-reach test; and station three, the sit-up test. The circuit began with one learner at each station. After the completion of that test, they rotated around the circuit until they completed all three stations. After the first group completed the circuit, they performed the shuttle test, and the second group performed the circuit. The process was repeated until all learners had completed the four fitness tests.

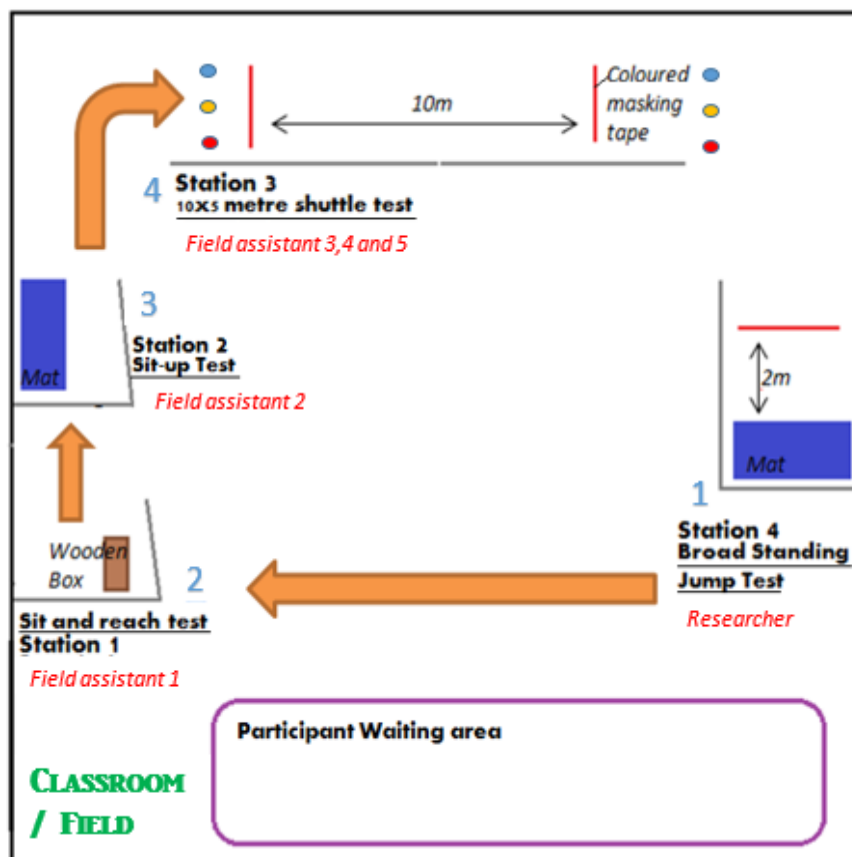


Figure 4.1: Eurofit Test Battery circuit

4.2.6.9 Procedure for EQ-5D-Y

A letter for permission to use the EQ-5D-Y was sent to the EuroQol Research Foundation (Appendix 22). Permission was granted to use the paper versions of the EQ-5D-Y, via e-mail. The EQ-5D-Y was completed by the participants within a classroom setting. A 30-minute time period, during break, was given to administer the EQ-5D-Y to the learners taking part in the study. The questionnaire (in the learner's preferred language) was distributed in the classroom to each learner, for whom parental consent and learner assent was obtained, with the teacher present. The researcher explained the questionnaire to the learners, allowing them time to read and understand the questions as well as giving them the opportunity to ask questions. The questionnaires were then collected and scanned to ensure completion. This process was conducted during first break with the BMI and WC measurements.

4.2.6.10 Intervention

A meeting was arranged with the teachers as a group, after pre-testing measures had been conducted, to ensure that the booklet content was covered and understood. During the training period, teachers were given the opportunity to ask questions; barriers to PE were discussed and possible solutions were suggested. For example, schools that did not have an indoor area to conduct the programme were concerned about weather implications; it was suggested that the programme be conducted on a different day within the week, if the weather improved. Teachers were also concerned with the large classes they had to manage during the programme; it was suggested that classes could be separated into more manageable groups. Otherwise, additional staff members (cleaners, for example), or volunteers should be recruited to assist in managing the classes during the programme. The researcher encouraged the teacher to adhere to the programme as much as possible; once per week, for 60 minutes, for six weeks. The researcher followed up with each teacher on a weekly basis to offer support, monitor progress, and address any concerns. Once per week, teachers participating in the intervention were also required to complete a logbook after each PE lesson. Within the logbook, teachers were required to tick once the 60 minute programme was completed to ensure compliance, indicate the date, indicate the number of learners that participated in the PE programme, indicate the names of absentees or learners that did not participate, indicate if there were any injuries as well as any problems or concerns with the programme (Appendix 21).

The grade four and five classes in the experimental group received the teacher-based intervention once per week, for six weeks. See Appendix 14 for the intervention programme.

Teachers were required to start each lesson with healthy eating education for five minutes. Weekly nutritional information was provided to the teachers to give to the learners. Each week covered a different topic relating to healthy eating. The class then continued with a warm up for seven minutes, which consisted of a slow jog around the area (field or court) and cardiorespiratory endurance exercises. The main component of the class consisted of trunk strength exercises; upper and lower limb strength exercises, and the invasion or target game specific to that week, for a total of 40 minutes. To end off the class, flexibility exercises were done for eight minutes. Teachers were required to choose the specified amount of exercises from the particular exercise category provided in the booklet. For example, as part of cooling down, teachers were required to choose three flexibility exercises; they would then need to go to the “flexibility exercises” section in the booklet and choose three exercises. Repetitions and sets were specified with each exercise description; starting positions and execution pictures were also provided. There were also a variety of exercises in each category for teachers to choose from; this allowed for exercise variety over the weeks, or even exercise repetition, which the teacher could choose at their own discretion. Importantly, teachers could encourage learners to rest where necessary during the programme.

The 60 minute programme consisted of vigorous intensity exercises for the majority of the session. Teachers were required to know the general programme structure, and to choose exercises prior to the PE lessons in order for the programme to be time efficient and run smoothly.

4.2.6.11 Post-testing

After six weeks, all pre-test measures (BMI, WC, Eurofit test battery, EQ5D-Y) were repeated using all previously documented learners according to the outcome measure procedures mentioned above. Research assistants were blinded to which schools or classes received the intervention in order to avoid experimenter bias.

4.2.7 Statistical analysis

4.2.7.1 Data management

All participants received an identification number on the testing day, which was used for the duration of the study. This number ensured that demographic information remained confidential. The data was entered into an Excel spreadsheet, which was password

protected; access was limited to the researcher and her supervisor. The physical data was stored in a locked room for safety and security.

4.2.7.2 Statistical analysis

Descriptive statistics were conducted. As the sample size was large, the Central Limits Theorem was applied (Sainani, 2012) and parametric tests were used on all numeric data. Independent t-tests were used to determine if there were between group differences at the initiation of the intervention. The paired t-test was used to determine whether there were within group differences from pre- to post- intervention. The Chi-squared test or the Fisher's Exact Test when the expected numbers were less than five, were used to determine if there were associations between categorical variables. Coding of open ended questions was done by three experts reaching consensus on the codes.

4.3 Results: phase two

4.3.1 Summary of response rates

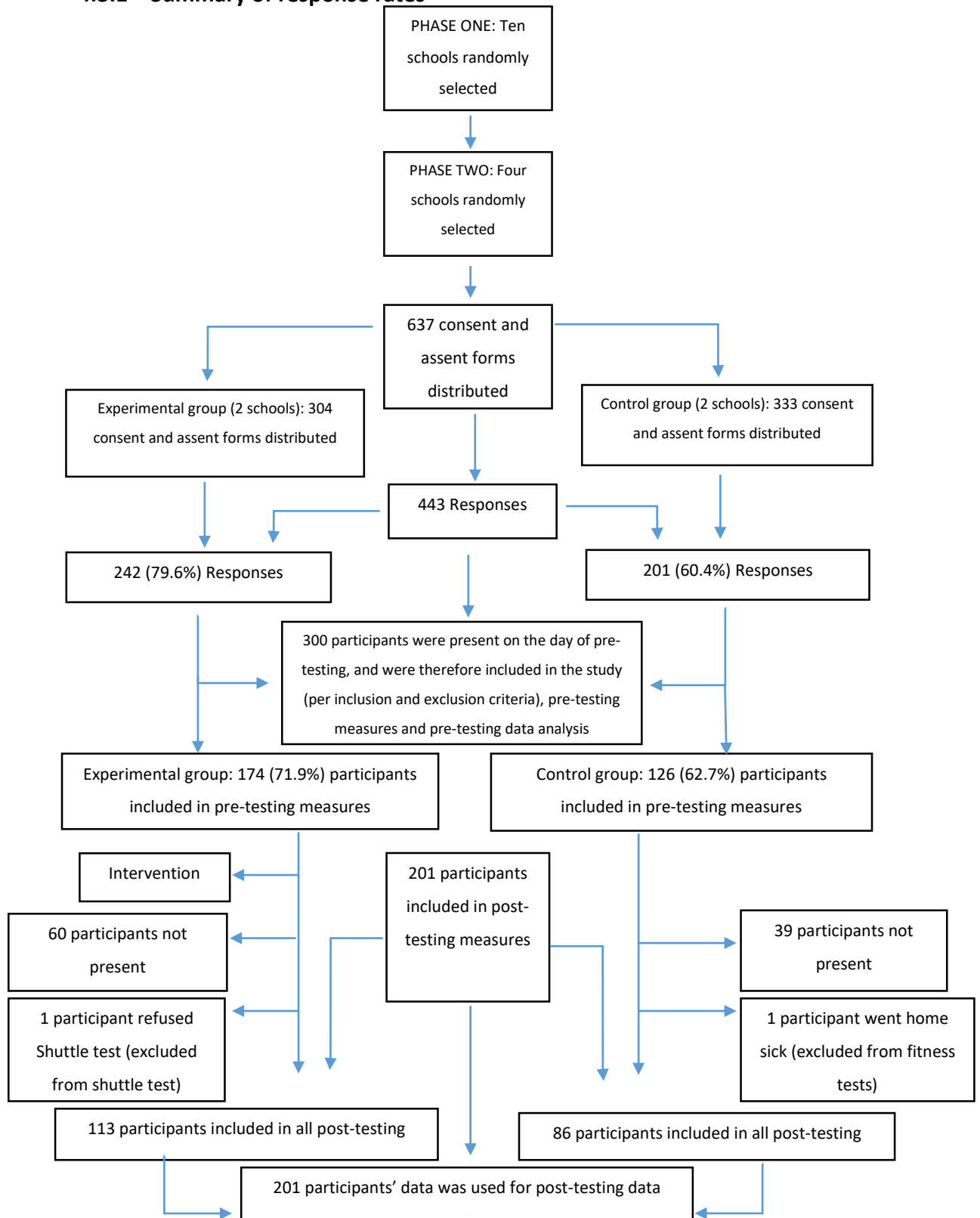


Figure 4.2: Summary of response rates (phase two)

4.3.2 Recruitment

Both control group schools were in quintile three, while the experimental group was represented by schools in quintiles three and four.

4.3.3 Pre-testing demographics information

There were 300 learners that participated in the pre-testing measures; 154 boys (51.3%) and 146 girls (48%). Gender was associated with the groups, with more girls being included in the experimental group ($p=0.030$), thus girls in the control group were underrepresented, as seen in Table 4.4. The mean age of the sample was 125.0 months ($SD=9.4$). There was no significant difference between the ages of the control and experimental groups ($t=0.93$, $p=0.353$).

Table 4.4: Pre-testing gender representation

Gender	N (%)	Control	Experimental	Totals
Boys	N	74	80	154
	%	48.1	52.0	
Girls	N	52	94	146
	%	35.6	64.4	
All Groups	N	126	174	300

Chi-Square=4.75, $p=0.030$

4.3.4 Comparison of outcome measures at baseline

4.3.4.1 BMI and WC

Table 4.5 indicates that 30.16% of the learners in the control group were overweight or obese ($N=38$) during pre-testing measures, whereas 18.96% of learners in the experimental group were overweight or obese ($N=33$). No learners were found to be underweight.

Table 4.5: Pre-test BMI Z-score interpretation

Pre-test BMI (Z-score) interpretation	N (%)	Control group	Experimental group	Total
Normal	N	88	141	229
	%	69.8	81.0	
Overweight	N	21	13	34
	%	16.7	7.5	
Obese	N	17	20	37
	%	13.5	11.5	
All Groups	N	126	174	300

N=300; Chi-square=6.89, p=0.032

Weight category was associated with the group with a higher proportion of learners in the normal weight category in the experimental group (Chi Sq=6.888; p=.032). Similarly the BMI Z-score was significantly less in the experimental group ($t=1.97$; $p=0.050$) between the control and experimental group at baseline in the pre-test BMI Z-scores. No significant difference was found between the control and experimental group at baseline in the WC measure ($t=-1.87$; $p=0.063$) (Table 4.6).

Table 4.6: T-test for independent samples (groups): BMI and WC

Pre-test variable	Experimental group		Control group		t-value	df	p-value
	Mean	SD	Mean	SD			
BMI Z-score	0.2	1.51	0.5	1.31	-1.97	298	0.050
WC	59.9	9.09	61.8	7.87	-1.87	298	0.063

N=300

4.3.4.2 HRQoL

As there were so few participants with severe problems, the responses to the EQ-5D-Y domains were dichotomised into “No problems” and “Problems” (Table 4.7). The only significant difference between the control and experimental groups at baseline for the components of the EQ-5D-Y was found in the “looking after myself” variable ($p=.004$).

Table 4.7: Pre-testing EQ-5D-Y responses

Question	N (%)	Response	Experimental group	Control group	Total	Chi-Square	p-value
EQ-5D-Y: Mobility	N	No problems	172	122	294		FE * =0.242
	%		98.9	96.8	98		
	N	Problems	2	4	6		
	%		1.1	3.2	2		
EQ-5D-Y: Looking after myself	N	No problems	170	113	283		FE* =0.004
	%		97.7	89.7	94.3		
	N	Problems	4	13	17		
	%		2.3	10.3	5.7		
EQ-5D-Y: Doing usual activities	N	No problems	167	118	285	.833	.362
	%		96.0	93.7	95.0		
	N	Problems	7	8	15		
	%		4.0	6.3	5.0		
EQ-5D-Y: Pain or discomfort	N	No problems	163	113	276	1.585	.208
	%		93.7	89.7	92.0		
	N	Problems	11	13	24		
	%		6.3	10.3	8.0		
EQ-5D-Y: Worried, sad, or unhappy	N	No problems	164	113	277	2.156	.142
	%		94.3	89.7	92.3		
	N	Problems	10	13	23		
	%		5.7	10.3	7.7		

N=300; FE = Fisher's exact

Table 4.8 shows that the mean pre-test EQ-5D-Y VAS was 92.5 (SD=18.25) in the control group; within the experimental group, the mean pre-test EQ-5D-Y VAS was 90.7 (SD=20.38). No significant differences were found ($t=-0.82$; $p=0.411$) between the control and experimental group at baseline in the EQ-5D-Y VAS.

Table 4.8: T-test for independent samples (groups): EQ-5D-Y VAS

Pre-test variable	Experimental group		Control group		t-value	df	p-value
	Mean	SD	Mean	SD			
EQ-5D-Y VAS	90.7	20.38	92.5	18.25	-0.82	298	0.411

N=300

4.3.4.3 Fitness tests

Table 4.9 displays the frequency of the Eurofit test battery components in terms of below, within, and above the normal range reference values for the various variables; that is, the sit-up test, sit-and-reach test, standing long jump test, and shuttle test.

Table 4.9: Eurofit test battery interpretation frequency table

	Below (B), normal (N), or above (A)	N (%)	Experimental group	Control group	Total
Sit-up test	B	N	78	96	174
		%	44.8	76.2	58
	N	N	96	30	126
		%	55.2	23.8	42
	A	N	0	0	0
		%	0	0	0
Sit-and-reach	B	N	70	60	130
		%	40.2	47.6	43.3
	N	N	103	66	169
		%	59.2	52.4	56.3
	A	N	1	0	1
		%	0.6	0.0	0.3
Standing long jump	B	N	139	118	257
		%	79.9	93.7	85.7
	N	N	35	8	43
		%	20.1	6.4	14.3
	A	N	0	0	0
		%	0	0	0
Shuttle test	B	N	2	0	2
		%	1.2	0.0	0.7
	N	N	92	55	147
		%	52.9	43.7	49.0
	A	N	80	71	151
		%	46.0	56.4	50.3

N=300

The results of the pre-testing measures showed that 174 learners (58%) performed below the norm during the sit-up test; 130 learners (43.3%) performed below the norm during the sit-and-reach test; 257 learners (85.7%) performed below the norm for the standing long jump test; and only two learners performed below the norm for the shuttle test. Based on these results, the intervention programme required teachers to choose more exercises within the explosive strength category; that is, lower limb exercises, followed by the trunk

strength category, then flexibility and lastly, cardiovascular endurance. Hence, the intervention programme focused on the health-related fitness categories for which the biggest deficiencies were found.

Table 4.10 shows the t-test for independent samples by group in the Eurofit test battery variables. Significant differences between experimental and control groups were seen in the sit-up test ($t=3.66$; $p<0.001$) at baseline. The following fitness components approached significance at baseline: sit-and-reach test ($t=1.91$; $p=0.057$), and the shuttle test ($t=-0.71$; $p=0.475$). No significant differences were found at baseline in the standing long jump test ($t=1.52$; $p=0.128$).

Table 4.10: T-test for independent samples (groups): Eurofit test battery

Pre-test measures	Experimental group		Control group		t-value	df	p-value
	Mean	SD	Mean	SD			
Sit-and-reach	15.1	6.66	13.6	6.53	1.91	298	0.057
Standing long jump test	108.3	27.09	103.8	21.50	1.52	298	0.128
Sit-up test	10.4	4.62	8.6	3.84	3.66	298	$p<0.001$
Shuttle test	25.0	2.01	25.2	2.46	-0.71	297	0.475

N=300

4.3.5 Post-testing demographics information

Due to the high rate of absenteeism, 201 (67%) of the 300 pre-testing learners were available to participate in the post-testing measures. There were 99 boys (49.3%) and 102 girls (50.7%). Gender was associated with the groups, with more girls being included in the experimental group ($p=0.020$), thus girls in the control group were underrepresented, as seen in Table 4.11. The mean age of the sample was 126.6 months ($SD=9.3$). There was no significant difference between the ages of the control and experimental groups ($t=-0.20$, $p=0.839$).

Table 4.11: Post-test gender representation

Gender	N (%)	Control group	Experimental group	Totals
Boys	N	51	48	99
	%	51.5	48.5	
Girls	N	36	66	102
	%	35.3	64.7	
All Groups	N	87	114	201

Chi Square=5.38, $p=0.020$

4.3.6 Comparison of outcome measures

As there were several significant differences between the groups in the pre-testing outcome measures, and there was a large attrition rate, between group testing at post-testing was not done. Teachers commented that the high attrition rate could be due to the commonly low attendance in the post-examination period. Instead within group tests were applied to see whether either or both groups had changed over the intervention period.

4.3.6.1 BMI and WC

No significant differences were found in the pre- and post-test BMI Z-score ($t=0.55$; $p=0.581$), and pre- and post-test WC ($t=1.28$; $p=0.202$) variables within the t-test for dependent samples in the experimental group, as seen in Table 4.12. It also displays the results of the dependent sample's test for the control group (pre- and post-test BMI Z-score and WC). No significant differences could be found in the pre- and post-test BMI Z-score variable ($t=-1.07$; $p=.289$); however, significant differences were found in the pre- and post-test WC variable ($t=2.22$; $p=0.029$), with a decrease in WC being observed.

Table 4.12: T-test for dependent samples: BMI and WC

E/C	Variable	Mean	SD	CIs	t-value	df	p-value
E	Pre-test BMI Z-score	0.1	1.50				
	Post-test BMI Z-score	0.1	1.47	(-0.110-0.062)	-0.55	113	0.581
	Pre-test WC	59.1	9.23				
	Post-test WC	58.7	9.58	(-0.204-0.951)	1.28	113	0.202
C	Pre-test BMI Z-score	0.5	1.33				
	Post-test BMI Z-score	0.6	1.35	(-0.122-0.037)	-1.07	86	0.289
	Pre-test WC	62.1	8.12				
	Post-test WC	61.4	7.64	(0.070-1.286)	2.22	85	0.029

N=201

Note that the values are slightly different to those given in Table 4.6 due to attrition

4.3.6.2 HRQoL

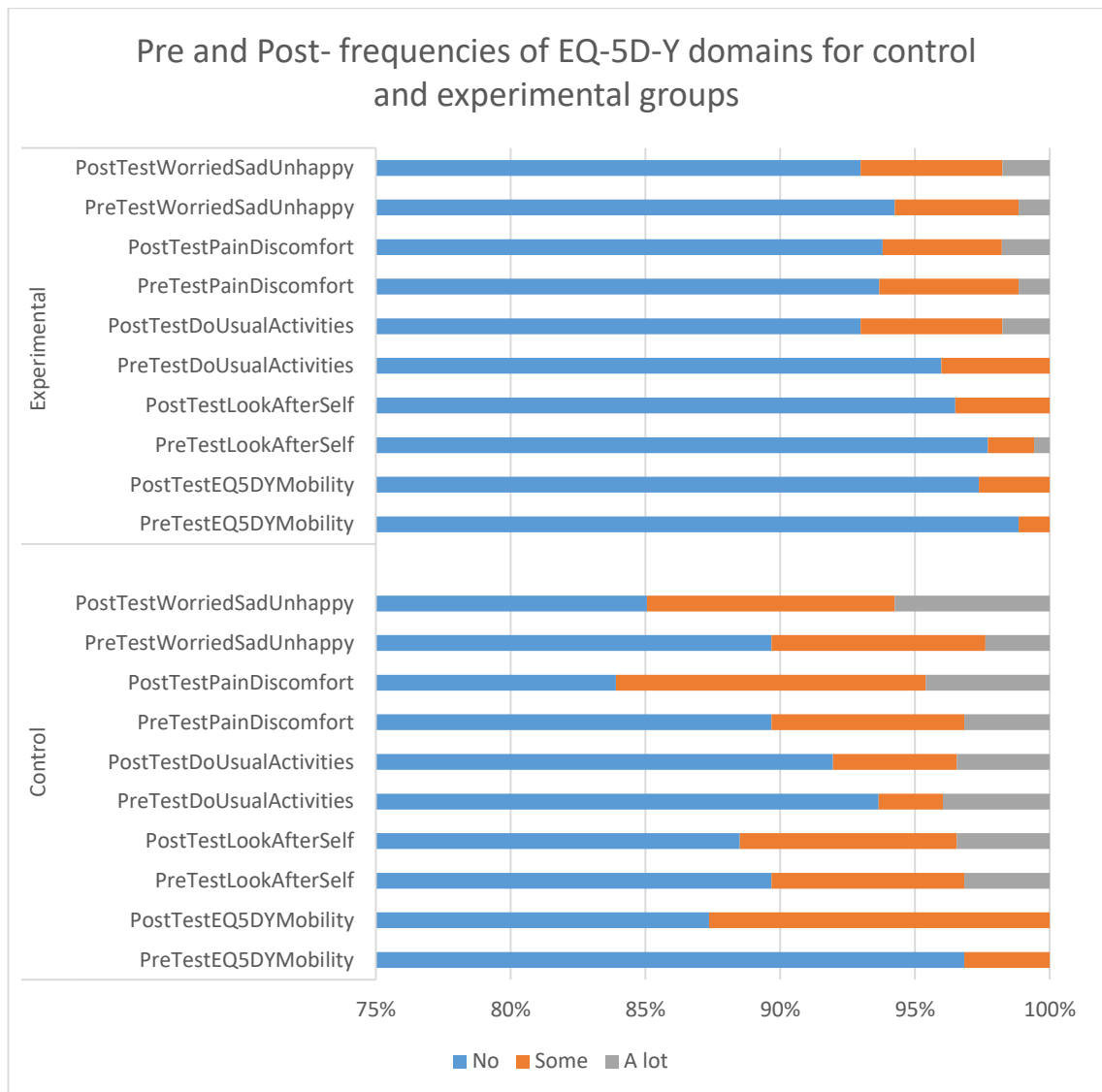
Table 4.13 shows the EQ-5D-Y pre- and post-test variables for the control and experimental group in terms of: 1 = no problems, 2 = some problems, 3 = a lot of problems, and 9 = missing data.

Table 4.13: HRQoL EQ-5D-Y pre- or post-test data

Pre-/Post-test	EQ-5D-Y Variable	Control Group						Experimental Group							
		1		2		3		1		2		3		9	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
Pre-test	Mobility	122	96.8	4	3.2	0	0.0	172	98.9	2	1.1	0	0.0	0	0.0
	Look After Self	113	89.7	9	7.1	4	3.2	170	97.7	3	1.7	1	.6	0	0.0
	Usual Activities	118	93.7	3	2.4	5	4.0	167	96.0	7	4.0	0	0.0	0	0.0
	Pain/Discomfort	113	89.7	9	7.1	4	3.2	163	93.7	9	5.2	2	1.1	0	0.0
	Worried/Sad/Unhappy	113	89.7	10	7.9	3	2.4	164	94.3	8	4.6	2	1.1	0	0.0
Post-test	Mobility	76	87.4	11	12.6	0	0.0	111	97.4	3	2.6	0	0.0	0	0.0
	Look After Self	77	88.5	7	8.0	3	3.4	110	96.5	4	3.5	0	0.0	0	0.0
	Usual Activities	80	92.0	4	4.6	3	3.4	106	93.0	6	5.3	2	1.8	0	0.0
	Pain/Discomfort	73	83.9	10	11.5	4	4.6	106	93.0	5	4.4	2	1.8	1	.9
	Worried/Sad/Unhappy	74	85.1	8	9.2	5	5.7	106	93.0	6	5.3	2	1.8	0	0.0

Pre-test N=300; Post-test N=201

As the proportion of each group reporting problems on the EQ-5D-Y domains was not equivalent on initiation of the study, the McNemar test was applied to test for change over time. However, due to the small numbers who reported problems, and the movement between categories, the test indicated a significant change ($p < 0.001$) for within group changes in all domains, in both groups. Therefore, the test was not useful and the results had to be presented graphically (Figure 4.3), rather than statistically. The general graphical trend shows a more stable curve within the experimental group, whereas the curve fluctuates more within the control group. This fluctuation implies that the control group generally experienced more problems over the six-week period. However, it cannot be inferred that it was the same learners who experienced problems after the six-week period.



Pre-test N=300; Post-test N=201

Figure 4.3: Pre- and post- frequencies of EQ-5D-Y domains for control and experimental groups

Table 4.14 displays the results of the dependent sample's test for the experimental group (pre- and post-test EQ-5D-Y VAS). No significant differences were found ($t=-0.34$, $p=0.737$). It also displays the results of the dependent sample's test for the control group. No significant differences were found ($t=-0.80$, $p=0.428$).

Table 4.14: T-test for dependent samples: EQ-5D-Y VAS

E/C	Variable	Mean	SD	CIs	t-value	df	p-value
E	Pre-test VAS	91.9	18.71				
	Post-test VAS	92.5	17.79	(-3.930-2.79)	-0.34	113	0.737
C	Pre-test VAS	93.0	17.38				
	Post-test VAS	94.4	12.93	(-4.822-2.063)	-0.80	86	0.428

N=201

4.3.6.3 Fitness tests

Significant differences, between the pre- and post-intervention tests, were found between the experimental and control groups for the following tests: sit-and-reach ($t=4.12$, $p<0.001$), standing long jump ($t=4.26$, $p<0.001$), and the sit-up ($t=-4.63$, $p<0.001$) (Table 4.15). The control group showed significant differences in the standing long jump ($t=-2.72$, $p=0.008$) and sit-up tests ($t=-9.11$, $p<0.001$).

Table 4.15: T-test for dependent samples: Eurofit test battery

E/C	Fitness test measures	Mean	SD	CIs	t-value	df	p-value
E	Pre-test sit-and-reach	15.6	6.70				
	Post-test sit-and-reach	13.3	7.28	(1.180-3.364)	4.12	113	<0.001
	Pre-test standing long jump	103.4	26.84				
	Post-test standing long jump	96.0	29.46	(3.950-10.827)	4.26	113	<0.001
	Pre-test sit-up	9.8	4.48				
	Post-test sit-up	11.5	4.21	(-2.317-0.928)	-4.63	113	<0.001
	Pre-test shuttle	25.2	1.95				
	Post-test shuttle	25.1	2.23	(-0.307-0.506)	0.48	111	0.630
C	Pre-test sit-and-reach	13.4	6.81				
	Post-test sit-and-reach	12.5	7.29	(-0.437-2.228)	1.34	85	0.185
	Pre-test standing long jump	107.2	21.16				
	Post-test standing long jump	112.1	21.77	(-8.494-1.313)	-2.72	85	0.008
	Pre-test sit-up	8.7	4.11				

	Post-test sit-up	11.9	4.35	(-3.924-2.518)	-9.11	85	<0.001
	Pre-test shuttle	25.1	2.08				
	Post-test shuttle	25.4	2.01	(-0.798-0.149)	-1.36	85	0.177

N=200 (post-test shuttle N=199)

4.3.7 Impact of attrition

Pre-testing measures of learners who were absent from post-testing were compared with the pre-testing measures of the learners who completed the post-testing measures. Significant differences were only seen in BMI Z-scores ($t=2.13$; $p=.034$), indicating that learners with higher BMI Z-scores were absent from the post-testing measures as seen in Table 4.16.

Table 4.16: T-test for independent samples: Impact of attrition

Pre-test variable	Absent or completed post-testing	Mean	SD	CI	t	df	p
Pre Test WC	Absent	61.8	8.69				
	Completed post-testing	60.2	8.58	(-0.422-3.721)	1.57	298	0.118
Pre Test BMI Z-score	Absent	0.6	1.50				
	Completed post-testing	0.2	1.39	(0.028-0.714)	2.13	298	0.034
Pre Test Sit and Reach	Absent	13.9	6.32				
	Completed post-testing	14.7	6.79	(-2.398-0.793)	-0.99	298	0.323
Pre Test Standing Long Jump Test	Absent	108.7	25.74				
	Completed post-testing	105.2	24.52	(-2.464-9.527)	1.16	298	0.247
Pre Test Sit Up Test	Absent	10.1	4.48				
	Completed post-testing	9.4	4.35	(-0.299-1.812)	1.41	298	0.159
Pre Test Shuttle Test	Absent	25.0	2.58				
	Completed post-testing	25.1	2.00	(-0.653-0.411)	-0.45	297	0.654

N (Absent) = 101 (including the 2 learners who did not complete all post-testing measures); N (Completed post-testing) =199

4.3.8 Programme adherence

Two schools completed the teacher-based intervention programme. School one had four classes (grades four and five), with four teachers implementing the programme. The programme was adhered to 83.3% of the time during the six-week intervention period. School two had three classes (grades four and five), with two teachers implementing the programme. The programme was adhered to 75% of the time during the intervention period. Decreased programme adherence was mainly attributed to teachers not being present due to illness or study leave. Teachers were given an opportunity to comment on the programme in the log book throughout the six-week period, as stated below in Table 4.17 and Table 4.18. There were seven comments stating that the programme was enjoyed by learners. This was followed by comments regarding time constraints and school facilities.

Table 4.17: Teacher's comments on the PE programme and post-coding

Teacher's comments	Programme Execution: Negative	Programme Execution: Positive	Programme intensity (strenuous)	Time constraints	Managing large groups
Too much; not enough time for invasion games; exercises strenuous; learners getting fitter; programme went well		1	2	1	
Coping well; space slightly cramped; only played game once per week; went well		2			
Foundation phase learners were distracting grade five learners; enjoyed class and game; bad weather; balls were too light; learners enjoyed programme and being outside					
Struggled with Invasion games-ran out of time; teacher had meeting; balls were light; difficulty managing big groups; learners enjoyed exercise; lots of running around for teacher; discrepancies noted between boys and girls; girls struggled more than boys; learners were writing exams but managed to squeeze in programme; windy weather	1			2	1
Learners enjoyed the programme; reps and times needed to be shortened; programme enjoyed				1	

Enjoyed class once they got used to it, difficulty explaining games; learners enjoyed warm up and cool down; exercises quite tough; divided class into boys and girls as whole class too big; class not done as teacher had exams; class not done as learners had exams	1		1		1
Total	2	3	3	4	2

N=6

Table 4.18: Teacher's comments on the PE programme and post-coding (continued)

Teacher's comments	Gender discrepancies	School Facilities	Enjoyment	Equipment	Improvement	No PE
Too much; not enough time for invasion games; exercises strenuous; learners getting fitter; programme went well					1	
Coping well; space slightly cramped; only played game once per week; went well		1				
Foundation phase learners were distracting grade five learners; enjoyed class and game; bad weather; balls were too light; learners enjoyed programme and being outside		2	2	1		
Struggled with Invasion games-ran out of time; teacher had meeting; balls were light; difficulty managing big groups; learners enjoyed exercise; lots of running around for teacher; discrepancies noted between boys and girls; girls struggled more than boys; learners were writing exams but managed to squeeze in programme; windy weather	2	1	1	1		1
Learners enjoyed the programme; reps and times needed to be shortened; programme enjoyed			2			
Enjoyed class once they got used to it; difficulty explaining games; learners enjoyed warm up and cool down; exercises quite tough; divided class into boys and girls as whole class too big; class not done as teacher had			2			2

exams; class not done as learners had exams						
Total	2	4	7	2	1	3

N=6

4.3.9 Correlations

As the implemented intervention programme did not reveal any significant changes in any of the parameters for both the PE (experimental group) and non-PE schools (control group), we could not conclude any associations amongst them.

4.3.10 Phase two summary

Two schools were randomly selected from each group; three schools were in quintile three, and one school was in quintile four. There were 300 learners that participated in the pre-testing measures, and 201 learners that participated in the post-testing measures. Gender was associated with the group, with more girls being in the experimental group. The mean age during pre-testing was 10.4 years, and 10.6 years during post-testing. No learners were found to be underweight. At baseline, the control and experimental groups were not equivalent with regard to gender distribution, BMI Z-scores and interpretation, EQ-5D-Y “looking after myself” variable, and the sit-up test.

When comparing the pre- and post-test values to each other, within the experimental group, no significant differences were noted in BMI Z-scores, WC, VAS of the EQ-5D-Y and the shuttle test. Significant differences were noted in three of the four fitness tests (sit-and-reach test, standing long jump test, and sit-up test), in the experimental group; however, the sit-and-reach and standing long jump tests showed a significant decline between the pre- and post-test measures. The experimental group showed a significant improvement in the sit-up test, but so did the control group. Within the control group, significant improvements were noted in the pre- and post-test WC, and two of the four fitness tests (standing long jump test and sit-up test). The general EQ-5D-Y graphical trend implies that more problems were experienced in the control group. Nevertheless, it cannot be inferred that it was the same learners who experienced problems over the six-week period.

As the implemented intervention programme did not reveal any significant changes in any of these parameters for the PE (experimental group) and non-PE schools (control group), we cannot conclude any associations amongst them. Comments on the teacher-based intervention programme throughout the six-week period included that the programme was

enjoyed by learners, time constraints were experienced, and school facilities limited programme execution at times.

4.4 Discussion

The primary aim of the second phase of the study was to determine the effect of a teacher-based intervention programme, after six weeks, for primary schools with less than the mandated amount or no specific amount of PE mandated on learners' HRQoL, BMI, and PF.

The secondary aim of this study was to determine any association between obesity, HRQoL, PF, and the extent of PA implementation in school-based PE programmes in primary schools, from various circuits within the PEED. The objectives for this phase of the study were to determine: the effect of a teacher-based intervention programme on the HRQoL, BMI, and PF of school learners, and whether there were any relationships between obesity, HRQoL, extent of PA implementation in PE programmes, and PF in these school learners. The learners were in grades four and five, between the ages of nine and eleven. In this section, the results were compared to the findings of other researchers and appropriate recommendations were made in the concluding chapter. The discussion summarises the second phase of the study.

4.4.1 Sample

To realise the objectives of the study, a sample of 85 learners per group was required to participate in the pre- and post-testing measures, based on the sample size determination calculations. There were 300 learners (mean age was 10.4 years) that participated in the pre-testing measures and 201 learners (mean age was 10.6 years) that participated in the post-testing measures. Teachers commented that the high attrition rate could be due to the commonly low attendance in the post-examination period. The high mean BMI Z-score of the learners who were absent could have contributed to a notable change in BMI Z-scores had they been present for post-testing measures. Gender was associated with the group. This association could be of importance, as Solmon (2014) noted that girls tend to be less active and less involved in PE compared to boys, most likely due to curricular issues and motivational aspects. Thus, the results of this study could be influenced by the uneven gender distribution between groups as there were more girls in the experimental group during pre- and post-testing measures. Herscovici, Kovalskys & De Gregorio (2013) also affirmed that gender differences should be considered when designing preventive interventions. A strength of this study is that the necessary sample sizes were obtained to establish significant relationships between the variables.

During this study phase, three schools were in quintile three and one school was in quintile four. Thus, the results of the second phase of the study cannot be generalised to the whole schooling population of the PEED as schools in quintile three were over-represented, and this over-representation may have caused biased results. PF levels in this study could have been affected by the SES of the school, as demonstrated in a study by Cleland *et al.* (2009). The authors found that high SES was associated with increased PA and PF from childhood to adulthood (Cleland *et al.*, 2009). Armstrong, Lambert & Lambert (2011) stated that age, gender, ethnicity, and SES play an important role in determining the PF status of children. Similarly, HRQoL can also be affected by SES (Wallander *et al.*, 2013); low parental education status was shown to result in decreased HRQoL in children (Von Rueden *et al.*, 2006). Additionally, ethnicity and SES affects overweight and obesity (Armstrong *et al.*, 2006; Armstrong, 2009). Ethnicity and SES were not considered in this study, and although age and gender were, they were not statistically analysed in comparison to BMI, HRQoL, and PF.

4.4.2 Prevalence of overweight and obese participants

The current study showed that, at baseline, 30.2% and 19% of the participants were overweight or obese in the control and experimental groups, respectively. Interestingly, a South African study by Pienaar (2015), which had a similar learner profile, found that the prevalence of overweight and obesity increased over a period of three years; from 12.7% at baseline to 16.7% at follow-up. Both percentages were markedly lower than the prevalence of overweight and obesity found during the pre-testing measures in this study. At baseline, learners in the intervention group had significantly lower BMI Z-scores compared to learners in the control group; this phenomenon was also found in a similar study by Taylor *et al.* (2007). In this study, no learners were found to be underweight, which differs from a study conducted in the Kwa-Zulu Natal province of South Africa, where 66% of learners were underweight (Puckree *et al.*, 2011). However, as this study used a small sample, and schools mainly from quintile three, the data cannot be compared to other South African prevalence studies, such as Armstrong *et al.* (2006), Puckree *et al.* (2011) and Pienaar (2015).

When comparing the pre-and post-test results to each other, within each group, no significant differences were noted in BMI. Hence, the intervention did not affect the BMI of learners in the experimental group. Similarly, Sahota *et al.* (2001) and Thivel *et al.* (2011) did not find any significant difference in measures of obesity after a primary school-based intervention programme. On the other hand, within the systematic review of school-based obesity prevention programmes by Brown & Summerbell (2009), nine of 20 (45%) studies

combining diet and PA demonstrated significant differences between the intervention and control groups for BMI. The only significant WC difference between pre- and post-testing was found in the control group. Hence, the intervention did not significantly affect the WC of learners who participated in the intervention. WC scores also showed no significant difference ($p=.25$) between the experimental and control groups following a PA programme (Kriemler *et al.*, 2010b). The unchanged BMI and WC variables, following the intervention, could have been due to the short six-week intervention period.

4.4.3 Health-related quality of life

The EQ-5D-Y is available in multiple languages; it is a viable tool in a cross-cultural setting (Ravens-Sieberer *et al.*, 2010). The study population included learners who spoke English, Afrikaans and Xhosa, for which the EQ-5D-Y was made available to them in their chosen language. Thus, the instrument was appropriate for this diverse group.

The EQ-5D-Y “looking after myself” component was significantly different between the two groups at baseline. Interestingly, Scott, Ferguson & Jelsma (2017) concluded that the EQ-5D-Y showed better psychometric properties in children with health conditions compared to healthy children. Similarly, physical as well as other domains (social and school) of HRQoL were more affected in children who were obese (Pinhas-Hamiel *et al.*, 2006). This occurrence was echoed in the study by Karlsson *et al.* (2007), where the authors concluded that long-lasting weight loss in severely obese adults had a general long-standing positive effect on HRQoL.

The intervention did not affect the HRQoL of learners in the experimental group. Contrastingly, Knöpfli *et al.* (2008) conducted an inpatient, multidisciplinary, intensive obesity intervention programme that was effective in producing a significant improvement in all quality of life variables in markedly obese children. The quality of life variables, body perception and image, improved following the programme by 17% and 11%, respectively. This improvement may result in increased control over eating behaviour and self-motivation, which may reflect a positive outcome of the treatment regime (Knöpfli *et al.*, 2008). The insignificant differences in HRQoL in the experimental group could therefore be attributed to the sample of children used in this study as well as the short six-week intervention period. Despite research done on the effect of HRQoL in obese children (Pinhas-Hamiel *et al.*, 2006), limited research has been done on assessing the effects of HRQoL in healthy children before and after an obesity prevention programme, or PE intervention programme.

4.4.4 Health-related fitness measures

Declining levels of health-related fitness amongst children are evident world-wide (Koletzko *et al.* (2002), as cited by Armstrong (2009)). Similarly, fitness levels of South African children are declining (Amusa *et al.*, 2011). This is an alarming trend, given that PF impacts significantly on physical and mental health (Ortega *et al.*, 2008). In this study, the results of each PF test were considered separately, and a composite fitness score was not analysed. Therefore, results from this study did not contribute to health-related fitness as a whole, but rather on the individual components of muscular endurance and trunk strength, explosive strength, flexibility, and cardiovascular fitness.

At baseline, learners in the experimental group did significantly more sit-ups compared to the control group; thus, comparisons between the two groups at post-testing were not done. When comparing the baseline and post-intervention scores of the tests within the control group, the standing long jump test and sit-up test showed significant improvement. For the experimental group, the standing long jump test and sit-and-reach test showed significant deterioration between baseline and follow-up testing. The only test that showed significant improvement in the experimental group, was the sit-up-test. However, as the control group's trunk strength also significantly improved over the six-week period, it cannot be concluded that the significant improvement was as a result of the intervention. Therefore, the intervention did not affect the components of health-related fitness of learners who participated in the intervention. Contrary to the results in this study, Sallis *et al.* (1997) noted significant differences in cardio-respiratory endurance, trunk strength, and endurance components of health-related PF after a two year PE programme. This could indicate that the effect of the intervention programme may be dependent on the duration of the intervention (six weeks as opposed to two years), and that the effect on outcome measures may require prolonged efforts, before changes can manifest.

4.4.5 Intervention programme

According to the Healthy Active Kids (2014) report card, the main reasons for not promoting PA in schools were lack of time (24%), finances (21%), facilities (14%), and human resources (12%). These factors were echoed in the comments by the participating teachers on the intervention programme throughout the six-week period, where time constraints were experienced and school facilities limited programme execution at times. Teachers mostly commented on the learners' enjoyment of the intervention programme.

4.4.6 Summary

In summary, the effect of a six-week teacher-based intervention programme was established, for primary schools with less than the mandated amount or no specific amount of PE mandated, on learners' HRQoL, BMI, and PF. The programme did not significantly affect BMI, WC, PF, or HRQoL. As the implemented intervention programme did not reveal any significant changes in any of these parameters for the experimental group, no deductions could be made on associations amongst the variables. Thus, the objective to determine whether there were any relationships between obesity, HRQoL, extent of PA implementation in PE programmes, and PF in these school learners, could not be achieved. The following chapter describes possible reasons why the intervention was unsuccessful, limiting factors to the study, and recommendations for future research and practice.

4.5 Limitations and recommendations

The limitations and recommendations (for practice and research) of the second phase of the study are discussed in Chapter five (Section 5.2 and 5.3), together with the limitations and recommendations for the study, as a whole.

5 CHAPTER FIVE: DISCUSSION AND CONCLUSION

5.1 Discussion

This discussion is presented with the summary of the study (Phase one and Phase two) as well as the limitations and recommendations for practice and future research. This chapter will also describe the implications of the findings for phase one and two, and it will be compared to current literature.

Phase one of this study provided a contextual background of the ten randomly selected schools, concerning the extent of PA implementation in school-based PE programmes. The South African Department of Education believes that participation in PE will develop motor skills that will allow learners to engage in a variety of physical activities (Department of Basic Education, 2011). It will also develop positive values and attitudes that will contribute to learners being mentally alert, physically fit, socially adjusted, and emotionally balanced (Department of Basic Education, 2011). These benefits to PE were re-iterated by respondents from the first phase of the study, where PE was regarded as important along with other subjects. Furthermore, the contributions to a healthy lifestyle, PF, and mental and behavioural well-being were noted. Despite the acknowledgment of the benefits of PE and PA, 50% of schools were not implementing the mandated amount of PE.

Due to the fact that quintile three schools were over-represented in the first phase of the study, these schools had a higher chance of and were also over-represented in the second phase of the study. Thus, the results of phase two could not be generalised to the whole schooling population of the PEED. This over-representation affected the responses from phase one regarding the school facilities and sports offered, as schools in quintile three are better resourced compared to schools in the lower quintiles, and less resourced compared to schools in the higher quintiles (Chutgar & Kanjee, 2009). PF levels (Armstrong, Lambert & Lambert, 2011), HRQoL scores (Wallander *et al.*, 2013), and anthropometric data (Armstrong *et al.*, 2006; Armstrong, 2009) could have also been affected by the degrees of SES during the second phase of the study.

In a study by Hardman & Marshall (2000), African countries in general had gaps in PE curriculum content and development, as PE programmes from all school levels were inadequate. In this study, the curriculum was implemented by 90% of schools, despite only 30% having access to teachers with PE qualifications. These statistics imply that if PE is indeed being implemented at 90% of schools in our sample, then many untrained teachers are

implementing these programmes. Therefore, school staff who lack the necessary expertise and knowledge to teach PE, could result in PE classes being unstructured and unsafe (Hardman & Marshall, 2000). Without structure, learners do not develop the necessary skills associated with PE. Perhaps this finding can be attributed to the results obtained in the second phase of the study: baseline measures showed that 58% of learners were below the norm during the sit-up test, 43% of learners were below the norm during the sit-and-reach test, and 86% of learners were below the norm for the standing long jump test. These findings could illustrate the effects of PE classes being taught by teachers without the necessary qualifications and inadequate curriculum content, as the data from this study shows major deficiencies in the components of PF.

Schools in the lower quintiles had fewer sporting opportunities and facilities, which had the potential to impact on the PA levels attained by learners (Haug *et al.*, 2010). An inverse relationship between BMI and PA has been demonstrated in multiple studies (Boreham & Riddoch, 2001; Ekelund *et al.*, 2002; Deforche *et al.*, 2003). Therefore, because obese children are typically less physically active, this trend can be connected to the results obtained in the second phase of the study; 30.2% and 19% of the participants in the control and experimental group were overweight or obese at baseline, respectively. These results were higher compared to another obesity prevalence study in South Africa, where the prevalence of overweight and obesity was 12.7% at baseline (Pienaar, 2015). Thus, schools in lower quintiles, with less facilities and sporting opportunities may cause learners to be at risk of obesity as it supports their decreased PA.

Nooijen *et al.* (2017) described how poor intervention implementation or compliance may result in a lack of significant effects during intervention studies. In this current study, the intervention was adhered to 77.7% of the time by participating teachers. However, this was a subjective measure of adherence, which may have been a limiting factor of the study as the intervention was not monitored objectively throughout the intervention period. Hence, the programme may not have been implemented correctly, or for the desired amount of time; this could have contributed to the insignificant results obtained in this study. Time constraints were experienced by the participating teachers during the 60 minute intervention, which could be linked with the results obtained from the first phase, where half of the schools were not implementing the mandated amount of PE. Similarly, the Healthy Active Kids Report Card (2014) stated that the main reason for decreased PA opportunities were a lack of time. In a similar study conducted in South African primary schools, time constraints experienced by participating staff members, were also noted as one of the

reasons for the unsuccessful intervention, even though the intervention period was greater (de Villiers *et al.*, 2015).

The effect of a six week teacher based intervention programme, for primary schools with less than the mandated amount or no specific amount of PE mandated, on learners' HRQoL, BMI, and PF, was established. The programme did not significantly affect BMI, WC, PF, or HRQoL. Similarly, the *HealthKick* intervention implemented in primary schools did not yield the desired results over the three year period (de Villiers *et al.*, 2015). Only 25.9% of school PA and sport environment actions were completed, which may have been due to the lack of time and available resources, lower SES circumstances, and the poor physical environment at schools (de Villiers *et al.*, 2015). Contrary to the findings of this current study, and the study by de Villiers *et al.* (2015), another South African school-based intervention study found a significant increase in the average number of sports each learner participated in during PE or LS lessons (Naidoo *et al.*, 2009). This intervention took place for six months (Naidoo *et al.*, 2009).

The unchanged BMI, WC, HRQoL, and PF variables, following the intervention, could have been due to the short six-week intervention period; a limiting factor to the study. A systematic review of school-based interventions that focused on improving dietary intake and PA to prevent childhood obesity, stated that the duration of the 38 studies ranged from 12 weeks (reporting a weight outcome) to 22 years (Brown & Summerbell, 2009). Twenty two of the 38 studies had follow-ups of less than one year, and nine had follow-ups between one and two years (Brown & Summerbell, 2009). Overall, there was not a consistent pattern between a significant effect and the duration of the study (Brown & Summerbell, 2009). Despite another systematic review stating that the duration of interventions ranged from as short as one month (Van Sluijs, McMinn & Griffin, 2007), notwithstanding the implementation factors discussed above, such as intervention compliance and time constraints, this study may have yielded better results with a longer intervention duration.

5.2 Limitations of the study

Ten schools were included in the first phase of the study to determine the extent of PE and PA implementation at the respective schools. Ten may be considered a small number for providing a profile and is acknowledged as a limitation. Another limiting factor was that phase one respondents were not anonymous, which could have biased the results. This study was subjected to sampling bias, which is a limitation as stratified random sampling method was conducted with the circuit lists, causing an over-representation of quintile three schools.

The sampling bias could have influenced the results, especially as each quintile group has differing resources and government support. Ethnicity and SES were not considered in this study, and although age and gender were, skewed gender representivity between the control and experimental groups resulted in no statistical analysis of these variables with BMI, HRQoL and PF. Gender representation during sampling was not equal, which may have been a limitation of the study as girls tend to be less active and less involved in PE compared to boys (Solmon, 2014). A limitation to PA and PE may be the limited access to an indoor gym area as this prevented some schools from conducting the programme in more adverse weather conditions such as rain and extreme cold. This study did not control for confounding variables likely to trigger physiological changes alongside the intervention programme such as extramural physical activities and walking or cycling to and from school, and is therefore acknowledged as a limiting factor to the study as it could have affected the results. Another limiting factor to this study was the relatively short six-week intervention period, during which, no significant changes were found. Lastly, while the intervention was guided by the researcher, no direct observation to ensure programme adherence was done.

5.3 Recommendations

5.3.1 Recommendations for future research

The results of the study were disappointing and in future research, steps must be taken to ensure compliance and decrease attrition. This attrition could have created a bias which should be avoided if possible. Future research should take ethnicity, SES (quintile system), and gender into account, to ensure an equal representation of the population during sampling, this can allow for multi-dimensional analysis of the data. In order to obtain unbiased responses during questionnaires, participants should remain anonymous. Due to the discrepancies noted between the subjective responses of the mandated amount of time spent in PE, and the curriculum implementation, compared to previous research done in Africa on policy implementation (Hardman & Marshall, 2000), a future recommendation would be to re-assess PE in schools objectively by observing PE classes and comparing it to the curriculum requirements. As this study used a small sample size and schools mainly from quintile three, the data on overweight or obese children cannot be contrasted with other South African prevalence studies such as Armstrong *et al.* (2006), Puckree *et al.* (2011), and Pienaar (2015). Thus, sampling factors should be included in future research to accommodate for these discrepancies. Implementation of teacher-based intervention programmes should be objectively assessed (directly observed) by external evaluators to prevent bias and to

ensure adherence and correct programme implementation. In future, prior to testing, discussion with teachers should be done in order to establish the periods during the school term when attrition is high. This could prevent the low attendance rates found during testing in this study. Future procedures would also need to be in place to ensure programme adherence, such as if the teacher implementing the programme is not present, another teacher participating in the study at the same school should implement the programme for that week. Lastly, a future recommendation would be to implement the teacher-based intervention programme for a minimum of 12 weeks in order to determine its effect on BMI, HRQoL and PF.

5.3.2 Recommendations for practice

Phase One:

Despite this study not showing a positive effect on the measured variables, literature does support the positive effects of PA on health. One possibility for increasing PA and PE in schools is with the assistance of non-government organisations, who are known to be involved in community development (Burnett, 2010). Thus, a recommendation would be for non-government organisations to become more involved in lower resourced schools to promote sport and PA. The ECDoE should provide ongoing training for LS educators to promote structured, safe PA at school level. The Department of Education should improve the level of PA by requiring schools to provide daily PE or PA opportunities before, during, and after school, and by enabling schools to create health promotion schemes that support PA. Within the school environment, a large focus should be on the development of quality PE and PA policies and programmes in order to give learners the opportunity to live healthy active lives (Lee *et al.*, 2007). A future recommendation would be the monitoring of and adherence to mandated PE sessions, as multiple variances in time allocated to PE were found.

Phase two:

Some teachers experienced difficulty managing large classes during the intervention programme, a recommendation would be that PE classes be organised in a way that allows for up to 25 learners per teacher (Skala *et al.*, 2012). For example, to separate the class into smaller groups or recruit volunteers to assist in class management. This should allow for more time spent in moderate to vigorous PA, and less time in class management. Another recommendation would be to ensure PA programmes are enjoyable for learners in order to ensure maximal participation. Teachers should plan their lessons well in order to minimize time constraints during PE classes. Additional government support should also be provided

to develop the subject, school facilities, and provide equipment. Developing the indoor and outdoor environment should be considered in PA promotion and development programmes. This will allow for less barriers to PE and PA. While this study did not show positive significant changes in the outcome measures, it is known that PA has many benefits. One possibility for increasing school attendance and PA in schools is with the implementation of structured PA programmes after examination periods when the academic programme is not highly prioritised. Parents should also be notified regarding the importance of school attendance in post examination periods.

5.4 Conclusion

In South Africa, the number of children at risk of obesity is rising, which negatively affects their HRQoL and PF. This study concludes that the effects of the six-week teacher-based intervention, for primary schools with little (less than the mandated amount) or no specific amount of PE, on learners' HRQoL, BMI, and PF, were insignificant. Similar results were found in other South African studies. Intervention findings may be as a result of poor intervention implementation or compliance, time constraints experienced by participating teachers and the short duration of the intervention. Nevertheless, this study did manage to provide a contextual background of the selected schools concerning the extent of PA implementation in school-based PE programmes; where all schools provided PE, despite half of the schools not implementing the mandated amount of PE. This study provides a platform for future research to further investigate the causative factors around unsuccessful PA or PE interventions in primary schools, specific to issues pertaining to South Africa, which differ from international challenges. For example, further research would be required to investigate the ethnic and socio-economic differences and their impact on PA and PE programmes. Results drawn from this research will hopefully allow for more effective intervention strategies and health promotion programmes to be planned and conducted within the South African school setting, with improved implementation factors such as the duration, minimizing time constraints and taking the school environment into consideration. These strategies will be aimed at promoting PA, preventing the onset of obesity, and reducing obesity levels in school children; to reduce the development of NCD in later life as well as to reduce the national burden on health and the economy.

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LIST OF APPENDICES

Appendix 1: Teaching plan for PE in the intermediate phase (CAPS)

Grade 4	Grade 5	Grade 6
• Different ways to locomote, rotate, elevate and balance, using various parts of the body with control • A variety of modified invasion games • Rhythmic movements with focus on posture • Basic field and track athletics or swimming activities • Safety measures	• Movement sequences that require consistency and control in smooth and continuous combinations • A variety of target games • Rhythmic movements and steps with attention to posture and style • A variety of field and track athletics or swimming activities • Safety measures	• Physical fitness programme to develop particular aspects of fitness • A variety of striking and fielding games • Rhythmic patterns of movement with co-ordination and control • Refined sequences emphasising changes of shape, speed and direction through gymnastic actions or swimming activities • Safety measures

Figure 5.1: Teaching plan for PE in the intermediate phase (CAPS)

Source: Department of Basic Education (2011)

Appendix 2: School Environment Questionnaire

A. SCHOOL CHARACTERISTICS

1. What is your position at this school? ☐ Principal ☐ Vice Principal ☐ Teacher ☐ Other
2. In what quintile/circuit is your school? _____
3. How many days (excluding holidays) do your learners attend school during the academic school year? _____ days
4. What is the total number of learners in Grades 4 and 5 at your school?

_____ Grade 4 learners

_____ Grade 5 learners
5. Does your school provide physical education (PE) classes? ☐ Yes / ☐ No
6. If PE is not provided, please provide reason :

Please continue from question 24 if you don't provide PE classes

7. Do you receive any funding/ support outside of government for PE equipment etc.?

☐ Yes / ☐ No
8. If yes, please specify?

9. What is the total number of educators involved in PE in your school?

_____ Educators
10. How many educators that are involved in PE classes have a physical education qualification?

_____ Educators
11. Does your school follow a physical education curriculum? ☐ Yes / ☐ No

12. Are learners assessed along the lines of the curriculum? ☐ Yes / ☐ No
13. Do you regard PE as an important subject along with other subjects at your school?
- ☐ Yes / ☐ No
14. If there are time constraints with regards to completing the curriculum, does physical education get suspended? ☐ Yes / ☐ No
15. Do you think PE classes are beneficial? ☐ Yes / ☐ No
16. What is the aim of physical activity at your school?
-
-

B. POLICIES AND PRACTICES

For the following section, "policies" refers to any mandates issued by the state/government, the local school board, or any other agency, including policies developed by your school or (district/diocese), that affects your school environment and that have been officially adopted by your school or district. This section also asks about practices (what your learners and staff are allowed to do on a regular basis) that you might follow to promote the health and well-being of learners.

17. Does your school have written policies or practices concerning physical activity?
- ☐ **Yes**, existing written policies
- ☐ **Yes**, written policies still under development
- ☐ **Yes**, practices
- ☐ No
- ☐ N/A
18. Does physical education get put on hold during student examination time? ☐ Yes / ☐ No

C. PHYSICAL ACTIVITY

19. How many minutes per week are allotted to physical education for learners in grade 4 and 5?

_____ minutes per [check the box indicating the time unit] week ☐ day ☐

☐ No specific amount

20. Compared to the class time allotted to physical education (PE) for grade 4 and 5 of 40 hours a year/1 hour per week as specified in the NCS, do the learners in grade 4 and 5 in your school receive on average:

- ☐ Less than the mandated amount
- ☐ Approximately the mandated amount
- ☐ More than the mandated amount
- ☐ No specific amount is mandated

21. From the following list, please indicate which sports are offered in your extramural or intramural programmes available to learners in grade 4 and 5:

☐ Not applicable, school does not offer inter-school or intra-mural sports to learners in grades 4 and 5

		<i>Inter-school</i>	<i>Intra-mural</i>			<i>Inter-school</i>	<i>Intra-mural</i>
b.	Basketball	☐	☐	j.	Gymnastics	☐	☐
c.	Volleyball	☐	☐	k.	Wrestling	☐	☐
d.	Soccer	☐	☐	l.	Track & Field	☐	☐
e.	Football	☐	☐	m.	Badminton	☐	☐
f.	Baseball/softball	☐	☐	n.	Swimming	☐	☐
g.	Rugby	☐	☐	o.	Hockey	☐	☐
h.	Netball	☐	☐	p.	Martial arts	☐	☐
i.	Cricket	☐	☐	q.	Other	☐	☐

If other please specify:

D. SCHOOL FACILITIES

22. Do the majority of learners at your school have regular access to any of the following during school hours*? *During school hours means from the first bell to the last bell, including both instructional and non-instructional time (e.g., lunch).

	<i>Yes, on grounds only</i>	<i>Yes, off grounds only</i>	<i>Yes, both on and off grounds</i>	<i>No</i>	<i>Don't know</i>
a. Gymnasium/school hall	☐	☐	☐	☐	☐
b. Running track/sports field	☐	☐	☐	☐	☐
c. Outdoor sports field (e.g., rugby or soccer)	☐	☐	☐	☐	☐
d. Outdoor paved area (e.g. tennis/netball court)	☐	☐	☐	☐	☐
e. Playground equipment (e.g., climbing structures, swings)	☐	☐	☐	☐	☐
f. Swimming pool	☐	☐	☐	☐	☐
g. Change rooms available for use before and after physical activity	☐	☐	☐	☐	☐
h. Bicycle racks	☐	☐	☐	☐	☐
i. Are the bicycle racks in a secure area to avoid theft?	☐	☐	☐	☐	☐

Appendix 3: Ethical approval letter



UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee



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17 December 2015

HREC REF: 731/2015

Mrs N Naidoo

Division of Physiotherapy
Dept of Health & Rehab
F45.41
OMB

Dear Mrs Naidoo

PROJECT TITLE: THE EFFECTS OF A TEACHER-BASED INTERVENTION PROGRAMME FOR PRIMARY SCHOOLS ON LEARNER'S HEALTH-RELATED QUALITY OF LIFE, BODY MASS INDEX AND PHYSICAL FITNESS: A RANDOMISED CONTROL TRIAL. (MSc-candidate- J Bowers)

Thank you for your response letter addressing the issues raised by the Human Research Ethics Committee (HREC).

It is a pleasure to inform you that the HREC has formally approved the above-mentioned study.

Approval is granted for one year until the 30th January 2017.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.

(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

We acknowledge that the following student: Jodie Bowers is also involved in this project.

Please quote the HREC reference no in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938

Hrec/ref:731/2015

This serves to confirm that the University of Cape Town Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP) and Declaration of Helsinki guidelines.

The Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

Appendix 4: Letter to Eastern Cape Department of Education

Letter requesting permission to conduct this study within the Eastern Cape Department of Education (Port Elizabeth Education District)

Division of Physiotherapy
Department of Health and Rehabilitation
Sciences
Faculty of Health Sciences
University of Cape Town
Anzio Road
Observatory 7925
Cape Town

The Eastern Cape Department of Education: Port Elizabeth Education District

Private Bag X3915

North End

6056

REQUEST FOR PERMISSION TO CONDUCT STUDY WITHIN TEN PRIMARY SCHOOLS IN THE PORT ELIZABETH EDUCATION DISTRICT

Dear Sir/Madam

I, Jodie Bowers, am a registered Masters Physiotherapy student in the Division of Physiotherapy, Department of Health and Rehabilitation Sciences, Faculty of Health Science, University of Cape Town. I wish to conduct a research study entitled: **The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.**

The primary aim of the study is to determine the effect of a teacher-based intervention programme after 6 weeks for primary schools, from various circuits within the Port Elizabeth

Education District, without physical education on learner's health-related quality of life, body mass index and physical fitness. The study will be conducted by myself as well as five research assistants, all under the supervision of Ms Nirmala Naidoo (Lecturer: University of Cape Town). I am applying for ethical approval from the Human Research Ethics Committee at UCT.

Childhood obesity is recognised by the WHO and the World Confederation of Physical Therapy as an international epidemic. Studies show that obesity present in childhood or adolescence is likely to increase adult morbidity and mortality. The study consists of two phases. During the first phase I will randomly selected ten co-ed schools within the Port Elizabeth education district, as this is likely to be representative of the school population in Port Elizabeth. An assessment of physical education within the ten schools will be conducted with a structured questionnaire with the principal or a delegated teacher. Phase two will commence with four randomly selected schools, two schools with physical education and two schools without physical education. Pre-testing will be conducted with grade four and five learners. This will consist of measurements of height, weight, and waist circumference in order to obtain learner's body mass index and waist circumference. Physical fitness will be determined using various fitness tests and Health-Related Quality of Life will be assessed with a short questionnaire. Selected class teachers from various schools will then participate in the intervention which will consist of an educational booklet and a short training session on physical education/activity, which they will hopefully incorporate into lessons with the learners. After six weeks, I will return to the four schools to conduct my post-testing measures with the same grade four and five learners.

Once permission is granted from ECDoE, I will liaise with the principals of the selected schools eligible for this study. Informed written consent will then be obtained from each school as well as written, informed consent from teachers, parents of learners participating and assent from the learners for their participation. This research can provide a platform for the management of overweight and underweight in childhood as well as the promotion of a healthy, active lifestyle and physical activity/fitness programmes within schools.

The study will be supervised by Ms Nirmala Naidoo, Division of Physiotherapy, School of Health and Rehabilitation Sciences, Faculty of Health Sciences, University of Cape Town.

Contact Details:

Tel: (Work) 021-4066314

Fax: 021-4066401

E-mail: niri.naidoo@uct.ac.za

If you have any further queries or concerns, you may contact my supervisor, Nirmala Naidoo, or the Chair of Human Research Ethics Committee (HREC), Professor Marc Blockman on 021 4066 411 or marc.blockman@uct.ac.za.

Your permission will be greatly appreciated.

Kind Regards

Jodie Bowers – 073 649 5333 (Researcher)

Appendix 5: Permission to conduct study in the PEED



Province of the
EASTERN CAPE

DEPARTMENT OF EDUCATION

* Algoa College Struanway Road * Straundale * Port Elizabeth * Private Bag X3931, North End * Port Elizabeth * 6056
REPUBLIC OF SOUTH AFRICA * Tel: +27 (0)41 4093701 * Fax: 041 4093723 *

FROM THE OFFICE OF MR MMA LEONARD
CES: CURRICULUM, MANAGEMENT AND SUPPORT

Dear Ms Jodie Bowers

PERMISSION TO CONDUCT RESEARCH

Permission is hereby granted to you to conduct research in schools in the Port Elizabeth District subject to the following conditions:

1. The principal must give consent for the research to be undertaken in the school.
2. The times for the research may not negatively influence the normal conduct of the school day.
3. All parents must give their written consent for their children to participate in the research.
4. Parents may withdraw their children from the research project at any time without providing reasons.
5. The Department of Education, as well as the school, must be indemnified from any eventuality that may arise from, and during the conduct of this research.
6. The welfare and wellbeing of the learners must be safeguarded at each stage of the research.
7. Neither the Department of Education nor the school will be held liable for any costs that may be incurred in the conduct of this research.
8. The Department of Education will be provided with the findings of the research project as well as the recommendations, if any, proceeding therefrom.

Kindly accept our best wishes as you embark on this project. We trust that you will receive good cooperation from the selected schools. Please revert to writer should you require further assistance.

Kind regards

MMA LEONARD
01 March 2016

Appendix 6: Cover letter to principals

Letter requesting permission to conduct our study at St Josephs Primary School (example)

Division of Physiotherapy

Department of Health and Rehabilitation

Sciences

Faculty of Health Sciences

University of Cape Town

Anzio Road

Observatory 7925

Cape Town

St Josephs Primary School

536 Cape Road

Morningside

Port Elizabeth

6025

REQUEST FOR PERMISSION TO CONDUCT STUDY AT ST JOSEPHS PRIMARY SCHOOL

Dear Principal Sauer

I, Jodie Bowers, am a registered Masters Physiotherapy student in the Division of Physiotherapy, Department of Health and Rehabilitation Sciences, Faculty of Health Science, University of Cape Town.

I wish to conduct a research study entitled: **The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.**

The primary aim of the study is to determine the effect of a teacher-based intervention programme after 6 weeks for primary schools, from various circuits within the Port Elizabeth Education District, without physical education on learner's health-related quality of life, body

mass index and physical fitness. The study will be conducted by myself as well as five research assistants, all under the supervision of Ms Nirmala Naidoo.

Childhood obesity is recognised by the World Health Organisation (WHO) and the World Confederation of Physical Therapy (WCPT) as an international epidemic. Studies show that obesity present in childhood or adolescence seems to increase the likelihood of adult morbidity and mortality. The study consists of two phases. During the first phase I will randomly selected ten co-ed schools within the Port Elizabeth education district. An assessment of physical education within the ten schools will be conducted with a structured questionnaire with the principal or a delegated teacher. Phase two will commence with four randomly selected schools, two schools with physical education and two schools without physical education. Pre-testing will be conducted with grade four and five learners. This will consist of measurements of height, weight, and waist circumference in order to obtain learner's body mass index and waist circumference. Physical fitness will be determined using various fitness tests and Health-Related Quality of Life will be assessed with a short questionnaire. Selected class teachers from various schools will then participate in the intervention which will consist of an educational booklet and a short training session on physical education/activity, which they will hopefully incorporate into lessons with the learners. After six weeks, I will return to the four schools to conduct my post-testing measures with the same grade four and five learners.

Further details of these measurements, as well as this study, are attached in the information letter. This research can provide a quantitative platform for future research to be conducted. Future research on this topic will aid in the management of overweight and underweight children as well as the promotion of a healthy, active lifestyle and physical activity/fitness programmes within schools.

The study will be supervised by Ms Nirmala Naidoo, Division of Physiotherapy, School of Health and Rehabilitation Sciences, Faculty of Health Sciences, University of Cape Town. If you have any further study-specific queries or concerns, you may contact me or my supervisor Nirmala Naidoo.

Contact Details: Jodie Bowers (Researcher)

Nirmala Naidoo (Supervisor)

Tel: (Cell) 0736495333

Tel: (Work) 021-4066314

E-mail: Jodiebowers@hotmail.co.za

Fax: 021-4066401

E-mail: niri.naidoo@uct.ac.za

The chair of the Human Research Ethics Committee (HREC), Professor Marc Blockman, may be contacted if you have any questions or concerns about your rights or welfare as a research participant on 021 4066 411 or marc.blockman@uct.ac.za.

Your permission will be greatly appreciated.

Kind Regards,

Jodie Bowers

Appendix 7: Information letter to school principals

Title: The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.

Researcher: Jodie Bowers (UCT Masters student)

Selection of participants

You and other principals and teachers within the Port Elizabeth education district are to be included in the first phase of the study. Learners in grade four and five and class teachers are to be included in the second phase of the study. Your school, together with nine other schools have been selected to participate in the study.

Description of research

The first phase will be conducted with ten randomly selected co-ed schools within the Port Elizabeth Education District. It will consist of a structured questionnaire on physical education which will need to be completed by you or a specified teacher if he/she is more equipped to complete the questionnaire. Phase two will commence with four randomly selected schools, two schools with physical education and two schools without physical education. Pre-testing will be conducted with grade four and five learners. This will consist of measurements of height, weight, and waist circumference in order to obtain learner's body mass index and waist circumference. Physical fitness will be determined using four different fitness tests. The tests are simple and used to assess different types of physical fitness. The learner's Health-Related Quality of Life will be assessed with a short questionnaire. The tests will be measured and results taken by myself and my research assistants. Pre-selected grade four and/or five class teachers will then participate in the intervention which will consist of an educational booklet and a short training session on physical education/activity, which they will hopefully incorporate into lessons with the learners. After six weeks, I will return to the four schools to conduct my post-testing measures with the same grade four and five learners. Although we will know the names of the learners, teachers and schools purely for gathering data, all descriptive information will remain anonymous to anyone not within this group of researchers.

What will be required of the learners?

The grade four and five learners will only be involved if your school is selected to participate in the second phase of the study. Pre-testing measures will preferably be conducted on one day and six weeks later post testing measures will preferably be conducted on one day. Allowances may need to be made for bigger/ multiple classes. The learners will not be interrupted for more than those two days at school during their participation in the study. Aside from completing the informed assent form and giving the information letter and the informed consent to their parents, the learners will not have to do anything else at home. Pre/posting measures will consist of: Waist, height and weight measurements to be taken for BMI and waist circumference; four fitness tests to determine the learners' fitness levels and a short questionnaire to assess the learner's Health-Related Quality of Life. The learners will just have to cooperate and undress as necessary (remove shoes and any baggy clothing). They will not be pushed to perform or hurt in any way. The tests are simple and will be monitored by the members of the research team. Learners may also need to participate in any physical education classes/activities with their class/PE teacher over the next six weeks. Not every class or school will get these physical education classes/activities. The classes will be 60 minutes once per week during school time and will involve running, jumping and other exercises in line with the Curriculum and Assessment Policy Statement Teaching Plan for Life Skills. This data will only be used for the original purpose of this study which was explained in the beginning of this letter. Should we wish to use it for any other purpose, you will be informed and we will send out another information letter and informed consent form prior to using it.

What will be required of you?

Once informed consent is obtained, you will be required to complete a structured questionnaire on the school environment pertaining to physical activity and physical education. I will give you the questionnaire once I have received your informed consent and collect the completed questionnaire one week later. If you are unable to complete the questionnaire or if you feel that a teacher would be more equipped to complete the questionnaire, please notify me and delegate a teacher to complete the questionnaire. I will then obtain informed consent and conduct the questionnaire with the delegated teacher.

What will be required of the class teacher?

The class teachers will only be involved if your school is selected to participate in the intervention. Once pre-testing measures have been conducted with the learners, selected

class teachers will participate in the intervention which will consist of giving them an educational booklet and a short 30-minute training session on physical education. They will then need to conduct physical education classes with the learners for 60 minutes, once per week for six weeks. They will also need to complete a logbook after each week.

What will be the risks involved

The only possible risks relate to the fitness tests that the learners will be participating in. Those learners who may feel out of breath or dizzy and thus cannot complete the fitness tests are free to stop and are not required to continue. The learners may feel tired or sore afterwards, depending how hard they push themselves but the risks are minimal and we will do our utmost to prevent any possible risks or discomfort for the learners. I have chosen a very simple fitness test to minimise any risks or discomfort for the learners. As I am measuring obesity and fitness levels, the learners may feel upset or uncomfortable if they are already conscious of their weight. We hope to minimise this by keeping everything anonymous and by not telling the learners or anyone else at the school/elsewhere the results. Results will be displayed in the final report but these will be completely anonymous and cannot be related back to you, individual learners, schools and teachers in any way. During the six-week intervention period, any injuries sustained may be minor (e.g. fall during activities), the teacher will be advised accordingly. The school's health protocol/procedure should be followed.

What benefits will there be for taking part in the study

Teachers and learners may benefit from the intervention implemented. Those learners identified as requiring further support will be referred after consultation with parents and teachers. However, upon completion of the study, you will be given a summary of the study results. Depending on the results, it will encourage the school authorities to promote programmes at schools to address deficiencies found in the study. The intervention will also be made available to classes that have not received the intervention if a positive effect has been proven.

What payment will be received or what costs will be incurred

You/learners/schools will not receive any payment and you/the school/parents and learners will not have to pay anything to participate in the study. The study is done during the school day, during break times, so there are no transport costs for parents and learners.

Voluntary participation

Participation in this study is completely voluntary and you, the school, teachers as well as the learners are under no obligation to participate. Even if you and/or the parent give consent for participation and on the day you/the learners decide that you/they don't want to continue, for whatever reason, no penalties will be incurred.

Right to withdraw from the study

Once consent from parents, teachers, you and assent have been obtained, the learner/teacher/you are under no obligation to complete the study and you/they can pull out at any time with no penalties. We will encourage you/learners to complete the study but should you/they really not want to, you/they will be free to withdraw at any time.

Confidentiality

Confidentiality will be maintained at all times. We, as the research team, will know your, the schools, teachers and learner's names for means of data capturing but from the start of the study the learners and schools will be allocated a number which will replace their name or any other personal details for the rest of the study. Full confidentiality will be maintained during publication of this dissertation and your/the learner's/schools name will never be mentioned and there will be no way for anyone that is not part of this group to relate any of the data back to you/a specific school or learner. All data and names will be kept on one computer in a locked up environment so that there is no way for anyone but the researcher to have access to it. All data will be maintained securely for up to a year after the study has been completed.

Compensation/treatment in the event of an injury

Once you, the parents and learners have given consent, the learners will partake in this study at their own risk and the university or members of this research group or supervisor will not be held responsible for any injuries incurred. The risk of injury is very minimal.

Who to contact for further information

Should you have study-specific queries or want more information, you can contact me, Jodie Bowers on 0736495333/jodiebowers@hotmail.co.za or my supervisor, Nirmala Naidoo, on niri.naidoo@uct.ac.za.

The chair of the Human Research Ethics Committee (HREC), Professor Marc Blockman, may be contacted if you have any questions or concerns about your rights or welfare as a research participant on 021 4066 411 or marc.blockman@uct.ac.za.

Thank you for taking the time to read this!

Appendix 8: Informed consent for principals

Informed Consent Form

University of Cape Town

TITLE: **The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.**

I, _____ have read the information sheet. I understand what is required of myself/my school and have had all my questions answered. I do not feel that I/my school have been coerced to participate in this study and we are doing so of our own accord. I know that I/my school can withdraw at any time if we so wish and that it will have no negative consequences for me/my school.

Signed:

Principal

Date and Place

Researcher

Date and Place

Appendix 9: Information letter to school teachers (if completing the school environment questionnaire)

Title: The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.

Dear Teacher

I, Jodie Bowers, am a registered Masters Physiotherapy student from the University of Cape Town.

Your school has been selected to participate in my study. Should you give consent, you will be allowed to participate in the study. The information which follows makes up the basis of my project:

Background, purpose and importance

Childhood obesity is recognised by the World Health Organisation (WHO) and the World Confederation of Physical Therapy (WCPT) as an international epidemic. Studies show that obesity present in childhood or adolescence seems to increase the likelihood of adult morbidity and mortality. The primary aim of the study is to determine the effect of a teacher-based intervention programme after 6 weeks for primary schools, from various circuits within the Port Elizabeth Education District, without physical education on learner's health-related quality of life, body mass index and physical fitness. I believe this research will aid in the management of overweight and underweight children as well as the promotion of a healthy, active lifestyle and physical activity/fitness programmes within schools.

Selection of participants

You, principals and other teachers within the Port Elizabeth education district are to be included in the first phase of the study. Learners in grade four and five and class/PE teachers are to be included in the second phase of the study. Your school, together with nine other schools have been selected to participate in the study.

Description of research

The first phase will be conducted with ten randomly selected co-ed schools within the Port Elizabeth Education District. It will consist of a structured questionnaire on physical education which will need to be completed by you, a specified teacher equipped to complete the questionnaire. Phase two will commence with four randomly selected schools, two schools

with physical education and two schools without physical education. Pre-testing will be conducted with grade four and five learners. Testing measures will consist of height, weight, and waist circumference for body mass index and waist circumference, physical fitness tests and a short questionnaire. The tests will be measured and results taken by myself and my research assistants. Certain grade four and/or five class teachers will then participate in the intervention which will consist of an educational booklet and a short training session on physical education/activity, which they will hopefully incorporate into lessons with the learners. Following the pretesting, the learners may need to do the exercise classes with their teacher once per week for six weeks. After six weeks, I will return to the four schools to conduct my post-testing measures with the same grade four and five learners. Although we will know your name purely for gathering data, all descriptive information will remain anonymous to anyone not within this group of researchers.

What will be required of you?

Once informed consent is obtained, you will be required to complete a structured questionnaire on the school environment pertaining to physical activity and physical education. I will give you the questionnaire once I have received your informed consent. One week later, I collect the completed questionnaire.

What will be the risks involved

There are no direct risks to completing the questionnaire. Results will be displayed in the final report but these will be completely anonymous and cannot be related back to you in any way.

What benefits will there be for taking part in the study

Upon completion of the study, the principals of the participating schools will be given a summary of the study results. Depending on the results, it will encourage the school authorities to promote programmes at schools to address deficiencies found in the study.

What payment will be received or what costs will be incurred

You will not receive any payment and you will not have to pay anything to participate in the study.

Voluntary participation

Participation in this study is completely voluntary and you are under no obligation to participate. No penalties will be incurred if you decide you do not wish to participate in the study, even after signing the informed consent form.

Right to withdraw from the study

Once consent has been obtained from you, you are under no obligation to complete the study and you can pull out at any time with no penalties. We will encourage you to complete the study but should you really not want to, you will be free to withdraw at any time.

Confidentiality

Confidentiality will be maintained at all times. We, as the research team, will know your/ your school's names for means of data capturing but from the start of the study the schools will be allocated a number which will replace the name or any other personal details for the rest of the study. Full confidentiality will be maintained during publication of this dissertation and the schools name will never be mentioned and there will be no way for anyone that is not part of this group to relate any of the data back to you or a specific school. All data and names will be kept on one computer in a locked up environment so that there is no way for anyone but the researcher to have access to it. All data will be maintained securely for up to a year after the study has been completed.

Who to contact for further information

Should you have study-specific queries or want more information, you can contact me, Jodie Bowers on 0736495333/ jodiebowers@hotmail.co.za or my supervisor, Nirmala Naidoo, on niri.naidoo@uct.ac.za.

The chair of the Human Research Ethics Committee (HREC), Professor Marc Blockman, may be contacted if you have any questions or concerns about your rights or welfare as a research participant on 021 4066 411 or marc.blockman@uct.ac.za.

Thank you for taking the time to read this.

Appendix 10: Informed consent for school teachers (if completed the School Environment Questionnaire)

Informed Consent Form

University of Cape Town

TITLE: **The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.**

I, _____ have read the information sheet. I understand what is required of me and I have had all my questions answered. I do not feel that I have been coerced to participate in this study and am doing so of my own accord. I know that I can withdraw at any time if I so wish and that it will have no negative consequences for me.

Signed:

Teacher

Date and Place

Researcher

Date and Place

Appendix 11: BMI percentiles for boys and girls

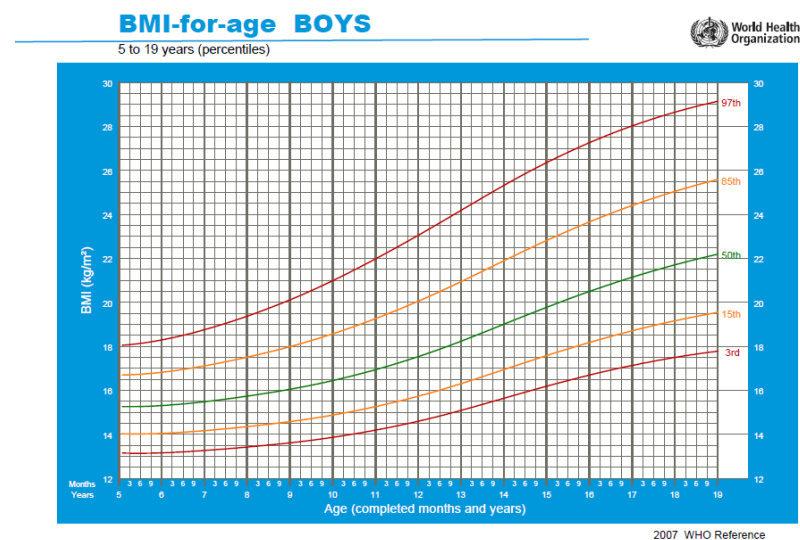


Figure 5.2: BMI percentile for boys

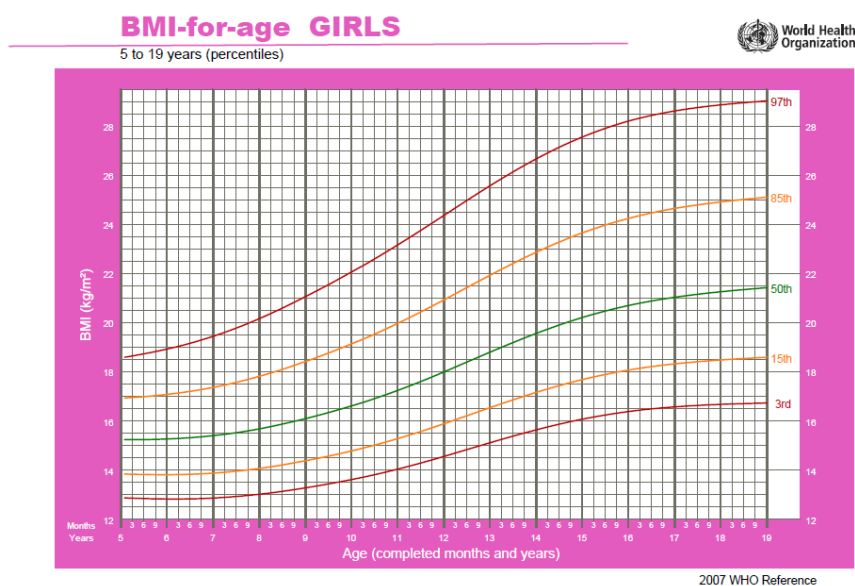


Figure 5.3: BMI percentile for girls

Source: WHO (2007)

Appendix 12: Eurofit fitness test battery

The Eurofit Physical Fitness Test Battery is a set of nine physical fitness tests covering flexibility, speed, endurance and strength. The standardised test battery was devised by the Council of Europe, for children of school age and has been used in many European schools since 1988. The series of tests are designed so that they can be performed within thirty-five to forty minutes, using very simple equipment. As only four of the nine tests were conducted, the time taken to complete the four tests were estimated to be about twenty minutes.

Tests

Four of the nine tests for which there are normative values were used for this study:

1. Standing Broad Jump - measured explosive leg power.
2. Modified Sit-and-Reach - flexibility test
3. Sit-Ups in 30 seconds - measured trunk strength
4. 10x5 m endurance shuttle-run—measured cardio-respiratory endurance

Equipment - In order to perform these tests, the following equipment was needed: four stopwatches, a ruler, non-slip soft landing area, floor mat, marker cones, box, inelastic 10m measuring tapes, masking tape/marker and recording sheets.

Explanation of tests:

Before any of the Eurofit tests were conducted, all subjects had to change into their gym attire and remove their socks and shoes.

Station 1: Standing long jump test (Broad Jump)

The Standing long jump is a common and easy to administer test of explosive leg power. The equipment needed for this test was a tape measure, a marker and a soft-land surface (i.e. a mat). The researcher at this station was research assistant 1.

Firstly, the researcher introduced herself and explained to the learner what had to be done during the test. The researcher explained to the learner that he/she must stand behind the marked line on the floor with his/her feet slightly apart. The learner was then instructed to jump forward with both feet as far as possible ensuring that he/she lands on both feet without falling backwards. They were given three attempts.

Scoring: The measurement in centimetres was taken from the take-off line to the nearest point of contact at the landing (i.e. back of the heels) using a tape measure. The longest distance jumped of the three attempts was recorded on the score sheet as seen in Table 5.1.

Table 5.1: Standing long jump score sheet

Eurofit test battery: Standing Long Jump Test			
Number	JUMP 1- Distance jumped: cm	JUMP 2-Distance jumped: cm	JUMP 3-Distance jumped: cm
1			
2			
3			

Station 2: Modified sit and reach test

The sit and reach test is an important functional measure of hip region flexibility, including the lower back and hamstring muscles. The equipment required for this test was a tape measure. The researcher at this station was research assistant 2.

Firstly, the researcher introduced herself and explained to the learner what had to be done during the test. The researcher instructed the learner to sit on the floor with their back and head against the wall. The learner's legs had to be out straight ahead and knees flat against the floor. The researcher placed a large wooden raised step against the learner's feet, so that their feet lie flat against it.

The researcher gave the instructions: 'Keeping your back and head against the wall, stretch your arms out as far as possible, aiming to touch your toes with your fingertips.' The researcher made a note of where the learner's fingertips reached, and the distance was measured from this point to the level on the box that corresponded with the learner's big toe. If the learner reached beyond the level of their toes, this distance was measured and recorded as a positive value. If their maximum reach was before the level of their toes, this distance was measured and recorded as a negative value. The learner was instructed not to jerk or bounce to reach further and to hold the full reach position for two seconds. Only one attempt was given.

Scoring: The score was recorded to the nearest centimetre as the distance reached, either as a positive or negative value on the score sheet as seen in Table 5.2.

Table 5.2: Modified sit and reach test score sheet

Eurofit test battery: Modified sit and reach test	
Number	Distance measured from fingertips to box in line with big toe. Reaches beyond the level of their toes = positive value. Reaches before the level of their toes = negative value. Recorded to the nearest centimetre, positive or negative value.
1	
2	
3	

Station 3: Eurofit Sit up Test

This test measured the endurance of the abdominal and hip-flexor muscles. The equipment required was a floor mat and a stopwatch. The researcher at this station was research assistant 3.

The researcher introduced herself and explained to the learner what they had to do during the test. The researcher explained that the aim of the test was to perform as many sit-ups as possible in 30 seconds. The learner was instructed to lie on the mat with their knees bent at right angles and with their feet flat on the floor. The researcher held down the learner's feet. The learner's fingers were to be interlocked behind their head. On the command 'Go', the researcher started the timer on the stopwatch. The learner had to raise his/her chest so that the upper body was vertical, and then return to the floor. This was done for 30 seconds. For each sit up the back had to return to touch the floor to be counted.

Scoring: The maximum number of correctly performed sit ups in 30 seconds was recorded on the score sheet as seen in Table 5.3. The sit up were not counted if the learner failed to reach the vertical position; failed to keep their fingers interlocked behind his/her head; arched his/her back or raised their buttocks off the ground in an attempt to raise their upper body; or let their knees exceed a 90-degree angle.

Table 5.3: Sit-up test score sheet

Eurofit test battery: Sit up test	
Number	Number of sit ups in 30 seconds
1	
2	
3	

AFTER THE CIRCUIT WAS COMPLETED, LEARNERS (THREE AT A TIME) PERFORMED THE SHUTTLE TEST

Station 4: 10 x 5 metre shuttle test

This test measured cardio-respiratory endurance. The researcher at this station was research assistant 4, 5 and 6.

Learners were instructed to take their place behind the start line with their front foot just behind the line. On the instruction of '1, 2, 3, Start', they had to run as fast as they could to the other line, always keeping both feet on the floor, in contact with the ground. Upon reaching the other line, learners had to turn around and return to the start line. This was repeated 5 times. If a learner did not have both feet behind the line when turning around, he/she was penalised. If a participant got penalised more than once, they had to redo the test. In total, each participant ran up and down five times i.e. a total of 10 straight lines.

Materials: Cones; Measuring tape; 3 stopwatches

Scoring: The time taken to run the 50 meters was recorded in seconds on the score sheet as seen in Table 5.4. If the learner scored a penalty, 0.1 seconds were added to their total time. If the learner received more than one penalty, she/he had to redo the test.

Table 5.4: Shuttle test score sheet

Eurofit test battery: Shuttle run	
Number	Time in seconds taken to complete shuttle run. Add 0.1 seconds if penalized
1	
2	
3	

Appendix 13: EQ-5D-Y description

The EQ-5D-Y is comprised of 2 pages, the descriptive system (page 1) and the visual analogue scale (VAS) (page 2). The descriptive system consists of five components and uses child friendly vocabulary i.e. mobility, looking after myself, doing usual activities, having pain or discomfort, feeling worried, sad or unhappy. Each component has three levels i.e. no problems, some problems, a lot of problems. A score was given to each response as seen in Table 5.5. The learner was asked to indicate his/her health state by ticking (or placing a cross) in the most appropriate box in each of the five components. The VAS measured the learner's self-rated health on a vertical, VAS where the endpoints were labelled 'The best health you can imagine' and 'The worst health you can imagine'. Table 5.6 shows how to score the VAS. This information can be used as a quantitative measure of health outcome as judged by the individual learners.

(Van Reenen *et al.*, 2014)

Table 5.5: EQ-5D-Y Variable schema

Variable name:	Mobility (walking about)		Looking after myself		Doing usual activities		Having pain or discomfort		Feeling worried, sad or unhappy	
Variable description:	1	No problems	1	No problems	1	No problems	1	No pain	1	Not worried
	2	Some problems	2	Some problems	2	Some problems	2	Some pain	2	A bit worried
	3	A lot of problems	3	A lot of problems	3	A lot of problems	3	A lot of pain	3	Very worried
	9	Missing value	9	Missing value	9	Missing value	9	Missing value	9	Missing value

Table 5.6: EQ-5D-Y VAS

Variable name:	EQ-5D-Y VAS	
Variable description:	#	Value
	999	Missing value

Describing your health

Under each heading, please tick the ONE box that best describes your health TODAY

Mobility (*walking about*)

- I have no problems walking about ☐
- I have some problems walking about ☐
- I have a lot of problems walking about ☐

Looking after myself

- I have no problems washing or dressing myself ☐
- I have some problems washing or dressing myself ☐
- I have a lot of problems washing or dressing myself ☐

Doing usual activities (*for example, going to school, hobbies, sports, playing, doing things with family or friends*)

- I have no problems doing my usual activities ☐
- I have some problems doing my usual activities ☐
- I have a lot of problems doing my usual activities ☐

Having pain or discomfort

- I have no pain or discomfort ☐
- I have some pain or discomfort ☐
- I have a lot of pain or discomfort ☐

Feeling worried, sad or unhappy

- I am not worried, sad or unhappy ☐
- I am a bit worried, sad or unhappy ☐
- I am very worried, sad or unhappy ☐

How good is your health TODAY

- We would like to know how good or bad your health is TODAY.
- This line is numbered from 0 to 100.
- 100 means the best health you can imagine.
0 means the worst health you can imagine.
- Please mark an X on the line that shows how good or bad your health is TODAY.

The best health
you can imagine



The worst health
you can imagine

Appendix 14: Teacher based intervention programme

Please refer to booklet below.

2016

SIX-WEEK PHYSICAL EDUCATION PROGRAMME



Jodie Bowers

Masters Dissertation

May – June 2016

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1. Introduction

Obesity is a rapidly rising global problem which has more than doubled between 1980 and 2014 (World Health Organization (WHO), 2015a; Caballero, 2007). The fast-growing prevalence of 42 million children under the age of five being overweight/obese is of particular concern as childhood obesity will often continue into adulthood (Nemet et al., 2005). Obesity may contribute to the development of non-communicable diseases such as cardiovascular diseases and diabetes (WHO, 2008). To highlight the problem of overweight and obesity locally, a sample of South African children showed 11.9% and 8.1% respectively (Armstrong et al., 2006). Health-related fitness may prevent the risk of obesity and obesity-related diseases in adulthood (Truter, Pienaar & Du Toit, 2010). In South Africa (SA), physical fitness (PF) in urban youth appears to be on the decline (Healthy Active Kids, 2007).

Considering the childhood obesity epidemic, the school environment is the ideal setting for children to obtain the skills and knowledge to increase physical activity (PA) levels and healthy diets, as this is where children spend the majority of their time (WHO, 2015c). WHO states that children should participate in “at least 60 minutes of moderate-to-vigorous intensity PA daily” and that vigorous-intensity activities should be included at least three times per week (WHO, 2011b). An international evaluation of physical education (PE) programmes established problems in South Africa relating to PE as policy shortfalls in syllabus content, implementation, time allocation, teachers’ attitudes towards PE delivery and a shortage of trained PE personnel (Hardman & Marshall, 2000). The current Curriculum and Assessment Policy Statement (CAPS) for life skills in the intermediate phase, grades four to six, allocates one hour per week and 40 hours per year to PE (Department of Basic Education, 2011).

This physical education program has been created to assist teachers to conduct a well-structured, vigorous intensity physical education class for children between the ages of nine and eleven (grade 4 and 5). This program is line with the National Curriculum Assessment Policy Statements, term two, and should be conducted for 60 minutes once per week for six weeks. This program was developed based on the deficiencies found in the measurements taken during the Eurofit test battery.

1.1. World Health Organization Recommendations for Physical Education

Policy implementation to increase children's physical activity levels should focus on increasing physical education/sports classes. According to the World health organization, staff responsible for developing policies are encouraged to make sure that (WHO, 2008):

- "Physical education classes contribute to the overall daily physical activity of the students throughout the school years.
- The majority of the physical education class time is actually spent on physical activity. This includes aerobic/endurance, strength, flexibility, and coordination activities.
- A variety and choice of physical education classes is offered so that each student's age, gender, and disability needs and interests are taken into consideration.
- Physical activity is enjoyable, developmentally appropriate, promotes fair play and encourages maximum participation of all students.
- Pupils learn about physical activity and health, and develop the confidence and skills for lifelong participation in physical activity.
- Physical education teachers are well-qualified and properly trained.
- Adequate safety precautions are established and enforced to prevent injuries and illness resulting from physical activity.
- The undertaking or withholding of physical activity is not used as punishment."

1.2. Safety recommendations

- Encourage children to drink water before, during and after physical education classes;
- No exercise should cause pain, this could result in an injury;
- Avoid doing physical education classes in hazardous areas with broken equipment, uneven surfaces and sharp rubbish;
- Children should wear physical education clothing if possible e.g. shorts, t-shirts and tackies/sneakers;
- It is very important to warm up and cool down after every class to prevent injuries
- When playing the invasion games and performing the exercises, it is very important that the children understand the rules of the game and how to perform the exercises correctly.

Source: Raising Children Network (Australia) (2016)

2. CAPS Physical Education Teaching plan

Grade 4	Grade 5
• Different ways to locomote, rotate, elevate and balance, using various parts of the body with control • A variety of modified invasion games • Rhythmic movements with focus on posture • Basic field and track athletics or swimming activities • Safety measures	• Movement sequences that require consistency and control in smooth and continuous combinations • A variety of target games • Rhythmic movements and steps with attention to posture and style • A variety of field and track athletics or swimming activities • Safety measures

CAPS Annual Teaching Plan: Physical Education

Term 2:

TERM 2	GRADE 4
3 hours	Recommended resources Textbook Resources for sports and games Resources for safety
Participation in a variety of modified invasion games	
Safety issues during games	
2 hours	Examples of possible activities Netball, basketball, soccer, rugby, indigenous or community games, etc.
Movement performance in a variety of modified invasion games	
3 hours	
Participation in a variety of modified invasion games	Safety measures Surface of the play area , use and condition of apparatus, warm up and cool down, basic first aid, spacing of learners during activities, following instructions
2 hours	
Movement performance in a variety of modified invasion games	

TERM 2	GRADE 5
3 hours	Recommended resources Textbook Resources for games and sports Resources for safety
Participating in a variety of target games	
Safety measures during target games	
2 hours	Examples of possible activities Modified netball, basketball, soccer, rugby, hockey, obstacle course, indigenous or community games, etc.
Movement performance in a variety of target games.	
3 hours	
Participation in a variety of target games	Safety measures Surface of the play area , use and condition of apparatus, warm up and cool down, basic first aid, spacing of learners during activities, following instructions
2 hours	
Movement performance in a variety of target games.	

CAPS Physical Education Teaching Plan: Breakdown per term

3. Grade 4 and 5: Weekly Physical Education Program

This exercise program has been designed based on the results found during the assessment of health-related physical fitness (trunk strength, cardio-respiratory endurance, flexibility and leg strength). This program is structured and allows teachers to choose the exercises (from the exercise provided) within a certain category e.g. trunk strength. Please adhere to the program as much as possible.

Pre-testing results indicated the biggest deficiencies in lower limb explosive strength, then trunk strength and lastly flexibility. Cardio-respiratory endurance exercises will still be included in this program for maintenance.

Week 1:

Healthy eating education Week 1 (5min)

Warm up

- Start with a slow jog around an area (field/court) (2min)
- Choose 2 Cardio-respiratory endurance exercises (5min)

Class

- Choose 3 trunk strength exercises (10min)
- Choose 4 Upper limb (UL) and lower limb (LL) strength exercises (Pick 1 UL exercise and 3 LL exercises) (10min)
- Invasion/target game week 1 and 2 (20min)

Cool down

- Choose 3 flexibility exercises (8min)

Week 2:

Healthy eating education Week 2 (5min)

Warm up

- Start with a slow jog around an area (field/court) (2min)
- Choose 2 Cardio-respiratory endurance exercises (5min)

Class

- Choose 3 trunk strength exercises (10min)
- Choose 4 Upper limb (UL) and lower limb (LL) strength exercises (Pick 1 UL exercise and 3 LL exercises) (10min)
- Invasion/target game week 1 and 2 (20min)

Cool down

- Choose 3 flexibility exercises (8min)

Week 3:

Healthy eating education Week 3 (5min)

Warm up

- Start with a slow jog around an area (field/court) (2min)
- Choose 2 Cardio-respiratory endurance exercises (5min)

Class

- Choose 3 trunk strength exercises (10min)
- Choose 4 Upper limb (UL) and lower limb (LL) strength exercises (Pick 1 UL exercise and 3 LL exercises) (10min)
- Invasion/target game week 3 and 4 (20min)

Cool down

- Choose 3 flexibility exercises (8min)

Week 4:

Healthy eating education Week 4 (5min)

Warm up

- Start with a slow jog around an area (field/court) (2min)
- Choose 2 Cardio-respiratory endurance exercises (5min)

Class

- Choose 3 trunk strength exercises (10min)
- Choose 4 Upper limb (UL) and lower limb (LL) strength exercises (Pick 1 UL exercise and 3 LL exercises) (10min)
- Invasion/target game week 3 and 4 (20min)

Cool down

- Choose 3 flexibility exercises (8min)

Week 5:

Healthy eating education Week 5 (5min)

Warm up

- Start with a slow jog around an area (field/court) (2min)

- Choose 2 Cardio-respiratory endurance exercises (5min)

Class

- Choose 3 trunk strength exercises (10min)
- Choose 4 Upper limb (UL) and lower limb (LL) strength exercises (Pick 1 UL exercise and 3 LL exercises) (10min)
- Invasion/target game week 5 and 6 (20min)

Cool down

- Choose 3 flexibility exercises (8min)

Week 6:

Healthy eating education Week 6 (5min)

Warm up

- Start with a slow jog around an area (field/court) (2min)
- Choose 2 Cardio-respiratory endurance exercises (5min)

Class

- Choose 3 trunk strength exercises (10min)
- Choose 4 Upper limb (UL) and lower limb (LL) strength exercises (Pick 1 UL exercise and 3 LL exercises) (10min)
- Invasion/target game week 5 and 6 (20min)

Cool down

- Choose 3 flexibility exercises (8min)

4. Healthy Eating Education

Weekly nutritional information for the teacher to give to the learners.

It is important for you, the teacher, to educate your pupils regarding healthy eating in order for them to make healthy food choices. Children should have a diet that is filled with nourishing foods that will give them energy during the school day and for extra-curricular activities i.e. sports (WHO, 2016). According to the revised general food-based dietary guidelines for South Africa, a diet that includes a variety of foods from the different food groups are recommended i.e. fresh vegetables and fruits, whole-grains, dairy products such as milk and yogurt, and lean protein sources including lean meats, fish and eggs (Vorster, Badham & Venter, 2013).

This section forms part of the Personal and Social Well-being study area within the life skills CAPS where dietary habits of children and healthy eating habits are taught (within the health and environmental responsibility topic for grade four and five) (Department of Basic Education, 2011). Every week you can start your physical education lesson teaching the pupils briefly about healthy eating (based on the revised food-based dietary guidelines for South Africa). It should not take more than 5 minutes.

In order to stay healthy, it is important to exercise and eat healthy nutritious foods. Today we will be briefly talking about:

Week 1: Fruits and vegetables

- Fruits and vegetables are very good for your body because they give you lots of nutrients which keep you healthy.
- Ask children to list 5 fruits and 5 vegetables: Fruits – bananas, apples, pears, peaches, mango etc. Vegetables – cauliflower, broccoli, spinach, mushrooms, cucumber
- You should try to eat plenty of fruits and vegetables every day. You should also eat dry beans, split peas, soya and lentils regularly.

Week 2: Fats and Sugars

- Too much fat and sugar in your diet is not good for your body. Fats should be used sparingly. Vegetable oils are much better than hard fats.
- Ask children to list 5 types of fats and sugars: butter, margarine, cooking oils, cream, salad dressings, chocolate, crisps, sugary soft drinks, sweets, jam, cakes, pudding, biscuits and pastries

- It is important to not eat or drink too many fizzy cool drinks, chocolates and sweets, as they are very high in sugar.
- You should also try not to eat food with lots of salt.

Week 3: Meat

- Meats are proteins. Proteins are good for your body as they help your body grow.
- Ask children to list 5 proteins: meat, fish and eggs as well as vegetable protein, nuts, beans, peas, lentils and soya.
- Chicken, fish, lean meat and eggs can be eaten every day.

Week 4: Breads and carbohydrates

- Carbohydrates are starchy foods that give us energy, fibre and micronutrients.
- Ask children to list 5 carbohydrates: e.g. pasta, rice, oats, potatoes, noodles, yam, green bananas, sweet potato, millet, couscous, breads, breakfast cereals, barley and rye.
- Starchy foods should be part of most meals.

Week 5: Dairy

- Ask children to list 3 dairy products: milk, yoghurt, milkshakes, cheese.
- These foods contain calcium, protein and vitamins which are very good for your body, especially your bones and teeth.
- Have milk, cheese and yogurt every day.

Week 6: Summary

- It is important to enjoy lots of different types of foods and stay active. You should also drink lots of clean, safe water.
- Ask children what foods are good for them: fruits, vegetables, low fat dairy products, proteins like meat and eggs and wholegrain carbohydrates.
- These foods are good for the body because they contain lots of vitamins and nutrients.
- Ask children what foods they should not eat too much of: Foods with lots of fat and sugar like sweets, chips and chocolates, food with lots of salt etc.
- These foods are not healthy and if you eat too much now it could cause health problems when you are older.

Source: The child first and always (2015); Vorster, Badham & Venter (2013)

5. Flexibility exercises

5.1. Child's pose

Children should kneel on the ground with their toes touching and knees spread slightly apart. They should then bend over and attempt to touch floor with their forehead. Arms can be along their legs, at their sides or extended in front of their head with their hands on the floor. Children should breathe in and out 5 times slowly and deeply in the position. This exercise is great for relaxation (About Health, 2016).



5.2. Cat and cow stretch

Children should go down on the floor onto their hands and knees. They should bend their elbows slightly and not allow them to lock. Their back should be flat like a table top. Firstly, they should drop their belly down and slowly lift their neck and head up. This is the cow half of the exercise. Secondly, they should lift their belly and spine and look towards their belly button. Their backs should be rounded like a cat. Cat and cow stretches should be repeated 10 times (About Health, 2016).



5.3. Overhead arm stretch

Children should stand up straight with feet together. They should the reach their arms up and overhead (hands together or apart). This should be held for 10seconds and repeated 3 times (About Health, 2016).



5.4. Outstretched arms

Children should stand with their arms outstretched to the sides, thumbs pointing down. They should then gently push their arms back as if they were squeezing a ball between their shoulder blades. This position can be held for 10 seconds. This exercise can be repeated with the thumbs pointing up. Repeat this exercise with thumbs pointing down an up holding each position for 10 seconds (About Health, 2016).



5.5. Knee lunge

This exercise stretches the muscles in the groin. Children should start by kneeling on the mat/floor. Keeping their back straight, they should place one foot on the ground and gently press forward until the knee is bent at a 90-degree angle i.e. the knee should be directly over the ankle. Children should place their hands or elbows on their knee to stabilize and hold for 20 seconds. This exercise should then be repeated on the other leg (About Health, 2016).



5.6. Butterfly stretch

In a seated position, children should place the soles of the feet together and hold them with the hands. They should gently press the knees down to increase the stretch. Hold exercise for 20 seconds and repeat (About Health, 2016).



5.7. Straddle stretch

Children should sit on the ground with their legs straight and comfortably apart. They should then bend slowly over the right leg, then to the centre, then over the left leg. This exercise can be repeated with children's legs together; bending forward trying to touch their toes. Hold each position for 10 seconds then repeat 3 times. This exercise stretches the inner thighs, hamstrings and lower back (About Health, 2016).



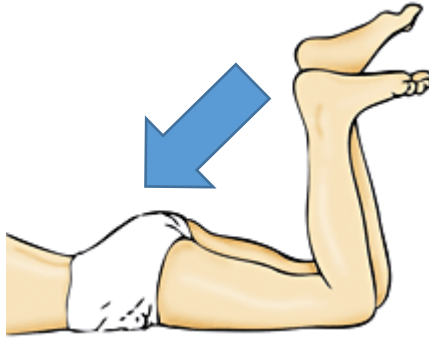
5.8. Hamstring stretch

Children should sit on the ground with their left leg extended straight forward, toes pointing up. They should bend their right leg and place the sole of the right foot along their left knee, inner thigh or leg. They should then reach forward and touch the toes of the left foot until they feel a stretch behind the left thigh. They should hold the stretch for 20 seconds and repeat the exercise on the other side (About Health, 2016).



5.9. Quads stretch

Children should lie on their stomach and bend their knees. They should try to touch their bottom with their feet. They should hold the stretch for 30 seconds. Children can even take their hands and gently pull their feet closer to their bottom.



6. Trunk strength

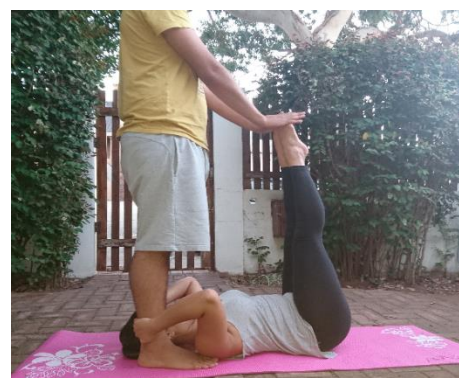
6.1. Crunches

Children should pair up. One child should lie on the ground with their knees bent and feet planted on the ground. The other child holds their partner's feet down. The child that is lying will do the exercise first. Instead of holding their hands behind their head, he/she should cross their arms across their chest. He/she should then lift their head and shoulders off the ground (sit up) then go down slowly and repeat the exercise 20 times. The other child should be holding their partner's feet down throughout the exercise. Once the exercise is complete, children should swap positions.



6.2. Lower abs

In pairs: One child should lie on the floor; the other child should stand above their partner with their feet underneath their partner's shoulders. The child lying down should raise both their legs keeping their knees straight, they should aim to touch their partner's hands. The child standing should push their partner's legs back down to the floor. This exercise should be repeated 20 times for the child lying down then swap positions.



6.3. Bicycle

In pairs, children should face one another and lie on their back. They should then place their feet on their partner's feet (keeping their knees bent) and cross their arms over their chest. They should then lift up their head and shoulders and move their legs up and down (keeping their feet connected to their partner's feet) as if they were riding a bicycle (with their head and shoulders off the ground). This should be done for 10 slow seconds then relax and repeat.



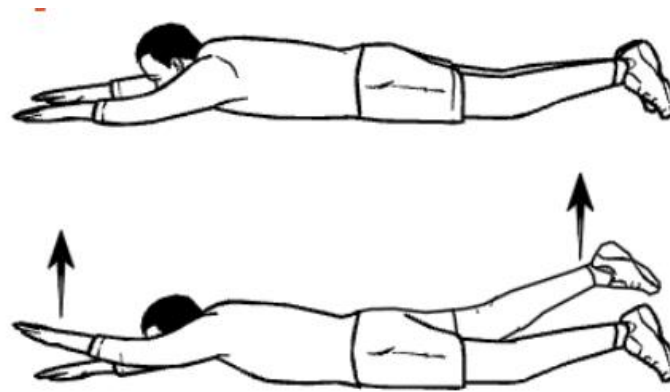
6.4. Planking

Children should start by getting into a press up position. They should bend their elbows and rest their weight onto their forearms and not on their hands. Their body should form a straight line from shoulders to ankles. Children should tighten their core by sucking their belly button into their spine. Hold this position for 20 seconds then relax and repeat.



6.5. Superman

Children should lie on their stomachs with their arms extended forward. They should lift their left arm and right leg off the ground keeping their elbows and knees straight. They should tighten their abdominal muscles before lifting their arm and leg. They should hold the position for 3 seconds then relax. They should then repeat the exercise with the opposite arm and leg, lifting their right arm and left leg off the ground. Again they should tighten their abdominal muscles before lifting. They should hold the position for 3 seconds then relax. The exercise should be performed 10 times on each side.



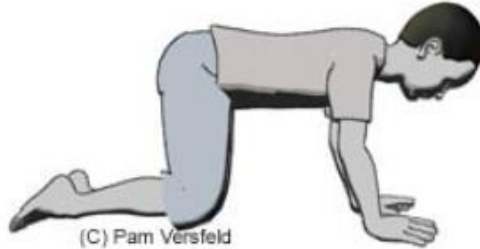
6.6. Crab walking

Children should lie on their back with their knees bent and arms on the floor beside them. They should then lift up their body into the air keeping their hands and feet on the floor. Instruct children to walk on their hands and knees in this position to a certain point and back. This exercise may be repeated.

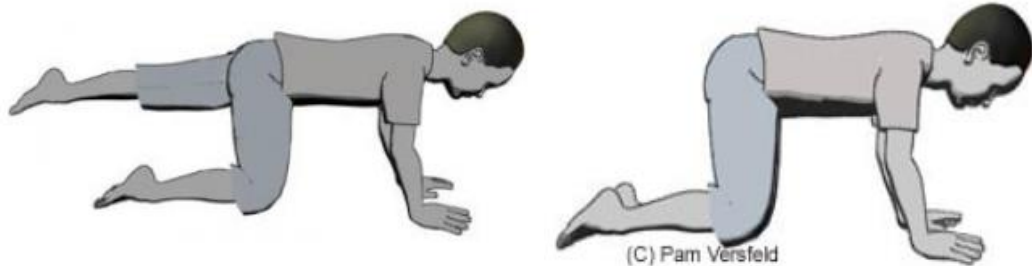


6.7. Four-point kneeling exercises

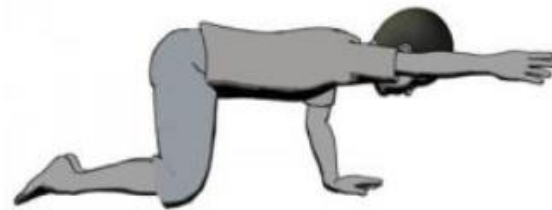
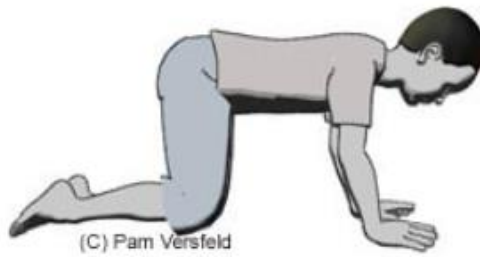
Children should go down on the floor onto their hands and knees. They should bend their elbows slightly and not allow them to lock. Their back should be flat like a table top.



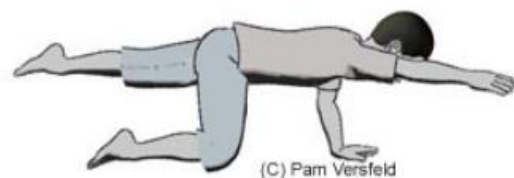
They should then lift their left leg up keeping their knee straight. They should keep their back flat. Children should try to lift their leg so that it is in line with their back. They should hold this position for 10 counts then lower their leg and repeat the exercise with the right leg. This exercise should be done 5 times on each leg.



From the same position (hands and knees on the floor), children should lift their left arm up keeping their elbow straight. They should then turn their head and look under their arm. This position should be held for 10 slow counts. They should then lower their arm and repeat exercise with the right arm. This exercise should be done 3 times on each side.



From the same position (hands and knees on the floor). Keeping their back quite flat, children should lift their right leg up with their knee straight and lift their left arm up next to their ear, keeping their elbow straight. They should hold the position for 10 slow counts. Then lower their arm and leg and repeat the exercise moving the other arm and leg. This exercise should be repeated 3 times on each side.



(Skills for Action, [no date])

6.8. Wood chopper exercise

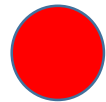
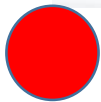
In standing, holding hands together. Children should lift their arms up above their head to left side then move hands down to their right foot. This should be repeated 10 times then repeated on the other side. I.e. Lift arms up above head to their right side then move hands down to their left foot.



7. Cardiorespiratory endurance

7.1. Sprints

Between 2 points children should run from one side to the other side as many times as they can in 30 seconds then rest and repeat 4 times.



7.2. Star jumps

From a standing position, children should jump moving their feet and arms apart then jump bringing arms and feet back together. Repeat this exercise 10 times then rest and repeat again.

1A

1B



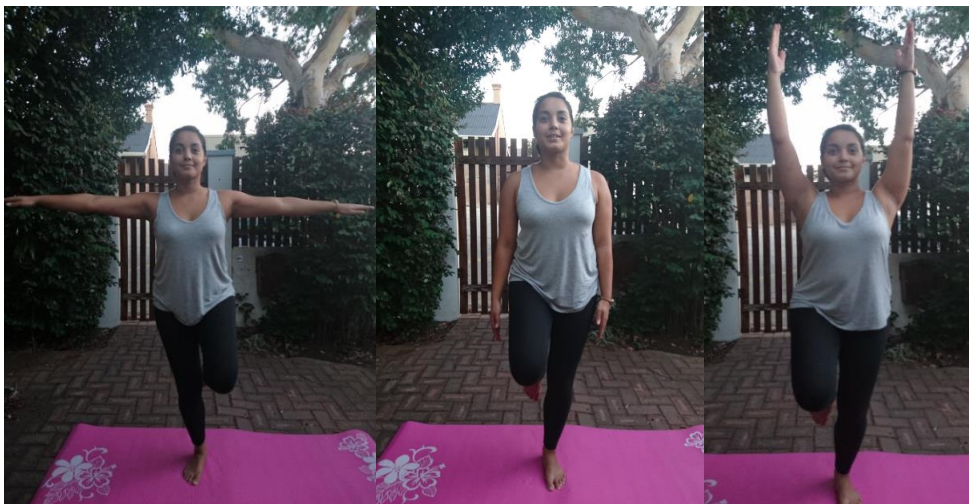
7.3. Hopping on 1 leg

Children should stand on one leg then hop on that leg 8 times then swop legs and repeat on the other side. This exercise should be repeated 3 times on each leg.



7.4. Running on spot moving arms

Children should jog on the spot. While jogging they should lift their arms up above head then out to the side then down to their sides. This exercise should be repeated 10 times then rest. Then repeat the exercise, reversing the arms, moving the arms out to sides then up above their head then down to their sides. Repeat this 10 times.



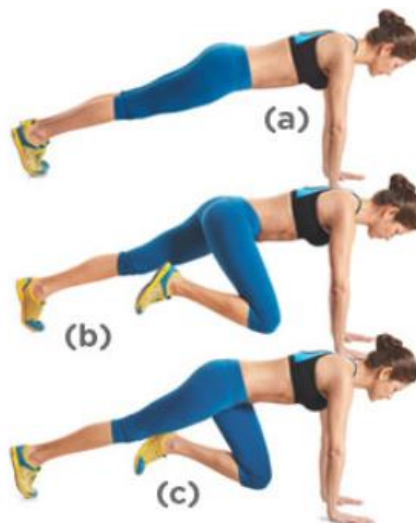
7.5. Burpees

Children should start by lifting their arms up above their head keeping their elbows straight, then squat down to the floor placing their hands on the floor. Children should then straighten legs behind them moving into a push up position. From the push up position children should walk or jump their feet back to their hands and stand up lifting their arms above their head. This exercise should be repeated 10 times followed by a rest period. Following the rest period, children should do another 10 repetitions.



7.6. Mountain climbers

From a push up position (hands and feet on the floor with legs straight, make sure body is straight) children should bend one leg towards chest followed by the other as if running (with legs) keeping their hands on the floor. Children should move legs for 20 counts then rest and repeat.



7.7. Squat jumps

Standing with feet hip distance apart, children should bend their legs (squat) then jump as high as they can. Children should land back into a squat position. Children should jump 10 times then rest and repeat.



7.8. Bear crawls

Children should start by squatting (bending legs) and placing hands on the floor and walking their hands forward. From this position, children should crawl with their hands and feet touching the floor, keeping arms/legs wide apart from one point to another and back as fast as they can. Children's legs may bend.



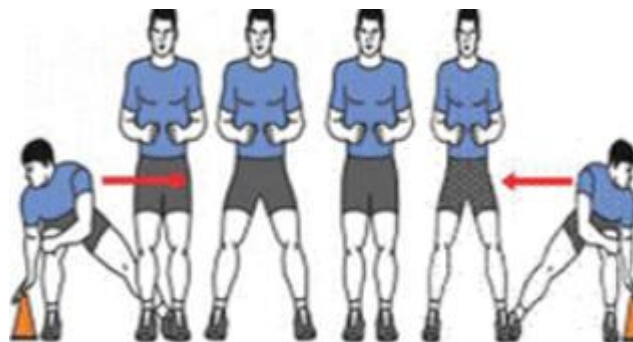
7.9. Kick boxing (make sure there is enough space between children)

In standing, children should kick one leg forward then the other leg. Following this they should jump twice. This set should be repeated 10 times.



7.10. Sideways shuffling

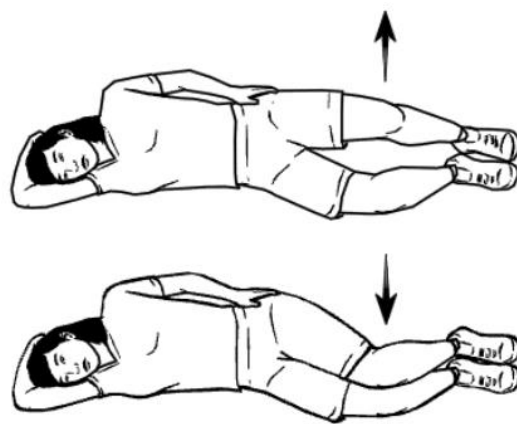
Between 2 points children should shuffle sideways from one side to the other side as many times as they can in 30 seconds then repeat.



8. Upper limb and lower limb strength

8.1. Clam shells (LL)

Children should lie on their side, both hips and knees should be bent. Children should place their top hand on their pelvis to make sure their pelvis does not move. Children should keep their pelvis, lower back, and shoulders still, and their heels together, as they slowly raise their top knee toward the ceiling. They should only move as far as they are able without letting their pelvis, lower back, or shoulders move, then return to the starting position. Children should perform 10 repetitions on one leg, then 10 repetitions on the opposite leg.



8.2. Wheelbarrow exercise (UL)

In pairs, one child should get into the push up position (hands and feet on the floor with legs straight) while the other child lifts up their partner's legs. The child with their hands on the floor should walk their hands forwards while their partner holds their legs. Children should move from one point to another then swap positions. This should be repeated 6 times, with each child being the "wheelbarrow" 3 times.



8.3. Bird Flapping (UL)

Children should bend their elbows, keeping their hands in line with their shoulders. They should then move their elbows out to the side as if flapping their wings like a bird. This should be repeated 30 times. [This exercise can be made more fun by asking children to run around flapping their wings then they need to stop like a statue when they hear you clap your hands. The last child to stop moving must sit down while the other children continue the game.]



8.4. Straight leg raise (LL)

In lying on their back with their legs straight, children should lift up one leg, keeping the knee straight then lower and lift up the other leg. This exercise should be repeated 10 times on each leg then rest and repeat.



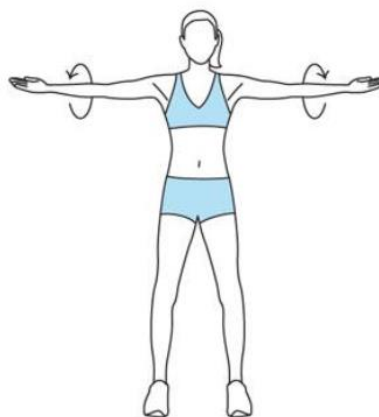
8.5. Bridging (LL)

In lying on their back, children should bend their legs keeping their feet on the floor. They should then lift up their bottom, making a bridge with their body. They should hold this bridge for 10 seconds then rest and repeat 10 times.



8.6. Arm circles (UL)

In standing, children should move their arms out to the side keeping their elbows straight. They should then start moving their arms in small fast circles forwards. Children should do as many rotations as they can in 10 seconds, then they should reverse the motion and do as many rotations as they can in 10 seconds in the reversed direction. Take a rest and repeat two more times.



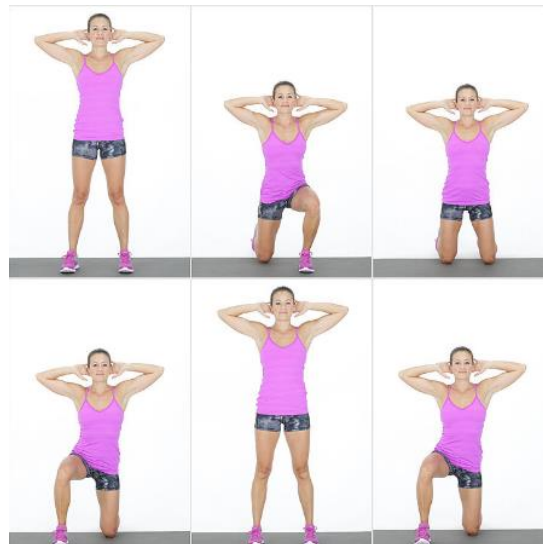
8.7. Heel raises (LL)

In standing, children should put their hands on their hips, lift their heels and rise up onto their toes. Children should try to balance for 3 seconds then lower their heels and repeat the exercise 20 times.



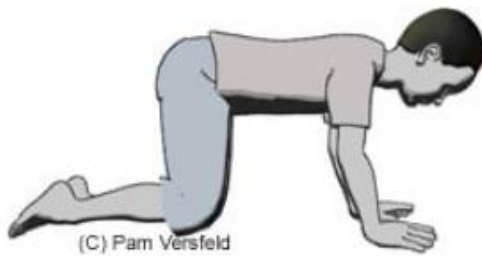
8.8. Floor to standing (LL)

In kneeling, children should move one leg forward putting the foot on the ground. From this half kneeling position, children should try to stand up. Once in standing they should go back onto their knees and repeat the exercise on the other side. This exercise should be repeated 5 times on each leg.



8.9. Mini Push ups (UL)

Children should go down on the floor onto their hands and knees. They should then bend their elbows slightly and do not allow them to lock. Their backs should be quite flat. From this position they should bend their arms, lowering their head to the floor then straighten arms and repeat exercise 10 times.



8.10. Wall sits/Squats (LL)

Each child should find a space on the wall. They should lean against the wall and move their feet slightly away from the wall. They should then slide their body down the wall as if sitting on a chair then slowly come back up into standing. This should be repeated 10 times.

If there is no access to a wall, then children can do a squatting exercise. They should stand with their feet hip distance apart and bend their legs as if sitting on a chair then slowly come back up into standing. This should be repeated 10 times.



8.11. Standing broad jump exercise

The learner must stand behind a marked line on the floor with his/her feet slightly apart. The learner should then be instructed to jump forward with both feet as far as possible ensuring that he/she lands on both feet without falling backwards. They should repeat this exercise 10 times.



All images sourced from google images from the websites below:

Flexibility exercises:

- Image 1-8: <http://familyfitness.about.com/od/kidssports/ss/Kids-Stretching-Exercises.htm> [Accessed April 1, 2016]
- Image 9: <http://erikdalton.com/media/published-articles/short-leg-syndrome-part-2/> [Accessed April 5, 2016]

Trunk strength:

- Image 1: <http://www.livestrong.com/article/503414-kids-calisthenics-exercises/> [Accessed April 7, 2016]
- Image 2-3: Own image
- Image 4: <http://greatist.com/move/plank-variations-for-core-strength> [Accessed April 9, 2016]
- Image 5: <http://www.getfit.com.au/exercise-library2/> [Accessed April 7, 2016]
- Image 6: <http://healthlivingyoga.com/1959/crab-walk-and-steps-to-do-it/> [Accessed April 17, 2016]
- Image 7: <http://www.skillsforaction.com/hands-knees-lift-limbs> [Accessed April 17, 2016]
- Image 8: <https://fitnesspedia.wordpress.com/category/abdominal-holds/> [Accessed April 24, 2016]

Cardiorespiratory endurance:

- Image 1: <http://www.shutterstock.com/s/running+man/search.html> [Accessed April 20, 2016]
- Image 2: <http://whatsdifferentinaustralia.tumblr.com/post/87263316858/star-jump> [Accessed April 7, 2016]
- Image 3: http://www.123rf.com/photo_12275552_cute-african-boy-balancing-on-one-leg.html [Accessed April 22, 2016]
- Image 4: Own Image
- Image 5: <http://thesizzlingmommy.com/2013/01/do-hiit-workouts-if-youre-short-on-time.html> [Accessed April 7, 2016]
- Image 6: <http://www.womenshealthmag.com/fitness/mountain-climbers-variations> [Accessed April 16, 2016]

- Image 7: <http://www.popsugar.com.au/fitness/photo-gallery/35930476/image/35930482/Double-Pulse-Jump-Squats-20-Reps> [Accessed April 10, 2016]
- Image 8: <https://maxreynoso.wordpress.com/tag/top-10-exercise/> [Accessed April 17, 2016]
- Image 9: <https://www.verywell.com/best-home-cardio-exercises-1231273> [Accessed April 17, 2016]
- Image 9: <http://hiitacademy.com/hiit-exercise-how-to-do-double-pump-squat-jumps/> [Accessed April 19, 2016]
- Image 10: <http://www.cbsa-asfc.gc.ca/job-emploi/bso-asf/pare-tape-eng.html> [Accessed April 17, 2016]

Upper limb and lower limb strength:

- Image 1: <http://www.dayasriod.top/clamshells-exercise/> [Accessed April 21, 2016]
- Image 2: <http://www.chicagonow.com/katalin-fitness-health-driven/2011/06/exercise-of-the-week-wheel-barrow-be-a-kid/> [Accessed April 22, 2016]
- Image 3: <http://therapystreetforkids.com/r-animalwalks.html> [Accessed April 9, 2016]
- Image 4: <http://deansomerset.com/understanding-mobility/> [Accessed April 18, 2016]
- Image 5: <http://www.webmd.com/fitness-exercise/bridging> [Accessed April 18, 2016]
- Image 6: <http://www.realsimple.com/health/fitness-exercise/workouts/get-toned-shoulders-in-fifteen-minutes/2-step-cooldown> [Accessed April 25, 2016]
- Image 7: <https://mycerebellarstrokecovery.com/2015/04/08/heel-raises-calf-raises/> [Accessed April 27, 2016]
- Image 8: <http://www.popsugar.com/fitness/How-Do-Leg-Surrender-Exercise-38984786> [Accessed April 16, 2016]
- Image 9: <http://www.skillsforaction.com/hands-knees-lift-limbs> [Accessed April 17, 2016].
- <http://www.skillsforaction.com/arm-exercises> [Accessed April 17, 2016]
- Image 10: <http://www.womenshealthmag.com/fitness/wall-squat> [Accessed April 23, 2016]
- Image 11: <http://www.menshealth.com.sg/taxonomy/term/1904> [Accessed May 21, 2017]

Cover page:

- Top image: <http://extended.unco.edu/programs/sport-exercise-science/physical-education-activity-leadership-masters/index.asp> [Accessed April 23, 2016]
- Bottom image: <http://blog.gaiam.com/be-like-a-kid-making-exercise-fun-again/> [Accessed April 23, 2016]

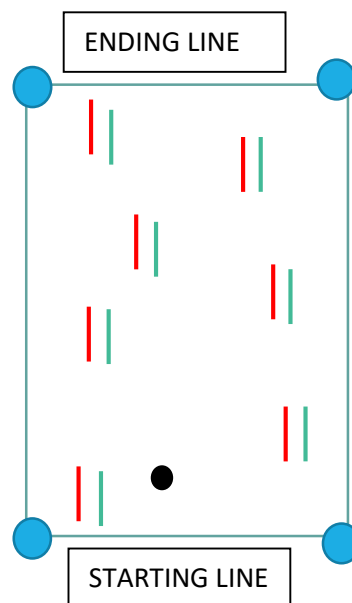
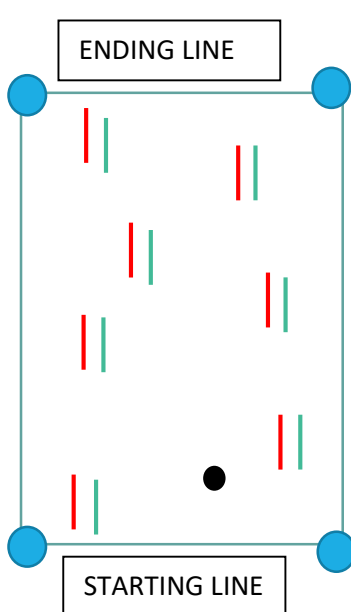
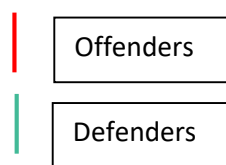
9. Invasion/Target games

The invasion/target games form parts of the CAPS second term teaching plan. These games should be played for 20-25 minutes of the physical education class. Each of the games below have been modified and adapted to the South African school environment e.g. bigger classes and less equipment from the SPARK physical education lesson plans. Permission has been granted to incorporate the SPARK physical education lesson plans into this treatment programme.

9.1. Week 1 and 2: Basketball/Netball game

Equipment:

- 2 Balls ●
- Colour bands 
- Cones x 8 ● 



Set:

- Approximately 2 10x5m areas
- Split the class into 2 groups
- Within each group children should pair up (offender and defender), one child per pair should tie a colour band around their arm. This will be the starting offender.

- Pair should spread out over the area

Aim of game:

- The object of the game is to move the ball from one side of the field/area to the other by throwing the ball to different members of the same team. Every team member should catch the ball at least once.
- Offenders do this by pivoting, passing and moving to an open space. Dribbling is not allowed
- Defenders guard a member of the opposing team.
- Once the ball gets to the other side of the field, after being thrown by all offenders, that team gets the point and the ball is given to the other group
- If turnover occurs (incomplete pass, ball out of bounds, defence intercepts), group roles are reversed i.e. the offense becomes the defence and the defence becomes the offense. The game starts again from the starting line.
- Offenders holding the ball are not allowed to run with the ball, they may pivot i.e. rotate then throw to another team mate.
- Defenders are not allowed to hit the ball from an offender's hands

(Spark, 2016)

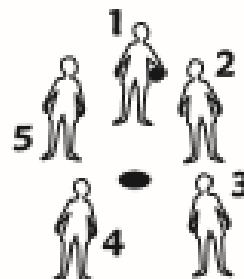
9.2. Week 3 and 4: Volley ball game

Equipment:

- 2x hoops
- 2x balls

Set:

- Split the class into 2 groups
- Each group should make a circle
- Place one hoop in the centre of each circle
- Each child should get a number e.g. 1-20
- The child with the lowest number should stand in the centre of the circle (in hoop) holding the ball)



Aim of the game:

- The object is to complete a “countdown.” The child with the lowest number starts by throwing the ball up and calls “countdown,” and quickly moves out of the centre.
- Number 20 (highest number) moves into the circle, catches the ball and throws it up, followed by #19 who catches and throws it and #17 who catches and throws it. The sequence is complete when #1 catches the ball.
- One bounce between each pass is allowed.
- Score 1 point for each successful rotation.
- If the ball bounces more than once, start a new “countdown.” The last player in the circle becomes the new #1.
- Everyone gets a new number after each countdown round.

(Spark, 2016)

9.3. Week 5 and 6: Straddle ball**Equipment:**

- 2x balls

Set:

- Split the class into 2 groups
- Each group should make a circle, with each person’s legs wide and sides of feet touching their neighbours

**Aim of the game:**

- The object of Straddleball is to score a goal. Children do that by striking the ball through the legs of anyone in the circle.
- Every child has created their own “goal” by straddling wide. Children should look around, and make sure everyone’s goal is the same size!
- Children should bend their knees and get low.
- Send the ball through anyone’s goal by striking it with an open palm and stiff wrist. Keep the ball low and on the floor/ground.
- Children may use either hands to protect their goal.
- If the ball goes outside of the circle, the child who touched it last runs after it.

- If a child is scored on, they should go retrieve the ball, toss it back in, then re-join the group as quickly as they can.

(Spark, 2016)

9.4. Additional invasion/target games

The below SPARK activities have been added to this program for your perusal and use after the 6-week treatment period. These activities will need to be modified and adapted to the South African school environment (e.g. bigger classes and less equipment) just as the above invasion/target games (included in the 6-week period) have been adapted/modified.

**SPARK
ACTIVITY**

GET YOUR BALL



Ready...

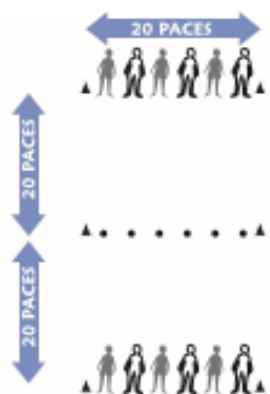
- 1 ball per pair
- 6 cones

Set...

- Designate 3 (20 paces long) parallel lines, 20 paces apart using cones.
- Students in equally skilled pairs in partner face off on opposite endlines.
- Distribute balls evenly along center line.

GO!

1. The object is to score a point by getting a ball from the center and dribbling it back to your own endline.
2. On "Get your ball!" you and your partner run from opposite endlines to midfield, and try to gain control of the ball in front of you. If you get the ball, dribble it back to your own endline (safe zone). Once there, trap the ball.
3. If you didn't get the ball, try to legally steal your partner's ball before they reach the safe zone. If you steal the ball, dribble it to your safe zone.
4. You and your partner continue to try to steal the same ball and bring it to your own endline until signal.
5. (Give stop signal after 30-45 seconds.)
6. Bring the balls back to midfield, and get ready for the next round.
7. (Continue for several rounds.)



CHALLENGES

- ✱ Which group can bring the most balls to their safe zone?
- ✱ How quickly can you set up the balls for the next round?

CUES

- ✱ Dribblers, when in an open space, push the ball and run after it.
- ✱ Remember, you can take a ball from your partner only.

GRADES 3-6

SOCCER

31

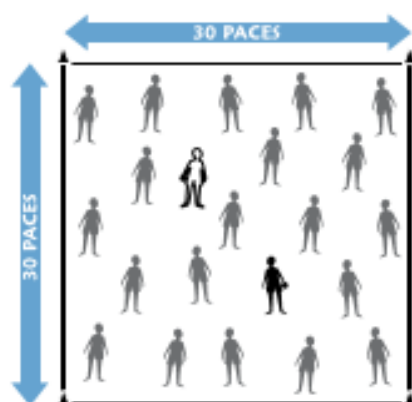


Ready

- 4 cones (for boundaries)
- 2 fluffballs
- Music and player
- Portable white board or chart paper with 2 different color markers (optional)
- 2 fruit and vegetable beanbags (optional)

Set

- Create large (30X30 paces) activity area.
- Select 2 students to be Taggers; name 1 "Sugar," the other "Fat."
- Give each Tagger 1 fluffball.



GO!

1. "Sugar" and "Fat," will try to safe tag (with their fluffballs) as many healthy students as they can while the music is playing.
2. When tagged, shout either "Sugar!" or "Fat!" – whichever 1 tagged you, while you jog in place.
3. When you hear and see someone who has had too much sugar or fat (a person tagged), rescue them!
4. You do that by tapping them on the shoulder and saying either "Fruit" or "Vegetable."
5. The person tagged responds by naming a fruit or vegetable.
6. When they do, give each other a high-five, and continue playing.
7. (Switch taggers every 1-2 minutes and change what students do when they're tagged; e.g., march in place, jump an imaginary rope, do jumping jacks, etc.)
8. **Wrap It Up**
 - What does the A in SPARK stand for? (*Avoid excess sugars and fats.*) Today you really did try to avoid Sugar and Fat!
 - Why does your body need nutritious food? How can you avoid eating too much sugar and fat?
 - What does the S in SPARK stand for? (*Select fruits and vegetables.*) Who will name a time when you can select a fruit or vegetable?
 - Today you heard the names of a lot of different fruits and vegetables. Ask a parent to include some in your lunch every day.



Ready...

- 1 very soft ball (ragball or Koosh® ball) per group of 5
- 4 bases/spot markers per group of 5

Set...

- Create small, diamond-shaped fields for each group of 5. Place bases 15 paces apart.
- Form groups of 5; a Runner and a Catcher at home plate, and 1 Baseperson at each of the 3 bases.
- Ball starts in the Catcher's hand.

GO!

1. The object is for the Runner to run the bases quickly enough to beat the ball home, while Fielders throw it around the bases once.
2. Runner says, "Go," and begins running the bases in order.
3. On "Go," the Catcher throws to 1st, who throws to 2nd, who throws to 3rd, who throws back to the Catcher. The ball needs to travel around the bases, before the Runner runs the bases.
4. Rotate counterclockwise after each round: Catcher to Runner to 1st Base to 2nd Base to 3rd Base to Catcher.



CHALLENGES

- How quickly can you run around the bases?
- Can you reach home before the ball gets to 3rd base?
- How many times can your group go through the rotation before the signal?

CUES

- Make the curve out to round 1st base toward 2nd.
- Touch only the inside edge of each base.

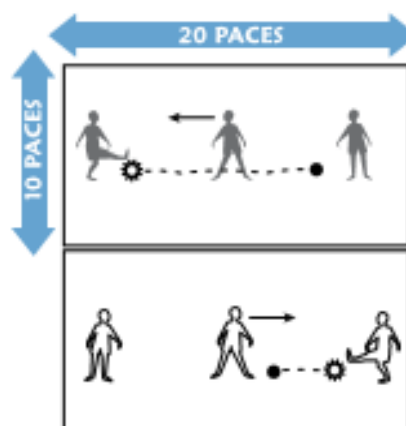


Ready

- 1 7" foamball per 3 students

Set

- Create grids of 10X20 paces.
- Form groups of 3 students; 1 group per grid.
- Place 2 students 10 paces from each other and the 3rd in the middle with their legs in a straddle position.



GO!

1. This recess activity is called *Shoot and Score*.
2. The object of the game is to practice kicking accurately between the legs of the middle player (the Goal.)
3. The 2 outside players kick the ball softly and slowly through the legs of the Goal, who turns and faces the side with the ball.
4. Goals, stand with your legs straddled wide and your hands up so you can protect yourself if the ball comes higher than your legs.
5. Outside players ask the Goal if they are ready before kicking the ball.
6. We will change Goals every minute or so on my signal.
7. **Wrap It Up**
 - What part of your foot did you kick with to score goals?

10. Reference list

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Appendix 15: Information letter to parents

Dear Parent/Guardian

I, Jodie Bowers, am a registered Masters Physiotherapy student from the University of Cape Town.

The school your child attends has been selected to participate in my study. Should you give permission, your child will be allowed to take part in the study. The information which follows makes up the basis of my project:

Title of the research project

The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.

Purpose of the study

The primary aim of the study is to determine the effect of a teacher-based intervention programme after 6 weeks for primary schools, from various circuits within the Port Elizabeth Education District, without physical education on learner's health-related quality of life, body mass index and physical fitness. A person is said to be underweight/overweight/obese if their weight is not in proportion to their height and age. Obesity is a growing problem not only in South Africa but all around the world. Recent studies indicate that anything between 300 million and 1.3 billion people worldwide weigh more than they should for their age and height. I believe the results from this study will aid in the management of overweight and underweight children as well as the promotion of healthy, active lifestyles and physical education programmes in schools.

Selection of participants

I would like to carry out my study with children who are in grade four and five and who attend schools within the Port Elizabeth Education District. This is where your child fits in and why your child was chosen to participate in the study. Children, in grade four and five, in three other schools within the Port Elizabeth Education District will also be participating in this study. The results will be pooled together and any reports that are written will be done with all the schools participating in the study.

Description of research

The first part of the study will be done with the principal of ten randomly selected co-ed schools within the Port Elizabeth Education District. They will need to complete a questionnaire on physical education. The second part of the study will involve four pre-selected schools, two schools with physical education and two schools without physical education. Your child's school has been selected to participate in the second part of the study. Three pre-testing measures will be done with grade four and five learners and should you give consent, your child will be expected to participate in all three areas. We will be measuring your child's body mass index (BMI)/ waist circumference (WC), physical fitness with a series of fitness tests and health-related quality of life with a questionnaire. The tests will be measured and results taken by myself and members of my research team. Certain grade four and/or five class teachers will then participate in the intervention which will consist of an educational booklet and a short training session on physical education/activity, which they will hopefully incorporate into lessons with your child and the other learners. Following the pretesting, your child may need to do the exercise classes with their teacher once per week for six weeks. After six weeks, I will return to the four schools to conduct my post-testing measures with the same grade four and five learners. Although we will know your child's name purely for gathering data, all children will remain anonymous to anyone not within our group.

What will be required of your child

All parts of the study will take place at school without interruption to your child's school activities. The initial information will preferably be gathered over one school day and six weeks later the measures will be repeated over one school day. Allowances may need to be made for bigger/ multiple classes. Your child will not be interrupted for more than those two days at school during their participation in the study. Aside from giving you this letter and the informed consent form, your child will not have to do anything else at home. Testing measures will consist of body measurements for BMI/WC, fitness tests and a short questionnaire. Your child will just have to cooperate and dress as necessary (remove shoes and wear shorts/tracksuit pants). Your child will not be pushed to perform or hurt in any way. The tests are simple and will be monitored by the research members of this group. Your child may also need to participate in any physical education classes/activities with their class/PE teacher over the next six weeks. Not every class or school will get these physical education classes/activities. The classes will be 60 minutes once per week during school time and will involve running, jumping and other exercises. This data will only be

used for the original purpose of this study which was explained in the beginning of this letter. Should we wish to use it for any other purpose, you will be informed and we will send out another information letter and informed consent form prior to using it.

What will be the risks involved

The only possible risks relate to the fitness test. If your child feels out of breath or dizzy and thus cannot complete the fitness tests, they are free to stop and are not required to continue. Your child may feel tired or sore afterwards depending how hard they push themselves. The fitness tests are simple and carry minimal risks. We will however, do our utmost to prevent any possible risks or discomfort for your child. As we are measuring obesity and fitness levels, your child may feel upset or uncomfortable if they are already conscious of their weight. We hope to minimise this by keeping everything anonymous and by not telling your child or anyone else at the school/elsewhere the results. Results will be displayed in the final report but these will be completely anonymous and cannot be related back to your child in any way. During the six week intervention period, any injuries sustained may be minor (e.g. fall during activities), the teacher will be advised accordingly. The school's health protocol/procedure should be followed.

What benefits will there be for taking part in the study

Your child may benefit from the intervention implemented. If your child is identified as requiring further support, he/she will be referred after consultation with you and their teacher. However, upon completion of the study, the principals of your child's schools will be given a summary of the study results. Depending on the results, it will encourage the school authorities to promote programmes at schools to address deficiencies found in the study. The intervention will also be made available to classes that have not received the intervention if a positive effect has been proven.

What payment will be received or what costs will be incurred

You will not receive any payment and you/your child will not have to pay anything to participate in the study. The study will be done during the school day, most likely during break times, so there are no transport costs for you.

Voluntary participation

Participation in this study is completely voluntary and your child is under no obligation to participate. Even if you give consent for your child to participate and on the day he/she decides that they don't want to, for whatever reason, no penalties will be incurred.

Right to withdraw from the study

Once consent and assent from the child have been given, the child is under no obligation to complete the study and they can pull out at any time with no penalties. We will encourage children to complete the study, but should they really not want to, they will be free to withdraw at any time.

Confidentiality

Confidentiality will be maintained at all times. We, as the group members, will know your child's name for means of data capturing but from the start of the study your child will be allocated a number which will replace their name or any other personal details for the rest of the study. Full confidentiality will be maintained during publication of this dissertation and your child's name will never be mentioned and there will be no way for anyone that is not part of this group to relate any of the data back to your child and a specific school. All data and names will be kept on one computer in a locked up environment so that there is no way for anyone but the researcher to have access to it. All data will be maintained securely for up to a year after the study has been completed.

Compensation/treatment in the event of an injury

Once you have given consent, your child will partake in this study at their own risk and the university or members of this group or supervisor will not be held responsible for any injuries incurred. The risk of injury is very minimal.

UCT no fault Insurance Policy:

The University of Cape Town (UCT) has insurance cover for the event that research-related injury or harm results from your participation in the trial. The insurer will pay all reasonable medical expenses in accordance with the South African Good Clinical Practice Guidelines (DoH 2006), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI) in the event of an injury or side effect resulting directly from your participation in the trial. You will not be required to prove fault on the part of the University.

The University **will not be liable** for any loss, injuries and/or harm that you may sustain where the loss is caused by

- The use of unauthorised medicine or substances during the study
- Any injury that results from you not following the protocol requirements or the instructions that the study doctor may give you

- Any injury that arises from inadequate action or lack of action to deal adequately with a side effect or reaction to the study medication★
- An injury that results from negligence on your part★

[★Researchers must bear in mind that it is unacceptable to impose a burden on participants who may not recognize symptoms or have the ready means to take action.]

“By agreeing to participate in this study, you do not give up your right to claim compensation for injury where you can prove negligence, in separate litigation. In particular, your right to pursue such a claim in a South African court in terms of South African law must be ensured. Note, however, that you will usually be requested to accept that payment made by the University under the SA GCP guideline 4.11 is in full settlement of the claim relating to the medical expenses. “

An injury is considered trial-related if, and to the extent that, it is caused by study activities. You must notify the study doctor immediately of any side effects and/or injuries during the trial, whether they are research-related or other related complications.

UCT reserves the right not to provide compensation if, and to the extent that, your injury came about because you chose not to follow the instructions that you were given while you were taking part in the study. Your right in law to claim compensation for injury where you prove negligence is not affected. Copies of these guidelines are available on request.

Who to contact for further information

Should you have study-specific queries or want more information, you can contact me, Jodie Bowers on 0736495333/ jodiebowers@hotmail.co.za or my supervisor, Nirmala Naidoo, on niri.naidoo@uct.ac.za.

The chair of the Human Research Ethics Committee (HREC), Professor Marc Blockman, may be contacted if you have any questions or concerns about your child's rights or welfare as a research participant on 021 4066 411 or marc.blockman@uct.ac.za.

Thank you for taking the time to read this.

Appendix 16: Informed consent for parents

Informed consent form

University of Cape Town

TITLE: The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.

I, _____ have read the information sheet. I understand what is required of my child/legal ward and I have had all my questions answered. I do not feel that my child/I are being coerced to participate in this study and am doing so of my own/child's free will. I know that my child/I can withdraw at any time if they/I so wish and that it will have no negative consequences for me/my child.

Please indicate here whether your child has any health/medical condition/s:

Signed:

Participant

Date and Place

Researcher

Date and Place

Witness (if necessary)

Date and Place

Appendix 17: Information letter to children

Dear learner

I, Jodie Bowers, am a student from the University of Cape Town who studies physiotherapy. I am completing a research project on children and physical education in schools. I would like you to be a part of my study. By allowing me to take some measurements and doing a few tests such as the speed at which you can run and other physical tests you will be helping me get the information I need for my project. Please read this letter and make sure you understand everything. If you have any questions, please speak to me or someone from my research team.

Name of the research project

The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.

Reason for the project

The reason for this project is to find out if a lesson done with your teacher on physical education will cause changes in your body, the way you feel and your fitness levels after she/he teaches you for six weeks. Being unfit is a big problem in our country and around the world. Research has shown that a lot people around the world weigh more than they should for their age. I hope that this study will help teachers to help learners like you to live a healthier, active life by making physical education classes better.

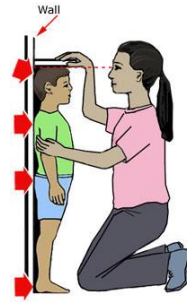
People taking part in the project

We would like to use you, a learner in grade four or five to take part in my project.

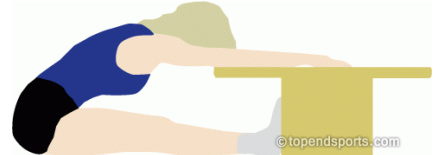
What is this project about?

The first part of the project is done with the principal of your school, he or she will be answering a questionnaire (a questionnaire is a list of questions) on physical education. The second part of the project involves you. You will be expected to do three things.

1. My research team and I will be measuring your height, weight and around your waist.



2. There will be a fitness test, made up of four different physical exercises



3. There will be a short questionnaire on the way you feel.



The tests will be measured by my group. Some grade four and/or five class teachers will have a lesson on physical education/activity, which he/she will hopefully put into your lessons. For the next six weeks you may need to do the exercise classes with your teacher. After six weeks, I will come back to your school and do all the tests again with you. I will then be able to see if my training session with your teacher made a difference to your fitness levels and the way you feel. My team will be the only people who know your names, the measurements and results during the project. Nobody else will be able to see this information. My team will make sure of this at all times.

What will be needed of you?

The whole project will take place at your school. The first part of the project will take place on one day and six weeks later we will do the tests again on another day. We may need to return to the school within the week to finish the measurements. Your school day will not be disturbed for more than those two days. You will not be expected to do anything at home to prepare for the tests. The tests will consist of body measurements, fitness tests and a short questionnaire. You will need to remove your shoes and wear shorts or tracksuit pants.

You may also need to take part in the physical education classes/activities with your class/physical education teacher. Not every class or school will get these physical education

classes/activities. The classes will be 1 hour per week for six weeks during school time and will involve running, jumping and other exercises.

What are the risks (the things that can go wrong)?

The things that can go wrong are very small. You may feel tired or sore after doing the fitness tests. If you feel dizzy or out of breath and cannot finish the tests you can stop at any time and you do not need to finish the tests. We will do our best to make sure there are no other things that can go wrong or feelings of unhappiness. You possibly may feel aware of your body because we will be measuring your weight and fitness levels. It is important to remember that nobody will know the information we get from you. If you fall and hurt yourself while your teacher is doing physical activities with you, she will be told what to do.

What can you get from taking part in the project?

This is not a competition and there will be no prizes for who does the best in these physical exercises. This is because this project is only for research reasons. If you take part in my project, you will get a gold star sticker. The good thing about this project is that your teacher may be able to do more physical activities with you which is very good for your health.

What does it cost?

There is no money involved. The project is done during the school day so there are no transport costs for your parents/drivers. You will however, need to give up a few of your break times.

Taking part in this project is your choice

You should not feel that you are forced to take part in my project. You should be taking part because you want to. You should know that you can pull out of the project at any time if you wish and that nothing bad will happen to you.

Treatment if you get hurt

There will be no treatment if you get hurt while taking part in this project. Once you say yes to take part in my project, you will take part in this project at your own risk and the university or group or supervisor will not be responsible if you get hurt. The chance of getting hurt is very low.

Who to call for more information

If you have any questions, please raise your hand and ask your question until you understand what is needed of you.

My phone number

For any more questions please call:

Jodie Bowers – 0736495333

Thank you for taking the time to read this information letter.

Appendix 18: Assent form for children

University of Cape Town

TITLE OF STUDY: The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.

Assent form

I, _____ (name and surname) have read (or had read to me by _____) the information sheet. I understand what is needed of me and have had all my questions answered. I do not feel that I am forced to take part in this project and I am doing so out of my own choice. I know that I can pull out at any time if I so wish and that nothing bad will happen to me if I do not want to take part in this project.

Signed: (write name and surname)

Participant

Date and Place

Researcher

Date and Place

Witness (if necessary)

Date and Place

Appendix 19: Information letter to school teachers (if participating in the intervention)

Title: The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.

Dear Teacher

I, Jodie Bowers, am a registered Masters Physiotherapy student from the University of Cape Town.

Your school has been selected to participate in my study. Should you give consent, you will be allowed to participate in the study. The information which follows makes up the basis of my project:

Background, purpose and importance

Childhood obesity is recognised by the World Health Organisation (WHO) and the World Confederation of Physical Therapy (WCPT) as an international epidemic. Studies show that obesity present in childhood or adolescence seems to increase the likelihood of adult morbidity and mortality. The primary aim of the study is to determine the effect of a teacher-based intervention programme after 6 weeks for primary schools, from various circuits within the Port Elizabeth Education District, without physical education on learner's health-related quality of life, body mass index and physical fitness. I believe this research will aid in the management of overweight and underweight children as well as the promotion of a healthy, active lifestyle and physical activity/fitness programmes within schools.

Selection of participants

You, principals and other teachers within the Port Elizabeth education district are to be included in the first phase of the study. Learners in grade four and five and class teachers are to be included in the second phase of the study, this is where you fit in and why you were chosen to participate in the study.

Description of research

The first phase will be conducted with ten randomly selected co-ed schools within the Port Elizabeth Education District. It will consist of a structured questionnaire on physical education which will need to be completed by the principal or a specified teacher. Phase two will commence with four randomly selected schools, two schools with physical

education and two schools without physical education. Pre-testing will be conducted with grade four and five learners. Testing measures will consist of height, weight, and waist circumference for body mass index and waist circumference, physical fitness tests and a short questionnaire. The tests will be measured and results taken by myself and my research assistants. You (a pre-selected grade four or five class/PE teacher) will then participate in the intervention which will consist of a short training session and an educational booklet on physical education/activity, which you will need to incorporate into lessons with the learners. After six weeks, I will return to the four schools to conduct my post-testing measures with the same grade four and five learners. Although we will know your name purely for gathering data, all descriptive information will remain anonymous to anyone not within this group of researchers.

What will be required you?

You will only be involved if your school is selected to participate in the intervention. Once pre-testing measures have been conducted with the learners, you will be expected participate in the intervention which will consist of a short 30 minute training session and an educational booklet on physical education/activity. The training session will be done during a time which suits you e.g. after school or break time. I will encourage you to incorporate the contents of the booklet into physical education classes for 60minutes once per week for 6 weeks. Six weeks after the training session, I will repeat the testing measures with the learners and assess whether the physical education programme with you made a difference. You will also need to complete a weekly logbook after every PE class with the learners.

What will be the risks involved

Results will be displayed in the final report but these will be completely anonymous and cannot be related back to you in any way. During the six week intervention period, any injuries sustained may be minor (e.g. fall during activities) and you will be advised accordingly. The school's health protocol/procedure should be followed.

What benefits will there be for taking part in the study

You and the learners may benefit from the intervention implemented. Those learners identified as requiring further support will be referred after consultation with you and the parents. However, upon completion of the study, the principals of the participating schools will be given a summary of the study results. Depending on the results, it will encourage the school authorities to promote programmes at schools to address deficiencies found in the

study. The intervention will also be made available to classes that have not received the intervention if a positive effect has been proven.

What payment will be received or what costs will be incurred

You will not receive any payment and you will not have to pay anything to participate in the study.

Voluntary participation

Participation in this study is completely voluntary and you are under no obligation to participate. No penalties will be incurred if you decide you do not wish to participate in the study, even after signing the informed consent form.

Right to withdraw from the study

Once consent has been obtained from you, you are under no obligation to complete the study and you can pull out at any time with no penalties. We will encourage you to complete the study but should you really not want to, you will be free to withdraw at any time.

Confidentiality

Confidentiality will be maintained at all times. We, as the research team, will know your name for means of data capturing but from the start of the study you will be allocated a number which will replace your name or any other personal details for the rest of the study. Full confidentiality will be maintained during publication of this dissertation and your name will never be mentioned and there will be no way for anyone that is not part of this group to relate any of the data back to you or a specific school. All data and names will be kept on one computer in a locked up environment so that there is no way for anyone but the researcher to have access to it. All data will be maintained securely for up to a year after the study has been completed.

Compensation/treatment in the event of an injury

Once consent has been given, the learners will partake in this study at their own risk and the university or members of this research group or supervisor will not be held responsible for any injuries incurred. The risk of injury is very minimal.

UCT no fault Insurance Policy:

The University of Cape Town (UCT) has insurance cover for the event that research-related injury or harm results from your participation in the trial. The insurer will pay all reasonable medical expenses in accordance with the South African Good Clinical Practice Guidelines (DoH 2006), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI) in the event of an injury or side effect resulting directly from your participation in the trial. You will not be required to prove fault on the part of the University.

The University **will not be liable** for any loss, injuries and/or harm that you may sustain where the loss is caused by

- The use of unauthorised medicine or substances during the study
- Any injury that results from you not following the protocol requirements or the instructions that the study doctor may give you
- Any injury that arises from inadequate action or lack of action to deal adequately with a side effect or reaction to the study medication★
- An injury that results from negligence on your part★

[★Researchers must bear in mind that it is unacceptable to impose a burden on participants who may not recognize symptoms or have the ready means to take action.]

“By agreeing to participate in this study, you do not give up your right to claim compensation for injury where you can prove negligence, in separate litigation. In particular, your right to pursue such a claim in a South African court in terms of South African law must be ensured. Note, however, that you will usually be requested to accept that payment made by the University under the SA GCP guideline 4.11 is in full settlement of the claim relating to the medical expenses. “

An injury is considered trial-related if, and to the extent that, it is caused by study activities. You must notify the study doctor immediately of any side effects and/or injuries during the trial, whether they are research-related or other related complications.

UCT reserves the right not to provide compensation if, and to the extent that, your injury came about because you chose not to follow the instructions that you were given while you were taking part in the study. Your right in law to claim compensation for injury where you prove negligence is not affected. Copies of these guidelines are available on request.

Who to contact for further information

Should you have study-specific queries or want more information, you can contact me, Jodie Bowers on 0736495333/ jodiebowers@hotmail.co.za or my supervisor, Nirmala Naidoo, on niri.naidoo@uct.ac.za.

The chair of the Human Research Ethics Committee (HREC), Professor Marc Blockman, may be contacted if you have any questions or concerns about your rights or welfare as a research participant on 021 4066 411 or marc.blockman@uct.ac.za.

Thank you for taking the time to read this.

Appendix 20: Informed consent for school teachers (if participating in the intervention)

Informed consent form

University of Cape Town

TITLE: The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.

I, _____ have read the information sheet. I understand what is required of me and I have had all my questions answered. I do not feel that I have been coerced to participate in this study and am doing so of my own accord. I know that I can withdraw at any time if I so wish and that it will have no negative consequences for me.

Signed:

Teacher

Date and Place

Researcher

Date and Place

Appendix 21: Teacher weekly logbook

Please complete this logbook weekly after each 60 minute physical education class with the learners.

School:

Name:

Grade:

WEEK	60 minute class done (tick)	Date:	Number of learners participating:	Absentees/ learners not participating: Name them	Any injuries?	Comments? Problems/concerns
1						
2						
3						
4						
5						
6						

Appendix 22: Letter for permission to use the EQ-5D-Y

Division of Physiotherapy

Department of

Health and

Rehabilitation

Sciences

Faculty of Health Sciences

University of Cape Town

Anzio Road

Observatory 7925

Cape Town

EuroQol Group

Marten Meesweg 107

3068 AV Rotterdam

Netherlands

REQUEST FOR PERMISSION TO USE THE EQ-5D-Y

Dear Sir

I, Jodie Bowers, am a registered Masters Physiotherapy student in the Division of Physiotherapy, Department of Health and Rehabilitation Sciences, Faculty of Health Science, University of Cape Town. I wish to conduct a research study entitled: **The Effect of a Teacher-Based Intervention Programme for Primary Schools on Learner's Health-Related Quality of Life, Body Mass Index and Physical Fitness: A Randomised Control Trial.**

The primary aim of the study is to determine the effect of a teacher-based intervention programme after 6 weeks for primary schools, from various circuits within the Port Elizabeth Education District in South Africa, without physical education on learner's health-related quality of life, body mass index and physical fitness. The study will be conducted by myself as well as five research assistants, all under the supervision of Ms Nirmala Naidoo (Lecturer: University of Cape Town). I am applying for ethical approval from the Human Research Ethics Committee at UCT.

Childhood obesity is recognised by the World Health Organisation (WHO) and the World Confederation of Physical Therapy (WCPT) as an international epidemic. Studies show that obesity present in childhood or adolescence seems to increase the likelihood of adult morbidity and mortality. I would like to use the EQ-5D-Y questionnaire as a part of my study to determine the Health-Related Quality of Life in children aged nine to eleven.

Once permission is granted from ECED, I will liaise with the principals of the selected schools eligible for my study. I will randomly select ten schools within the Port Elizabeth Education District that will participate in the first phase of the study. The second phase of the study will commence with four randomly selected schools. Pretesting measures with the learners will be conducted prior to a teacher based intervention. Following the intervention post testing measures will be conducted and data will be analysed. You will receive notification of confirmation of permission to conduct the study from the Ethics committee before any action is implemented. Informed consent in a written form will then be obtained from each school as well as written informed consent from each parent of children participating and ascent from the children for their participation.

The study findings will contribute to the knowledge of the extent of PA implementation in schools and will inform the development of programmes to address any deficiencies in PA implementation that may arise from the study. The study will be supervised by Ms Nirmala Naidoo, Division of Physiotherapy, School of Health and Rehabilitation Sciences, Faculty of Health Sciences, University of Cape Town.

Contact Details:

Tel: (Work) 002721-4066314

Fax: 002721-4066401

e-mail: niri.naidoo@uct.ac.za

If you have any further queries or concerns, you may contact me (details below) or my supervisor Ms Naidoo.

Your permission will be greatly appreciated.

Kind Regards,

Jodie Bowers

Contact details: jodiebowers@hotmail.co.za Telephone number: 002773 6495333