

The effect of an enhanced quality Physical Education Programme on physical activity and fitness among Grade 7-learners in Potchefstroom

Haili Tian
24544647

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Promoter: Dr D du Toit
Co-promoter: Prof AL Toriola

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FOREWORD

I would like to express my sincere appreciation to the following persons who contributed to my work:

- I express my deep gratitude to my promoter, Dr Dorita Du Toit, for your patient manner of guidance, encouragement, support, and motivation through my study period. I am extremely grateful for helping me to order and organize the whole work during we presented our intervention programme period. I really appreciate it.
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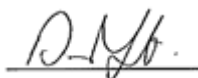
DECLARATION

Dr D. Du Toit (promoter) and Prof. A.L. Toriola (co-promoter) are the co-authors of the three articles which form part of this thesis, hereby give permission to the candidate, Haili Tian to include the article as part of a doctoral thesis. The contribution of each co-author, both supervisory and supportive, was kept within reasonable limits and included:

Dr D. Du Toit: Developing the proposal, interpretation of the results, writing of the manuscript and the thesis;

Prof. A.L. Toriola: Contributed in the write-up of the articles.

This thesis, therefore, serves as fulfillment of the requirements for the PhD degree in Human Movement Science within Physical Activity, Sport and Recreation (PhASRec) in the Faculty of Health Sciences at the North-West University (Potchefstroom Campus).



Dr D. Du Toit

Promoter, co-author



Prof. A.L. Toriola

Co-Promoter, co-author

SUMMARY

The effect of an enhanced quality Physical Education Programme on physical activity and fitness among Grade 7-learners in Potchefstroom

The low physical activity (PA) levels of children have become a national public health concern in South Africa. Moreover, the quality of Physical Education (PE) in South African schools has been compromised by challenges resulting from the subject's reintroduction after a long absence from the school curriculum. Up to date no study has investigated the effects of a quality PE programme, within the prescriptions of the South African Curriculum and Assessment Policy Statement (CAPS), on the PA and fitness levels of twelve to thirteen years old South African children. Furthermore, no PA measuring instrument exists that has been validated specifically for South African children of this age group, with which to conduct such a study. The objectives of this study were therefore, firstly, to validate a standardised PA questionnaire for Grade 7 learners in a South African context; secondly, to evaluate the effects of an enhanced quality PE programme presented by well-trained teachers, on the PA levels, and thirdly on the physical and motor fitness of Grade 7 learners in Potchefstroom, South Africa.

For the first objective, 108 schoolchildren aged twelve to thirteen years (boys, $n=45$; girls, $n=63$) from two primary schools in Potchefstroom participated in this study to validate the Children's Leisure Activities Study Survey (CLASS) for children in a South African context. Test-retest reliability of the questionnaire was examined with an interval of 3 weeks, while validity was assessed by comparing measurements of the reported minutes in PAs from questionnaire responses with ten physical fitness parameters using the Eurofit test battery. Data analysis included Cronbach's alpha coefficients, paired t-test and intra-class correlation coefficients (ICC), and Spearman correlation coefficients (r). The results showed substantial internal consistency and significant intra-class correlations estimates for all intensities of PA and sedentary time (ST). Non-significant differences were found in the means of test and retest measurements. Aerobic fitness was significantly correlated with all intensities of PA and ST, and the results of several of the other fitness tests had significant associations with vigorous PA.

For the fulfillment of the second and the third objectives, 110 Grade 7 learners (experimental school, $n = 40$; control schools, $n = 70$) were studied. The twelve-week PE intervention programme was presented according to the prescriptions of the CAPS which allocates one hour per week to PE, but included 5 quality-enhancing components namely well-trained teachers, homework activities, a reward system, improvised apparatus and the monitoring of activity intensity. Data was collected by means of the validated CLASS questionnaire, anthropometric measurements as well as physical and motor fitness tests, by means of the Eurofit test battery. Data analysis included Kruskal-Wallis and Wilcoxon signed-rank tests, a series of analyses of covariance (ANCOVA), Tukey's post hoc analysis, and interpreting effect sizes for practical significance.

The results showed practically and statistically significant increases in moderate PA, vigorous PA, and total PA as well as decreases in sedentary behaviours. Furthermore, the learners' data on physical and motor fitness levels showed statistically significant improvements among most of the experimental groups with regard to six of the ten fitness parameters.

Based on these results, it can be concluded that the enhanced quality PE programme is effective in improving the PA, physical and motor fitness levels of South African primary school children. Therefore it is recommended that PE programmes in South Africa include the quality-enhancing components used in this intervention programme. Moreover, the modified CLASS questionnaire is a valid and reliable measure of PA among South African Grade 7 schoolchildren.

Keywords: Physical Education intervention, physical activity, physical fitness, motor fitness, children, questionnaire, validation.

Opsomming

Die effek van 'n verhoogde-kwaliteit Liggaamlike Opvoedingprogram op die fisieke aktiwiteit en fiksheid van Graad 7-leerders in Potchefstroom

Die onvoldoende fisieke aktiwiteitvlakke van Suid-Afrikaanse kinders is 'n nasionale publieke gesondheidskwessie. As gevolg van Liggaamlike Opvoeding (LO) se herinstelling na afloop van 'n lang afwesigheid uit die skoolkurrikulum, word die kwaliteit van die vak in Suid-Afrikaanse skole verder benadeel deur verskeie uitdagings. Tot op datum was daar egter geen studie wat die effek van 'n kwaliteit LO-program, wat saamgestel is volgens die voorskrifte van die Suid-Afrikaanse Kurrikulum- en Assesseringbeleidsverklaring (KABV), op die fisieke aktiwiteit- en fiksheidvlakke van twaalf- tot dertienjarige leerders, ondersoek het nie. Die doelstellings van die huidige studie was daarom om eerstens, 'n gestandaardiseerde vraelys vir fisieke aktiwiteit (FA) te valideer vir Graad 7-leerders in 'n Suid-Afrikaanse konteks; tweedens om die effek van 'n verhoogde-kwaliteit LO-program aangebied deur goed-opgeleide LO-onderwysers, op die fisieke aktiwiteitvlakke, en derdens op die fisieke- en motoriese fiksheidvlakke, van Graad 7-leerders in Potchefstroom te ondersoek.

Vir die eerste doelstelling het 108 twaalf- tot dertienjarige skoolkinders (seuns $n=45$; dogters $n=63$) van twee laerskole in Potchefstroom, deelgeneem aan die studie om die *Children's Leisure Activities Study Survey* (CLASS) te valideer vir kinders in 'n Suid-Afrikaanse konteks. Die toets-hertoets betroubaarheid van die vraelys is geëvalueer met 'n interval van drie weke, terwyl die geldigheid geassesseer is deur die gerapporteerde hoeveelhede minute in fisieke aktiwiteite uit die vraelys te vergelyk met tien fisieke - en motoriese fiksheid parameters, wat getoets is met behulp van die Eurofit toetsbattery. Die data analise het Cronbach alfa ko-effisiënte, gepaarde t-toetse en intra-klas korrelasie ko-effisiënte (*intra-class correlation coefficients* - ICC), asook Spearman korrelasie ko-effisiënte (r) ingesluit. Die resultate toon wesenlike interne konstantheid en betekenisvolle intra-klas korrelasiewaardes vir al die intensiteite van FA en sedentêre tyd (ST) (Cronbach alfa-waardes tussen 0.71 en 0.84, $p < 0.05$; ICC tussen 0.73 en 0.95, $p < 0.05$). Nie-betekenisvolle verskille is gevind in die gemiddeldes van die toets-en-hertoets metings. Aerobiese fiksheid het

betekenisvol gekorreleer met al die intensiteite van FA en ST, en die resultate van verskeie ander fiksheidtoetse het betekenisvolle korrelasies met intensiewe FA getoon.

Vir die doel van die tweede en derde doelstellings is 110 Graad 7-leerders (eksperimentele skool, $n = 40$; kontrole skole, $n = 70$) as deelnemers gebruik. Die twaalf-weeklange LO intervensieprogram is aangebied volgens die voorskrifte van die KABV wat een uur per week vir LO voorskryf, maar het ook vyf kwaliteitbevorderende komponente ingesluit, naamlik goed-opgeleide onderwysers, huiswerk-aktiwiteite, 'n beloningstelsel, geïmproviseerde apparate en die monitering van die intensiteit van aktiwiteite. Data is ingesamel deur middel van die gevalideerde CLASS-vraelys, antropometriese metings, asook fisieke - en motoriese fiksheidtoetse wat gedoen is met behulp van die Eurofit toetsbattery. Data-analise het die Kruskal-Wallis en Wilcoxon-rangorde toetse, 'n reeks analyses met betrekking tot kovariansie (ANCOVA), Tukey se post hoc-analise, en die interpretering van effekgroottes vir praktiese betekenisvolheid, ingesluit.

Die resultate toon prakties- en statisties-betekenisvolle toenames in matige FA, intensiewe FA, en totale FA asook afnames in ST. Die resultate met betrekking tot die fisieke- en motoriese fiksheidvlakke van die leerders, toon verder statisties-betekenisvolle verbeterings van verskillende grade by die meeste van die eksperimentele groepe met verwysing na ses van die tien fiksheid parameters.

Op grond van die bogenoemde resultate kan die gevolgtrekking gemaak word dat die verhoogde-kwaliteit LO-program effektief is om die vlakke van FA en fisieke- en motoriese fiksheid van Suid-Afrikaanse laerskoolleerders te verbeter. Gevolglik kan die aanbeveling gemaak word dat LO-programme in Suid-Afrika die kwaliteitbevorderingskomponente wat in hierdie program ingesluit is, inkorporeer. Die aangepaste CLASS-vraelys is verder 'n geldige en betroubare meetinstrument vir die evaluering van FA-vlakke by Suid-Afrikaanse Graad-7 leerders.

Slutelwoorde: Liggaamlike Opvoeding intervensie, fisieke aktiwiteit, vraelys, validasie, fisieke fiksheid, motoriese fiksheid, kinders.

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List of abbreviations

AAHPERD	American Alliance for Health, Physical Education, Recreation and Dance
BMI	Body Mass Index
CAPS	South African Curriculum and Assessment Policy Statement
CLASS	Children's Leisure Activities Study Survey
CPD	Continuing Professional Development
CSPs	County Physical Activity and Sports Partnerships
DBE	Department of Basic Education
DoE	Department of Education
DTE	Diploma Teacher Education
ECDE	Early Childhood Development Teacher Education
ERPs	Event-Related Brain Potentials
ES	Effect Size
HBSC	Health Behavior in Schoolchildren
ICC	Intra-class Correlation Coefficients
IPAQ	International Physical Activity Questionnaire
LO	Life Orientation
MPA	Moderate Physical Activity
MVPA	Moderate-to-Vigorous Physical Activity
OBE	Outcomes-Based Education
PA	Physical Activity
PDPAR	Previous Day Physical Activity Recall Questionnaire
PE	Physical Education
PF	Physical Fitness

PTE	Primary Teacher Education
<i>R</i>	Spearman correlation coefficients
<i>SD</i>	Standard Deviation
ST	Sedentary Time
UTE	Undergraduate Teacher Education
VPA	Vigorous Physical Activity
VS	Versus
WHO	World Health Organisation
Wk	Week

CHAPTER 1



CHAPTER 1: INTRODUCTION

1. **Problem statement**
 2. **Objectives**
 3. **Hypotheses**
 4. **Structure of the thesis**
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-

1. **Problem statement**

Schools have traditionally played an important role in the provision of Physical Education (PE) to learners of all ages. PE can help to improve children's physical activity habits and enhance their health by providing quality instruction, programmes, and services that promote enjoyable, lifelong physical activity to all learners around the world (Pate *et al.*, 2006:1214). The PE curriculum is usually a framework that provides guidance for facilitating physical activity, improving physical fitness, teaching motor and sport skills (Burgeson *et al.*, 2001:279; NASPE, 2006; Pühse & Gerber, 2005:32). According to the South African Curriculum and Assessment Policy Statement (CAPS), the primary aim of the South African Physical Education curriculum is to “expose learners to an understanding of the value of regular participation in physical activity” by facilitating physical fitness activities, games, recreational movement activities, motor and sport skills (DBE, 2011:10).

The value of regular participation in physical activity is related to the improvement or maintenance of physical and motor fitness (Ortega *et al.*, 2013:467; Eather *et al.*, 2013:12), which has an impact on physical (Van Sluijs *et al.*, 2007), social (Mcveigh *et al.*, 2004:982),

psychological (Biddle & Asare, 2011:886; Eime *et al.*, 2013) and cognitive health (Jemmott *et al.*, 2011:183; Puma *et al.*, 2013:635). Despite these well-known advantages of physical activity, most young people are not active enough to benefit. In fact, the lack of physical activity among children and adolescents is a global health concern (Zahner *et al.*, 2006). Physical inactivity is a major contributory cause of the high incidence of overweight and obesity among children. It has been identified as the fourth leading risk factor for global mortality and is estimated to be the principal cause for approximately 21-25% of breast and colon cancer, 27% of diabetes and 30% of heart disease (WHO, 2009; Toriola & Monyeki, 2012:796). According to Zahner *et al.* (2006) the growing problem of children with physically inactive lifestyles, combined with the added burden of major health implications like obesity, type 2 diabetes, hypertension, low fitness and osteoporosis, has increased dramatically. This is due to the fact that obesity and other high risk behaviours are usually hard to change from childhood to adulthood (Kriemler *et al.*, 2010).

In South Africa, studies regarding the physical activity levels of children have yielded mixed results. Toriola and Monyeki (2012:802) found that 14-year old boys were fitter and more physically active and had less body fat than girls in the North West province. These authors also found that 30% of the adolescents in this study showed low levels of physical activity (Toriola & Monyeki, 2012:803). These findings support those of Mamabolo *et al.* (2007:1047) who found that Grade 8 boys in the North West Province tend to be more physically active than girls of the same age and children of this age group tend to become less physically active as they mature. Similarly to these results, the study of Shirinde *et al.* (2012:236) investigating the physical activity levels of 15-16 year old children attending farm schools, shows that most of the population was only engaged in light physical activity during weekdays and that boys tended to participate more in moderate physical activity than girls. In contrast, Themane *et al.* (2006:53) found high physical activity levels among 7-14 year old rural children. Although the 15-18 year old children from a disadvantaged community, in a study by Lennox *et al.* (2008:68), showed low to moderate levels of physical activity, their levels of physical activity seemed to be influenced by the distance children walked to school. Hurter and Pienaar (2007:54) found low levels of physical activity among 13-15 year old boys in the North-West Province, while Lennox and Pienaar (2013:158) found low to moderate levels of physical activity in Grade 8-learners from a disadvantaged community. Similarly, a study carried out by Craig *et al.* (2013:81) using accelerometers to measure physical activity levels in rural areas of South Africa, revealed that although rural children

and adolescents showed a high volume of physical activity, the intensity thereof was too low to meet international recommendations.

The majority of the above mentioned South African studies show inadequate levels of physical activity when compared to international recommendations for physical activity (ACSM, 2009:3; WHO, 2009), which is 60 minutes of moderate physical activity per day. These results are similar to the results regarding physical activity levels of children and adolescents in England (NHS, 2013), the USA (American Heart Association, 2009) and Europe (De Cocker *et al.*, 2011:249). These findings raise concern as evidence shows that the decrease in physical activity levels may contribute to lower physical and motor fitness levels (De Milander, 2011:12).

Concerns about low physical activity levels and the concurrent prevalence of hypokinetic health conditions, like overweight and obesity, have led several researchers to investigate the effect of physical activity intervention programmes on South African children's physical activity levels and fitness. Adolescents in disadvantaged communities showed significant improvements in physical activity levels and aerobic fitness after an extra-mural aerobic intervention programme in the study by Lennox and Pienaar (2013:158). This programme had a stabilizing effect on learners' physical activity levels three years after the intervention programme (Pienaar *et al.*, 2012:300). Monyeki *et al.* (2012:245) established that a ten month physical activity intervention programme had beneficial health outcomes for 9-13 year old boys in the Gauteng Province. Additionally Naidoo and Coopoo (2012:82) found that an 18-month physical activity intervention programme, incorporated within classroom lessons, increased flexibility, strength and physical activity levels of primary school learners from 18 schools in KwaZulu-Natal.

The low physical activity levels of South African children as well as research results regarding the effect of intervention programmes, such as the above mentioned, were motivating factors for the reintroduction of PE in the South African school curriculum, after an absence of more than ten years (Du Toit *et al.*, 2007:245). However, PE was reintroduced not as an independent subject with stand-alone status, but as one component of the new Life Orientation subject, and it has been allocated only one period of practical physical activities per week (DBE, 2011:7). According to international guidelines (ACSM, 2009:3; WHO, 2009), youth should participate in at least 60 minutes of moderate to vigorous intensity

physical activity daily, and most of the daily physical activity should be aerobic. Considering these guidelines, one hour of PE per week as prescribed by the CAPS (DBE, 2011:10) appears to be inadequate to improve the physical activity levels and fitness of children and adolescents. Additionally, since the reintroduction of PE, a considerable percentage of schools do not even adhere to the once-a-week requirement of the CAPS. This is evident in the study by Toriola and Monyeki (2012:796) that found that only 54.3% of South African children had PE classes on their timetable and only 52.8% engaged in vigorous activity at school in 2003. Recent studies showed that this trend continues to this day (Du Toit *et al.*, 2007:241; Van Deventer, 2012:162).

In addition to other challenges resulting from the reimplementing of PE after its long absence, Van Deventer (2012:162), Hardman (2008:5) and Sherman *et al.* (2010:2) agree that the lack of training of PE teachers, facilities and equipment, inadequate funding and a lack of status in the school, as the most prominent factor influencing the implementation and quality of PE Programmes in South Africa. In this regard, South African teachers were trained in the content and principles of the new Life Orientation curriculum by undergoing 5-day workshops countrywide from 2010 to 2012 (Crouse, 2013). These 5-day workshops comprise of only one afternoon's session of training for PE. In contrast, at some universities in South Africa, teachers are trained in a four year Bachelor of Education degree specializing in PE (NWU, 2013:64). However, due to financial reasons, most schools in South Africa still utilize the services of teachers trained in the 5-day workshops presented by provincial governments (Van Deventer, 2012:162). Hardman (2008:5) and Du Toit *et al.* (2007:241) agree that South African teachers are inadequately trained as specialists to teach all aspects of Life Orientation. As a result, PE teachers who had the 5-day CAPS training are uncomfortable because they don't know how to assess movement skills and they are also afraid of legal implications if learners get injured in the PE class (Van Deventer, 2012:163). This is not an uncommon phenomenon in PE in other countries, where primary school PE teachers have been reported to have limited knowledge of, and low confidence in, teaching PE (Hardman & Marshall, 2005:44).

The effect of inadequately trained teachers on the quality and effectiveness of PE programmes have been researched extensively in national and international literature (Du Toit *et al.*, 2007:252; Morgan & Bourke, 2008:2; Napper-Owen *et al.*, 2008:30; Rainer *et al.*, 2012:431; Van Volkinburg *et al.*, 2008:33), as it is believed that a quality PE teacher forms

the core of a quality PE programme (Napper-Owen *et al.*, 2008:28; Van Volkinburg *et al.*, 2008:33). A quality PE programme provides learning opportunities for physical activity, appropriate instruction, challenging and meaningful content, learner and programme assessment, and employs highly qualified PE teachers (NASPE, 2013:1; Napper-Owen *et al.*, 2008:28).

Qualified PE teachers also play a major role in providing adequate physical activity within PE Programmes. In a review of physical activity in primary school PE, Fairclough and Stratton (2006:251) point out that a key determinant of the efficacy of the PE programme to ensure adequate levels of physical activity is the expertise of those teaching the programmes. According to these authors, well-trained teachers employ more efficient instructional methods and activity-promoting tasks. Lonsdale *et al.* (2013:160) emphasise this statement in their systematic review of interventions to increase physical activity in PE, where they found that PE programmes presented by qualified PE teachers increased the time spent on moderate physical activity during PE lessons. In support of the above findings, research shows that by modifying existing PE lessons to improve the quality of the programme, physical activity levels can be increased together with the improvement of physical and motor fitness (Van Beurden *et al.*, 2003:497; Fairclough & Stratton, 2006:251).

After reviewing the literature, questions arise as to the effects of an enhanced quality PE programme on the physical activity and fitness levels of pre-adolescents in South Africa. No study, that investigated the effects of such an enhanced quality PE programme on the physical activity levels and fitness of South African learners, was found. Furthermore, to answer the question with regard to the physical activity levels of learners participating in an enhanced quality PE programme, a valid physical activity measuring instrument that can easily be administered by PE teachers, should be used. In this regard, although several standardised physical activity questionnaires exist to measure children's physical activity levels, e.g. the International Physical Activity Questionnaire (IPAQ) (Craig *et al.*, 2003:1381), the Previous Day Physical Activity Recall questionnaire (Trost *et al.*, 1999:30), and the Children's Leisure Activities Study Survey (CLASS) (Telford *et al.*, 2004:66), no questionnaire that was developed for South African primary school pre-adolescents exists. As self-report questionnaires are culturally dependent and questionnaires used in one population may not be directly applicable to other populations (MRC, 2013), a standardised questionnaire for South African pre-adolescents would have to be developed or an existing

questionnaire would have to be validated for the South African population, to attempt to answer the above-mentioned questions.

It is in the light of this research background that the main research question is posed: Can an enhanced quality PE programme, presented by well-trained PE teachers according to the prescriptions of the CAPS, have a positive effect on the physical activity levels as well as physical and motor fitness of Grade 7 learners in Potchefstroom? From this main question, the following research questions are derived: Firstly, can a standardised physical activity questionnaire be validated for South African Grade 7-learners? Secondly, what are the effects of an enhanced quality PE programme, presented by well-trained PE teachers, on the physical activity levels of Grade 7-learners in Potchefstroom? Lastly, what are the effects of a quality PE programme, presented by well-trained PE teachers, on the physical and motor fitness of Grade 7-learners in Potchefstroom?

Answers to these research questions will provide primary school PE teachers with a valid questionnaire with which to determine the physical activity levels of their learners and it will also provide valuable information regarding the effect of a quality PE programme on said levels as well as on the learners' fitness. This will supplement the content and implementation of the PE programme within the Life Orientation curriculum with the aim of improving learners' physical activity levels and fitness. Additionally, this could improve future research designs.

2. Objectives

The main objective of this study was to determine the effect of an enhanced quality PE programme, presented by well-trained PE teachers according to the prescriptions of the CAPS, on the physical activity levels as well as physical and motor fitness of Grade 7 learners in Potchefstroom.

The sub-objectives of this study were:

- 2.1 To validate a standardised physical activity questionnaire for Grade 7-learners in a South African context.
- 2.2 To determine the effect of an enhanced quality PE programme, presented by well-trained teachers, on the physical activity levels of Grade 7-learners in Potchefstroom.

2.3 To determine the effect of an enhanced quality PE programme, presented by well-trained teachers, on the physical and motor fitness of Grade 7-learners in Potchefstroom.

3. Hypotheses

With regard to the main objective of the study, the hypothesis is set that an enhanced quality PE programme, presented by well-trained PE teachers according to the prescriptions of the CAPS, will have a positive effect on the physical activity levels as well as physical and motor fitness of Grade 7-learners in Potchefstroom.

The following hypotheses were set for each of the sub-objectives of the study:

3.1 A standardised physical activity questionnaire can be validated for Grade 7-learners in a South African context.

3.2 An enhanced quality PE programme, presented by well-trained teachers, will have a significant positive effect on the physical activity levels of Grade 7-learners in Potchefstroom.

3.3 An enhanced quality PE programme, presented by well-trained teachers, will significantly improve the physical and motor fitness of Grade 7-learners in Potchefstroom.

4. Structure of the thesis

The thesis was submitted in article format as approved by the senate of the North-West University. The chapters are as follows:

Chapter 1: Introduction.

Chapter 2: Literature review: Physical Education and its role in promoting physical activity and fitness.

Chapter 3: *Article 1:* Validation of the CLASS-questionnaire for children in a South African context. This article has been submitted to the *African Journal for Physical, Health Education, Recreation and Dance*. This chapter was compiled in accordance with the guidelines of the journal.

Chapter 4: *Article 2:* The effects of an enhanced quality Physical Education programme on the physical activity levels of Grade 7-learners in Potchefstroom, South Africa.

This article has been submitted to *Physical Education and Sport Pedagogy*. This chapter was compiled in accordance with the guidelines of the journal.

Chapter 5: Article 3: Effects of a 12-week Physical Education intervention programme on physical and motor fitness of Grade 7-learners in Potchefstroom, South Africa. This article has been submitted to the *Mediterranean Journal of Social Sciences*. This chapter was compiled in accordance with the guidelines of the journal.

Chapter 6: Summary, conclusions, limitations and recommendations.

Appendix A: Ethical approval and title registration letter.

Appendix B: The validated CLASS questionnaire and informed consent form.

Appendix C: The enhanced quality PE intervention programme (12 lessons).

Appendix D: Rewards from rewards system: stickers, badges, certificates and homework booklets.

Appendix E: Apparatus improvisation.

Appendix F: Declaration of language editing.

Appendix G: Author guidelines for the African Journal for Physical, Health Education, Recreation and Dance.

Appendix H: Author guidelines for Physical Education and Sport Pedagogy.

Appendix I: Author guidelines for the Mediterranean Journal of Social Sciences.

Appendix J: Letter stating that article 1 (Chapter 3) has been published in the African Journal for Physical, Health Education, Recreation and Dance.

Appendix K: Letter stating that article 2 (Chapter 4) is in the revise process of Physical Education and Sport Pedagogy.

Appendix L: Letter stating that article 3 (Chapter 5) has been published in the Mediterranean Journal of Social Sciences in November.

Appendix M: Turnitin originality receipt.

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CHAPTER 2



CHAPTER 2: Literature overview: Physical Education and its role in promoting physical activity and fitness

1. Introduction

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6 Chapter summary

7. References

1. Introduction

Physical Education (PE) is a compulsory part of the school curricula in many countries around the world. The purpose of PE is to develop physically educated individuals who have the knowledge, skills and confidence to enjoy a lifetime of physical activity (WHO, 2007:2). A high quality PE programme also addresses the knowledge and social aspects of the child (NASPE, 2011:2). Research further shows that high quality PE can improve motor skills (Morano *et al.*, 2014:345), reduce sedentary behaviours (Dale & Corbin, 2000:240), and increase physical activity levels (Pate *et al.*, 2005:1582).

Physical activity includes all types of movement, including the smallest and the most complex, and is widely recognized as a mode to improve an individual's health status (Naidoo & Coopoo, 2012:76). Participation in physical activity and sport can in fact provide individuals of all ages with a wide range of physical, social and mental benefits (Naidoo & Coopoo, 2012:76). However, despite the benefits of physical activities, physical activity levels are reported to be decreasing among people of all ages. Physical inactivity among children and adolescents has consequently become a global health concern (Zahner *et al.*, 2006:2).

In agreement with available literature on the subject, the majority of studies with regard to South African children have reported that they have inadequate levels of physical activity (Toriola & Monyeke, 2012:802; Lennox & Pienaar, 2013:158). The low physical activity levels were one of the reasons why PE was re-introduced after it's a long absence from the national curriculum (Du Toit *et al.*, 2007:245). However, PE was re-introduced as only one focus area of the subject called Life Orientation, and allocated only one period of practical physical activities per week (DBE, 2011:7), which is inadequate to improve or maintain physical fitness (WHO, 2009; ACSM, 2009:3).

Additionally, several studies have reported that in the majority of schools in the country, PE is not implemented according to the national curriculum prescriptions (Du Toit *et al.*, 2007:241; Van Deventer, 2012:162). One of the primary reasons for this lack of curriculum implementation is the shortage of qualified PE teachers in the country (Sherman *et al.*, 2010:2). In fact, the majority of PE teachers in South African primary schools have been reported to demonstrate limited knowledge and low confidence in teaching PE (Harris *et al.*,

2012:368). The impact of inadequately trained teachers on the quality and effectiveness of PE programmes has also been researched as a global concern. According to Napper-Owen *et al.* (2008:28), a quality PE teacher forms the basis of a quality PE programme. A quality PE programme provides opportunities for physical activity, for learning challenging movement and sport skills and accurate assessment.

In view of the critical role of PE in the enhancement of physical activity and fitness levels, as well as reduced sedentary behaviours, it is important to implement effective, quality PE programmes, presented by well-trained PE teachers in order to address the problem of physical inactivity among school children. Furthermore, in order to evaluate whether the PE programme provides sufficient opportunities for health-enhancing physical activity levels, it is necessary to use a valid physical activity measuring instrument. This chapter presents a brief overview of literature, firstly, regarding physical activity and fitness, including the health values of regular physical activity and fitness. Secondly, research findings on children's physical activity and fitness, government's approaches to physical activity and fitness in children and adolescents, as well as the measurement of physical activity and fitness in children and adolescents are presented. Thirdly, the chapter focuses on PE, including definition of quality PE, PE teacher education, and PE development in South Africa.

2. Physical activity and fitness

2.1 The health values of physical activity and fitness

Physical activity is defined as any body movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure. Physical activity is categorised as low, moderate and vigorous intensities (WHO, 2007:4). According to the World Health Organization (WHO, 2007:4), brisk walking, dancing and bicycling on level terrain can be considered low intensity physical activities, while jogging, playing football and bicycling uphill are some examples of vigorous activities.

Fitness is defined as an attribute describing how well one performs physical activity (De Milander, 2011:12). The components of physical fitness are body composition, cardiovascular endurance, flexibility, strength and muscular endurance (Ortega *et al.*, 2008:2), while the components of motor fitness are speed, balance, coordination, agility and explosive power (Voelcker Rehage *et al.*, 2010:167). Physical fitness and physical activity are considered to be important supportive elements for the maintenance and enhancement of

health and well-being. A decrease in participation in physical activity can lead to low fitness levels and subsequently fewer opportunities to acquire appropriate levels of motor proficiency. Figure 1 illustrates the relationship between physical activity and physical fitness as adapted from Bouchard *et al.* (1990).

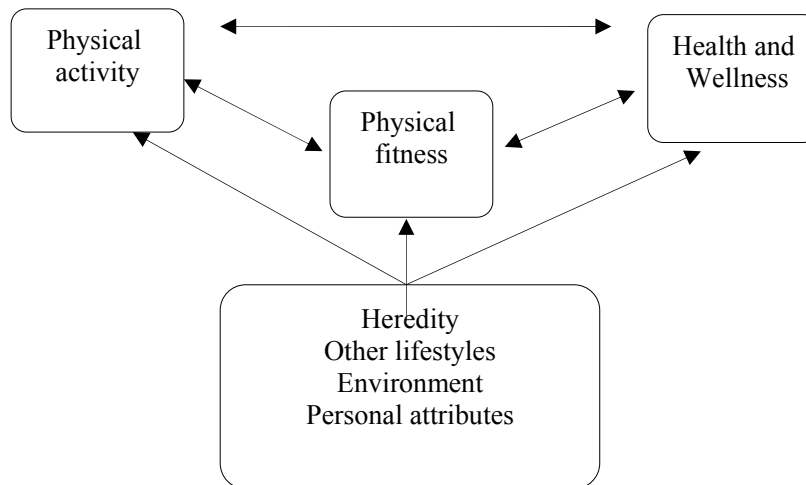


Figure 1: The relationship between physical activity and physical fitness (Adapted from Bouchard *et al.*, 1990)

This model illustrates that there is a mutual link between physical activity, physical fitness, and health and wellness, which are all affected by factors like heredity, lifestyle, the environment and personal attributes. Of these factors, lifestyle or behaviour can be influenced by the PE teacher, in a manner that can have an impact on the learner's physical activity levels, fitness, health and wellness (Corbin *et al.*, 2000:10).

As the present study focuses on the health- and fitness-based elements of PE, the health values of physical activity, physical fitness and motor fitness will be discussed separately in more detail in the following sections.

2.1.1 The health values of physical activity

Physical activity can provide a wide range of physical, social and mental benefits (Naidoo & Coopoo, 2012:75). Odunaiya *et al.* (2010:530) report that appropriate physical activity can help young people to develop healthy bones, muscles and joints, cardiovascular system and neuromuscular awareness. Similarly, Eyre *et al.* (2004:3244) indicate that regular physical activity is associated with a healthier, longer life and with a lower risk of heart disease,

obesity and other non-communicable diseases. Le Masurier and Corebin (2006:44) also emphasise the role of physical activity in disease prevention and healthy lifestyle promotion, while Hallal *et al.* (2006:1019) point out that regular physical activity in adolescence may contribute to the development of a healthy adult lifestyle and help reduce chronic disease incidence in later life.

There is, furthermore, a widespread belief that physical activity is good for young people in respect developing of self-esteem and promoting cognitive functioning (Biddle & Asare, 2011:886; Altintas *et al.*, 2014:395; Blakemore, 2003:23; Sibley & Etnier, 2003:243). Self-esteem is viewed as a key indicator of positive mental health and well-being, and the development of self-esteem is considered to be an underlying factor determining student motivation, persistence and academic success (Yawkley, 1980; Tremblay *et al.*, 2000:312; Donnelly *et al.*, 2009:336). Biddle and Asare (2011:886) conclude in their study that physical activity can lead to improvements in self-esteem at least in the short term, although measures of self-esteem can be affected by many factors beyond physical activity. In the study of Tremblay *et al.* (2000:312), physical activity had a positive relationship with self-esteem and was indirectly related to the enhancement of academic performance by improving physical health and self-esteem. These results are supported by those of Raustorp *et al.* (2006:262), who found a strong relationship between physical activity and self-esteem among children and adolescents in a three-year-long study in Sweden. According to Edmunds *et al.* (2013:8), any form of physical activity has the potential health benefit of promoting mental wellbeing and preventing mental health problems through improving self-worth and personal control by mastering an activity.

Research further shows a relationship between physical activity and cognitive functioning (Pontifex *et al.*, 2011:1332; Sibley & Etnier, 2003:243; Biddle & Asare, 2011:886). A study by Pontifex *et al.* (2011:1332) involving electroencephalographic activity known as event-related brain potentials (ERPs), indicate a positive association between aerobic fitness and neurocognitive processes that occur between stimulus engagement and response execution in children. Sibley and Etnier (2003:243) also found a significant positive relationship between physical activity and cognitive functioning in children. Biddle and Asare (2011:886) conducted a systematic review of physical activity and cognitive functioning which also provided evidence that routine physical activity can be associated with improved cognitive performance and academic achievement in young people. Investigating the reasons for this

association, Taras (2005:214) found that cognitive facilitation through physical activity contribute to the improvement of neurotransmitter actions in the central nervous system and increased blood flow to the brain.

To attain these positive effects of physical activity and to prevent the prevalence of non-communicable diseases, the WHO (2009) prescribes that children and youths should accumulate at least 60 minutes of moderate to vigorous intensity physical activity daily, and that most of the daily physical activity should be aerobic. Vigorous intensity activities should be incorporated at least 3 times per week (WHO, 2009).

Despite the well-known benefits of physical activity, several research studies report that the physical activity levels of young people are inadequate and decreasing around the world. Physical inactivity among children and adolescents is becoming a major public health concern in developed (Sibley & Etnier, 2003:244) and developing (Muntner *et al.*, 2005:1631) countries as an inactive lifestyle among children, with the burden of major health implications like obesity, type-2 diabetes, hypertension and low fitness levels, has been shown to be a growing problem (Zahner *et al.*, 2006:2). One study on the correlates of physical activity among children indicates that physical activity is influenced by multidimensional aspects such as physiological, psychological, sociocultural, and ecological factors (Dobbins *et al.*, 2009:6). Physiological factors include age, sex, and body composition (Dobbins *et al.*, 2009:6), while psychological factors include self-efficacy and self-esteem which is dependents on the perception of own physical competence and skills (Dishman *et al.*, 2004:634). Social support, especially parental support and peer support, is a consistently important determinant, which is positively associated with parental encouragement (Sallis *et al.*, 2000:969). Ecological factors include having access to convenient play spaces, sports equipment, and easy transportation to sport or fitness programmes (Sallis *et al.*, 2000:969).

As stated above, physical activity and physical fitness are interrelated and sufficient levels of physical activity lead to health-related (physical) fitness. The following discussion attends to research regarding the health values of physical and motor fitness.

2.1.2 The health values of physical and motor fitness

Physical fitness is an important predictor of physical and psychological health in people (Eather *et al.*, 2013:12). Maintaining and ensuring physical fitness has shown a strong correlation with decreased overweight or obesity, decreased cardiovascular disease risk factors, as well as skeletal and mental health (Parfitt *et al.*, 2009:1307).

Sacchetti *et al.* (2012:633) reported that a sedentary lifestyle not only affects body weight negatively but also reduces physical performance. In fact, overweight and obesity are negatively correlated with physical fitness and investigations into the relationship between obesity and physical fitness have increased in number in recent years (Sacchetti *et al.*, 2012:633). In this regard, cardiorespiratory fitness has shown a stronger negative association with adiposity than other physical fitness components (Moreno *et al.*, 2003:481; Poortvliet *et al.*, 2003:255). Poortvliet *et al.* (2003:255). In a study of health risk factors among children aged 9- to 16- years in Sweden, it was found that children with high cardiorespiratory fitness levels had significantly lower total adiposity, while Moreno *et al.* (2003:481) found similar results among Spanish adolescents with regard to moderate and high levels of cardiorespiratory fitness and abdominal adiposity.

Janz *et al.* (2002:S19), who examined the relationship between physical fitness and cardiovascular health outcomes among children for a five-year period, indicated that maintaining high levels of fitness during late childhood has beneficial effects on blood pressure and cholesterol. Similarly, Hasselstrøm *et al.* (2002:S27) carried out an eight-year-long Danish youth and sports study among 15- to 19-year-old children, and noted that the changes in physical fitness can lead to alterations in cardiovascular disease risk factors. These researchers concluded that physical fitness may be the best predictor of cardiovascular disease risk factor levels in young adulthood (Hasselstrøm *et al.*, 2002:S27; Twisk *et al.*, 2002:S12).

Physical fitness has furthermore been found to be related to bone health. Ginty *et al.* (2005:101) showed a positive association between total bone mineral status and muscular fitness, especially in males, in a study among adolescents in the UK. Similar results were reported by Kemper *et al.* (2000:847), in which muscular fitness in adolescence was related to adult bone mineral content. The results of this study also indicated a significant correlation

between cardiorespiratory fitness and lumbar spinal bone mineral density among adolescents (Kemper *et al.*, 2000:847).

Besides the potential physiological health benefits of enhanced physical fitness as highlighted in the literature, there is strong evidence suggesting that physical fitness improves mental health and academic achievement, both in young and in old people. Voelcker-Rehage *et al.* (2010:167) investigated the relationship between physical and motor fitness and brain metabolism among 68-year-old adults in Germany and found that health-related fitness has a strong association with cognitive function. In this regard, Ortega *et al.* (2008:6) discovered that cardiorespiratory fitness has beneficial effects on psychological outcomes, which can be explained by the fact that increased fitness may directly impact on neuro-chemicals in the brain, such as serotonin, which elevates mood (Ortega *et al.*, 2008:6). Additionally, a cross-sectional study carried out in the north-eastern United States among students in grades 7 to 9, demonstrated a significant relationship between academic achievement and physical fitness (Chomitz *et al.*, 2009:30). Similar investigations have been conducted in Korea among children aged 11 to 17 years (Kim *et al.*, 2003:186). In agreement with these findings, Christodoulos *et al.* (2006:199) examined changes in obesity and physical fitness, as well as academic performance among 178 elementary school children in Greece, and found a positive relationship between physical fitness and academic achievement and a lower prevalence of obesity

Motor fitness consists of the components such as coordination, balance, agility, speed and explosive power (Voelcker-Rehage *et al.*, 2010:167). Components of motor fitness have been shown to be directly related with physical activity levels (Haapala, 2013:55), health aspects and academic achievement (Lopes *et al.*, 2013:9). For instance, Haapala (2013:55) found that higher physical activity levels are associated with higher levels of motor fitness among children. Stodden *et al.* (2008:290) also presented a conceptual model of the relationship between physical activity, motor skill competence and health-related physical fitness and contended that motor skill competence is an underlying mechanism that promotes participation in physical activity. According to Wrotniak *et al.* (2006: e1758), the thoroughly explored positive relationship between motor proficiency and physical activity in children shows that children's motor proficiency may be an appropriate target for increasing physical activity in youth.

Available research findings suggest that coordination is probably the motor fitness component mostly related to academic achievement (Chomitz *et al.*, 2009:30; Lopes *et al.*, 2013:9). A study aimed at evaluating the relationship between gross motor coordination and academic achievement in Portuguese children aged 9- to 12-years, emphasised that children with high levels of gross motor coordination showed better academic achievement (Lopes *et al.*, 2013:9). These findings are similar to those of Budde *et al.* (2008:220) and Chomitz *et al.* (2009:30) who concluded that better gross motor coordination may contribute to improved overall health and cognition. The underlying mechanism of these results actually lies in the functional improvement of neural structures such as in the cerebellum and the frontal lobe of the brain, which are specifically responsible for coordination and for cognition (Lopes *et al.*, 2013:10). According to Stodden *et al.* (2008:292), increased motor fitness will also, through with increased persistence in physical activity, lead to the enhancement of competence and self-esteem.

2.2 Children's physical activity and fitness

2.2.1 Research findings on children's physical activity and fitness

There has been increasing evidence that physical activity and fitness among children and adolescents are associated with the benefits of physical, psychological, sociocultural and cognitive health (Dobbins *et al.*, 2009:6). In this regard, Le Masurier and Corebin (2006:44) emphasised the role of physical activity in disease prevention and healthy lifestyle promotion. Furthermore, it is widely believed that physical activity is good for young people in respect of development of self-esteem and cognitive functioning (Biddle & Asare, 2011:886; Altintas *et al.*, 2014:395). In the study by Tremblay *et al.* (2000:312), physical activity was shown to have a positive relationship with self-esteem and was indirectly related to the enhancement of academic performance by improving physical health and self-esteem. Additionally, Taras (2005:214) reported that cognitive facilitation through physical activity may contribute to the improvement of neurotransmitter actions in the central nervous system and increased blood flow to the brain. However, despite the health benefits of physical activity, several studies have shown a marked decline of physical activity from childhood to adolescence in many countries. Children, particularly girls, are less active due to influence of modern lifestyles in which value femininity and beauty for girls in contrast to boys who are expected to be physically fit and strong (Chiodera *et al.*, 2008: 179; Sibley & Etnier, 2003:244; Muntner *et al.*, 2005:1631). In this regard, Cliff and Janssen (2011:2), in a study using accelerometry to investigate young Australian children's habitual physical activity levels over the course of a

typical week, showed that preschoolers normally perform light physical activities. These researchers further claimed that contemporary lifestyles and environments in Australia may be preventing young children from engaging in adequate levels of physical activity (Cliff & Janssen, 2011:2), which is in agreement with the findings of Hume *et al.* (2012:61). Focusing on children's environments, Singh *et al.* (2009:73) stated that children who experience socioeconomic disadvantages, have lower rates of physical activity.

Physical fitness is not only an important predictor of physical and psychological health (Eather *et al.*, 2013:12), but also positively associates with improvements of mental health and academic achievement both in children and adults (Voelcker-Rehage *et al.*, 2010:167; Chomitz *et al.*, 2009:30). Castelli and Valley (2007:359) examined the effects of physical fitness and motor competency on levels of physical activity among 230 children aged 7 to 12 years in American Midwest, and found that 34% of the children only met four of the fitness requirements, on average the children presented medium or low physical activity levels, and 24% showed a lack of motor competence. These findings support those of Tomkinson *et al.* (2003:285) who analysed the results of 55 studies on the 20m Shuttle Run test among 6- to 19-year-old school children in 11 countries, including Australia, and reported a significant decline in fitness performance in all 11 countries. In this study, older age groups presented the greatest decline (Tomkinson *et al.*, 2003:285). Additionally, in relation to children of similar ages in other countries, Australian children showed poor to average aerobic fitness levels (Tomkinson *et al.*, 2003:285). In contrast, Orterga *et al.* (2011:20) reported relatively high sex- and age-specific physical fitness levels in European adolescents, particularly among boys, whereas girls showed more stable levels across ages.

Studies regarding children's physical activity levels in South Africa have yielded mixed results. Toriola and Monyeki (2012:802) found that 14-year-old boys in the North West Province were fitter and more physically active and had less body fat than girls. These authors also found that 30% of the adolescents showed low levels of physical activity (Toriola & Monyeki, 2012:803). Similar to these results, the study of Shirinde *et al.* (2012:236), investigating the physical activity levels of 15- to 16-year-old children attending farm schools, showed that most of the population only engage in light physical activity during weekdays and that boys tend to participate more in moderate physical activity than girls. In contrast, Themane *et al.* (2006:53) found high physical activity levels among 7- to 14-year-old rural children living in Ellisras, Limpopo Province of South Africa. A study by

Craig *et al.* (2013:81) using accelerometers to measure physical activity levels in rural areas of South Africa, revealed that although rural children and adolescents were more physically active, the intensity was too low to meet international recommendations.

Regarding the fitness levels of South African children, De Milander (2011:11) investigated the motor proficiency and physical fitness levels of 97 girls aged 12-13-years in Bloemfontein in the Free State province of South Africa. Results of this study indicated that the majority of the girls had insufficient fitness levels, although physically active girls presented better fitness test performances. These findings are consistent with those of Lennox *et al.* (2008:59) who determined the physical fitness and physical activity status of 15-year-old adolescents in the North West Province of South Africa, and found low fitness and physical activity levels among the adolescents.

In summary, literature shows that the physical activity levels and fitness of children and adolescents worldwide as well as in South Africa are insufficient and seem to be declining. Governments around the world have employed different strategies and policies to address these concerns. These approaches will be discussed in the following section, in which specific examples will be cited in developed and developing countries.

2.2.2 Government approaches to children's physical activity and fitness

In the USA, 78.4% of the states require primary school learners to take PE (Burgeson *et al.*, 2001:281). According to the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD), a high quality PE programme for grade K-12 should allocate at least 150 minutes of physical activity per week at the elementary level and 225 minutes at the secondary level (NASPE & AHA, 2010:4). Also it is recommended that at least 50% of PE class time should be spent in moderate to vigorous physical activity (NASPE, 2006:2). Although American schools have spent a large amount of time on improving the school environment and the PE curriculum, there is still a dramatic rise in the prevalence of obesity among children and adolescents in America (Pate *et al.*, 2006:1220). In accordance with this statement, Foulds *et al.* (2013:593) emphasise that children and adults can generally be classified as physically inactive. Furthermore, the activity levels of American adults have decreased since 2000 and a small proportion of American people are currently meeting daily physical activity recommendations (Foulds *et al.*, 2013:599).

In several states of Australia, the time allocation for PE is a minimum of two hours per week in primary and secondary schools (AGDH, 2013:27). The Australian government released physical activity recommendations for children and young people in 2005, recommending that 120 minutes be dedicated to planned physical activity per week and at least 60 minutes of moderate to vigorous intensity physical activity should be part of PE each day in the primary school (Skouteris *et al.*, 2012:174). Furthermore, in contrast to the curriculum for PE in the USA and the UK, PE is part of the learning area of “Health and Physical Education” in the Australian school curriculum, reflecting the holistic development approach of the Australian Education Council (Lynch, 2013:11). This holistic approach, which includes the aims of the development of knowledge, understanding and skills to “enhance their own and others’ health and well-being” (ACARA, 2012:2), is widely debated in Australian PE literature in light of the type of teachers needed to meet these aims (Lynch, 2013:10). According to advocates of the specialist PE teacher, quality PE in the Health and PE curriculum can only be delivered by a teacher who has in-depth training in PE, while generalist teachers are ideal candidates for providing developmentally appropriate, best practice instruction in PE in early childhood and primary school settings’ based on the guidelines of the Health and PE curriculum (Curry, 2012:17; Lynch, 2013:10).

In England, PE remains a compulsory subject in the National Curriculum for children aged 5- to 16-years (Hardman, 2004:5). The government has mandated that children are entitled to 2 hours of physical activity per week within the timetable allocation for PE, which used to be 3 hours in 2004 (Hardman, 2013:8). Furthermore, there are 49 county physical activity and sports partnerships (CSP’s) in England, which link primary schools with local sports coaches, clubs and sports governing bodies (Fairclough *et al.*, 2008:576). According to the government, the percentage of children in primary schools in England who spend at least two hours per week on high quality PE and school sport within and beyond the curriculum, has increased to 75% in 2006 (Smith & Leech, 2010:327). Primary schools also received funding from the government to improve the quality of PE and sport in 2013 (UK Department for Education, 2013). The purpose of the funding was to provide means and opportunities for schools to hire specialist PE teachers, for professional development in PE and to provide places for learners in after-school sport clubs and holiday clubs to improve physical activity levels of learners (UK Department for Education, 2013). The Secretary of State for Education of England meanwhile published a new national curriculum framework on 11 September 2013, of which the most of the requirements of the new national curriculum would

be implemented from September 2014 (UK Department for Education, 2013). In the new curriculum, learners in primary schools are encouraged to get involved in a range of competitive and co-operative physical activities, in which they will develop fundamental movement skills, become more competent, confident and physically active (UK Department for Education, 2013).

China represents a developing country currently experiencing rapid change in health and nutrition linked to political and social reforms (Tudor-Locke *et al.*, 2003:1093). The purpose of the reform in primary schools in China is to improve students' physical and mental development. In response to the threat of declining health of the Chinese youth, the "Sunshine Sports" programme was launched by the Ministry of Education in 2007 to make it obligatory for students to do one hour of physical activity daily. The purpose of the programme was to encourage the majority of young students to actively participate in physical activity, effectively improving their health and developing positive physical activity habits (Ministry of Education, State Sports General Administration, 2007). As recommended by the guidelines of the Sunshine Sports programme, students in different schools levels should accumulate at least 60 minutes per day of moderate to vigorous physical activity; they should be encouraged to go out of the classroom to breathe fresh air and increase their range of extra-curricular sporting activities; they should be helped to improve personal skills, self-efficacy and they should acquire at least two basic movement skills. Furthermore, more than 85% of students' levels of physical activity participation should meet the requirements. Currently, 56% of primary learners engage in a minimum of one hour of supervised daily physical activity on campus (Ministry of Education, State Sports General Administration, 2007). Additionally, most students are encouraged to participate in extracurricular activities, which can encourage more of them to participate in a variety of activities. These guidelines also include for students with disabilities who are expected to acquire a wide range of learning experiences and consequently cover a comprehensive aspect of the curriculum. According to Li and Hooke (2010:102), this programme can potentially have a positive impact on the health and well-being of the general population. In addition to analyzing developments in China, it is also pertinent to examine the trend in children's participation in physical activities in other African counties, such as Kenya.

Physical activity and sport in Kenya are as old as the archeological trivia of the trace of the origin of mankind (Wanderi, 2006:31). Many sports such as cricket, motor sports, volleyball,

swimming and netball, played both professionally and as recreational physical activities, are popular in Kenya (Nyaga, 2011). PE is a compulsory and examinable subject for primary school pupils in Kenya. Many primary schools are committed to providing equipment and facilities for PE and physical activity for students, although evidence shows that a shortage of facilities and equipment still exist in many schools (Kakui, 2005). The primary school education syllabus states that all teachers should be cognisant of the golden rule of sports, i.e. that of satisfaction from participation (Republic of Kenya, 2002). In the primary school PE curriculum, physical activity is allocated one period of 40 minutes per week. The majority of schools have a physical activity department and a PE teacher. However, many teachers at different school levels, offer inadequate support to students in sports and physical activity participation due to the negative attitude commonly associated with PE, although the Kenyan government made PE compulsory in 2002. Therefore, learners still need to be encouraged to improve their levels of participation in physical activity (Ongong'a *et al.*, 2010:611).

In summary, although the strategies and approaches of governments in both developed and developing countries commonly involve the introduction of policies prescribing PE and physical activity requirements, it is evident from the literature that such policies are either poorly implemented or completely neglected, which is in agreement with the findings of Hardman (2013:8) and Pühse and Gerber (2005:8).

In order to accurately measure the physical activity and fitness levels of learners, it is necessary to use accurate physical activity and fitness measuring instruments. The following section discusses the measurement of physical activity and physical and motor fitness among children.

3. Measuring physical activity and fitness in children

3.1 Methodological issues in the measurement of physical activity and fitness in children

Accurate measurement instruments for physical activity are a pre-requisite to assess levels of physical activity and to design effective intervention programmes. Currently, a range of methods to measure physical activity levels in children and adolescents are described in the literature. The most common methods involve objective methods of measurements such as accelerometers, pedometers and heart rate monitoring; and more subjective methods like self-report questionnaires (Loprinzi & Cardinal, 2011:15).

3.1.1 Objective methods of physical activity measurements

Accelerometers are devices worn on the body that measure the body's movements in terms of acceleration. It can be used to estimate the intensity and duration of physical activity over time (Rachele *et al.*, 2012:210). Several studies have used accelerometers as a method of physical activity measurement for children and adolescents (Fairclough *et al.*, 2011:243; Pfitzner *et al.*, 2013; Morris *et al.*, 2013:1284). Fairclough *et al.* (2011:243) used ActiGraph accelerometers to measure the volume and intensity of physical activity and to investigate the relationship between biological maturation and late primary school children's physical activity in the North-West of England. Pfitzner *et al.* (2013) combined two tri-axial accelerometers, one worn at the hip and another at the ankle, with a prospective activity diary. In all of the above-mentioned studies, accelerometry has been shown to be a valid and reliable measurement tool for use among children.

Pedometry is also a valid technique of physical activity measurement in children and adolescents, which estimates the number of steps taken over a given period (Loprinzi & Cardinal, 2011:20). In addition to evidence of validity, pedometers appear to demonstrate evidence of reliability in children (Loprinzi & Cardinal, 2011:19). Inter-instrument reliability has also been confirmed by examining differences in pedometer steps between pedometers attached at different locations (Loprinzi & Cardinal, 2011:19). Pedometry has been used in different studies among children, from seven days pedometry evaluating school-based physical activity intervention on health-related fitness among primary school children (Eather *et al.*, 2013:13), to determining the effects of mastery and performance climates on physical activity during PE using 20-step field-based pedometer checks (Wadsworth *et al.*, 2013:308). The above-mentioned evidence showed that pedometers are well-suited for measuring physical activity in children and adolescents, although most of them are limited in that they are unable to record the magnitude of the movement (Rachele *et al.*, 2012:211).

Heart rate monitoring is another approach for assessing the frequency, intensity and duration of physical activity in children and adolescents. The devices are relatively inexpensive compared to other physical activity measuring devices and can provide multiple-day storage capacity for minute by-minute heart rates (Loprinzi & Cardinal, 2011:16). Heart rate monitors have been used in several studies to validate physical activity questionnaires among children (Moy *et al.*, 2008:S45; Harro, 1997:259; Jago *et al.*, 2005:557) and have been reported to reliably measure physical activity levels. Overall, heart rate monitors provide an

objective indicator of the effect of physical activity, which make it a feasible method for assessing physical activity in children and adolescents. However, as a potentially resource-intensive method of measurement, heart rate monitoring should be carefully used for physical activity programme measurement.

3.1.2 Self-report methods of physical activity measurement

A variety of self-report methods have been used to assess physical activity in children and adolescents, including self-administered questionnaires and proxy-reports completed by parents or teachers. Numerous questionnaires have been developed for varying populations, with different types of activities reported and recall periods used. Three examples of widely used self-report instruments are the International Physical Activity Questionnaire (IPAQ) (Craig *et al.*, 2003:1382), the Previous Day Physical Activity Recall Questionnaire (PDPAR) (Mamabolo, *et al.*, 2007:1048) and the Children's Leisure Activities Study Survey (CLASS) questionnaire (Telford *et al.*, 2004:66).

The IPAQ was developed with four short and four long versions and can be completed over the telephone or self-administered (Craig *et al.*, 2003:1381). It is a self-report instrument that records the duration of habitual physical activity during the past 7 days. Both the short and long form data are used to estimate the total weekly physical activity by calculating the total reported minutes per week within each activity category and converting them to METs energy expenditure (Craig *et al.*, 2003:1382). De Cocker *et al.* (2011) adapted the IPAQ for adolescents. Questions about physical activity at work in the original questionnaire were replaced by those related to moderate and vigorous physical activities at school and an actigraph was used to validate the adapted version (De Cocker *et al.*, 2011). These results indicate that the IPAQ-A could well be a logical choice over the IPAQ (long or short version) for use among youths.

The PDPAR is a self-report instrument designed in consideration of children's cognitive abilities (Rachele *et al.*, 2012:209). The activities in the questionnaire are categorised as light, medium and hard intensity. Mamabolo *et al.* (2007:1048) used this questionnaire to investigate the habitual physical activity and body composition of black township adolescents residing in the North West province of South Africa. The PDPAR, which was validated by Trost *et al.* (1999), was administered to 300 grade 8 children to record the various activities they undertake daily. However, the researchers in this study concluded that children, when

using the recall questionnaire, often overestimate the amount of time, intensity as well as duration of physical activities. In support of these findings, Trost *et al.* (2000:426) reported that youth have physical activity patterns that are much more variable and intermittent, and they are less likely than adults to make accurate self-report assessments due to developmental differences, especially with regard to the recall of detailed activity information.

The CLASS was developed by Telford *et al.* (2004:66) to assess physical activity and sedentary behaviours among Australian children who were aged 5- to 12-years with acceptable reliability and validity. It consists of two parts, i.e. demographic items and a 30-item checklist of habitual physical activity participation. One study has validated the CLASS questionnaire for use among children and adolescents of nationalities other than Australia (Huang *et al.*, 2009:341). Huang *et al.* (2009:341) examined the reliability and validity of the modified CLASS (Chinese-version) questionnaire to assess physical activity among Hong Kong Chinese children aged 9- to 12-years (Huang *et al.*, 2009:341). The validity was determined by comparing data from the second administration with accelerometer estimates. The results indicated that the CLASS questionnaire provided reliable and valid estimates of overall physical activity patterns in Hong Kong Chinese children and that this version of the CLASS questionnaire provided an accurate estimate of individual children's physical activity levels.

As no questionnaire has ever been developed for pre-adolescent South African primary school pupils and since self-report questionnaires are culturally dependent and questionnaires used in one population may not be directly applicable to other populations (MRC, 2013), a standardised questionnaire for pre-adolescent South African learners would have to be developed or an existing questionnaire validated for the South African population in order to accurately assess the physical activity levels of the learners. The CLASS questionnaire was used for children age 10- to 12-years, and was therefore validated for the purpose of the present study.

3.2 Measurement of physical and motor fitness in children

With regard to the measurement of fitness in children and adolescents, several standardised field test batteries are used around the world. Some examples are the Fitnessgram, a software system for educational assessment and reporting which is widely used in the USA, the Eurofit test battery which is used in most European countries (Cvejić *et al.*, 2013:139), the Youth

Fitness Test which was part of the Presidential Fitness Awards programme (now the Presidential Youth Fitness Programme), that was developed by the American Association for Health, Physical Education and Recreation (AAHPER) (PCFSN, 2015); the YMCA Youth Fitness Test which is used in North America, Canada and some European countries (Golding, 2015), the CAHPER-FPT II test which is a Fitness Performance Test (II) developed by the Canadian Association for Health, Physical Education and Recreation (CAHPER) (Cvejić *et al.*, 2013:139); the New Zealand Fitness Test which was developed by the New Zealand Department of Education, and the Australian Fitness Education Award that was developed by the Australian Council for Health, Education and Recreation (ACHER) (Ruiz *et al.*, 2011:519). Most of these fitness test batteries use protocols for the assessment of cardiorespiratory fitness and musculoskeletal fitness, and some include specific test items for motor fitness (Ruiz *et al.*, 2011:519).

Castro-Piñero *et al.* (2010:940) and Ruiz *et al.* (2011:520) examined the validity and reliability of the existing field-based fitness tests used for children and adolescents, and found that the test items of the 20 meter shuttle run are valid and reliable to measure cardiorespiratory fitness; the handgrip test and the standing broad jump are valid and reliable to assess musculo-skeletal fitness, and skinfold measurements and BMI are good measures of body composition. The Eurofit battery of tests (Adam *et al.*, 1988) contains all these test items, as well as items to assess motor fitness. The Eurofit further entails simple tests which are designed for mass and regular use in PE classes (Cvejić *et al.*, 2013:139), easy to administer, practical in the school- and club-setting, reliable, and where appropriate criterion measures have been identified (e.g. aerobic fitness tests) (Tomkinson & Olds, 2007:106). For these reasons, the Eurofit test battery was chosen for in the present study to measure physical and motor fitness, and consequently will be discussed in detail.

After launching the testing of physical fitness and establishing normative data for European students in 1977 for the first time and several years of research after that, the Council of Eurofit was published the Handbook for the Eurofit tests of physical fitness manual in 1987 (Council of Europe, 1988). The Eurofit battery of tests was accepted by the majority of European countries, as well as some counties outside Europe (Cvejić *et al.*, 2013:140). According to Cvejić *et al.* (2013:140), the Eurofit test battery does not extract all the latent dimensions of motor space, but is based on an estimate of health-related components. The Eurofit in fact comprises numerous health- and performance-related fitness tests, including

field tests measuring balance, cardio-respiratory (aerobic) endurance, muscular endurance (abdominal and upper body), flexibility, power, speed, speed agility and strength; anthropometric tests measuring height, mass and skinfold thicknesses at various sites, and age and sex identification data (Tomkinson & Olds, 2007:106). The Eurofit has been used in various countries and in large-scale fitness surveillance studies (e.g. Gulías-González *et al.*, 2014:625; Jürimäe *et al.*, 2007:129; Lovecchio *et al.*, 2012:13; Tomkinson & Olds, 2007:104).

The above literature review emphasises the importance and values of physical activity and physical fitness with regard to children's health. PE plays an integral role in providing children with the skills and opportunities to be physically active and to improve or maintain physical fitness. In the next section, a discussion of PE with regard to the requirements for quality PE, PE teacher education, and developments concerning PE in South Africa is undertaken.

4. Physical Education

4.1 Defining quality Physical Education

PE is a compulsory part of the school curricula in most European countries and American states (Burgeson *et al.*, 2001:279; NASPE, 2006). Although it is widely acknowledged that quality PE goes beyond providing activity opportunities and instead promises to provide children with opportunities to learn through meaningful and appropriate instruction (Le Masurier & Corbin, 2006:46), the term “quality PE” continues to be complex and this complexity is reflected in various different approaches to PE which have been contested in the literature over the last fifty years. In the late twentieth century, Jewett (1980:165) accentuated the need for the development of collaborative models for PE curriculum and instruction, and for group efforts in theory building in PE curriculum, whereas Siedentop (1998:20) called for a shift from the traditional skills-based PE curriculum to a more encompassing Sport Education model for PE. According to Haerens *et al.* (2011:323), a curriculum model is a general pattern for creating or shaping programme designs that is based on a conceptual framework and incorporates the identification of learning goals, the selection and structuring of programme content, and the development of instruction procedures and learning environments. In addition to the Sport Education model of Siedentop (1998:20), various curriculum models in PE have been proposed since, among others the Fitness model (Jewett *et al.*, 1995), which promotes the learning of fitness concepts through fitness

activities like fitness activities and games, weight training, aerobics and fitness testing, and the Skill Theme model (Graham *et al.*, 2001) that promotes the learning of fundamental movement skills and concepts through skill themes.

Different instructional models, which are defined by Metzler (2005:16) as coherent and comprehensive plans for teaching PE, further emerged in support of the shift from traditional multi-activity PE to encompassing PE curriculum. According to Metzler (2005:24), the 8 instructional models he proposed, address the need for multiple models of practice in PE due to the complex challenges in the broad-ranging and diverse content of PE. With regard to different curriculum and instructional models in PE, Kirk's (2013:979) argument that although each model reflects different ways of thinking and approaches, a unifying element is the idea that PE potentially contributes to the achievement of various educationally beneficial outcomes and that new and multiple models of PE are needed for this purpose.

Curriculum and instructional models are further based on the teaching of PE within certain theoretical frameworks, such as the experiential learning theory of Dewey (1938), which postulates that active engagement in an authentic learning environment, together with the sharing of and reflection on experiences, leads to faster and better learning; neoliberalism which supports the notion that humans are rational, self-managing and autonomous, and therefore they are deemed to be responsible for their own health through the actions they take (McEvilly *et al.*, 2014:279); and self-determination theory (Deci & Ryan, 2000) which suggests that a person must have certain basic psychological needs satisfied in order to be motivated to persist in an activity.

The above literature review emphasises the complexity of PE with regard to philosophical underpinning and pedagogical approaches. From the discussion on different approaches and models, it is clear that the health-based approach in the present study which includes physical fitness and physical activity encompasses only one of the various dimensions of PE. In this regard, Penney and Jess (2004:270) cautioned against the marginalization of PE with regard to one dimension there-of, like physical activity, and advocate the conceptualization of PE as a lifelong learning process.

Regardless of the theoretical framework or model used, relevant literature (Gallahue & Cleland Donnelly, 2003:11; Napper-Owen *et al.*, 2008:28; NASPE, 2013:1; Pangrazi &

Beighle, 2010:20) identifies the following pedagogical prescriptions and prerequisites for high quality PE: differentiating between learners with different learning styles, physical abilities and developmental levels and adapting PE activities accordingly; using variations of teaching styles suitable for PE; incorporating in-depth knowledge of exercise and sport physiology into the PE programme, using effective organisational and disciplining skills for the presentation of practical activities; implementing accurate and effective assessment of movement skills and abilities; and selecting appropriate, challenging and progressive content.

According to the standards for quality PE set by NASPE (2004), which has been setting the standard for the profession for more than 35 years in the US, a high quality PE programme also addresses the knowledge and social aspects of the child and should include students with limited English proficiency and those with special needs. In order to ensure a high quality PE programme, four things should be in place, namely curriculum, policies and environment, instruction practices, and student assessment (NASPE, 2004; CDC, 2013). However, based on a recent NASPE survey, three-quarters of 50 American States have PE mandates from elementary through high schools. A total of 28 States allow PE exemptions or waivers, only 22 States have specified curriculum time allocations, 6 States require PE in every grade, and 3 States have adopted the national guidelines of 150 minutes per week in elementary schools and 225 minutes in high schools (NASPE, 2013).

In agreement with the criteria for quality PE set by NASPE, the recommendations by the United Nations Educational, Scientific and Cultural Organization (UNESCO), state that quality PE should enable children and young people to become physically literate, and provision should be made for quality PE from the early years throughout the entire school journey to secondary school education (UNESCO, 2015:24). In this respect, UNESCO (2015) released benchmarks of quality PE to develop minimum standards for quality PE, in which children are entitled to quality PE during their entire life-time through physical activity participation and performance. Six parameters were underscored in the benchmarks, namely policy, human resources, fiscal resources, capacity development, advocacy as well as monitoring and evaluation. These benchmarks include the recommendation that the weekly accumulated time allocation of PE curriculum should be at least 120 minutes for primary schools and 180 minutes for secondary schools; qualified teaching personnel should be available for all levels of compulsory schooling, including school directors and principals in accordance with the relevant criteria; and the provision of adequate resources such as

facilities, equipment and learning or teaching materials which should be safe, accessible, and well maintained (UNESCO, 2015:75). Furthermore, PE teachers should be raising awareness of the intrinsic and extrinsic PE health values, and periodic reviews should be done involving the evaluation of curriculum and regular reports to the national coordinating body (UNESCO, 2015:75).

4.2 The role of PE in promoting physical activity and physical fitness

With regard to the role of quality PE in physical fitness, Van Dusen *et al.* (2011:737) found that children who spent more time participating in PE activities showed higher levels of physical fitness and also better academic performance. Evidence from an American early childhood longitudinal study in 2004 also showed that expanding PE programmes in schools can reduce learners' BMI and diabetes risk factors (Datar & Sturm, 2004:1501). According to Le Masurier and Corbin (2006:46), PE is "indeed a perfect place to provide enjoyable and developmentally appropriate physical activity and physical fitness to children". Le Masurier and Corbin (2006:48) further demonstrated that PE programmes enable students to participate in a variety of physical activities by providing them with the opportunity to learn motor skills. Similarly, Bailey (2006:398) indicates that PE and sport develop a broad range of basic movement skills that are likely to encourage learners to be physically active. In the study by Jacobs and Wright (2014:44), personal and social responsibility lessons were integrated with youth fitness games, and it was found that fitness activities used as the main physical activity component of the PE programme also had the potential to make PE a place not only for physical skill acquisition, fostering children's high levels of enjoyment and participation, but also for fun life-skill building. Wright and Stork (2013:41) had similar results in a study where fitness activities were incorporated into the daily activities of 3-5 year-old learners.

However, Haerens *et al.* (2011:322) argue that PE can only promote an active lifestyle if the activities provided are considered enjoyable, personally relevant and interesting, as to impact on adolescents' intrinsic motivation to engage in physical activities outside school. This view is supported by the self-determination theory (SDT) of Deci and Ryan (2000) which proposes that when students find activities inherently interesting, meaningful, and enjoyable, or when activities hold personal relevance, students will be more likely to engage in such activities outside PE (Haerens *et al.*, 2010:117). The PE teacher plays an important role in providing learners with opportunities to experience positive intrinsic motivation, and should be

competent and trained to do so. Accordingly, PE teacher education will be discussed in more detail.

4.3 Teacher education in Physical Education

The PE teacher forms an integral part of a high quality PE programme as the teacher can help learners to develop their knowledge and to understand theoretical movement and exercise concepts, improve their physical and motor fitness, increase physical activity levels and enhance their social skills (Van Volkinburg *et al.*, 2008:34). A highly qualified PE teacher demonstrates skills and knowledge to use efficient teaching practices and to deliver a standards-based curriculum that helps learners maintain healthy lifestyles (NASPE, 2004). As PE teacher education, like the quality of PE programme implementation, often differs according to the socio-economic status of a country (Gulati, 2008), it is worthwhile to provide a background of PE teacher education in developed and developing countries, using specific examples of each, before undertaking a discussion of teacher education developments in PE.

4.3.1 PE teacher training in developed and developing countries

A common scenario across the world is the practice of having qualified specialist PE teachers at secondary level and generalist teachers at elementary levels (Hardman, 2004:4). In most European countries, PE teaching degrees and diploma qualifications are usually acquired at universities, pedagogical institutes and national sports academies or specialist PE institutes (Hardman, 2008:11). PE teachers in approximately half of the European countries have to be qualified to teach PE and 63% of these countries provide opportunities for PE teachers for continuing professional development (CPD) (Hardman, 2008:12).

In light of new curriculum standards for PE in England due to the decline of physical activity levels and drop-out rates from sports among children (Hardman, 2004:6), a number of policy documents and strategies have since been published by the government. An amount of nearly £18 million was allocated for PE teachers and others to support the growing need for highly qualified PE and PE teaching in England during the 10 years up to 2004 (Hardman, 2004:6). During this period, the England government initiated the National PE Continued Professional Development (CPD) programme for teachers and others, which sustained PE teachers by giving them the opportunity to attend a local workshop, complete a self-review, and to select opportunities from a menu of modules (Hardman, 2004:6). The programme was one of a

number of interlinked initiatives designed to enable teachers in different sectors of the school system to have the knowledge and confidence to develop quality PE and school sports in their teaching fields. Each school in England was able to access the training modules free of charge. Schools were further required, as part of a national research project on PE teacher training, to monitor the progress of PE teachers and to participate in a yearly review process (Hardman, 2004:6).

In America, a significant percentage of States, districts and schools have established requirements for teacher qualifications (Lee *et al.*, 2007:443). The majority of schools have adopted a policy to hire PE teachers who have undergraduate or graduate training qualification in PE or related fields, as 73.2% of states require PE teachers to offer at least a certification, licensure and endorsement to teach PE (Lee *et al.*, 2007:443). Among these schools, 52.9% of states require these qualifications to teach education for grade K-12, in elementary schools 52.9%, in middle schools 56.9%, and approximately 60% require them for high school (Lee *et al.*, 2007:443). Local governments and schools further provide opportunities to develop qualified PE teachers with workshops, conferences, continuing education, graduate courses and other related PE opportunities (Lee *et al.*, 2007:444).

According to the Australian Council for Private Education and Training (ACPE, 2013), PE teaching in Australia can be an extremely rewarding and enjoyable career. Most PE teachers in primary and secondary schools in Australia are qualified to teach at least one other subject as well (ACPE, 2013). PE teaching courses offer a wide range of practical experiences that provide students with skills in PE, individual development and healthy lifestyle (ACPE, 2013). Aiming to ensure high quality PE teacher education as a first and critical step to deliver high quality teaching in schools, standards and procedures for the accreditation of initial teacher education programmes were published by the Ministerial Council for Education in 2011 (AITSL, 2011:1). These Standards and Procedures reflect high expectations of initial teacher education, and the Australian government emphasises the delivery of sport and PE as part of a teacher training programme, particularly in primary schools (AITSL, 2011:13). Great efforts have also been put into the training of PE teachers placed at secondary schools (AITSL, 2011:14). However, the number of qualified PE teachers in primary and secondary schools is declining. This trend is linked to a decline in emphasis placed on PE and sport in teacher education courses (AGDH, 2013:28). Current teacher education has been reviewed as a priority to consider the mandatory inclusion of

basic PE training (AGDH, 2013:29). The Australian government underlines skills-based training for teachers as something that should receive greater emphasis and offers coaching and officiating courses as components towards high school certificate degrees (AGDH, 2013:29).

It can be concluded that most developed countries place high emphasis on PE teacher education, and for both the primary school and secondary school, PE teachers are expected to be certified or licensed before starting to teach.

Turning to developing countries, in China, one of the biggest developing countries in the world, PE teacher education has had a long-honoured standing history (Guo, 2005:69). Qualified PE teachers play a major role in providing ample opportunities for physical activity participation in PE programmes. However, the qualifications required for physical educators are varied. According to China's education law, teachers at the elementary level, including PE teachers, should hold a diploma from a two- or three-year teacher training school (Liang *et al.*, 2005:17). Teachers at the middle school level must have a diploma awarded by a two or three-year bachelor's degree or graduate degree and teachers at the high school level have to hold a bachelor's degree or post-graduate degree (Liang *et al.*, 2005:17). The Chinese government encourages people who have college degrees to teach in elementary and secondary schools (Liang *et al.*, 2005:17). The Chinese Ministry of Education published a 10th five-year Plan in 2002, entitled "Suggestions on Teacher Education Reform and Development", to improve PE teacher qualifications (Zhou & Reed, 2005:210). Two approaches in this project are recommended. The first one was to increase the number of highly qualified teacher educators. The higher education teacher institutions as suggested by the Ministry of Education should have a certain proportion of faculty holding PhD degrees. Furthermore, faculty members in normal schools should at least hold Bachelor degrees or be studying towards Master degrees (Zhou & Reed, 2005: 210). Another method for improving PE teacher education was to establish evaluation systems and the reform of teacher education programmes, curricula, and methodology (Zhou & Reed, 2005: 210). With the rapid development of education in China, the project has been successful towards promoting qualified teacher training that will effectively meet the needs of learners.

In Africa, professional teacher training programmes differ in certain respects, but in general there is a shortage of qualified PE teachers in most developing African countries (Van der

Merwe, 2011:98). After reviewing the status of PE and PE teacher education in several African countries, for example, South Africa, Van der Merwe (2011:118) concludes that, although governmental policies advocate the value and implementation of PE, and in most cases Higher Education courses are available for the training of PE teachers, educators who teach PE in the primary schools are usually generalists and often unqualified to teach PE. Furthermore, due to the low status of PE in most developing countries in Africa, beginner teachers tend to choose more “academic” subjects rather than PE to qualify in (Van der Merwe, 2011:118).

In India, there are three types of teacher education institutions, namely elementary, secondary and tertiary levels of education (Rao, 2009:51). Presently, a large number of trained teachers, including PE teachers, are at different levels of the schools system after undergoing education reform (Rao, 2009:51). Several schools and colleges in India offer teaching courses for different levels, and teacher education is provided by several private and open universities, and affiliated colleges. If a teacher intends to teach at a higher level, the teacher must pass a higher examination (NCTE, 2014). Currently, many schools in India still lack qualified PE teachers and facilities (Hardman, 2004:3). Particularly, there is no special provision for PE teacher training regarding students with disabilities (Hardman, 2004:3).

In South Africa, PE was re-introduced into the school curriculum in 1994 as part of the learning area called Life Orientation (DoE, 2003). It is only one of five focus areas of this learning area in the Senior Phase (Grades 7-9) and six focus areas in the Further Education and Training (FET) Phase (Grades 10-12) (DBE, 2011). Since the introduction of the new CAPS in 2010 (DBE, 2011), South African teachers have been undergoing training regarding the content and principles of the new Life Orientation curriculum by attending 5-day workshops presented by provincial departments of education countrywide from 2010 to 2012 (Crouse, 2013). Training with regard to the curriculum and presentation of PE constituted one afternoon of the 5-day workshop (Crouse, 2013). In contrast, at some universities in South Africa, teachers are trained in a four year Bachelor of Education degree specialising in PE (NWU, 2013:64). Most South African teachers are therefore inadequately trained as specialists to teach PE as part of Life Orientation (Du Toit *et al.*, 2007:241).

4.3.2 Developments in PE teacher training

Recent developments in PE teacher education seem to focus on three issues, namely the continued professional development (CPD) of PE teachers, the use of school-university collaborations in PE teacher education, and generalist vs specialist PE teachers.

Firstly, the need for CPD for PE teachers has been highlighted in the literature. UNESCO (2015:50) emphasises that the provision of quality PE depends on well-qualified educators; therefore authorities should take responsibility with regard to improvements in both the initial and continuing PE teacher education. Moreover, both specialist and generalist teachers should be trained to deliver quality PE according to national or regional qualification standards with reference to ongoing CPD. UNESCO further emphasises that continued PE teacher education should encompass a wider community multi-sector provision (UNESCO, 2015:50). In 2007 O’Sullivan advocated the need for “Communities of Practice”, where a professional learning community means PE teachers coming together over time to interrogate their own teaching and work practices as well as the appropriateness of expectations for PE and PE teachers. O’Sullivan (2007:10) thus emphasised the importance of the shift from traditional CPD for PE teachers which often entailed one or two days’ governmental training with regard to the latest curriculum revisions, to providing opportunities for teachers to learn about the values and relevance of various objectives and how the curriculum might align with local contexts. Armour and Yelling (2007:177) reported positive results from a two-year long investigation into CPD for PE teachers conducted in England, where professional learning communities and networks played a lead role in providing teachers with a variety of ways to gain knowledge. In a subsequent study, however, after reviewing three PE CPD projects in Greece, Ireland and England, and showing numerous barriers that teachers and pre-service teachers encountered in accessing effective professional development, Armour *et al.* (2012:62) expressed concerns with regard to the learning progression of PE teachers in CPD. In this regard, they suggested that CPD programmes should be presented in such a way that PE teachers will continue to grow in knowledge and skills in specific areas of interest or context, as well as pedagogical practices over time (Armour *et al.*, 2012:74). These principles are supported by the findings of Faucette *et al.* (2002:303) in a study on the experiences of PE teachers in a 2-year professional development project as part of the SPARK (Sports, Play, and Active Recreation for Kids) programme. The SPARK is an extensive federally funded, health-related PE programme which was implemented during 1989-2000 in the USA and designed to incorporate policy, curriculum and specialist teaching

to enhance physical activity levels and self-determination of learners. The research by MacKenzie *et al.* (2009:114) with regard to the SPARK programmes showed that these programmes had three features ensuring their successes, namely active curriculum, staff development, and follow-up support. MacKenzie *et al.* (2009:114) further pointed out that the programmes have the required substantial collaboration among university, school, and private sector personnel.

A second aspect of PE teacher education which seems to enjoy increased attention in recent literature, is the use of university-school collaborations. University-school collaboration is seen as a partnership between a university and a school where pre-service PE teachers can achieve the objectives of academic curricula through active participation in authentic PE teaching settings at a school, and collaborating with in-service PE teachers who also benefit (Castelli *et al.*, 2012:15). In their review of literature on university-school partnerships in PE teacher education programmes, Cervantes and Meaney (2013:349) found that the benefits of this type of collaboration in PE teacher education culminated in the gained hands-on experience of pre-service PE teachers in designing, instructing, and assessing physical activity lessons, but also the broadening of their awareness of and attitude towards students from ethnically diverse communities and with different abilities. Furthermore, as pre-service PE students' opportunities to provide instruction increased their fears with regard to teaching decreased and their confidence levels improved (Cervantes & Meaney, 2013:349). Other benefits of university-school collaborations have been shown to include enhanced self-competence, gains in content knowledge, improved ability to use different instructional strategies, and enhanced cultural awareness for pre-service teachers (Douglas, 2011:94; Wilkinson *et al.*, 2013; Whitley & Walsh, 2014:39). Positive outcomes for in-service PE teachers were shown to include more efficient use of allocated time for teaching PE, the infusion of technology, the introduction of new ideas and current best practices, and heightened motivation of students and teachers (Robinson & Meyer, 2011:226; Hicks *et al.*, 2012:39). With regard to primary school teacher training, Petray and Hill (2009:25) pointed out that in many countries, primary school teachers are generalist teachers and not PE specialists and that service-learning can enhance the teachers' content and pedagogical knowledge and self-competence.

Thirdly, the debate with regard to generalist and specialist PE teachers continues in PE literature. According to Morgan and Hansen (2008:506), a lack of confidence and expertise

are the main drawbacks for generalist teachers who teach PE in primary schools. Tzvetkov (2014:203) adds to this by reporting that generalist teachers in Bulgaria tend to present PE classes of which the methodological structure of the subject is random and not based on the modern theories and achievements in the field. According to McMaster (2013:5), however, advocates of the generalist teacher propose that primary and early childhood teachers have the developmentally appropriate pedagogical knowledge and understanding of the child's holistic learning, which contributes to life-long health. In contrast, the results of several studies promote the advantages of the specialist PE teacher above the generalist (Brooks *et al.*, 2013:235; Curry, 2012: 17; De Groot *et al.*, 2014:S53; Ross *et al.*, 2014:327), most prominently with regard to developing children's motor skills and advancing physical activity in the primary school, thus supporting the earlier findings of Patterson and Faucette (1990:324) as well as Faucette and Patterson (1990:106).

5. Developments in South Africa

5.1 Physical Education developments in South Africa

In South Africa, PE was part of only one of the sectors that practiced unequal distribution of resources during the apartheid era. Going back into the history of PE in South Africa to the early 20th century, white schools were relatively stable and problem-free, but black schools were adversely affected by the apartheid government's separate development policies (Amusa *et al.*, 2013:188). Facilities in white schools were generally well developed, whereas lack of equipment, facilities, qualified PE teachers and poorly resourced education departments existed in black schools (Amusa & Toriola, 2005:23). PE thus became either a neglected or forgotten entity at the affected schools, and was even left out of the national school curriculum between 1988 and 1994 (Spamer, 2001:1). With the first South African democratic elections in 1994, changes were made to the whole education system of the country, and PE was not left unaffected (Amusa *et al.*, 2013:189). According to Amusa and Toriola (2005:23), the introduction of curriculum change in South African education in order to deliver a fair, just and unitary education system was inevitable. During this period, the aims of PE included that learners must be fully developed physically, socially, spiritually and mentally. As an integral part of the whole education process, post-independence PE in South Africa aspired to develop a sense of cooperation, ability to work together successfully as a group, physical coordination and confidence (Amusa *et al.*, 2013:190).

In 1995, the new policy frameworks for South African education attempted to encourage students to inform, change, enrich and advance their minds, bodies and souls (Amusa *et al.*, 2013:190). The policy document made provision for Life Orientation as one of the learning areas in South Africa's Outcomes-Based Education (OBE) system and replaced PE as a subject on the timetable (Hendricks, 2004:22). As prescribed by the national Department of Education, Life Orientation includes five focus areas, namely Personal Development, Environmental Education, Human Rights, Physical Education and the World of Work (DoE, 2002:7).

Recently, the Curriculum and Assessment Policy Statement (CAPS) document was developed for each subject to replace the old Subject Statements. According to the CAPS, the purpose of the subject Life Orientation is to address "skills, knowledge, and values about the self, the environment, responsible citizenship, a healthy and productive life, social engagement, recreation and physical activity, and careers and career choices" (DBE, 2011:8). PE is one of the topics of Life Orientation to address physical activity and recreation and is administered across all four school terms, where learners are expected to participate in PE once a week (DBE, 2011:26). In accordance with the content of PE in most countries, PE in the CAPS mainly addresses 3 themes, namely Physical Fitness, Sport Skills and Recreational Movement Activities (including gymnastics and dance) (DBE, 2011:11), and assessment is based on participation in physical activities during PE classes and performance of movement skills or physical fitness tests (DBE, 2011:31). However, the allotted time is still inadequate to improve the physical activity levels and fitness of children and adolescents when compared to international guidelines (ACSM, 2009:3; WHO, 2009). Furthermore, due to budgetary control with inadequate financial resources, the lack of training of PE teachers, facilities and equipment in most schools are still the most prominent factors influencing the implementation and quality of PE programmes in South Africa (Sherman *et al.*, 2010:2). With regard to PE teacher training, although some South African universities offer opportunities for CPD PE training and make use of university-school collaborations in their PE teacher education programmes (Van der Merwe, 2011:281), unqualified PE teachers in both the primary and secondary school continue to be a concern. In light of these concerns, several intervention programmes have been implemented with the purpose of increasing children's physical activity and fitness levels, and these will be discussed accordingly.

5.2 Children's physical activity and fitness interventions in South Africa

A review of the literature shows that several researchers have investigated the effect of physical activity intervention programmes on South African children's physical activity levels and fitness. Kemp and Pienaar (2009:527) implemented a 10-week aerobic-based exercise programme performed twice a week for 30 minutes on physical fitness of 10-15-year olds girls in the North West Province. It was concluded that this intervention programme successfully increased the girls' physical activity and physical fitness levels. Monyeki *et al.* (2012:245) established that a ten month physical activity intervention programme had beneficial health outcomes for 9-to 13-year-old boys in the Gauteng Province. Naidoo and Coopoo (2012:82) found that an 18-month physical activity intervention programme incorporated into classroom lessons, increased flexibility, strength and physical activity levels of primary school learners from 18 schools in KwaZulu-Natal. Furthermore, Pienaar *et al.* (2013:415) designed a physical activity, diet and behaviour modification intervention programme to improve body composition and physical fitness of children aged 11 years. It was concluded that the intervention programme had a significant beneficial impact on the learners' body composition profiles and health-related physical fitness levels. In another study in the North West Province (Lennox & Pienaar, 2013:158), adolescents in disadvantaged communities showed significant improvements in physical activity levels and aerobic fitness after an extra-mural aerobic intervention programme. Likewise, Tian *et al.* (2014:1073) evaluated the effects of an enhanced quality PE intervention programme presented for 12 weeks with once a week on physical activity and fitness levels of Grade 7 learners in Potchefstroom. This programme encompasses 5 quality-enhancing elements namely well-trained teachers, homework activities, a reward system, improvised apparatus and the monitoring of activity intensity. The results of this study showed that the comprehensive intervention programme was effective in improving the children's physical activity levels, even when presented only once a week (Tian *et al.*, 2014:1073).

6 Chapter summary

It is evident from this literature overview that PE plays an important role promoting physical activity and fitness, which is significantly and beneficially associated with physical, mental, social and emotional development, as well as the creation of an environment that supports inclusion among children and adolescents. Furthermore, high quality PE can increase physical activity levels, improve motor skills and reduce sedentary behaviours. Therefore, well qualified PE teachers play an important role in the delivery of PE content knowledge,

improvement of motor skills and maintenance of healthy lifestyles. In studying the effects of physical activity programmes, accurate measurement of physical activity is a pre-requisite to assess levels of physical activity and design effective interventions.

It is also clear from the literature review that children and adolescents in South Africa are inadequately physically active and fit, and that one period of PE per week prescribed in the school curriculum might be insufficient to improve these levels attributes in the youth. Therefore, it is necessary to investigate the effect of an enhanced quality PE intervention programme, developed within the prescriptions of the CAPS but presented by well-trained PE teachers, on the physical activity and fitness levels of children in a South African community so that effective strategies could be developed for promoting healthy lifestyles among children and adolescents in the country.

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CHAPTER 3



CHAPTER 3: Validation of the Children's Leisure Activities Study Survey Questionnaire for 12-year old South African children

Validation of the Children's Leisure Activities Study Survey Questionnaire for 12-year old South African children

Haili Tian ¹, Dorita du Toit ^{2*} and Abel L. Toriola ³

¹ *Physical activity, Sport and Recreation Focus Area, Faculty of Health Science, North-West University, Potchefstroom Campus, Potchefstroom2520, South Africa. Email: tianhaili123@163.com*

² *Physical activity, Sport and Recreation Focus Area, Faculty of Education Sciences, North-West University, Potchefstroom Campus, Potchefstroom2520, South Africa. Email: Dorita.DuToit@nwu.ac.za*

³ *Department of Sport, Rehabilitation and Dental Sciences, Tshwane University of Technology, Pretoria 0001, South Africa. Email: ToriolaAL@tut.ac.za*

***Corresponding author:** Dr. Dorita du Toit, *Physical activity, Sport and Recreation Focus Area, Faculty of Education Sciences, North-West University, Potchefstroom Campus, Potchefstroom2520, South Africa.*

Tel: +27- 182991716. Email: Dorita.DuToit@nwu.ac.za

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Abstract

This study evaluated the reliability and construct validity of a modified Children's Leisure Activities Study Survey (CLASS) questionnaire for 12-year old South African children. Test-retest reliability of the questionnaire was examined in 108 (n=45 boys; n=63 girls) schoolchildren aged 12 years at a 3 weeks interval. Construct validity was assessed by comparing data on the reported minutes spent in physical activities (PAs) obtained from the CLASS questionnaire responses with ten physical fitness (PF) parameters, assessed using the Eurofit test battery. Cronbach alpha's test of internal consistency, intra-class correlation coefficients (ICC) and the paired t-test were used to determine reliability. Validity was evaluated with the Spearman correlation coefficients. Substantial internal consistency and significant Intra-class correlations estimates for all intensities of PA and sedentary time (ST) were found (Cronbach's alpha ranged from 0.71 to 0.84, $p < 0.05$; ICC ranged from 0.73 to 0.95, $p < 0.05$). Non-significant differences were found in the means of test and retest measurements. BMI had moderate negative correlations with both moderate and total PA ($r = -0.34$, $r = -0.36$, respectively, $p < 0.05$). Aerobic fitness was significantly correlated with all intensities of PA and ST ($r = 0.63$, 0.57 , 0.43 and -0.34 , respectively; $p < 0.05$). ST was significantly and negatively associated with sit-ups ($r = -0.38$, $p < 0.01$) and shuttle run ($r = -0.29$, $p < 0.05$). Similarly, the results of the shuttle run (10x5 meter run), sit-ups, bent arm hang, and standing broad jump tests, had significant associations with vigorous PA. The CLASS questionnaire is a valid and reliable measure of PA in 12-year old South African children.

Keywords: CLASS questionnaire, validation, physical activity questionnaire, physical fitness, children

Introduction

Regular physical activity (PA) promotes physical, mental, and social health benefits among children and adolescents (Mcveigh *et al.*, 2004; Van Sluijs *et al.*, 2007; Puma *et al.*, 2013). The accurate assessment of PA levels amongst youth is critical for quantifying PA behaviors and health outcomes. So far, there is no gold standard approach for measuring all aspects of PA. The question of the most appropriate method for population-based study of PA has been extensively debated (Sobngwi *et al.*, 2001). Measuring the PA levels in children offers unique challenges as their movement patterns are highly variable, non-structured, and generally short. The most practicable measures of PA for young children available are limited (Hands *et al.*, 2006). Therefore, the use of reliable approaches to estimate childhood PA is warranted.

Currently, a wide range of methods used to measure PA levels in children and adolescents are described in the literature (De Cocker *et al.*, 2011; Fairclough *et al.*, 2011; Rachele *et al.*, 2012). The most common methods involve self-report measures such as the International Physical Activity Questionnaire (IPAQ) (Craig *et al.*, 2003), the Previous Day PA Recall Questionnaire (PDPAR) (Mamabolo, *et al.*, 2007), as well as the Children's Leisure Activities Study Survey (CLASS) questionnaire (Telford *et al.*, 2004), and objective measures e.g. accelerometers, pedometers, double-labeled water, and heart rate monitoring (Loprinzi & Cardinal, 2011). Compared to other research techniques, self-report questionnaires continue to be the most commonly used method for PA assessment in studies involving large sample sizes, and restricted budgets due to its relative simplicity of administration and cost effectiveness (Rachele *et al.*, 2012). Furthermore, self-report instruments may provide valuable information on multiple dimensions of PA, such as frequency, type, duration, and contexts in which the activity is performed that is not readily available from other methods (Huang *et al.*, 2009).

A variety of self-report questionnaires have been developed for children and adolescents with type of activities reported and recall periods determined. De Cocker *et al.* (2011) adapted the long version of the IPAQ to evaluate its relationship to gender, age category, socio-economic status, and domestic PA in adolescents. Low but significant correlations between the Actigraph and IPAQ-A were found for the whole study sample by age and gender ($r=0.08$ to 0.26). Hagströmer *et al.* (2006) evaluated the construct validity of the long version IPAQ against aerobic fitness (VO_{2max}), BMI, and body fat. The results yielded a weak correlation

between the IPAQ in total PA and both aerobic fitness ($r=0.21$, $p=0.051$) and BMI ($r=0.25$, $p=0.009$). In contrast, Fogelholm *et al.* (2006) assessed the criterion validity of the short format of the IPAQ against health-related fitness (sit-ups, push-ups and squats). The weekly frequency of vigorous PA was positively associated with fitness. Moreover, the highest PA category with an activity frequency of 4-7 times a week had a significantly ($p<0.05$) higher VO_{2max} and push-up test result than those in the low PA group (Fogelholm *et al.*, 2006). With regard to recall questionnaires, several validation studies have been reported where there is a consensus among researchers that children are often unable to accurately recall their PA over a period, and this limitation may be further confounded by developmental differences, especially regarding detailed recall of PA information (Troost *et al.*, 2000; Telford *et al.*, 2004; Huang *et al.*, 2009; Bähler *et al.*, 2013). Several comprehensive reviews have summarized the validity and reliability of self-report instruments (Kohl *et al.*, 2000; Loprinzi & Cardinal, 2011; Rachele *et al.*, 2012). However, most of the instruments were not designed to assess PA levels of children younger than 13 years of age (Telford *et al.*, 2004).

The CLASS questionnaire was developed to assess PA among large groups of Australian children aged 5-12 years (Telford *et al.*, 2004). Despite that the CLASS questionnaire has been utilised to measure the PA among children, there is paucity of research regarding its feasibility to assess PA in children and adolescents. In one such study, Huang *et al.* (2009) evaluated PA among 9-12 years old Chinese children in Hong Kong, China. Another Chinese 7-day PA recall questionnaire has been adapted from the CLASS questionnaire to assess PA among 92 primary schoolchildren in which acceptable reliability and validity was found (Liu *et al.*, 2003). Whilst several questionnaires have been validated in various parts of the world, socio-cultural differences require the development and validation of a particular questionnaire to be used in different populations (Sobngwi *et al.*, 2001). As reported in the literature, direct measurements of PA involving pedometers and accelerometers have been used in validation studies (Loprinzi & Cardinal, 2011; Rachele *et al.*, 2012). However, these methods are quite expensive and are sometimes unreliable as children may be reluctant to adhere to measurement procedures. One indirect method of establishing validity that has been used successfully in some studies (Hülya Aşçı, 2005; Nikolaidis & Säcklova, 2011) is to compare the self-reported PA of participants with their results of PF measurements. Moreover, the CLASS questionnaire has not been validated for pre-adolescent South African primary school pupils. Therefore, the purposes of the present study were: 1) to validate the CLASS

questionnaire for 12-year old South African children, 2) to examine the correlation between the children's self-reported PA and their physical fitness (PF) measurements.

Methods

Participants

A total of 108 schoolchildren aged 12 years (n=45 boys; n=63 girls) from two primary schools in Potchefstroom, the capital city of North West province, South Africa, participated in this study. The two schools were from similar socio-economic backgrounds and the participants were representative of the demographic composition of the Potchefstroom area.

The CLASS questionnaire

The original CLASS questionnaire was developed for 5-12 years old Australian children with acceptable reliability and validity (Telford *et al.*, 2004). It consists of two parts, i.e. demographic variables and a 30-item checklist of habitual PA participation. In the questionnaire 18 activities are classified as moderate-intensity (3-5.9 METS), e.g. bicycling and traveling to school by walking; and 12 activities classified as vigorous (6+ METS), e.g. aerobics and jogging or running. The questionnaire required respondents to estimate the time spent on moderate PA, vigorous PA and moderate-to vigorous PA. To validate the questionnaire for 12-year old South African children, the items were adapted by researchers and experts in the areas of PA and fitness, based on a research committee approach as stipulated by the guidelines of Frazer and Lawley (2000). Adhering to these guidelines, the words and phrases of the questionnaire were adapted to fit the South African context, e.g. names and descriptions of PAs and sport in the questionnaire items were adapted to typical South African PAs and sport. In addition, to achieve an even more comprehensive view of the participants' leisure activities, a separate section containing 15 items on sedentary activities, e.g. time spent on television viewing or sending text messages, was developed and administered in the same format as the adapted CLASS items.

Physical fitness measures

Body mass index (BMI) calculated as weight (in kilograms) divided by height (in meters) squared, was used to estimate body composition. Triceps and suprailiac skinfolds were measured with slim guide caliper.

The Eurofit test battery (Adam, 1988) was used for the fitness measurements. Participants performed nine fitness tests as follows:

Aerobic fitness - Aerobic fitness was assessed with the multi-stage 20-metre shuttle run test in which participants endeavored to touch each marker over a 20-metre distance simultaneously with a bleep signal until they were unable to keep up with the running pace.

Sit-ups - The number of sit-ups that learners were able to perform in 30s was used to measure functional abdominal strength.

Flexibility - Flexibility was measured by using a sit and reach test. The participants reached forward over a measuring bar while sitting with bare feet and straight legs against a sit and reach box.

Grip strength - Static strength was assessed with hand-grip dynamometer. Participants squeezed the dynamometer as forcefully as they could with their arm abducted. The score was recorded to the nearest kilogram.

Flamingo Balance - The flamingo balance test was assessed on a balance beam. The participants were required to stand on the balance beam on their preferred leg; the number of attempts in one minute was scored.

Broad jump - The standing long jump evaluated the explosive power of the lower body and leg extensors. The distance the participants jumped from two legs was measured and recorded.

Plate tapping - the plate tapping test required the learners to perform taps with one hand on a rectangular plate and two round discs. They moved the preferred hand back and forth between the discs over the center hand. The time taken to complete 25 cycles was recorded.

Agility and coordination - Agility and coordination were assessed with a 10x5 m shuttle run test in which participants tried to touch each marker 5 times over a 5-metre distance. The total time taken was recorded.

Muscular endurance - Upper body muscular endurance was measured using the bent arm hang test. The participant was assisted to the height of a horizontal bar with the chin at the level of the bar. The total time that the participant held this position to exhaustion was recorded.

Procedure

The children were assembled in a classroom where they received detailed explanations on how to complete the CLASS questionnaire. The researchers provided the necessary assistance to the children in completing the questionnaire. The questionnaire took approximately 20 minutes to complete. The children also completed the same questionnaire 3 weeks after the baseline administration. All PF assessments were performed on the schools' playground after the second questionnaire administration.

Ethical considerations

Ethical approval for the study was obtained from the Ethical Committee of the North West University (Ethics no: NWU-00003-14-S1). Permission was also obtained from the school principals as well as the North West Department of Education. Written informed consent and verbal consent were obtained from learners' parents as well as the learners, respectively before they participated in the study.

Data Analysis

Data were analyzed using SPSS version 21 statistical software. The descriptive characteristics were expressed as means and standard deviations. Cronbach's alpha coefficients were calculated to determine internal consistency of the questionnaire items. A coefficient alpha of ≥ 0.7 was considered to show sufficient reliability of a multiple-item scale (Pirasteh *et al.*, 2008). Paired t-test and intra-class correlation coefficients (ICC) were used to estimate test-retest reliability. An ICC value of 0.7 was considered to be an acceptable level of agreement (Sim & Wright, 2000). To assess construct validity, Spearman correlation coefficients (r) were used to measure the association of PA based on the questionnaire responses with PF results. The correlation coefficients were evaluated as poor where $r < 0.30$, moderate where $r = 0.31-0.50$, and strong where $r > 0.50$ (Armstrong *et al.*, 2000). For all statistical analyses a probability level of 0.05 or less was taken to indicate significance.

Results

Characteristics of participants

Descriptive statistics of the children's anthropometric measurements, PA, sedentary time and PF are shown in Table 1.

Overall, the boys were taller than the girls ($p < 0.05$), who in turn had higher skinfolds than the boys ($p < 0.001$). In general, there were no significant differences in the children's body weight and BMI values by gender. With respect to fitness measurements, significant gender differences were observed in aerobic fitness, standing broad jump, sit-ups, bent arm hang, and hand-grip (Table 1). Regarding the PA measurements, there were no gender differences in sedentary time ($p = 0.59$). However, boys were generally more physically active than girls (Table 1).

Table 1: Descriptive characteristics, physical activity, sedentary time and fitness of the participants (Mean \pm SD)

Variable	Boys (n=45)	Girls (n=63)	<i>p</i> value
Characteristics			
Height (cm)	155.2 \pm 7.1	152.2 \pm 7.1	<0.05
Weight (kg)	48.4 \pm 11.1	49.1 \pm 10.6	0.72
BMI (kg.m ⁻²)	19.9 \pm 3.8	21.1 \pm 4.4	0.12
Skinfolds (mm)	11.6 \pm 8.5	16.0 \pm 7.6	<0.001
Fitness measurements			
Flamingo balance (attempts)	3.4 \pm 3.0	3.6 \pm 2.9	0.66
Plate tapping (sec.)	13.1 \pm 1.6	13.0 \pm 1.6	0.61
Sit and reach (cm)	37.4 \pm 7.2	39.8 \pm 7.5	0.11
Standing broad jump (m)	1.5 \pm 0.2	1.3 \pm 0.2	<0.001
Hand-grip (kg)	24.6 \pm 5.7	22.0 \pm 3.8	<0.01
Sit-ups (reps)	14.6 \pm 5.3	9.0 \pm 3.9	<0.001
Bent arm hang (sec.)	11.4 \pm 10.4	4.4 \pm 4.2	<0.001
10x5 meter run (sec.)	23.6 \pm 7.2	22.7 \pm 2.6	0.39
Aerobic fitness (ml O ₂ kg ⁻¹ min ⁻¹)	4.3 \pm 1.8	2.5 \pm 1.0	<0.001
PA measurements			
MPA (min/Wk)	41.8 \pm 21.8	24.6 \pm 22.1	<0.05
VPA (min/Wk)	43.2 \pm 31.97	18.8 \pm 12.5	<0.01
MVPA (min/Wk)	85.0 \pm 53.7	43.4 \pm 34.6	<0.01
Sedentary time (min/Wk)	254.6 \pm 78	252.2 \pm 47.7	0.59

BMI = body mass index; PA = physical activity; MPA = moderate physical activity; VPA = vigorous physical activity; MVPA = moderate-to-vigorous physical activity; SD = standard deviation.

Reliability

Internal consistency

Based on questionnaire responses, the PAs were categorised as moderate, vigorous, and moderate-to-vigorous, as well as sedentary behaviours (Telford *et al.*, 2004). The Cronbach's alpha coefficients for the four sub-items assessed as the total score of the CLASS questionnaire as well as the sedentary behaviours section, was 0.81, indicating a high internal consistency. Specific internal consistency estimates for moderate PA, vigorous PA, total PA, and sedentary time were substantial (alpha=0.71, 0.84, 0.76, and 0.72, respectively) (Table 2a). These values exceeded the benchmark of 0.70 recommended by Sim and Wright (2000). For a reliable scale, the ideal inter-item correlations are expected to range from 0.20 to 0.40 (Pirasteh *et al.*, 2008). The values in our study ($r=0.24-0.56$) therefore, yielded substantial correlations.

Table 2a: Internal consistency based on Cronbach's alpha for the CLASS questionnaire

Variable	Items	Alpha	Inter-item correlation
Moderate PA (min/Wk)	18	0.71	0.24
Vigorous PA (min/Wk)	12	0.84	0.45
Total PA (min/Wk)	30	0.76	0.56
Sedentary time (min/Wk)	15	0.72	0.45

PA = physical activity

Test-Retest reliability

The reliability of the CLASS questionnaire was determined by the intra-class correlation coefficient (ICC) and paired t-test for the test-retest comparisons. The results are presented in Table 2b. The intra-class correlation coefficients were significant for all PAs, with substantial relationships observed for moderate PA (ICC=0.95), vigorous PA (ICC=0.83), and total PA (ICC=0.93). Similarly, significant correlations were found regarding sedentary time (ICC=0.73). Non-significant mean differences were observed between test and retest measurements for all PAs (Table 2b).

Table 2b: Test-retest reliability based on paired t-test and intra-class correlation coefficients (ICC) for the CLASS questionnaire (Mean \pm SD)

Variable	Test 1	Test 2	t-test (p)	Correlation (r_{icc})
Moderate PA (min/Wk)	52.43 \pm 15	51.04 \pm 13.7	0.052	0.95*
Vigorous PA (min/Wk)	48.02 \pm 20.2	51.67 \pm 32.75	0.134	0.83*
Total PA (min/Wk)	100.45 \pm 27.56	102.7 \pm 37.35	0.358	0.93*
Sedentary time (min/Wk)	250.4 \pm 58.96	253.36 \pm 63.49	0.702	0.73*

* Significant correlation at $p < 0.01$; PA = physical activity; SD = standard deviation; Wk= week

Validity

Construct validity of the CLASS questionnaire was assessed by comparing the intensities of reported minutes of weekly PA with the children's PF results. Moderate negative Spearman's correlations were found between BMI and moderate PA ($r = -0.34$, $p < 0.05$), as well as total PA ($r = -0.36$, $p < 0.05$), but low negative correlation with vigorous PA ($r = -0.18$). In addition, non-significant correlation was found between BMI and sedentary time ($r = 0.23$). Aerobic fitness significantly correlated with vigorous PA, moderate PA, and total PA, as well

as sedentary time ($r = 0.63, 0.57, 0.43,$ and $-0.34,$ respectively; $p < 0.05$). Similarly, the duration of involvement in vigorous PA was positively associated with the children's performances in the shuttle run, sit-ups, bent arm hang and standing broad jump tests (Table 3), thus yielding significant correlation coefficients: $r = 0.54, r = 0.53, r = 0.46,$ and $r = 0.34,$ respectively ($p < 0.05$). Additionally, sedentary time was significantly and negatively associated with sit-ups ($r = -0.38, p < 0.01$) and shuttle run ($r = -0.29, p < 0.05$). Measurements of test performances in the shuttle run, sit-ups, and standing broad jump tests also showed moderate correlation coefficients with total PA: $r = 0.38, r = 0.32,$ and $r = 0.30,$ respectively ($p < 0.05$). Low correlations were however, found between flexibility and vigorous PA ($r = 0.27$); flamingo balance and vigorous PA ($r = 0.28$); as well as skinfolds and total PA ($r = 0.25$). Grip strength and plate tapping correlated poorly with total PA ($p > 0.05$) (Table 3).

Table 3: Spearman rank correlation coefficients (r) for minutes spent in physical activity from the CLASS questionnaire, sedentary behaviours and fitness measurements

Fitness measure	PA measure(min/Wk)	R
BMI (kg.m^{-2})	Moderate PA	-0.34*
	Vigorous PA	-0.18
	Total PA	-0.36*
	Sedentary time	0.23
Aerobic fitness ($\text{ml O}_2 \text{ kg}^{-1} \text{ min}^{-1}$)	Moderate PA	0.57*
	Vigorous PA	0.63*
	Total PA	0.43**
	Sedentary time	-0.34*
Skinfolds (mm)	Moderate PA	0.13
	Vigorous PA	0.20
	Total PA	0.25*
	Sedentary time	0.19
Flamingo balance (attempts)	Moderate PA	0.13
	Vigorous PA	0.28*
	Total PA	0.26
	Sedentary time	-0.20

	Moderate PA	0.17
Plate tapping (sec.)	Vigorous PA	0.17
	Total PA	0.25
	Sedentary time	-0.17
	Moderate PA	0.14
Sit and reach (cm)	Vigorous PA	0.27**
	Total PA	0.13
	Sedentary time	-0.23
	Moderate PA	0.25
Standing broad jump (m)	Vigorous PA	0.34**
	Total PA	0.30**
	Sedentary time	-0.09
	Moderate PA	0.14
Hand-grip (kg)	Vigorous PA	0.21
	Total PA	0.16
	Sedentary time	-0.15
	Moderate PA	0.23
Sit-ups (reps)	Vigorous PA	0.53**
	Total PA	0.32*
	Sedentary time	-0.38**
	Moderate PA	0.15
Bent arm hang (sec.)	Vigorous PA	0.46**
	Total PA	0.29*
	Sedentary time	-0.16
	Moderate PA	0.27*
10x5 meter run (sec.)	Vigorous PA	0.54**
	Total PA	0.38*
	Sedentary time	-0.29*

* $P < 0.05$, ** $P < 0.01$; BMI = body mass index; PA = physical activity.

Discussion

This study examined the reliability and construct validity of the CLASS questionnaire in measuring the PF of 12-year old South African children. The CLASS questionnaire had

substantial reliability and construct validity based on internal consistency, test-retest measurements and correlation between the intensity of PA and PF assessments, which demonstrates the practicability of using subjective measurement to estimate children's PA levels.

The CLASS questionnaire demonstrated substantial internal consistency and reliability, which was comparable to those reported in previous studies (Telford *et al.*, 2004; Huang *et al.*, 2009). However, our findings tended to be more reliable ($\alpha=0.71$ to 0.84 ; $ICC=0.73$ to 0.95). Huang *et al.* (2009), for instance, reported good reliability coefficients for the CLASS questionnaire for assessing different levels of PA among Chinese children aged 9-12 years. The values for weekly moderate-to-vigorous PA, vigorous PA, and moderate PA were of $ICC=0.71$, 0.73 , and 0.61 , respectively (Huang *et al.*, 2009). Similar findings were also reported in other studies conducted by Telford *et al.* (2004) and Nor Aini *et al.* (2013). The higher scores from our study could be attributed to the slight age differences of children in previous studies. For instance, the Huang *et al.*'s (2009) study involved 9-12 years old children, and Telford *et al.* (2004) included participations aged 10-12 years for the self-report version of CLASS questionnaire. Generally, participants in the older age group may have a better ability to comprehend the questionnaire interpretation (Rangul *et al.*, 2008). Participants may also underestimate their PA levels if the questionnaires are administered long after their PA involvement. Consequently, the participants may remember their answers and repeat them rather than provide answers which may be more accurate if the time lapse was short. Therefore, the timeframe of 3 weeks used in our study as recommended by Bähler *et al.* (2013) is deemed appropriate.

In our study, PF measurements were determined by the Eurofit test battery (Adam, 1988). Correlations between 10 fitness parameters (Table 3) with PA responses from the CLASS questionnaire were examined. Negative correlations were found between BMI and both moderate PA ($r = -0.34$, $p < 0.05$), and total PA ($r = -0.36$, $p < 0.05$). Similar results were obtained by Ainsworth *et al.* (2000), although the Spearman correlation (r) was slightly lower and ranged from -0.30 to -0.59 . The correlation results of the present study also appear lower than that found ($r=-0.64$) in the study by Nikolaidis and Säcklova (2011) in which the relationship between BMI and health related fitness variables such as aerobic power, muscular strength, and body composition were estimated. However, some inconsistent results were found in the low correlations between moderate PA and BMI ($r=0.26$) in a study among

18-year old Iranians (Vasheghani-Farahani *et al.*, 2011) and total PA with BMI ($r=0.25$) in a study among Swedish participants (Hagströmer *et al.*, 2006). Low correlation coefficient was found between BMI and sedentary time in our study, which is consistent those reported in the study by Mitchell *et al.* (2013), may contribute to the few number of children were classified as obese.

In our study, aerobic fitness was significantly correlated with vigorous PA, moderate PA and total PA, as well as sedentary time ($r = 0.63, 0.57, 0.43,$ and $-0.34,$ respectively; $p<0.05$). Several studies also reported similar findings (Rangul *et al.*, 2008; Ainsworth *et al.*, 2000; Nikolaidis & Säcklova, 2011). Nikolaidis and Säcklova (2011) found significant correlations between total PA and aerobic fitness for both genders ($r = 0.63$ in female and $r = 0.65$ in male) among young Greek adults. Mitchell *et al.* (2013) indicated that reduced time spent in sedentary behaviours was associated with increased energy expenditure. Likewise, Rangul *et al.* (2008) reported substantial validity estimates between cardiorespiratory fitness and all categories of PA based on the World Health Organisation (WHO) Health Behavior in Schoolchildren (HBSC) and IPAQ questionnaires. The study of Vasheghani-Farahani *et al.* (2011) revealed weak correlation coefficients between all PA variables and aerobic fitness (r ranged from 0.22 to 0.33). A similar correlation ($r=0.16$) was reported by Wareham *et al.* (2002), while Hagströmer *et al.* (2006) did not find any significant relationship between vigorous PA from IPAQ and aerobic fitness ($r=0.14$). The discrepancies in the results of previous studies may be attributed to the differences in the questionnaire used for data collection (Hagströmer *et al.*, 2006).

Other fitness parameters, e.g. the shuttle run, sit;-ups, bent arm hang, and standing broad jump tests were shown to be consistently and highly associated with vigorous PA, and showed moderate correlation with total PA in the present study. The correlation coefficients were $r = 0.54,$ $r= 0.53,$ $r = 0.46,$ and $r = 0.34,$ respectively. Comparable findings were reported in the study by Hülya Aşçı (2005), who designed 9 PF variables such as muscular strength and flexibility to examine the construct validity among university students in Turkey. The study indicated that 7 of 9 fitness parameters showed convergent correlations with vigorous PA estimated from questionnaires.

The results of this study should be interpreted in the light of some limitations. Firstly, the self-report questionnaire tended to underestimate PA levels although significant reliability

was found. This may be attributed to errors in the children's PA recall and their limited ability to calculate the total PA minutes spent during weekdays and weekends. Secondly, the small sample size confounds the generalization of our results and warrants the need for further research to conclusively validate the present findings. However, the usefulness of our study lies in the fact that the adapted instrument as well as the section on sedentary behaviours showed strong reliability and validity for this group of participants and it presents baseline information for future studies aimed at validating the CLASS questionnaire in the South African context.

Conclusion

The present findings demonstrate that the CLASS questionnaire can reliably and validly assess PA among 12-year old South African schoolchildren.

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CHAPTER 4



CHAPTER 4: The effects of an enhanced quality Physical Education programme on the physical activity levels of Grade 7 learners in Potchefstroom, South Africa

The effect of an enhanced quality Physical Education programme on the physical activity levels of Grade 7 learners in Potchefstroom, South Africa

Haili Tian¹, Dorita du Toit² and Abel L. Toriola³

¹ *Physical activity, Sport and Recreation Focus Area, Faculty of Health Science, North-West University, Potchefstroom Campus, Potchefstroom 2520, South Africa. tianhaili123@163.com*

² *Physical activity, Sport and Recreation Focus Area, Faculty of Education Sciences, North-West University, Potchefstroom Campus, Potchefstroom 2520, South Africa. Dorita.DuToit@nwu.ac.za*

³ *Department of Sport, Rehabilitation and Dental Sciences, Tshwane University of Technology, Pretoria 0001, South Africa. toriolaal@tut.ac.za*

Journal name: Physical Education and Sport Pedagogy

***Corresponding author:** Dorita du Toit, Faculty of Education Sciences, North-West University, Potchefstroom Campus, Potchefstroom2520, South Africa.

Tel: +27-182991716; Email: Dorita.DuToit@nwu.ac.za

This study evaluated the effects of an enhanced quality Physical Education (PE) programme on the physical activity (PA) levels of South African learners. Using a pre-test and post-test control-group design, 110 Grade 7 learners aged 12-13 years (experimental groups, $n = 40$; control groups, $n = 70$) from two primary schools were studied. They participated in a 12-week PE intervention programme presented once a week, based on the guidelines of the South African PE curriculum, but which comprised 5 quality-enhancing components including well-trained teachers and an award system. Children's PA levels were measured before and after the intervention using a validated Children's Leisure Activities Study Survey (CLASS) questionnaire. The Kruskal-Wallis and Wilcoxon signed-rank tests were used to evaluate the effects of the intervention programme. Results of the experimental groups showed practically and statistically significant increases in moderate PA ($ES=0.47$; $p=0.014$), vigorous PA ($ES=0.48$; $p=0.012$), and total PA ($ES=0.51$; $p=0.008$) as well as decreases in sedentary behaviours ($ES=0.39$; $p=0.041$) after the 12-week intervention programme, whereas no significant changes were found in the control groups. It is concluded that the enhanced quality PE programme is effective in improving the PA levels of South African primary schoolchildren.

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1. Introduction

Regular physical activity (PA) is associated with the improvement of physical and motor fitness (Ortega, Ruiz, and Castillo 2013; Eather, Morgan, and Lubans 2013), which have a positive impact on physical (van Sluijs, McMinn, and Griffin 2007), social (McVeigh, Norris, and Wet 2004), psychological (Biddle and Asare 2011) and cognitive health (Jemmott III et al. 2011; Puma et al. 2013). However, despite these well-known health benefits, most young people are inadequately physically active. A physically inactive lifestyle in children, which is widely associated with the burden of major health implications like increased risk for obesity, type 2 diabetes and hypertension, is a major public health concern in developed (Sibley and Etnier 2003) as well as developing (Muntner et al. 2005) countries.

In South Africa, there is a consensus that low PA levels exist among children and adolescents (Toriola and Monyeki 2012; Lennox and Pienaar 2013). For instance, in their study of 283 fourteen-year-old adolescents in the North West Province, Toriola and Monyeki (2012) reported that 30% of them had low levels of PA participation. Similarly, Craig *et al.* (2013), using accelerometers to measure children's PA levels in South African rural areas, indicated that although rural children showed a high volume of PA, the intensity thereof was too low to meet international recommendations. The low PA levels found commonly reported among children in previous research could be explained in the light of the fact that Physical Education (PE) has been long absent from the curriculum before its reintroduction in recent years (Du Toit, Van der Merwe, and Rossouw 2007). Furthermore, based on the guidelines of the South African Curriculum and Assessment Policy Statement (CAPS), PE, which was one of five focus areas of the Life Orientation (LO) subject, was allocated only one hour of PE per week (DBE, 2011). Compared to international recommendations (ACSM, 2009; WHO, 2009), which entail that children should participate in at least 60 minutes of moderate PA per day, one hour of PE per week, as prescribed in the CAPS appears to be inadequate to promote children's PA levels. Additionally, since the reintroduction of PE, a considerable percentage of schools don't even adhere to the CAPS's once-a-week PE requirement. This is evident in the study by Reddy *et al.* (2003) which indicated that only 54.3% of South African children had PE classes on their timetable and 52.8% of them engaged in vigorous activities at school. Recent studies have reported that the situation has not changed because the policy concerning the teaching of PE in South African schools is poorly implemented (Du Toit, Van der Merwe, and Rossouw 2007; Van Deventer 2012), with causes postulated that include the lack of training of PE teachers, appalling state of facilities and equipment, as well as inadequate funding (Du Toit, Van der Merwe, and Rossouw 2007). These barriers are also the most prominent factors which impact negatively on the quality of PE teaching as reported in various countries (Morgan and Bourke 2008; Rainer *et al.* 2012). In addition, too little time allocation to PE is one of the major challenges for PE teachers in several countries (Beurden *et al.* 2003; Du Toit *et al.* 2007; Hardman 2008).

The increased prevalence of debilitating hypokinetic conditions such as obesity and type II diabetes (HAKSA 2010) among children has prompted the need to design appropriate intervention programmes to improve South African children's PA levels in order to reverse the trend. For instance, in a study conducted in the Gauteng Province of South Africa, Monyeki *et al.* (2012) implemented a ten-month PA intervention programme consisting of two 30-minute structured exercise sessions per week, which yielded beneficial outcomes with regard to reduction of body fatness among 9-13-year old boys. Additionally, Naidoo and Coopoo (2012) found that an 18-month PA intervention programme, incorporated within classroom lessons, increased flexibility, strength and PA levels of 10-15 year-old learners from 11 schools in KwaZulu-Natal, South Africa. Similarly, adolescents in disadvantaged

communities showed significant improvements in PA levels and aerobic fitness after an extra-mural aerobic intervention programme presented twice a week for 60 minutes (Lennox and Pienaar 2013).

The results of the South African studies are consistent with those reported in other countries. For example, in the studies of Cecchini *et al.* (2014) and Eather *et al.* (2013), which were conducted in the northern Spain and Australia, respectively, increased levels of learners' PA were found using school-based PA intervention programmes. McKenzie *et al.* (2009) has researched the effect of the SPARK (Sports, Play, and Active Recreation for Kids) programme, a comprehensive school-based PA intervention programme in seven states of the United States, which lasted from 1989 to 2000. The original SPARK programme included a PE curriculum intended to increase class-based PA, a behavioural self-management programme and comprehensive teacher training and support (McKenzie *et al.* 2009). In reviewing research on the effect of SPARK, McKenzie *et al.* (2009) pointed out improved PA, physical fitness and motor skill development as just some of the significant effects. In addition, Siedentop (2009) used the reviews of meta-analyses to evaluate the efficacy of improving PA through school intervention programmes, and found that PE intervention led to improved PA if the protocols related to use of time were employed by teachers. The role of qualified PE teachers is further emphasized by Buchan *et al.* (2011), who cited the compliance and full participation of PE teachers as one of the most important requirements for the success or failure of the PE intervention programmes in Scotland. Furthermore, in a comprehensive review of 26 studies in which school-based PA programmes were used for promoting PA and fitness in children and adolescents, Dobbins *et al.* (2013) report that in general, little effect was found on PA rates if the intervention programmes did not include certain elements such as a combination of printed educational materials, changes to the school curriculum, as well as quality-enhancing elements like qualified instructors and community involvement (Dobbins *et al.* 2013).

The outcomes of previous research, therefore, underscore the importance of well-trained teachers in school-based PA programmes. In this regard, literature shows that the training of PE teachers plays a major role in providing adequate PA within PE programmes (Hardman 2008; Napper-Owen *et al.* 2008; NASPE 2013). In a review of PA in primary school PE, Fairclough and Stratton (2006) pointed out that a key determinant of the efficacy of the PE programme is the expertise of those teaching the programmes. According to these authors, well-trained teachers utilise more efficient instructional methods and activity-promoting tasks. Furthermore, the quality and training of PE teachers are highly correlated with the motivation of learners in the PE class to learn and to be physically active (Richards and Levesque-Bristol 2014). Consequently, well-trained PE teachers, in contrast to their poorly trained peers, will use instructional strategies to contribute to both intrinsic motivation (when students participate in PA as an end in itself such as enjoyment and health benefits) and extrinsic motivation (to comply with an external demand such as seeking a reward) (McDavid, Cox, and McDonough 2014). Lonsdale *et al.* (2013) emphasise this statement in their systematic review of interventions to increase PA in PE, in which they indicated that PE programmes taught by qualified PE teachers increased the time spent on moderate PA during PE lessons. These findings corroborate the reports of studies which modified existing PE lessons to improve the quality of the programme such that PA levels can be increased together with improvement of physical and motor fitness (Beurden *et al.* 2003; Fairclough and Stratton 2006).

In light of the above background, the question arises whether a PE programme in which quality-enhancing factors like well-trained teachers and motivational strategies are incorporated, even when presented only once a week, can positively affect the PA levels of South African primary school children. The answer to this question can contribute to the quality and effect of E programme in other countries experiencing similar challenges, like limited time allocation, with regard to the presentation of PE. To date, few studies, if any, have investigated the effects of a quality PE programme on the PA levels of South African children. Therefore, the purpose of this study was to evaluate the effects of an enhanced quality PE programme, presented within the limited time allocated in the curriculum, on the PA levels of Grade 7-learners in Potchefstroom, South Africa.

Methods

Research design

This study was conducted using a pre-test and post-test control-group design. The participants' PA levels were measured before and after the intervention.

The learners were assigned to treatment groups, in which the experimental groups participated in a 12-week enhanced quality PE programme presented by well-trained PE teachers, based on the guidelines of the CAPS (DBE 2011) and the control groups attended the usual PE classes taught by teachers who were trained by the government after the reintroduction of PE (consisting of one afternoon's training in presenting PE).

Baseline and post-intervention assessments were performed on the school premises by the researcher, with the assistance of fourth-year pre-service PE teachers. The questionnaire was administered in the learners' classroom under the researchers' supervision.

Participants

A convenient sample of 110 Grade 7 learners (experimental groups, $n = 40$, 30 girls and 10 boys; control groups, $n = 70$, 45 girls and 25 boys) aged 12-13 years from two primary schools in Potchefstroom, the capital city of North West Province South Africa, participated in this study. The two schools were situated in low socio-economic areas of Potchefstroom and different ethnic groups were represented in the experimental and control groups. Although both schools had large open fields, no apparatus were available for teaching PE lessons at the schools. In one school, 4 experimental groups of 10 learners each were formed to control for possible teacher-interactive effect. As there were only ten boys among the 40 learners and in order to compare the experimental groups more accurately, it was decided to place all the boys in one of the four experimental groups. Two control groups with similar gender distribution, one from the same school ($n = 37$, 27 girls and 10 boys) as the experimental groups and the other from a different school ($n = 33$, 20 girls and 13 boys) were used.

Physical activity measurements

The Children's Leisure Activities Study Survey (CLASS) questionnaire (Telford et al. 2004), which has been validated for South African Grade 7-learners (Tian et al. 2014) was used to determine the participants' PA levels. This questionnaire was initially developed to assess PA among 5-12 year-old Australian children (Telford et al. 2004). It consists of two parts, i.e. demographic variables and a 30-item checklist of habitual PA participation. In the questionnaire 18 activities are classified as moderate-intensity (3-5.9 METS), e.g. bicycling and traveling to school by walking; and 12 activities are classified as vigorous (6+ METS),

e.g. aerobics and jogging or running. The questionnaire required respondents to estimate the frequency and duration of involvement in moderate, vigorous and moderate-to-vigorous PA. The adapted version of the CLASS (Tian et al. 2014) includes a separate, additional section containing 15 items on sedentary activities, e.g. time spent on television viewing or sending text messages, which have been developed and administered in the same format as the adapted CLASS items. The adapted version of the CLASS showed acceptable reliability and validity in the study of Tian et al. (2014). The adapted questionnaire was administered before the onset of the PE programme, as well as after the 12 weeks in order to measure any changes in the participants' baseline PA behaviour.

Anthropometric Assessments

The anthropometric measurements which included body weight, stature, BMI and body fat percentage were performed according to the guidelines of the International Society for The Advancement of Kinanthropometry (ISAK 2001). Body weight was measured on a portable electronic scale to the nearest 0.1 kg. Participants wore minimal clothing and took off their shoes before the weight measurement. BMI was calculated as weight/height (kg/m²). Height was measured with a stadiometer and recorded to the nearest 0.1 cm. Percentage body fat was calculated from triceps and subscapular skinfolds measurements using Slaughter *et al.*'s (1988) age- and sex-specific equations.

The enhanced quality Physical Education programme

The enhanced quality PE programme was presented for 60 minutes once a week over 12 weeks, as prescribed in the PE curriculum guidelines suggested in the CAPS (DBE 2011). In the CAPS (DBE 2011), PAs for the first semester of Grade 7 entails various physical fitness activities (weeks 1 to 6) and indigenous games (weeks 7-12). Each lesson in the PE intervention programme comprised a 10-minute warm-up and introduction, followed by a 50-minute activity session which consisted of 30 minutes of moderate to high intensity aerobic exercise (such as rope skipping, aerobic dance, throwing Jukskei, and playing soccer), and 20 minutes of strength and muscular endurance activities (like sit-ups, crab soccer, ball dribbling, and wheelbarrow exercises). Additionally, awards comprising stickers for class presentation and completed homework as well as new homework were given at the end of each lesson. The learners' compliance to the programme was ensured by grading them for their participation in each PE lesson, as prescribed in the CAPS (DBE 2011) To optimize the quality of the PE programme within this framework and based on prevailing circumstances at the schools, emphasis was placed on five components, namely using well-trained PE teachers, two motivational strategies comprising homework activities and a reward system, using improvised apparatus, and monitoring of the intensity of activities.

Well-trained PE teachers

The PE intervention programme offered to the experimental groups was presented by four pre-service PE teachers who have had 3 years of teacher training in a B.Ed PE degree programme (NWU 2013). The B.Ed PE degree programme included in-depth training on skills required in the following specific areas: ability to differentiate learners with unique learning styles, physical abilities and developmental levels and adapting PE activities accordingly; using various PE teaching styles; incorporating in-depth knowledge of exercise and sport physiology into the PE programme, using effective organisational and discipline skills in presenting practical activities; and implementing accurate and effective assessment of movement skills and abilities (NWU 2013). In the control groups, the normal PE

programme was presented by teachers who had undergone one afternoon's PE teacher preparation programme presented by the North West Department of Education (Crouse 2013). This is a crash teacher training programme designed in response to the urgent need created by the reintroduction of PE in the school curriculum after an absence of more than ten years, and consisted of a brief overview of the content themes of the PE curriculum as well as some examples of practical activities for each content theme.

Homework activities Although homework activities were not prescribed by the PE curriculum in the CAPS, specific homework activities were given to learners to encourage them to be physically active after school and during their free time. These homework activities were follow-up activities of those presented during the PE lesson, but which always included aerobic exercise, even when practicing a sport skill. For example, when the PE lesson included the skill of dribbling a soccer ball, the homework activity would be to dribble the ball around obstacles placed in a line over a distance of 20 meters, and the learner would have to attempt to complete as many 20-meter sets of dribbling successfully as possible in 5 minutes, and then repeat the exercise at least four times. The signatures of the learners' parents, confirming their compliance, were required and the learners were asked to show the homework to the teacher at subsequent classes, which also formed part of the warm-up activity for such lessons.

Reward system

Rewards included stickers, badges and certificates, and colourful self-evaluation and motivational charts, which were all made at minimum cost from recycled paper, by the researchers. At the beginning of the intervention programme, learners received colourful booklets in which the benefits of PA in general as well as advantages of life-long PA were listed, and in which they received stickers for participation in lessons as well as completed homework (showing the activities that had been practised at home). Learners who had a certain number of stickers in their homework booklets within the first 6 weeks were awarded colourful badges. After the programme and on completion of the PA questionnaires, the learners received certificates of acknowledgement. Although most of these rewards constitute extrinsic rewards, intrinsic motivation was stimulated by the PE teachers enthusiastically emphasizing the benefits of PA in every lesson and placing the emphasis on participation rather than achievement. When compared to the overarching model of human motivation, self-determination theory (SDT; Deci and Ryan 1985) which distinguishes between two forms of motivation, namely autonomous and controlled forms of motivation, the reward system used in this study would seem to fall into the category of external regulation (acting to attain a reward or to avoid punishment) as part of controlled motivation. Autonomous motivation, which includes intrinsic motivation, has been shown in numerous studies to have a more positive relationship with participation in PA and PE than controlled motivation (Hassandra et al. 2003; Pannekoek et al. 2013; Owen et al. 2014). However, as Hassandra et al. (2003) and Pannekoek et al. (2013) point out, socio-contextual factors (e.g. lesson content and the instructional style of the PE teacher) can influence motivation and the internalization of behaviour. In this regard, it was found in the study of Hassandra et al. (2003) that lesson content, the PE teacher, classmates and school facilities were socio-contextual factors influencing secondary school learners' intrinsic motivation in PE. The extrinsic rewards used in the current study, together with the lesson content of the PE programme, the well-trained PE teachers, the innovative PE equipment, and the emphasis placed on the lifelong benefits of PA and the process of participation by the PE teachers, could therefore be considered as socio-contextual factors which could impact on the learners' intrinsic motivation.

Improvised apparatus

As the school did not have standard PE apparatus available, improvised equipment were made from waste material, for example, balls were made from crumpled newspaper and tape. These supplies were then taken home by the learners for their homework activities.

Monitoring intensity of activities

The intensity of the aerobic activities during the PE lesson and homework activities was monitored by asking learners to measure their own heart rate at 5-minute intervals by using the manual palpation method to feel the carotid pulse (neck) or the radial pulse (wrist) and counting their heartbeat for ten seconds under the guidance and supervision of the teacher. Activities were then adapted (made faster or slower) so that learners' heart rates stayed within the recommended heart rate range for cardiorespiratory improvement; calculated as 60% - 80% of the estimated maximal heart rate (220-age) (ACSM 2009). Therefore, the children's exercise heart rates ranged between 124 and 166 beats per minute throughout the intervention programme.

Ethical considerations

Ethics approval for the study was obtained from Ethics Committee of the North West University (Ethics approval no: NWU-00003-14-S1). Permission was also obtained from the school principals as well as the North West Department of Education. Written informed consent was obtained from learners' parents before they participated in the study. The principals, parents and learners were assured of the anonymity of the participants' data in reporting the results. Learners were further assured that participation was voluntary and that they could withdraw at any time without repercussion.

Data Analysis

Data were analyzed using SPSS version 21 software. The descriptive characteristics were expressed as means and standard deviations, with range, skewness and kurtosis provided. Because a convenience sample was used and the data pool was relatively small and not normally distributed, the comparisons between the intervention and control groups as well as the pre- and post-test measurements were examined using the Kruskal-Wallis and Wilcoxon signed-rank tests, respectively. To examine the practical significance of differences, effect sizes (ES) were calculated as recommended by Cohen (1988). In this regard, Cohen (1988) proposed that an ES of 0.2 represents a small effect, 0.5 a medium effect and 0.8 a large effect. For all statistical analyses a probability level of 0.05 or less was taken to indicate significance.

3. Results

Descriptive statistics of the children's anthropometric characteristics and the PA results for the control and intervention groups are shown in Tables 1 and 2, respectively.

Table 1: Descriptive characteristics of control and intervention groups (Mean \pm SD)

Groups	Characteristics	N	Mean \pm SD	Range	Skewness	Kurtosis
Experi1	Height (cm)	10	153.5 \pm 4.3	16	0.131	-0.704
	Weight (kg)	10	51.8 \pm 10.6	31	0.485	-1.691
	BMI (kg.m ⁻²)	10	21.8 \pm 3.6	11	0.508	-1.283
	Skinfolds(mm)	10	11.7 \pm 3.7	6.92	-0.645	0.064
Experi2	Height (cm)	10	152.7 \pm 6.9	20	0.209	-1.303
	Weight (kg)	10	50.1 \pm 7.1	37	0.981	1.455
	BMI (kg.m ⁻²)	10	21.5 \pm 3.6	11	0.483	-1.767
	Skinfolds(mm)	10	17.3 \pm 7.9	6.19	-1.125	1.974
Experi3	Height (cm)	10	147.6 \pm 6.9	24	1.162	1.519
	Weight (kg)	10	42.5 \pm 10.4	28	-0.71	-0.953
	BMI (kg.m ⁻²)	10	19.2 \pm 3.9	11	-0.286	-1.286
	Skinfolds(mm)	10	13.6 \pm 6.5	11.53	-2.146	1.109
Experi4	Height (cm)	10	150.3 \pm 8.5	24	0.124	-0.007
	Weight (kg)	10	54.3 \pm 9.7	29	-1.323	1.065
	BMI (kg.m ⁻²)	10	23.8 \pm 3.3	11	-0.318	-0.969
	Skinfolds(mm)	10	17.8 \pm 6.9	3.21	0.348	-0.442
Contr1	Height (cm)	37	152.75 \pm 9	33	0.249	-0.473
	Weight (kg)	37	46.8 \pm 9.6	43	0.402	-0.638
	BMI (kg.m ⁻²)	37	20 \pm 3.9	18	0.539	-0.199
	Skinfolds(mm)	37	14 \pm 11.6	10.78	0.092	0.279
Contr2	Height (cm)	33	153.5 \pm 7.2	27	-0.285	0.476
	Weight (kg)	33	49.8 \pm 11.2	43	1.038	0.824
	BMI (kg.m ⁻²)	33	20.9 \pm 3.4	16.3	1.52	1.938
	Skinfolds(mm)	33	14.4 \pm 7	9.37	0.519	-0.115

BMI = body mass index; Experi = Experimental group; Contr = Control group.

With regard to PA levels, Statistically and practically significant improvements were found in all four experimental groups between pre- and post- test for the time spent on the intensities of involvement in moderate PA ($p= 0.028$ to 0.05 ; ES = 0.23 to 0.64), vigorous PA ($p= 0.018$ to 0.036 ; ES = 0.23 to 0.63), total PA ($p=0.017$ to 0.05 ; ES = 0.30 to 0.68), and sedentary time ($p= 0.014$ to 0.049 ; ES= 0.26 to 0.66), whereas no marked changes were observed in the two control groups. These results indicate that there was no teacher interaction effects in the experimental groups, thus the effect of the programme could not be attributed to differences in teaching styles among the PE teachers in the experimental groups. To strengthen the power of the analysis, as all the experimental groups improved significantly with no substantial improvements noted for the control group, the results of the treatment groups were also combined to reflect one total experimental and one control group. The combined results were also analyzed according to gender (Table 4).

Table 3 summarises the effects of the PE programme on PA levels in the experimental and control groups, showing the significance of differences between the pre- and post-test scores of the total experimental and control groups as well as differences between the two groups after the intervention. Substantial differences were found between the experimental and control groups for the time spent on the intensities of involvement in moderate PA ($p=0.025$), vigorous PA ($p=0.023$) and total PA ($p=0.005$) after the intervention, whereas no marked changes were observed in sedentary time between the two groups ($p=0.490$) (Table 3). The time spent on moderate and total PA increased significantly in the experimental group

between pre- and post-test measurements, with practical significances of medium effects ($ES=0.47$ and 0.51 , respectively), while no changes were found in the control group. The time spent on vigorous PA increased significantly in the experimental group between pre- and post-test measurements, which reflected medium practical significance effect ($ES=0.48$), while insignificant decrease was found in the control group. A pronounced decrease was found between the pre- and post-test score regarding time spent on sedentary behaviours in the experimental group, which reflected a small practical significance effect ($ES=0.39$), while this aspect remained stable in the control group.

Table 4 shows the significance of differences based on gender, between the pre- and post- test scores of the total experimental and control groups as well as disparities between the two groups after the intervention. Among the girls, the intervention programme appears to have contributed to significantly increased scores in moderate PA levels and decreased scores in the time spent on sedentary behaviours in the experimental group, which yielded medium practical significance effects ($ES= 0.52$ and 0.45 , respectively). However, no significant changes were found in the control group. With regard to the boys, the intervention programme also contributed to significant improvements in moderate and vigorous PA levels, but no change was observed concerning sedentary activities. The differences between pre- and post-test measurements of moderate and vigorous PA levels showed medium practical significance effects ($ES= 0.55$ and 0.47 , respectively), while no significant changes were found in the control group. The boys had higher scores in moderate PA than girls.

Table 2: Descriptive statistics of the physical activity results of control and intervention groups at pre- and post-test measurements (Mean \pm SD)

Variables	Pre-test					Post-test				
	Experimental Groups				Kruskal-Wallis	Experimental Groups				Kruskal-Wallis
	Group1 (n=10)	Group2 (n=10)	Group3 (n=10)	Group4 (n=10)	<i>p</i> value	Group1 (n=10)	Group2 (n=10)	Group3 (n=10)	Group4 (n=10)	<i>p</i> value
Moderate PA (min/Wk)	46.1 \pm 6.1	50.1 \pm 13.4	50 \pm 10.3	47 \pm 6.9	0.85	60.1 \pm 18.8	62.9 \pm 16.5	54.6 \pm 10.5	49.9 \pm 13.2	0.38
Vigorous PA (min/Wk)	46.7 \pm 14.1	45.7 \pm 12.9	41.7 \pm 5.6	41.1 \pm 5.7	0.94	47.9 \pm 6.4	58.4 \pm 20	56.9 \pm 34.4	55.4 \pm 36.1	0.65
Total PA (min/Wk)	92.8 \pm 17.2	95.9 \pm 22.4	91.8 \pm 12.1	88.1 \pm 7.5	0.96	108.1 \pm 18.5	121.4 \pm 30.3	111.6 \pm 35.8	105.4 \pm 47.1	0.66
Sedentary time (min/Wk)	232.6 \pm 66.8	277.4 \pm 69.1	274.2 \pm 92.8	274 \pm 102.2	0.88	222.8 \pm 28.2 \pm	243 \pm 22.8	228.3 \pm 59.1	207.9 \pm 34.7	0.45
	Control Groups					Control Groups				
	Group1 (n=37)		Group2 (n=33)		<i>p</i> value	Group1 (n=37)		Group2 (n=33)		<i>p</i> value
Moderate PA (min/Wk)	49 \pm 23.3		46.2 \pm 14.2		0.74	47.5 \pm 12		49.4 \pm 12.5		0.74
Vigorous PA (min/Wk)	45.5 \pm 13.2		46.8 \pm 9.9		0.30	42.1 \pm 10.2		43 \pm 11.8		0.82
Total PA (min/Wk)	94.5 \pm 28		93 \pm 21.3		0.77	89.6 \pm 20.5		92.4 \pm 18.6		0.64
Sedentary time (min/Wk)	224.7 \pm 53.8		243.4 \pm 54.3		0.65	234.7 \pm 64.9		250.8 \pm 95.9		0.83

PA = physical activity; SD = standard deviation; Wk= week

Table 3: The effects of the Physical Education intervention programme on physical activity levels in the experimental and control groups at pre- and post-test (Mean \pm SD)

Variables	Condition	Control group		Experimental group		ES	P(Con vs exp)
		Mean \pm SD	<i>p</i> (Pre vs Post)	Mean \pm SD	<i>p</i> (Pre vs Post)		
Moderate PA (min/Wk)	Pre-test	47.6 \pm 26.8	0.215	47.3 \pm 23.8	0.014*	0.47 ^b	0.825 ^{Pre}
	Post-test	48.5 \pm 30.0		57.3 \pm 35.2			0.025 ^{Post*}
Vigorous PA (min/Wk)	Pre-test	46.1 \pm 25.3	0.235	42.5 \pm 18.6	0.012*	0.48 ^b	0.445 ^{Pre}
	Post-test	43.9 \pm 25.4		54.7 \pm 31.2			0.023 ^{Post*}
Total PA (min/Wk)	Pre-test	93.7 \pm 52.2	0.688	91.0 \pm 43.9	0.008*	0.51 ^c	0.814 ^{Pre}
	Post-test	92.4 \pm 55.4		112.1 \pm 66.4			0.005 ^{Post*}
Sedentary time (min/Wk)	Pre-test	244.0 \pm 142.9	0.638	264.2 \pm 170.5	0.041*	0.39 ^b	0.279 ^{Pre}
	Post-test	242.8 \pm 169.0		226.9 \pm 137.0			0.490 ^{Post}

* $P < 0.05$; ES=Effect size: small $\geq 0.1^a$, medium $\geq 0.2^b$, large $\geq 0.5^c$; VS=Versus; Con=control group; Exp=Experimental group; PA = physical activity; SD = standard deviation; Wk= week

Table 4: The effects of Physical Education programme on physical activity levels in the experimental and control groups at pre- and post-test by gender (Mean \pm SD)

Variables	Condition	Control group				Experimental group					
		Girls	<i>p</i> (Pre vs Post)	Boys	<i>p</i> (Pre vs Post)	Girls	<i>p</i> (Pre vs Post)	<i>ES</i>	Boys	<i>p</i> (Pre vs Post)	<i>ES</i>
Moderate PA (min/Wk)	Pre-test	45.3 \pm 26.3	0.070	50.9 \pm 29.8	0.498	49.3 \pm 31.5	0.05*	0.42 ^b	45.7 \pm 24.7	0.037*	0.55 ^c
	Post-test	50.3 \pm 27.6		47.3 \pm 23.8		56.6 \pm 33.3			59.7 \pm 33.6		
Vigorous PA (min/Wk)	Pre-test	51.8 \pm 33.7	0.402	45.1 \pm 23.1	0.289	44.4 \pm 26.6	0.116	0.47 ^b	42.1 \pm 21.3	0.002*	0.47 ^b
	Post-test	43.9 \pm 22.3		41.7 \pm 16.3		46.5 \pm 18.3			57.1 \pm 34.9		
Total PA (min/Wk)	Pre-test	97.2 \pm 60	0.382	96 \pm 53	0.274	87.8 \pm 46	0.173	0.45 ^b	93.8 \pm 58.1	0.350	0.54 ^c
	Post-test	94.3 \pm 49.9		89 \pm 40.1		89 \pm 40.1			94.3 \pm 49.9		
Sedentary time (min/Wk)	Pre-test	221.6 \pm 138	0.917	249.6 \pm 141.7	0.986	275.1 \pm 174.3	0.039*	0.45 ^b	226 \pm 157.2	0.753	0.12 ^a
	Post-test	234.7 \pm 161.3		247.8 \pm 173.8		227.5 \pm 143.5			225 \pm 114.1		

* $P < 0.05$; ES=Effect size: small $\geq 0.1^a$, medium $\geq 0.2^b$, large $\geq 0.5^c$; VS=Versus; PA = physical activity; SD = standard deviation; Wk= week

Discussion

This study evaluated the effects of an enhanced quality PE programme on the PA levels of South African Grade 7 learners. The results showed that children in the experimental group improved their PA levels significantly and were more physically active compared to those in the control group after a 12-week intervention programme; indicating that the quality-enhancing components in the PE intervention programme were effective in increasing the participants' PA levels. These findings confirmed those reported in previous South African studies (Kemp and Pienaar 2009; Monyeki et al. 2012; Roos et al. 2014), where beneficial treatment effects in children's PA levels were found.

The quality-enhancing elements which were used in the present study, especially well-trained teachers and motivational strategies, were also incorporated in the above-mentioned South-African studies, and have been reported in several other PA intervention studies (Erwin et al. 2011; Pate et al. 2005; Kain et al. 2004; Verstraete et al. 2006). For instance, Erwin *et al.* (2011) evaluated the effect of a year-long low-cost, teacher-directed classroom-based intervention programme on PA levels of 10 year-old American children. This intervention programme incorporated two 30-minute classroom PA trainings per week and used motivational strategies such as activity break cards and web resources for activities. The results showed that an inexpensive, teacher-directed intervention programme can be effective in improving children's PA levels (Erwin et al. 2011). Significantly positive effects on PA levels of 2744 American high school girls were also found in the study of Pate *et al.* (2005) after a year-long comprehensive school-based intervention programme. This intervention programme was designed to include both intrinsic and extrinsic motivation strategies through quality instructional PE practices, family or community involvement, as well as school environments that supported PA. Similarly, Kain *et al.* (2004) found positive effects on PA and physical fitness following a six-month nutrition-education and PA intervention programme conducted among 2141 primary school children in Chile. The programme was presented twice a week for two hours on school facilities by integrated PE specialists who used improvised apparatus such as soccer balls and hula hoops. Dobbins *et al.* (2013), in their review of school-based PA programmes for promoting PA and fitness in children and adolescents, supported the principle that school-based intervention programme should focus on fostering positive attitudes toward PA, and that they should be comprehensive in involving the community and parents.

The results of such comprehensive PA intervention programmes confirm the belief that the provision of well-trained teachers, appropriate facilities, equipment and well-designed PE programmes in schools has positive effects on learners' perceptions of and behaviours with regard to PA (Rainer et al. 2012). A South African study by Sherman *et al.* (Sherman, Tran, and Alves 2010) emphasised that the lack of training of PE teachers, facilities and equipment, and poor status of PE in the school are the most profound factors influencing the implementation of quality PE programmes. It is, therefore, recommended that PE intervention programme, especially in South Africa, should incorporate well-trained teachers who can encourage learners to be physically active by using different motivational teaching strategies, adapting and monitoring activities scientifically and incorporating creative ways of improvising apparatus and equipment.

Limitations

The results of this study should be interpreted in the light of some limitations. Firstly, the increased PA levels which were found may not be sustainable as this would require that such enhanced PE intervention programme be incorporated in the school's PE curriculum. Thus

further research is recommended to investigate the long-term effects of such a quality driven PE intervention programme. Secondly, the limited ability of children to accurately recall their PA in self-reported questionnaires, is well-recognised in the literature (Telford et al. 2004; Rangul et al. 2008), and may have contributed to less accurate estimates of the participants' PA levels. Thirdly, the small sample size of this study confounds the power and generalizability of our results and warrants the need to conduct further research involving larger samples in order to substantiate the present findings. In this regard, however, Altman and Bland (2004) note that studies which seem to have low power due to limited effects of small samples, can still yield important information and tendencies even if the results are not definitive. Finally, although effort was made to integrate intrinsic motivation through the enthusiastic encouragement and information provided by the PE teachers in the PE programme used in this study, the reward system mostly incorporated extrinsic motivation. For future research, it is recommended that more emphasis be placed on autonomous, intrinsic motivation and internalization of behaviour as postulated by SDT.

Conclusion

Despite the above limitations, the usefulness of our study lies in the fact that the enhanced quality PE intervention programme, even when presented only once a week, seemed to be effective in increasing the children's PA levels. Therefore, it could provide a valuable framework for PE curriculum development and implementation targeted at promoting learners' PA levels, even in the presence of restricted time allocation, and limited teaching and learning resources.

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Conflict of Interests

The authors declare that they do not have any conflict of interest regarding the publication of this paper.

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CHAPTER 5



CHAPTER 5: Effects of a 12-week Physical Education intervention programme on physical and motor fitness of Grade 7 learners in Potchefstroom, South Africa

Effects of a 12-week Physical Education intervention programme on physical and motor fitness of Grade 7 learners in Potchefstroom, South Africa

Haili Tian

*Physical activity, Sport and Recreation Focus Area, Faculty of Health Science, North-West University, Potchefstroom Campus, Potchefstroom2520, South Africa.
tianhaili123@163.com*

Dorita du Toit

*Physical activity, Sport and Recreation Focus Area, Faculty of Education Sciences, North-West University, Potchefstroom Campus, Potchefstroom2520, South Africa.
Dorita.DuToit@nwu.ac.za*

Abel L. Toriola

*Department of Sport, Rehabilitation and Dental Sciences, Tshwane University of Technology, Pretoria 0001, South Africa.
toriolaal@tut.ac.za*

Abstract

This study aimed at evaluating the effects of an enhanced quality Physical Education (PE) programme on the physical and motor fitness levels of South African Grade 7 learners. Using a pre-test and post-test control-group design, 110 Grade 7 learners aged 12-13 years (experimental school, n = 40; control schools, n = 70) from two primary schools in Potchefstroom, South Africa, were studied. They participated in a 12-week PE intervention programme based on the South African Curriculum and Assessment Policy Statement (CAPS) which allocates one hour per week to teaching PE. The intervention included 5 quality-enhancing components namely well-trained teachers, homework activities, a reward system, improvised apparatus and the monitoring of activity intensity. In the experimental school, 4 experimental sub-groups of 10 learners each were formed. Other categories included two control groups (n = 37 and n = 33), one from the same school as the experimental school, and one from a different school. Physical and motor fitness levels were assessed using the Eurofit test battery. An analysis of covariance (ANCOVA) was used to examine between and within the group differences as well as the effects of the intervention programme. Effect sizes (ES) were calculated to evaluate practical significance. The co-variance analysis of learners' data after the 12 weeks intervention programme showed statistically significant improvements of varying degrees among most of the experimental groups with regard to the test results for sit and reach (ES=0.4, p=0.000), standing broad jump (ES=0.13, p=0.014), sit-ups (ES=0.39, p=0.000), shuttle run test for aerobic fitness (ES=0.14, p=0.007), plate tapping (ES=0.23, p=0.000), and shuttle run for agility (ES=0.28, p=0.000). The differences between the combined control and experimental groups regarding these tests also yielded practically and statistically significant differences (ES> 0.13; p<0.05), while no substantial differences were found in the control groups. It is concluded that the enhanced quality PE programme used in this study appears to be effective in improving physical and motor fitness among South African primary schoolchildren.

Key words: *Physical Education intervention, physical fitness, motor fitness, children.*

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1. Introduction

Physical and motor fitness are important indicators of physical and psychological health in youth (Eather *et al.*, 2013). The components of physical fitness (PF) are generally considered to be body composition, cardiovascular endurance, flexibility, strength and muscular endurance (Ortega *et al.*, 2008; Haga, 2009), while motor fitness components are speed, balance, coordination, agility and explosive power (Voelcker Rehage *et al.*, 2010; Sacchetti *et al.*, 2012). Maintaining and ensuring PF has shown strong negative correlations with overweight and obesity as well as cardiovascular disease risk factors (Parfitt *et al.*, 2009), and are associated with mental health and academic achievement in children and adults (Voelcker-Rehage *et al.*, 2010; Christodoulos *et al.*, 2006). In addition, several studies (Stratton *et al.*, 2007; Pienaar & Kemp, 2009; Eather *et al.*, 2013) demonstrate that children's fitness levels tend to decline, while fatness levels are inclined to increase with age.

Due to the relationship of overweight, obesity and other variables with PF, investigations into the factors influencing PF have increased in recent years (Sacchetti *et al.*, 2012). Castelli and Valley (2007) examined the effects of PF and motor competency on the physical activity (PA) levels of 230 children aged 7-12 years old in American Midwest and reported that children presented medium or low PA levels and a lack of motor competence. Similar findings have also been reported by Carter and Micheli (2013) who indicated that the aerobic fitness levels of American children and adolescents are decreasing. One study by Tomkinson *et al.* (2003) which examined trends in aerobic fitness among 12-15 year-old South Australian schoolchildren, reported that there had been a significant annual decline in PF levels among these children. In relation to children of similar ages in other countries, Australian children showed poor to average aerobic fitness levels (Tomkinson *et al.*, 2003).

In South Africa, a study by De Milander (2011) which investigated the motor proficiency and PF levels of 97 girls aged 12-13 years in Bloemfontein indicated that the majority of the girls had insufficient fitness levels. These findings support those of Lennox *et al.* (2008) who evaluated the PF and PA status of 15-year-old South African adolescents in the North West Province, and found low fitness and PA levels among the children. Similar results were reported in another South African study by Toriola and Monyeki (2012) which evaluated the health-related PF, body composition and PA status of 14 year-old South African adolescents in the North West Province.

Concern about the decline in children's fitness levels in many countries has prompted the need to design appropriate intervention programmes in order to reverse the trend. For instance, in their study of 10 year-old Australian children in Newcastle, Eather *et al.* (2013) evaluated the impact of a 6-month, 60 minutes per week multi-component school-based PA intervention programme, incorporated with homework and break-time activities, on the children's health-related fitness. The authors concluded that the children's PA levels and fitness especially, muscular fitness and flexibility significantly improved after the intervention. Similarly, Zhou *et al.* (2014) using a quasi-experimental design, investigated the effectiveness of a 12-month multifaceted intervention programme, including the incorporation of family and community involvement, to promote the PF levels of 357 Chinese preschool children in Beijing. The results demonstrated that such a multi-faceted intervention programme can successfully improve preschool children's body composition and PF. In a study conducted in Potchefstroom, North West Province of South Africa, Pienaar *et al.* (2013) designed a PA, diet, and behaviour modification intervention programme to improve the body composition and PF of 11 year-old children. It was concluded that the intervention programme had a significant beneficial impact on the learners' body composition profiles and health-related PF levels such as muscular strength and flexibility.

Another comparable study indicated that adolescents in disadvantaged communities of the North West Province showed significant improvements in aerobic fitness levels and motor skills after an extra-mural aerobic intervention programme carried out twice a week for 60 minutes per session (Lennox & Pienaar, 2013).

The low PF and PA levels of South African children as well as research results regarding the effect of intervention programmes were motivating factors for the reintroduction of PE in the South African school curriculum, after an absence of more than ten years (Du Toit *et al.*, 2007:241). However, PE has been allocated only one hour per week in the school time table (DBE, 2011:7), which is inadequate to improve the PF of children and adolescents when compared to international guidelines that youth should participate daily in at least 60 minutes of moderate to vigorous intensity PA (ACSM, 2009:3; WHO, 2009).

In addition to the limited time allocation for PE, the quality of PE in South African schools has been compromised by other challenges resulting from its long absence from the curriculum, including poor teacher preparation, inadequate resource allocation and its low status as a subject (Van Deventer; 2012:162; Du Toit *et al.*; 2007:241).

In the light of the above background, the question arises as to whether an enhanced quality PE programme, presented by well-trained PE teachers and incorporating initiatives like PE homework and creative rewards, can have a profound effect on children's physical and motor fitness levels. Therefore, the present study was designed to evaluate the effects of an enhanced quality PE programme on the physical and motor fitness levels of South African Grade 7 learners.

2. Methods

2.1 Research design

An experimental study was conducted using a pre-test and post-test control-group design in which the dependent variables were measured before and after intervention. Participants were assigned to experimental and control groups. The experimental groups participated in a 12-week enhanced quality PE programme presented by well-trained PE teachers, based on the guidelines of the South African Curriculum and Assessment Policy Statement (CAPS) (DBE, 2011). The control groups attended the usual PE classes taught by teachers who had had the usual governmental training after the reintroduction of PE, consisting of one afternoon's training in presenting PE. Physical and motor fitness levels were assessed before and after the intervention.

2.2 Participants

A convenient sample of 110 Grade 7 learners (experimental groups, $n = 40$; control groups, $n = 70$, aged 12-13 years) from two primary schools in Potchefstroom, the capital city of the North West Province in South Africa, participated in this study. Learners in the two schools had similar socio-economic backgrounds and were representative of the demographic composition of the Potchefstroom area. Although both schools had large open fields, no apparatus were available for PE lessons at the schools. In one school, 4 experimental sub-groups of 10 learners each were formed to control for possible teacher-interactive effect. As there were only ten boys among the 40 learners and in order to compare the experimental groups more accurately, it was decided to place all the boys in one of the four experimental groups. Two control groups, one from the same school ($n = 37$) as the experimental groups and one from a different school ($n = 33$) were used.

2.3 Measuring instruments

2.3.1 Anthropometric assessments

The anthropometric measurements which included body weight, stature, BMI and body fat percentage were performed according to the guidelines of the International Society for The Advancement of Kinanthropometry (ISAK, 2001). Body weight was measured on a portable electronic scale to the nearest 0.1 kg. Participants wore minimal clothing and took off their shoes before the weight measurement. BMI was calculated as weight (kg)/height (m²). Height was measured with a stadiometer and recorded to the nearest 0.1 cm. Percentage body fat was calculated from triceps and subscapular skinfolds measurements using the equation of Slaughter *et al.* (1988), which was age- and sex-specific.

2.3.2 Physical and motor fitness assessments

The EUROFIT (EUROFIT, 1988) test battery was used for the fitness measurements. It comprises nine tests measuring cardio-respiratory endurance, muscle strength, muscular endurance, flexibility, running speed, agility, and balance. For the purpose of the study the participants performed the following fitness tests:

20-meter multistage shuttle run - This aerobic fitness test required participants to step over markers located at a 20-metre distance simultaneously with a bleep signal until they were unable to keep up with the running pace.

Sit-ups - The number of sit-ups that learners were able to perform in 30 seconds was used to measure functional abdominal strength.

Sit and reach - Flexibility was measured with a sit and reach test. The participants reached forward over a measuring bar while seated bare feet and legs kept straight (knees fully extended) against a sit and reach box. The distance reached by the distal tips of the fingers, following forward inclination of the trunk was recorded to the nearest 0.1 cm.

Flamingo balance - The flamingo balance test was assessed on a 3 cm wide balance beam. The participants were required to stand on the balance beam with their preferred leg and the number of attempts in one minute was recorded.

Standing broad jump - The test evaluated the explosive power of the lower body and leg extensors. The distance the participants jumped a two-legged take off was measured and recorded to the nearest 0.01m.

Plate tapping - This test required the learners to perform taps with one hand on a rectangular plate and two round discs. They moved the preferred hand back and forth between the discs over the center hand. The time taken to complete 25 cycles was recorded.

Shuttle run 10 x 5 meters - Agility and running speed were assessed with a 10x5 m shuttle run test in which participants tried to touch each marker 5 times over a 5-metre distance. The total time taken was recorded.

Bent arm hang – This test evaluated upper body muscular endurance. Participants were assisted to the height of a horizontal bar with the chin at the level of the bar. The total time that the participant held this position to exhaustion was recorded.

2.4 The enhanced quality Physical Education programme

The enhanced quality PE programme was presented for 60 minutes once a week over 12 weeks, as prescribed in the PE curriculum guidelines suggested in the CAPS (DBE, 2011). According to the CAPS (DBE, 2011), PAs for the first semester of Grade 7 entails various PF activities (weeks 1 to 6) and indigenous games (weeks 7-12). Each lesson in the PE

intervention programme comprised a 10-minute warm-up and introduction, followed by a 50-minute activity session which consisted of 30 minutes of moderate to high intensity aerobic exercise (such as rope skipping, aerobic dance, throwing Jukskei, and playing soccer), and 20 minutes of strength and muscular endurance activities (like sit-ups, crab soccer, ball dribbling, and wheelbarrow exercises). Additionally, awards comprising stickers for class participation and completed homework as well as new homework were given at the end of each lesson. The compliance of learners to the programme was ensured by the marks awarding system, prescribed by the CAPS, whereby a learner attained a mark for every PE lesson that he/she participated in (DBE, 2011).

To optimize the quality of the PE programme within this framework and within the circumstances at the schools as described above, emphasis was placed on five components, namely using well-trained PE teachers, including homework activities, a reward system, improvised apparatus, and monitoring of the intensity of activities.

2.4.1 Well-trained PE teachers

The PE intervention programme offered to the experimental groups was presented by four pre-service PE teachers who have had 3 years of teacher training in a B.Ed PE degree programme (NWU, 2013). The B.Ed degree programme included in-depth training on skills required in the following specific areas: ability to differentiate learners with unique learning styles, physical abilities and developmental levels and adapting PE activities accordingly; using various PE teaching styles; incorporating in-depth knowledge of exercise and sport physiology into the PE programme, using effective organisational and discipline skills in presenting practical activities; and implementing accurate and effective assessment of movement skills and abilities (NWU, 2013). In the control groups, the normal PE programme was presented by PE teachers who had undergone one afternoon's PE teacher preparation programme presented by the North West Department of Education (Crouse, 2013). This is a crash teacher training programme designed in response to the urgent need created by the reintroduction of PE in the school curriculum.

2.4.2 Homework activities

Specific homework activities were given to learners to encourage them to be physically active after school and during their free time. These homework activities were follow-up activities of those presented during the PE lesson, but which always included aerobic exercise, even when practicing a sport skill. For example, when the PE lesson included the skill of dribbling a soccer ball, the homework activity would be to dribble the ball around obstacles placed in a line over a distance of 20 meters, and the learner would have to attempt to complete as many 20-meter sets successfully as possible in 5 minutes, and then repeat the exercise at least four times. The signatures of the learners' parents, confirming their compliance, were required and the learners were asked to show the homework to the teacher at subsequent classes, which also formed part of the warm-up activity for such lessons.

2.4.3 Reward system

Rewards included stickers, badges and certificates, and colourful self-evaluation and motivational charts, which were all made at minimum cost from recycled paper by the researchers. At the beginning of the intervention programme, learners received colourful booklets in which they received stickers for participation in lessons as well as completed homework (showing the activities that had been practiced at home). Learners who had a

certain number of stickers in their homework booklets within the first 6 weeks were awarded colourful badges. After finishing the programme and on completion of the fitness tests, the learners received certificates of acknowledgement.

2.4.4 Improvised apparatus

As the school did not have standard PE apparatus, improvised equipment were made from waste material, for example, balls were made from crumpled newspaper and tape. These supplies were then taken home by the learners for their homework activities.

2.4.5 Monitoring intensity of activities

The intensity of the aerobic activities during the PE lesson and homework activities was monitored by asking learners to measure their own heart rate at 5-minute intervals by using the manual palpation method to feel the carotid pulse (neck) or the radial pulse (wrist) and counting their heartbeat for ten seconds under the guidance and supervision of the teacher. Activities were then adapted (made faster or slower) so that learners' heart rates stayed within the recommended heart rate range for cardiorespiratory improvement; calculated as 60% - 80% of the estimated maximal heart rate (220-age) (ACSM, 2009). Therefore, the children's exercise heart rates ranged between 124 and 166 beats per minute throughout the intervention programme.

2.5 Ethical considerations

Ethical approval for the study was obtained from the Ethics Committee of the North West University (Ethics approval no: NWU-00003-14-S1). Permission was also obtained from the school principals as well as the North West Department of Education. Written informed consent was obtained from learners' parents before they participated in the study.

2.6 Procedures

Baseline and post-intervention assessments were performed on the school premises by the researcher, with the assistance of fourth-year pre-service PE teachers, who were well-trained in the implementation of the EUROFIT test battery.

2.7 Data Analysis

Data were analyzed using SPSS version 21 software. The descriptive characteristics were expressed as means and standard deviations. The comparisons between the experimental and control groups at the baseline measurements were evaluated with a series of analysis of covariance (ANCOVA). In the ANCOVA, adjusted means were computed with the pre-test data as co-variates to determine the effects of the intervention programme. Tukey's post hoc analysis was used to statistically interpret significant group differences. To examine the practical significance of differences, the results were analysed as recommended by Steyn (2006). In this regard, Steyn (2006) proposed that a correlation coefficient of 0.1 represents a small effect, 0.2 a medium effect and 0.5 a large effect. For all statistical analyses a probability level of 0.05 or less was taken to indicate significance.

3. Results

The baseline descriptive statistics of the children's anthropometric characteristics and the fitness results for the control and the experimental groups are presented in Table 1. With regard to anthropometric characteristics, only height differed significantly among all the experimental and control groups ($p=0.030$), while non-significant group differences were found in body weight, BMI and percentage body fat ($p=0.199$, 0.078 and 0.065 , respectively). The Tukey's HSD results for height showed that the significant difference was observed between experimental group 3 and control group 2, with learners in the control group 2 having higher mean values than those in experimental group 3. Regarding the fitness measurements, four of the eight fitness parameters showed statistically significant differences among the control and experimental groups as well as among the experimental groups, which were plate tapping ($p=0.000$), sit and reach ($p=0.001$), the 10x5 meter shuttle run ($p=0.000$) and the 20m meter shuttle run ($p=0.000$) tests. The Tukey's post hoc analysis showed that learners in experimental group 3 performed significantly poorer than the other groups regarding the plate tapping test. As for the sit and reach test, learners in experimental group 1 performed significantly worse than those in experimental group 2. Considering the 10x5 meter shuttle run test, experimental group 1 had significantly higher mean values compared with the other groups. Significant differences were found in the 20m meter shuttle run test among experimental groups 1, 2 and 3. Further analysis indicated that learners in experimental group 1 performed significantly better than those in experimental groups 2 and 3 (Table 1). However, the flamingo balance, standing long jump and bent arm hang tests did not yield any significant differences among the groups. Generally, experimental group 1 had the highest mean values for all the fitness measurements when compared to the other 3 experimental groups, which might be attributed to gender differences as this was the only boys' group.

Table 1: Descriptive statistics of control and experimental groups at baseline (Mean \pm SD)

Variables	Control Group		Experimental Group				p value
	Group1 (n=37)	Group2 (n=33)	Group1 (n=10)	Group2 (n=10)	Group3 (n=10)	Group4 (n=10)	
Height (cm)	152.7 \pm 7.9	156.5 \pm 6	154 \pm 5.1	154.1 \pm 7.3	148.4 \pm 7.4	150.3 \pm 7.4	0.030*
Weight (kg)	49.7 \pm 11.2	47.8 \pm 10.5	52.6 \pm 12.7	52.5 \pm 10.8	48 \pm 10.5	53.3 \pm 9.7	0.199
BMI (kg.m ⁻²)	20.8 \pm 4.35	19 \pm 4.1	21.5 \pm 4.1	22.0 \pm 4.2	21.8 \pm 4	23.1 \pm 3.7	0.078
%Body fat	20.7 \pm 5.7	20.3 \pm 7.1	19.6 \pm 4.6	22 \pm 1.9	20.3 \pm 4.8	22.2 \pm 1.0	0.065
Flamingo balance (attempts)	3.1 \pm 2.9	4.3 \pm 3.1	2.6 \pm 2.1	4.2 \pm 3.5	3.7 \pm 2.6	2 \pm 1.7	0.232
Plate tapping (sec.)	12.7 \pm 1.1	12.7 \pm 1.6	14.2 \pm 2.7	12.4 \pm 0.8	15.4 \pm 1.7	12.8 \pm 0.6	0.000*
Sit and reach (cm)	42 \pm 6.1	38.1 \pm 8.3	33.6 \pm 5.3	43 \pm 6.1	38.1 \pm 2.8	36.3 \pm 9.4	0.001*
Standing broad jump (m)	1.33 \pm 0.2	1.22 \pm 0.3	1.51 \pm 0.1	1.38 \pm 0.2	1.31 \pm 0.1	1.47 \pm 0.2	0.618
Sit-ups (reps)	12 \pm 6.1	12.8 \pm 5.5	10.4 \pm 1.6	7.8 \pm 4.3	7.8 \pm 3.1	11.2 \pm 3	0.182
Bent arm hang (sec.)	6.5 \pm 2.2	8.8 \pm 3.3	11.6 \pm 4.1	4.3 \pm 3	7.3 \pm 6.3	3.1 \pm 1.5	0.192
10x5 meter run (sec.)	21.5 \pm 2.3	22.6 \pm 3.9	21.3 \pm 2	24.7 \pm 1.5	23.8 \pm 2.6	22.3 \pm 1.4	0.000*
20m shuttle run (laps)	3.1 \pm 1.5	3.7 \pm 1.6	4.7 \pm 1.3	1.5 \pm 0.7	2.3 \pm 0.5	3 \pm 1	0.000*

* $P < 0.05$; BMI = body mass index

Adjustments were made for the above pre-test differences, after which the intervention effect was determined by means of a series of ANCOVA with the pre-test data used as co-variates. The results are shown in Tables 2 and 3, respectively.

Table 2: Adjusted post-test means for experimental and control groups

Variables	Control Groups		Experimental Groups				ES	p
	Group1 (n=37)	Group2 (n=33)	Group 1 (n=10)	Group 2 (n=10)	Group 3 (n=10)	Group 4 (n=10)		
Height (cm)	155.7	158.3	157.2	156.0	150.0	151.9	0.03	0.615
Weight (kg)	50.9	50.4	52.0	52.4	50.1	52.6	0.09	0.520
BMI (kg.m ⁻²)	20.5	20.1	20.9	21.6	21.3	22.8	0.03	0.590
%Body fat	21.7	20.7	19.1	21.9	19.9	22.8	0.13	0.309
Flamingo balance (attempts)	4.3	2.4	4.3	2.2	3.0	1.9	0.12 ^a	0.204
Plate tapping (sec.)	12.2	11.6	10.5	11.9	13.3	12.1	0.23 ^b	0.000*
Sit and reach (cm)	40.9	39.7	39.0	45.9	47.0	47.7	0.40 ^b	0.000*
Standing broad jump (m)	1.39	1.52	1.41	1.38	1.35	1.44	0.13 ^a	0.014*
Sit-ups (reps)	13.3	10.4	19.8	12.3	10.0	16.1	0.39 ^b	0.000*
Bent arm hang (sec.)	8.4	6.6	8.4	6.4	6.9	7.0	0.04	0.477
10x5 meter run (sec.)	22.1	21.3	15.0	23.7	22.6	20.3	0.28 ^b	0.000*
20m shuttle run (laps)	3.4	3.2	4.8	4.1	4.2	4.1	0.14 ^a	0.007*

M=Adjusted mean; ES=Effect size ; * $P < 0.05$; small $\geq 0.1^a$, medium $\geq 0.2^b$, large $\geq 0.5^c$; BMI = Body Mass Index

The ANCOVA revealed that the intervention programme resulted in significant group differences on all the fitness measurements except for bent arm hang and flamingo balance, indicating positive effects of the enhanced quality PE intervention programme. The post hoc pairwise comparisons indicated that experimental group 1 performed significantly poorer than the other three experimental groups regarding the sit and reach test. Furthermore, the improved scores in experimental groups 1, 3 and 4 showed substantial significances between pre- and post-test measurements, with practical significance of medium and large effects (ES= 0.28, 0.35 and 0.60). Experimental group 4 exhibited the highest mean values among the three experimental groups (31.4%), whereas no substantial changes were found in the control groups (Table 3). For the standing broad jump test, control group 2 performed significantly better than the other groups. However, the mean score of experimental group 4 was significantly increased between pre- and post-test measurements with practical significance of a large effect (ES= 0.70), while no changes were found in the other groups. With regard to the sit-up tests, experimental group 1 performed significantly better than the other groups. Results also indicated statistically significant increases in the experimental groups 1 and 4 between pre- and post-test measurements, which reflected large practical significance effects (ES= 0.60 and 0.53, respectively). It is striking to note that the highest improvement in mean score was noted in experimental group 1 (90.3%) in comparison to experimental group 4 (57.6%). Regarding the 20m shuttle run test, the intervention programme contributed to significant group differences among control groups 1 and 2 and experimental group 1, which also seemed to have resulted in marked improvements in

experimental groups 2, 3 and 4 between pre- and post-test measurements, with practical significance of large effects ($ES= 0.50, 0.70$ and 0.55). In this regard, experimental group 3 had the highest increase among the three experimental groups (82.6%). Considering the plate tapping and 10x5m shuttle run tests, significant group differences were observed between experimental category 1 and the other groups, and experimental group 1 performed the best compared with the other groups. Moreover, significant increases were also found between the pre- and post-test scores of the two tests of experimental group 1, which reflected large practical significance effects ($ES= 0.50$ and 0.51 , respectively).

Although this study did not aim to combine the control groups and experimental groups into two groups due to the differences in schools and teachers, it can be noted that the average adjusted pre- and post-test scores of all the experimental groups combined, also showed statistically significant differences in the same tests as describes above, namely the sit and reach ($ES=0.23$), standing broad jump ($ES=0.13$), sit-ups ($ES=0.18$), 20m shuttle run test ($ES=0.23$), plate tapping ($ES=0.50$) and 10 x 5m shuttle run ($ES=0.28$) tests. No significant differences were found in the pre- and post-test scores of the combined scores of the control groups.

Table3: Summary of statistical significant improvements, effect sizes and percentages of improvement of the experimental and control groups after adjustment by ANCOVA

Variables	Control Groups						Experimental Groups												
	Con 1			Con 2			Exp 1			Exp 2			Exp 3			Exp 4			
	<i>p</i>	Per	ES	<i>p</i>	Per	ES	<i>p</i>	Per	ES	<i>p</i>	Per	ES	<i>p</i>	Per	ES	<i>p</i>	Per	ES	
Plate tapping (sec.)	-	-	-	-	-	-	0.009*	8.69%	0.52 ^c	-	-	-	-	-	-	-	-	-	-
Sit and reach (cm)	-	-	-	-	-	-	0.05*	16%	0.28 ^b	-	-	-	0.005*	23.3%	0.35 ^b	0.001*	31.4%	0.60 ^c	
Standing broad jump (m)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001*	10.5%	0.70 ^c	
Sit-ups (reps)	-	-	-	-	-	-	0.000*	90.3%	0.60 ^c	-	-	-	-	-	-	0.000*	57.6%	0.53 ^c	
10x5 meter run (sec.)	-	-	-	-	-	-	0.009*	59.7%	0.51 ^c	-	-	-	-	-	-	-	-	-	-
20m shuttle run (laps)	-	-	-	-	-	-	-	-	-	0.003*	63.4%	0.50 ^c	0.016*	82.6%	0.7 ^c	0.033*	36.6%	0.55 ^c	

* $P < 0.05$; Con= control group; Exp= Experimental group; ES=Effect size; small effect $\geq 0.1^a$, medium effect $\geq 0.2^b$, large effect $\geq 0.5^c$; Per=Percentage

4. Discussion

This study investigated the effects of an enhanced quality PE programme on physical and motor fitness levels of South African Grade 7 learners. The results generally showed significant beneficial effects in three of the experimental groups for all the fitness measurements except for bent arm hang and flamingo balance, whereas none of the control groups showed statistically significant differences.

Regarding the fitness components, practically significant differences were found between pre- and post-test scores in one to three of the experimental groups in the score obtained for the sit and reach, standing broad jump, sit-ups, 20m shuttle run, plate tapping, and 10x5m shuttle run parameters after the intervention. Non-significant differences were found in the control groups. The improvement in the sit and reach test, which reflects children's flexibility, is consistent with the findings of other studies on children of similar age groups (Kemp & Pienaar, 2009; Mavridis *et al.*, 2004; Pienaar *et al.*, 2013) but inconsistent with the findings of Eather *et al.* (2013) who investigated a multi-component school-based intervention programme (incorporated with curriculum components, nutrition and family involvement) on health-related fitness and PA in 10 year-old Australian primary school children. The results indicated that the programme did not yield any treatment effects for flexibility although the total fitness scores and PA levels significantly improved after the intervention. However, studies including strategies designed specifically to improve flexibility in children are sparse.

With regard to cardiorespiratory endurance, measured by the 20m shuttle run test, the adjusted mean values revealed that aerobic fitness significantly increased in three of the four experimental groups (groups 2, 3 and 4) due to the effect of the intervention programme, and these improvements showed large practical significance effects. This finding is widely supported by the literature, with the majority of school-based PE interventions reporting significant treatment effects regarding improvements in aerobic endurance (Zhou *et al.*, 2014; Kriemler *et al.*, 2010; Kemp & Pienaar, 2009). A recent 10-month primary school-based study conducted in Switzerland by Kriemler *et al.* (2010) reported a significant increase in aerobic fitness among 498 children aged 11 years corresponding to a difference in running time of 20 seconds and over a distance of 60 meters equivalent to an average increase of 5% from the baseline training session. These findings are also comparable to those reported in a similar study by Zhou *et al.* (2014). In our study, the non-significant improvement in the cardiorespiratory endurance were found in experimental group 4 could be explained in the light of the fact that the learners already had a high level of cardiorespiratory endurance in the baseline assessment. Consequently, the intervention programme merely sustained the level of cardiorespiratory fitness in this group.

Our results which showed improved scores in the standing broad jump test (experimental group 4) and sit-up tests (experimental groups 1 and 4), which are measures of explosive strength and abdominal muscular endurance, are consistent with the findings of some intervention studies (Pienaar *et al.*, 2013; Mavridis *et al.*, 2004), although higher than those of a study by Eather *et al.* (2013) which investigated a multi-component school-based intervention programme on health-related fitness and PA of Australian primary schoolchildren, and found low treatment effects in muscular fitness tests.

The adjusted means of the dependent variables in our study further revealed that the plate tapping and shuttle run tests, which assess speed of limb movement, body movement and agility, significantly improved in one of the experimental groups (group1). These findings corroborate the reports of a similar study where a fitness training programme yielded improvements in the plate tapping and shuttle run tests (Pan *et al.*, 2014). Likewise, García-Hermoso *et al.* (2014) investigated a six-month physical exercise intervention programme on

fitness levels of 8-11 year-old Spanish boys with and without diet by using the EUROFIT test battery. The authors observed significant changes in various PF parameters, including limb speed and agility as determined by the plate tapping and 10x5 m shuttle run tests, respectively.

In summary, even though the same intervention programme was presented to all four experimental groups, this study found different degrees of improvements among the experimental groups suggesting that different teaching styles used by the four PE teachers might have influenced the outcomes of the intervention. It is therefore recommended that the effects of different teaching styles should be investigated in future PE intervention research. However, as the results of this study showed improvements in several fitness components among the experimental groups, in contrast to the control groups, it could be concluded that these positive changes may be attributed to the enhanced quality PE intervention programme. It is, therefore, strongly recommended that even though the South African curriculum prescribes the presentation of PE only once a week in the school time table, the PE programme should be presented by well-trained teachers, and should also include the other components of enhanced quality PE as described in this study, namely homework activities, a reward system, improvised apparatus, and monitoring of the intensity of activities.

5. Limitations and conclusion

The results of this study should be interpreted in the light of some limitations. Firstly, the increased physical and motor fitness levels which were found in this study may be attributable to a temporary effect which may not be sustainable. Thus further interventions might be required to sustain the improvements noted. Secondly, the small sample size of this study confounds the generalization of our results and warrants the need for further research to be conducted with larger sample sizes in order to substantiate the present findings. However, the usefulness of our study lies in the fact that the enhanced quality PE intervention programme was effective in increasing children's physical and motor fitness levels, and thus provides a valuable framework for PE curriculum development and implementation targeted at promoting the PF levels of primary school learners.

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CHAPTER 6



CHAPTER 6: SUMMARY, CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

6.1 Summary

6.2 Conclusions

6.3 Limitations and Recommendations

6.1 Summary

The purpose of this study was firstly, to validate a standardised physical activity questionnaire for Grade 7 learners in a South African context; secondly, to evaluate the effects of an enhanced quality PE Programme, presented by well-trained teachers, on the physical activity levels of Grade 7 learners in Potchefstroom, South Africa; and thirdly, to determine the effects of an enhanced quality PE Programme, presented by well-trained teachers, on the physical and motor fitness of the Grade 7 learners.

Chapter 1 provides the problem statement, objectives and hypotheses of the study, as well as the structure of the thesis.

Chapter 2 consists of a literature overview entitled: “Physical Education and its role in promoting physical activity and fitness”. This chapter presents a brief overview of literature, firstly, regarding physical activity and fitness, including the health values of regular physical activity and fitness. Secondly, research findings on children’s physical activity and fitness, government’s approaches to physical activity and fitness in children and adolescents, as well as the measurement of physical activity and fitness in children and adolescents are presented. Thirdly, the chapter focuses on PE, including definition of quality PE, PE teacher education, and PE development in South Africa.

Literature indicates that physical activity and fitness are important supportive elements for the maintenance and enhancement of health and well-being. Research further shows that physical activity is beneficial for young people in respect of self-esteem and cognitive functioning. Maintaining and ensuring physical and motor fitness have shown a strong relationship with decreased obesity and cardiovascular disease, improved skeletal and mental health, as well as academic achievement both in young and old people.

PE plays an important role in physical activity and fitness, which is beneficially associated with physical, mental, social and emotional development among children and adolescents. High quality PE goes beyond providing opportunities for physical activity and promises to provide children with opportunities to learn through meaningful and appropriate instruction. Literature further reports that the four areas of curriculum, policies and environment, instruction practices and student assessment are the main factors that ensure the successful implementation of a high quality PE programme. The PE teacher plays a major role in facilitating the roles of the last two of the above-mentioned factors.

The PE teacher forms an integral part of a high quality PE programme and plays an important role in providing knowledge of exercise concepts, improvement of motor skills and maintenance of healthy lifestyles. Research indicates that PE teacher training often differs according to the socio-economic status of countries, as does the consequent quality of PE programme implementation. Generally, education systems in developed countries place much emphasis on PE teacher training and PE teachers are expected to be certified before starting to teach. In developing countries, including South Africa, PE teacher training is often lacking. Consequently, most South African teachers are inadequately trained as specialists to teach PE as part of Life Orientation after the introduction of the new school curriculum in 2010. The shortage of trained PE teachers, coupled with the meagre one hour allocated to PE per week, has compromised learners' opportunities for participation in quality physical activity in schools.

This state of affairs has led to inadequate physical activity and fitness levels among children and adolescents in South Africa. The quality of PE in South African schools has also been compromised by other challenges resulting from its long absence from the curriculum, including poor teacher preparation, inadequate resource allocation and its lack of status as a subject. Further research is, therefore, needed to implement effective PE programmes to

address the low participation in physical activity and its associated poor fitness levels of school children.

In order to design effective PE intervention programmes, the accurate measurement of physical activity levels among learners is a pre-requisite. Although most physical activity measurement procedures include subjective and objective methods, a self-report questionnaire is inexpensive and applicable for use in schools. Therefore, this study validated an existing standardised self-report questionnaire for South African primary school children and used this questionnaire to evaluate the effects of a quality PE programme on the learners' physical activity levels.

Chapter 3, which is presented in article format and has been submitted to the *African Journal for Physical, Health Education, Recreation & Dance*, documents the results of the validation of a standardised self-report physical activity questionnaire, namely the Children's Leisure Activities Study Survey (CLASS) questionnaire, for the South African context. The purpose of this study was to evaluate the reliability and construct validity of a modified Children's Leisure Activities Study Survey (CLASS) questionnaire for 12-year-old South African children by comparing the results to the learners' physical fitness levels, which were measured using the Eurofit test battery. The results showed substantial internal consistency and significant intra-class correlations estimates for all intensities of physical activity, as well as sedentary time (ST), a section that was developed and added in the same format as the rest of the questionnaire (Cronbach's alpha ranged from 0.71 to 0.84, $p < 0.05$; ICC ranged from 0.73 to 0.95, $p < 0.05$). Non-significant differences were found in the means of test and re-test physical activity measurements. BMI had moderate negative correlations with both moderate and total physical activity ($r = -0.34$, $r = -0.36$, respectively, $p < 0.05$). Aerobic fitness was significantly correlated with all intensities of physical activity and ST ($r = 0.63$, 0.57 , 0.43 and -0.34 , respectively; $p < 0.05$). ST was significantly and negatively associated with sit-ups ($r = -0.38$, $p < 0.01$) and the shuttle run ($r = -0.29$, $p < 0.05$). Similarly, the learners' performances in the shuttle run (10x5 meter run), sit-ups, bent arm hang, and standing broad jump tests, had significant associations with vigorous physical activity. It was concluded that the CLASS questionnaire is a valid and reliable measure of physical activity in 12-year-old South African children.

Chapter 4 is also presented in the form of an article and has been submitted to *Physical Education and Sport Pedagogy*. The article presents the results found with respect to the effects of an enhanced quality PE programme on the physical activity levels of Grade 7 learners in Potchefstroom, South Africa. The quality of the PE programme was enhanced by incorporating five components, namely well-trained teachers, homework activities, a reward system, improvised apparatus and the monitoring of activity intensity. The results of the experimental groups showed practically and statistically significant increases in moderate physical activity ($ES=0.47$; $p=0.014$), vigorous physical activity ($ES=0.48$; $p=0.012$), and total physical activity ($ES=0.51$; $p=0.008$), as well as decreases in sedentary behaviours ($ES=0.39$; $p=0.041$) after the 12-week intervention programme, whereas no significant changes were found in the control groups. It was concluded that the enhanced quality PE programme is effective in improving the physical activity levels of South African primary schoolchildren.

Chapter 5 is presented in article format and has been submitted to the *Mediterranean Journal of Social Sciences*. The article contains the results of the effects of the 12-week enhanced quality PE intervention programme on the physical and motor fitness levels of Grade 7 learners in Potchefstroom. The results showed statistically significant improvements of varying degrees among most of the experimental groups with regard to the test results for the sit and reach test ($ES=0.4$, $p=0.000$), standing broad jump ($ES=0.13$, $p=0.014$), sit-ups ($ES=0.39$, $p=0.000$), shuttle run test for aerobic fitness ($ES=0.14$, $p=0.007$), plate tapping ($ES=0.23$, $p=0.000$), and shuttle run for agility ($ES=0.28$, $p=0.000$). The differences between the performance of the combined control and experimental groups in these tests also yielded practically and statistically significant differences ($ES > 0.13$; $p < 0.05$) after the 12 weeks intervention programme, while no substantial differences were found in the control groups. The enhanced quality PE programme appears to be effective in improving physical and motor fitness among South African primary schoolchildren.

6.2 Conclusions

The conclusions drawn from this research are presented in accordance with the set hypotheses from Chapter 1.

Hypothesis 1: A standardised physical activity questionnaire can be validated for Grade 7 learners in a South African context.

Hypothesis 1 is accepted, based on the fact that the modified CLASS questionnaire had substantial reliability and construct validity based on internal consistency, test-retest measurements and correlation between the intensity of physical activity and physical fitness assessments.

Hypothesis 2: An enhanced quality PE programme, presented by well-trained teachers, will have a significant positive effect on the physical activity levels of Grade 7 learners in Potchefstroom, South Africa.

Hypothesis 2 is accepted in view of the fact that children in the experimental groups improved their physical activity levels significantly and were more physically active compared to those in the control group after the 12-week intervention programme.

Hypothesis 3: An enhanced quality PE programme, presented by well-trained teachers, will significantly improve the physical and motor fitness of Grade 7 learners in Potchefstroom, South Africa.

Hypothesis 3 is accepted, based on the results of the study, which indicate that all the fitness measurements except for bent arm hang and flamingo balance showed statistically significant improvements after the intervention programme.

With regard to the main objective of the study, namely to determine the effect of an enhanced quality PE programme on the physical activity levels, physical fitness and motor fitness of pre-adolescent learners in South Africa, the main hypothesis that the enhanced quality PE programme had a positive effect on the learners' physical activity levels and fitness, is accepted.

The contributions of this study include the provision of a valid questionnaire to PE teachers with which to determine the physical activity levels of Grade 7 learners, as well as valuable information regarding the effect of a quality PE programme on said levels as well as on the learners' fitness. Furthermore, the quality-enhancing components included in the PE

programme in this study can supplement the content and implementation of the PE programme within the Life Orientation curriculum with the aim of improving learners' physical activity levels and fitness.

In this regard, from the results of the study, the main contribution of this study is consolidated in the following recommendations for PE programmes in countries like South Africa where there are challenging circumstances for PE, such as the lack of training of PE teachers, inadequate facilities and equipment, restricted time allocation and poor status of PE. The goal is to enhance the quality of PE and to ensure that learners' derive maximum benefits from physical activity participation.

- As the PE teacher plays a major role in providing opportunities and motivation for adequate and meaningful physical activities within PE programmes, it is strongly recommended that the PE teacher should be well-trained as a specialist. In the current South African school curriculum, a Life Orientation teacher has to teach five to six different focus areas of which PE is one, making it difficult for a teacher to specialise in any one focus area. The PE teachers in this study were trained to specialise in PE teaching, which means that they could differentiate between learners with various learning styles, physical abilities and developmental levels and adapt PE activities accordingly; use appropriate teaching styles suitable for PE; incorporate in-depth knowledge of exercise and sport physiology into the PE programme; use effective organisational and disciplining skills to present practical activities; implement accurate and effective assessment of movement skills and abilities; and select appropriate, challenging and progressive content. The results of the intervention in this study then accentuate the need for PE teachers to be trained as a specialist to present a quality PE programme.
- Specific homework activities that follow up on activities done during the lesson should be given with every PE lesson. Homework activities should mostly be given with specific instructions with regard to repetitions, time and apparatus, and should always be checked in subsequent lessons.
- A reward system should be used to motivate and inspire learners to do homework activities and to participate fully in PE lessons. Inexpensive rewards like stickers, badges and certificates can be printed and presented to learners in recognition of their efforts,

even during formal events like school and parental meetings.

- Due to the shortage of facilities and equipment in many South African schools, it is recommended that improvised equipment made from waste materials and that can be taken home by learners, be used to teach PE programmes (see appendix E for examples of improvised apparatus).
- Maintaining an adequate intensity of physical activity during the intervention programme is a pre-requisite to improve children's fitness levels. It is thus recommended that a PE programme should include the monitoring of the intensity of activities among children by using simple methods, such as the manual palpitation method which was used in this study, to monitor whether the learners' heart rates stay within the recommended heart rate range for cardiorespiratory improvement.
- The experimental groups in this study consisted of 10 learners each, whereas an average PE class in South Africa could include up to 40 learners in a class. In light of the present results, to optimise the effects of a quality PE programme, it is recommended that the number of learners in a PE class should be smaller, or alternatively the PE teacher should divide the class into smaller groups for effective instruction.
- In conclusion, the findings of this study reveal that the five quality-enhancing components of the PE intervention programme, which included well-trained teachers, two motivational strategies comprising homework actives and a reward system, improvised apparatus, and monitoring of the intensity of activities, have positive effects on learners' physical activity behaviours and fitness. It is, therefore, recommended that PE intervention programmes should be comprehensive and include as many strategies as possible to motivate learners to adopt physically active lifestyles.

6.3 Limitations and Recommendations for further research

The review of the literature reveals that as far as is known, this is the first study to investigate the effects of such an enhanced quality PE programme based on the guidelines of the CAPS on physical activity and fitness levels of South African learners. Furthermore, the uniqueness of this study lies in the fact that it is also plausible that it might be the first to provide

evidence concerning the validation of a modified CLASS questionnaire for assessing physical activity among 12-year-old South African schoolchildren. Thus, based on the results attained, the enhanced quality PE intervention programme was effective in increasing primary school learners' physical activity and fitness levels, and the modified CLASS questionnaire is also a valid and reliable measure of physical activity in 12-year-old South African children.

Although all efforts were made in this study to optimise the results, some limitations should, however, be acknowledged that could improve the generalisation of the results and the outcome of further studies:

- While a significant reliability was found in the study, the limited ability of children to accurately recall the total number of minutes spent on physical activity during weekdays and weekends is well-recognised in the literature and may have contributed to inaccurate estimates of the participants' physical activity levels. Also, the physical fitness levels used to validate the questionnaire is an indirect method of validation and might not be as accurate as direct methods, such as pedometers. It is therefore recommended that a combination of self-report and objective, direct measures should be used in further research for assessing children's physical activity behaviour.
- The increased physical activity and fitness levels that were found in this study may be attributable to a temporary effect, which may not be sustainable. Therefore, prospective research designs would be required to investigate the long-term effects in order to confirm the findings.
- The small sample size in this study confounds the generalisation of the results. It thus warrants the need for further research involving larger samples in order to substantiate the present findings.

APPENDIXES



APPENDIXES

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- Appendix A:** Ethical approval and title registration letter.
- Appendix B:** The validated CLASS questionnaire and informed consent form.
- Appendix C:** The enhanced quality PE intervention programme (12 lessons).
- Appendix D:** Rewards from rewards system: stickers, badges, certificates and homework booklets.
- Appendix E:** Apparatus improvisation.
- Appendix F:** Declaration of language editing.
- Appendix G:** Author guidelines for the African Journal for Physical, Health Education, Recreation and Dance.
- Appendix H:** Author guidelines for Physical Education and Sport Pedagogy.
- Appendix I:** Author guidelines for the Mediterranean Journal of Social Sciences.
- Appendix J:** Letter stating that article 1 (Chapter 3) has been published in the African Journal for Physical, Health Education, Recreation and Dance.
- Appendix K:** Letter stating that article 2 (Chapter 4) is in the revise process of Physical Education and Sport Pedagogy.
- Appendix L:** Letter stating that article 3 (Chapter 5) has been published in the Mediterranean Journal of Social Sciences in November.
- Appendix M:** Turnitin originality receipt.
-

APPENDIX A Ethical approval and title registration letter



Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: <http://www.nwu.ac.za>

Prof SJ Moss
PhASRec

Faculty of Health Sciences
Tel: 018 265-2291
Fax: 018 299-2088
Email: Wayne.Towers@nwu.ac.za

05 August 2014

Dear Prof Moss

Ethics Application: NWU-00003-14-S1

The effect of structured physical activity intervention programmes on the body composition, physical fitness, physical activity and motor proficiency of Grade 6 and 7 learners

Thank you for amending your application. All ethical concerns have now been addressed and ethical approval is granted until 30/12/2016.

Yours sincerely

Prof Minrie Greeff
Chairperson Health Research Ethics Committee

Original details: Prof Minrie Greeff(10187308) C:\Users\13210572\Documents\ETIEK\2014 ETHICS\NWU-00003-14-S1 - D Coetzee Goedkeuring.docm
05 August 2014

File reference: NWU-00003-14-S1



Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: <http://www.nwu.ac.za>

Post Graduate Studies and Organisation
Tel: 018-285 2427
Fax:
Email: 24908347@nwu.ac.za

Ms H Tian
17 Section 3 Peoples South Rd
Huaxi Campus

14 May 2014

Dear Ms Tian
REGISTRATION OF TITLE

t the recent Faculty Board meeting, the faculty of Health Science approved your title as follows:

The effect of an enhanced quality Physical Education Programme on physical activity and fitness among Grade 7-learners in Potchefstroom

The abovementioned title may under **no circumstances** be changed without consulting your supervisor/promoter and obtaining the approval from the Faculty Board.

Should you wish to submit for examination, please inform your supervisor. Upon approval of your supervisor, please submit the Notice of Submission form THREE months in advance, if you intend on submitting. The form is available at the M & D department or the administrative manager of the faculty.
Dates of submission of copies for examination:

- 31 March to 30 April 2014 to qualify for the September 2014 graduation ceremony
- 17 October to 14 November for the May 2015 graduation ceremony

Should you neglect to submit by 14 November 2014, the possibility exists that you will not qualify to graduate in May 2015. You will then be required to register again for 2015 to qualify for the next graduation ceremony in September 2015.

Your attention is drawn to the following publications / web addresses:

1. A Rules: http://www.nwu.ac.za/webfm_send/60147
2. Manual for Postgraduate Studies (2010): http://www.nwu.ac.za/webfm_send/46198

We wish you a pleasant and successful period of study.

Yours sincerely

Ms Thea Joubert
FOR CAMPUS REGISTRAR

Original details: Marietjie.Ackermann@nwu.ac.za(10512187) C:\Users\10512187\Desktop\Titelregistration.docm
23 January 2014

File reference: 7.1.11.

APPENDIX B The validated CLASS questionnaire and informed consent form

Name: _____ Gender: _____ Subject number: _____

Children's Leisure Activities Study Survey (CLASS)

Children's Questionnaire

Important

We are interested in what you do in your leisure time during a typical week.

There are no right or wrong answers- **this is not a test.**

Please answer all the questions as honestly and accurate as you can- this is very important.

Which of the following PHYSICAL activities do you usually do during a typical week
(From the start of the current school term, do not include school holiday)?

During a typical WEEK what activities do you usually do?	Do you do this activity?	MONDAY - FRIDAY		SATURDAY & SUNDAY	
		How many times Monday – Friday?	Total hours/minutes Monday – Friday?	How many times Saturday & Sunday	Total hours/minutes Saturday & Sunday
E.g. Bike riding	No Yes	2	40min	1	15min
Aerobics	No Yes				
Dance	No Yes				
Gymnastics	No Yes				
Tennis/ Hand tennis	No Yes				
Rugby	No Yes				
Soccer/Street soccer	No Yes				
Basketball	No Yes				
Cricket / street cricket	No Yes				
Netball	No Yes				

During a typical WEEK what activities do you usually do?	Do you do this activity?	MONDAY - FRIDAY		SATURDAY & SUNDAY	
		How many times Monday – Friday?	Total hours/minutes Monday – Friday?	How many times Saturday & Sunday	Total hours/minutes Saturday & Sunday
Volleyball/Softball/wrestling	No Yes				
Swimming laps	No Yes				
Swing for fun	No Yes				
Hockey	No Yes				
Tag/ chase games	No Yes				
Skipping rope/ Kgati	No Yes				
Roller blades	No Yes				
Athletics	No Yes				
Skate boarding	No Yes				
Bike riding	No Yes				
Household chores	No Yes				
Play on playground equipment/in parks/sports grounds	No Yes				
Play in the street or the yard - Traditional games	No Yes				

During a typical WEEK what activities do you usually do?	Do you do this activity?	MONDAY - FRIDAY		SATURDAY & SUNDAY	
		How many times Monday – Friday?	Total hours/minutes Monday – Friday?	How many times Saturday & Sunday	Total hours/minutes Saturday & Sunday
Bounce on the trampoline	No Yes				
Play with pets	No Yes				
Walk with dog	No Yes				
Walk for exercise	No Yes				
Jogging or running	No Yes				
Physical education class (LO practical)	No Yes				
Sport class at school (Activity period)	No Yes				
Travel by walking to school (to and from school= 2 times)	No Yes				
Travel by cycling to school (to and from school= 2 times)	No Yes				
Other (please state)	No Yes				

During a typical WEEK what other leisure activities do you usually do?	Do you do this activity?	Total hours/minutes	Total hours/minutes
		Monday – Friday?	Saturday & Sunday
E.g. TV/DVD's	No Yes	15 hours	6 hours 30min
PlayStation/ Nintendo/ Computer/ IPAd	No Yes		
TV/DVD's	No Yes		
Computer / Internet	No Yes		
Homework	No Yes		
Play indoors with toys	No Yes		
Sitting talking	No Yes		
Talk on the phone/ busy on your phone-SMS/BBM/ Whatsapp/facebook	No Yes		
Listen to music	No Yes		
Play Music instrument	No Yes		
Board games/ cards	No Yes		
Reading	No Yes		
Art & craft (e.g. pottery, sewing, drawing)	No Yes		
Imaginary play e.g. drama classes, plays	No Yes		
Travel by car or taxi (to and from school)	No Yes		
Other Please state:	No Yes		



NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOMKAMPUS

Privaatsak X6001, Potchefstroom
Suid-Afrika, 2520

Tel: (018) 299-1111/2222
Web: <http://www.nwu.ac.za>

Physical Activity, Sport and Recreation (PhASRec)

Tel: (018) 018-2991716
Faks: (018) 018-2991716
E-pos: dorita.dutoit@nwu.ac.za

30 October 2013

Dear Parents

PERMISSION FOR PARTICIPATION IN PHYSICAL ACTIVITY PROGRAMME

The research entity Physical Activity, Sport and Recreation (PhASRec) of the North-West University plans to do a research project in 2014 where-in the physical activity levels of 12-year old learners will be investigated and compared to other variables. In light of this project we would like to do a small pilot study which entails the completion of a brief questionnaire by the Grade 6 learners of President Pretorius School, during school hours. The questionnaire contains questions regarding learners' participation in sport and other physical activities during a normal week, and will take approximately ten minutes to complete.

The purpose of the research is to develop a valid questionnaire with which the physical activity levels of 12-year old learners can be measured.

In order to conduct this research, we need to ask your permission as parents, as well as the learner's permission, for him / her to participate. You are therefore kindly asked to complete the accompanying form together with your child and return it to the school. You are also most welcome to contact me at any time for more information regarding the project.

Yours sincerely,

Dr. Dorita du Toit
Project Leader / Senior Lecturer Movement Education
Physical Activity, Sport and Recreation (PhASRec)



Research project: The validation of a questionnaire regarding the physical activity levels of 12-year old learners

Consent and indemnity form

With this I, _____, parent / gaurdian of _____ (name of learner), confirm that I have read and that I understand the accompanying information regarding the above research project, and that he / she may participate in the project; thus he / she may complete a questionnaire regarding his / her participation in sport and physical activity.

Signature of parent / gaurdian _____ Date _____

With this I, _____, (name of learner), confirm that I have read and that I understand the accompanying information regarding the above research project, and that I will voluntarily participate in the project; thus I may complete a questionnaire regarding my participation in sport and physical activity.

Signature of learner _____ Date _____

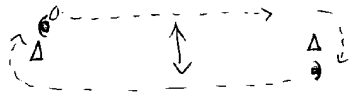
APPENDIX C

The enhanced quality PE intervention programme

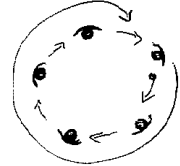
Physical Education lesson 1 (Physical Fitness, 30 min.)


Subject		Life Orientation	Date	25 February	Grade	7
Topic		Physical Education	Lesson aim	Rope skipping skills	Number of learners	8-10
Physical Education theme		Physical fitness	Sub-aim (CAPS)	Participate in physical fitness programme		
Movement concepts		Muscle names – quadriceps and hamstrings; definition of cardio, heart rate (HR) as measure of cardio-respiratory intensity				
Assessment		Normal rope skipping, one other rope skipping skill (1 leg skipping / straddle and together)				
Time	Component	Activity	Organisation		Apparatus	
Introduction						
5 min	Aims, movement concepts, warm-up	<ul style="list-style-type: none"> - Definition of cardio and how to measure intensity (HR) - One partner does 20 Jumping Jacks while the other partner runs around him until he has finished doing 20, then they switch. - Stretching: thighs (quadriceps and hamstrings – teach learners the names), ankles, calves 	Learners stand 2-2 together		None	
Primary activities						
20 min	Cardio: rope skipping skills Abdominal muscular endurance Upper arm and shoulder strength Agility	<ul style="list-style-type: none"> - Take resting HR. Do basic rope skipping, then 1leg skipping, straddle and close while jumping, switch jumps, double spin, cross-over (repeat each at least 10 times). Take HR once during these activities. - Circuit (each station for 2 min): Station 1- sit-ups partners clap each others' hands Station 2 – wheelbarrow over beanbags placed in a circle (may not touch beanbags, partner holds by the thighs) Station 3 – run zig-zag between cones placed in 2 lines, forward, backward and sideways 	- Learners in a half circle, teacher in front of them 2-4 learners at each station -		11 ropes, 10 beanbags, 10 cones	
Conclusion						
5 min	Movement concepts	<ul style="list-style-type: none"> - Definition and measurement of cardio-respiratory fitness, where is quadriceps and hamstrings - Assessment: do basic and one more rope skipping skill - Homework: Go and practise one rope skipping skill (other than basic) for 50 times 	Learners in a half circle, teacher in front of them		10 ropes – learners get ropes to take home, receive homework books and stickers for participation	

Physical Education lesson 2 (Physical Fitness, 30 min.)

Subject		Life Orientation	Date	25 February	Grade	7
Topic		Physical Education	Lesson aim	Rope skipping skills	Number of learners	8-10
Physical Education theme		Physical fitness	Sub-aim (CAPS)	Participate in physical fitness programme		
Movement concepts		Muscle names – abdominal muscles; definition of strength				
Assessment		Partner rope skipping (at least one skill)				
Time	Component	Activity	Organisation		Apparatus	
Introduction						
5 min	Aims, movement concepts, warm-up	<ul style="list-style-type: none"> - Definition of strength and what it's needed for. - Both learners run clockwise around two cones placed \pm 10 m apart. Every time the learners run past each other, they pass the beanbag. Learners must try to pass and catch correctly, as many times as they can before the allotted time is over. - Stretching: thighs, ankles, calves, abdominals (teach learners the name and function of the abdominal muscles) 	Learners stand 2-2 together at a set of cones		16-20 cones 5 beanbags	
						
Primary activities						
20 min	Cardio: partner rope skipping skills Abdominal muscular endurance Upper arm and shoulder strength Agility	<ul style="list-style-type: none"> - Recap on homework: let every learner (they can do it two at a time) show the homework they had to practice) . - Partner rope skipping: give every pair of learners the paper with 5 partner rope skipping activities. They have to try at least 4, and show the teacher as soon as they get one right (=assessment). - Sit-ups: partners throw beanbag to each other every time they sit up, continue for 1 minute (learners also count how many they can do) - Balance on one leg, throw beanbag to partner 30 times (once each leg) 	<ul style="list-style-type: none"> - Learners in a half circle, teacher in front of them - Learners 2-2 together 		11 ropes, 5 beanbags	
Conclusion						
5 min	Movement concepts	<ul style="list-style-type: none"> - Definition of strength, location and function of abdominals - Homework: Practise sit-ups in 30 seconds, next time teacher will test how many can be done 	Learners in a half circle, teacher in front of them		Stickers for participation and previous homework	

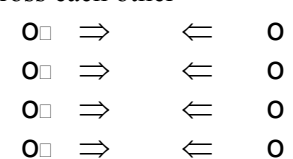
Physical Education lesson 3 (Physical Fitness, 30 min.)

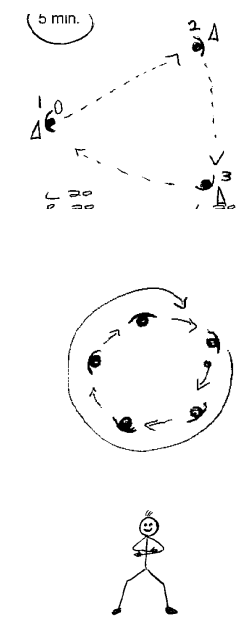
Subject		Life Orientation	Date	25 February	Grade	7
Topic		Physical Education	Lesson aim	Cardio-games with balls	Number of learners	8-10
Physical Education theme		Physical fitness	Sub-aim (CAPS)	Participate in physical fitness programme		
Movement concepts		Muscle names – deltoids, biceps, triceps; definition of muscular endurance				
Assessment		Sit-ups (abdominal muscular endurance)				
Time	Component	Activity	Organisation		Apparatus	
Introduction						
5 min	Aims, movement concepts, warm-up	<ul style="list-style-type: none"> - Definition of muscular endurance and what it's needed for. - The ball is thrown quickly from one learner to the next along the circle. The learner who threw the ball first, must run around the outside of the circle to his original place, and must try to reach his place before the ball does in order to catch the ball again when it gets there. Repeat until everyone has had a turn to run. - Stretching: hamstrings (stand & touch toes), ankles, shoulders and arms (teach learners the names and functions of the deltoid, biceps and triceps muscles) 	<ul style="list-style-type: none"> - Learners stand in a half circle around teacher - Two groups of 3- 4 learners in a circle  <ul style="list-style-type: none"> - Learners stand in a half circle around teacher 		<p>None</p> <p>-2 balls, 1 per circle</p>	
Primary activities						

<p>20 min</p>	<p>Cardio: partner ball skills</p> <p>Abdominal muscular endurance Upper arm and shoulder strength Agility</p>	<p>- Recap on homework: let every learner (they can do it two at a time) show the homework they had to practise, namely a rope skipping skill)</p> <p>1. Groups of 4 learners. Two learners stand side by side at one cone, which is placed 20 meters from the other cone. One learner is positioned in the middle between the two cones while the other learner is standing behind the other cone. Learner 1 throws the ball to learner 2 and runs to take position behind learner 2, while learner 3 runs in and takes position in the middle between the two markers. Learner 2 throws the ball to learner 3, who throws the ball to learner 4 and runs to stand behind learner 4 while learner learner 2 runs in to stand in the middle. Learner 4 throws the ball to learner 2, who throws the ball to learner 1 and runs to stand behind learner 1, while learner 4 runs in to stand in the middle. Try to maintain a flowing, continuous movement until every learner has had a turn to be in the middle.</p> <p>2. Pairs of learners are positioned in their marked areas, one of the two has the ball. Learner 1 (with the ball) dribbles the ball with the feet behind learner 2 who runs forward, and tries to stay as close as possible to learner 2. When the teacher shouts “pass!” or blows the whistle, learner 1 passes the ball to learner 2, who then dribbles the ball behind learner 1. Continue for 5-6 minutes.</p> <p>- Sit-ups partners throw ball to each other every time they sit up, continue for 1 minute (learners also count how many they can do) . - Balance on one leg, throw ball to partner 30 times (once each leg).</p>	<p>- Learners in a half circle, teacher in front of them - Learners 2-2 together</p>  <p>-</p> <p>4 cones per pair of learners, about 20 meters apart, placed in a rectangle.</p> <p>Pairs of learners on their mats</p>	<p>-11 ropes</p> <p>- 2 balls</p> <p>- 4 balls</p> <p>- 4 balls</p>
<p>Conclusion</p>				

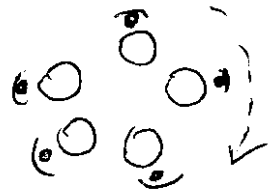
5 min	Movement concepts	- Definition of muscular endurance, location and function of deltoids, biceps and triceps - Homework: Go practise sit-ups in 30 seconds, next time teacher will test how many can be done	Learners in a half circle, teacher in front of them	Stickers for participation and previous homework
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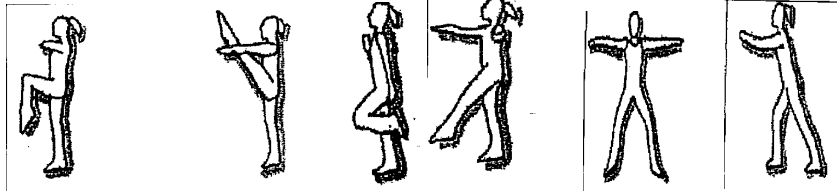
Physical Education lesson 4 (Physical Fitness, 30 min.)

Subject	Life Orientation	Date	19 March	Grade	7
Topic	Physical Education	Lesson aim	Cardio-games with balls	Number of learners	8-10
Physical Education theme	Physical fitness	Sub-aim (CAPS)	Participate in physical fitness programme		
Movement concepts	Criteria for improving cardio-respiratory fitness (3x/week, 30min, intensity of heart rate >120bpm, cardio activities)				
Assessment	Agility skill with ball				
Time	Component	Activity	Organisation	Apparatus	
Introduction					
5 min	Aims, movement concepts, warm-up	- Plastic bag game: two learners stand 10m from each other, one holds the plastic bag. At the teacher’s sign, the learner with the bag throws the bag up as high as he can and then runs to the spot where the other learner is standing. The other learner runs and must catch the bag before it hits the floor. Teams of two count who can catch the most without the bag touching the floor, in 2 minutes. - Stretching: hamstrings (stand & touch toes), ankles, calves, while discussing the criteria for improving cardio-respiratory fitness (see movement concepts above).	- Two lines of 3- 4 learners across each other  - Learners stand in a half circle around teacher	- 3-4 plastic bags -None -	
Primary activities					


<p>20 min</p>	<p>Cardio: partner ball skills</p> <p>Abdominal muscular endurance Upper arm and shoulder strength Agility</p>	<p>- Recap on homework: let the learners (they can do it two at a time while the other two count the sit-ups of one learner each) show the homework they had to practise, namely sit-ups in 30 sec.</p> <p>1. Groups of 3, each learner standing at a marker, markers placed in the formation of a triangle, 10 meters from each other. Learner 1 runs to and passes the ball to learner 2, takes learner 2's position while learner 2 runs to and passes to learner 3 and takes his place, etc. Continue until each group has completed their triangle 5 times.</p> <p>2. 5 learners in a group, jogging in a circle. The ball is thrown quickly from one learner to the next along the circle. The learner who threw the ball first, must run around the outside of the circle to his original place, and must try to reach his place before the ball does in order to catch the ball again when it gets there. Repeat until everyone has had a turn to run.</p> <p>- Jump squats: two partners stand 5m from each other, each with a ball. Squat and jump up while throwing the ball to each other (simultaneously), also catching the ball while jumping. X 10</p>	<p>- Learners in a half circle, teacher in front of them</p> <p>- Learners 2-2 together</p> 	<p>-11 ropes</p> <p>- 4 balls, 9 markers</p> <p>- 4 balls</p> <p>- 8 balls</p>
Conclusion				
<p>5 min</p>	<p>Movement concepts</p>	<p>- Criteria for improving cardio-respiratory fitness.</p> <p>- Homework: Go practise at home – throw the ball high forward, do the grapevine step / skip very fast and catch the ball. See how many times you can do this (to and through) in one minute.</p>	<p>Learners in a line, teacher in front of them.</p> <p>Learners do the homework skill once.</p>	<p>Stickers for participation and previous homework</p>

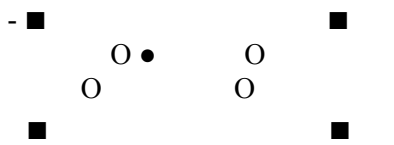
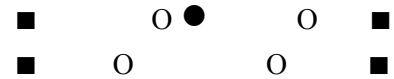
Physical Education lesson 5 (Physical Fitness, 30 min.)

Subject		Life Orientation	Date	26 March	Grade	7
Topic		Physical Education	Lesson aim	Aerobics	Number of learners	8-10
Physical Education theme		Physical fitness	Sub-aim (CAPS)	Participate in physical fitness programme		
Movement concepts		Criteria for improving strength / muscle building (3x/week, sufficient resistance to fatigue muscles, 8-12 reps, resistance exercises like weights or own body weight exercises)				
Assessment		4 Aerobics movements				
Time	Component	Activity	Organisation		Apparatus	
Introduction						
5 min	Aims, movement concepts, warm-up	<p>- Hoop bounce game: Groups of 5, place 5 hoops in a circle, each learner stands behind a hoop with a ball in his hand. On the signal of the teacher, all the learners bounce the tennis ball hard in their hoops, then immediately move on to the next hoop so that they can catch the ball of the learner next to them when it rises from the bounce. Try to make it a flowing, continuous movement of “hop, move, catch, hop, move, catch” etc. Place the hoops far enough from each other so that learners have to run to the next hoop.</p> <p>- Stretching: hamstrings (stand & touch toes), ankles, shoulders, sides while discussing the criteria for improving strength (see movement concepts above)</p>	<p>- Two lines of 3- 4 learners across each other</p>  <p>- Learners stand in a half circle around teacher</p>		<p>- 5 Hoops per group, 5 tennis balls per group</p> <p>-None</p> <p>-</p>	
Primary activities						

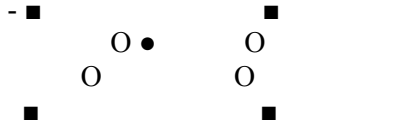
<p>20 min</p>	<p>Cardio: Aerobics</p> <p>Abdominal muscular endurance Upper arm and shoulder strength Agility</p>	<p>- Recap on homework: let the learners (they can do it two at a time) show the homework they had to practise, namely the throw of the ball high forward, do the grapevine step / skip very fast and catch the ball.</p> <p>- Aerobics: show learners the 5 movements and let them practise without music. Then do all 5 continuously for 8 counts each, then teach them a grapevine / sideways step. Then to the music, do all 5 moves again after each other (8 counts each), do the grapevine step and on the last step turn in a different direction. Repeat until facing forward again. Repeat the whole sequence.</p> <p>The 5 moves: knee-lift Kick Skip Jack Lunge</p>  <p>- Wheelbarrow (girls take each other on the thighs) over small obstacle course: place 6 cones in a circle, learners have to complete the circle walking over the cones.</p>	<p>- Learners 2-2 together</p> <p>- Learners in two lines in front of the teacher</p> <pre> O O O O O O O O O O - 0 </pre> <pre> I I I I I I </pre>	<p>-11 balls</p> <p>- Music</p> <p>- 6 ropes</p>
<p>Conclusion</p>				
<p>5 min</p>	<p>Movement concepts</p>	<p>- Criteria for improving strength (relate to wheelbarrow).</p> <p>- Homework: Go practise at home – the whole sequence of the 5 moves for 4 counts each, then the grapevine step and in a new direction, until facing forward again..</p>	<p>Learners in a line, teacher in front of them.</p> <p>Learners do the homework skill once (one direction)</p>	<p>Stickers for participation and previous homework, badges for all who have 9 stickers</p>

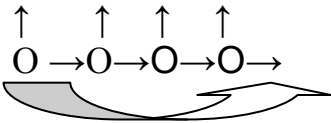
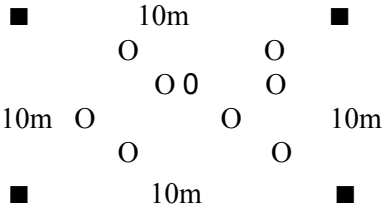
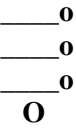
Physical Education lesson 6 (Indigenous games, 30 min.)

Subject		Life Orientation	Date	26 March	Grade	7
Topic		Physical Education	Lesson aim	Target throw	Number of learners	8-10
Physical Education theme		Community / Indigenous invasion games	Sub-aim (CAPS)	Participate in community / indigenous games that include the concept of invasion		
Movement concepts		Technique of overhand target throwing (ball from behind ear, point towards target, step with opposite foot, throw by moving elbow first, follow through with arm)				
Assessment		Overhand throw at target from 5m away (correct technique & number of hits in 1 minute).				
Time	Component	Activity		Organisation	Apparatus	
Introduction						
5 min	Aims, warm-up & assessment of previous homework	<p>- Aerobics: 5 movements done in previous lesson – do whole sequence (4x each movement, then do quarter turn and repeat, until facing front again), together, while assessing learners.</p> <p>The 5 moves:</p> <p>knee-lift Kick Skip Jack Lunge</p>  <p>- Stretching: hamstrings (stand with on straight leg in front & touch toes, change legs), ankles, shoulders (pull elbow down behind head, then try to touch hands behind back with one arm above and one below)</p>		<p>- Learners in two lines in front of the teacher</p> <pre> O O O O O O O O O O 0 </pre> <p>- Learners stand in a half circle around teacher</p>	<p>- CD player & music</p> <p>-None</p>	
Primary activities						

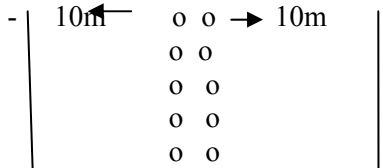
<p>20 min</p>	<p>Sport skill: Overhand throwing at target</p> <p>Indigenous game, applying sport skill Agility, hand-eye coordination</p> <p>Agility, foot-eye coordination</p> <p>Upper arm and shoulder strength</p>	<p>- Do the overhand throw slowly while emphasizing correct technique (see movement concepts above). Two learners throw at cones placed between them for 1 minute. Learners must run and get the ball each time and stand behind the starting line again before throwing again.</p> <p>- Target ball game: Groups of 4 learners, 2 teams of 2 learners each, one ball – place 4 beanbags in a square 5m x5m. Learners must stay within the area of the beanbags. The aim is to throw and hit the beanbags of the opposite team as many times as possible within the designated time (5min). Learners may not run with the ball and may not make contact. Learners may throw the ball to teammate and may block or catch the ball when thrown by the other team. Each time the ball hits a target, the team who threw the ball gets a point, and the opposite team gets the ball from the spot where they pick it up.</p> <p>- One legged beanbag soccer: Two teams of two learners each try to kick a beanbag into the opposite team’s goal (two beanbags placed together), but they may only hop on one leg. Use two beanbags (each team starts with one beanbag).</p> <p>- (If time allows) Resistant push-ups: Two learners stand in push-up position facing each other (girls can do ladies push-ups), do push-up and clap each other’s hands before doing another; do 10 push-ups.</p>	<p>- Learners face each other, 2-2 around 10m apart, with a cone in the middle o 5m Δ 5m o</p>   <p>2-2 learners in a line in front of teacher</p> <pre> o o o o o o o o o </pre>	<p>-11 balls</p> <p>- 8 beanbags, 2 balls</p> <p>- Music</p> <p>- None</p>
<p>Conclusion</p>				
<p>5 min</p>	<p>Movement concepts, Homework</p>	<p>- Recap on correct overhand target throwing technique</p> <p>- Homework: Go practise at home – throwing at a target (rolled up socks / plastic cup / paper plate etc.) from ± 5m away, run and get ball and run back to starting point, throw again; see how many times you can hit the target in 1 min. (Do 3 times and see if you can do more each time).</p>	<p>Learners in a line, teacher in front of them. Learners do the homework skill once (one direction).</p>	<p>Stickers for participation and previous homework, badges for all who have 9 stickers</p>

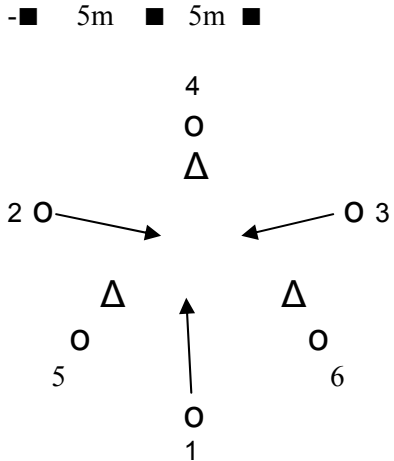
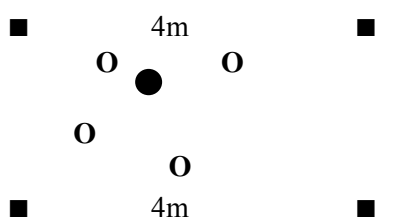
Physical Education lesson 7 (Indigenous games, 30 min.)

Subject		Life Orientation	Date	15 April	Grade	7
Topic		Physical Education	Lesson aim	Passing the ball, modified touch rugby	Number of learners	8-10
Physical Education theme		Community / Indigenous invasion games	Sub-aim (CAPS)	Participate in community / indigenous games that include the concept of invasion		
Movement concepts		Technique of passing the ball (hold ball with fingers under the ball, swing back while the eyes are already focused on the receiver / target, swing ball sideways past body, rotate upper body toward receiver when letting the ball go)				
Assessment		Passing ball at target from 5m away (correct technique & number of hits in 1 minute).				
Time	Component	Activity	Organisation		Apparatus	
Introduction						
5 min	Aims, warm-up & assessment of previous homework	<p>(Game of previous lesson) - Target ball game: Groups of 4 learners, 2 teams of 2 learners each, one ball – place 4 beanbags in a square 5m x5m. Learners must stay within the area of the beanbags. The aim is to throw and hit the beanbags of the opposite team as many times as possible within the designated time (5min). Learners may not run with the ball and may not make contact. Learners may throw the ball to teammate and may block or catch the ball when thrown by the other team. Each time the ball hits a target, the team who threw the ball gets a point, and the opposite team gets the ball from the spot where they pick it up.</p> <p>- Stretching: hamstrings (stand with on straight leg in front & touch toes, change legs), ankles, shoulders (pull elbow down behind head, then try to touch hands behind back with one arm above and one below)</p>	 <p>- Learners stand in a half circle around teacher</p>		-	-None
Primary activities						

<p>20 min</p>	<p>Sport skill: passing ball at target</p> <p>Agility, hand-eye coordination</p> <p>Indigenous game, applying sport skill Agility, hand-eye coordination</p> <p>Upper arm and shoulder strength</p>	<p>- Do the pass slowly while emphasizing correct technique (see movement concepts above).</p> <p>- Place three beanbags 5m apart. Two learners run around the cones, then past each other; each time they pass the beanbag in the middle they pass the ball to each other (emphasize passing technique) for \pm 5 minutes.</p> <p>- Passing game: 4 learners run in a row next to each other from one line to another (about 10m apart). The first learner passes the ball to the second, who passes the ball to the third, who passes the ball to the fourth learner. After passing the ball, the first learner has to run behind the other learners to the end of the row to receive the ball from the fourth learner, and he then passes the ball back again. The ball is then passed back to the second learner, who is now the first learner in the row. Repeat from the start.</p> <p>- Modified touch rugby: 4 learners in a team within a grid of 10x10m, one team tries to score a try by going over the other team's goal line. The other team "tackles" this team by touching them with both hands. Emphasise that the learners have to pass the ball to avoid being touched.</p> <p>- (If time allows) Push-up bridge: Three learners stand in push-up position in a row next to each other; the fourth learner roll the ball under the "bridge" and runs to the other side to catch the ball and roll it back under the bridge again. She then forms part of the bridge and the second learner rolls the ball under the bridge. Hold the bridge and repeat until every learner has had a turn to roll the ball.</p>	<p>Learners stand in a half circle around teacher.</p> <p>- ■ 5m ■ 5m ■</p>   <p>Groups of 4 learners</p> 	<p>-11 balls</p> <p>- 15 beanbags</p> <p>- 1 ball per group of 4, cones to mark lines</p> <p>-4 beanbags, 1 ball</p> <p>- 1 Ball per group of 4</p>
<p>Conclusion</p>				
<p>5 min</p>	<p>Movement concepts, Homework</p>	<p>- Recap on correct passing technique</p> <p>- Homework: Go practice at home – passing at a target (mark / paper on wall) from \pm 5m away, run past target from about 5 m, pass at target while running past target, get ball and run back to starting point, repeat; see how many times you can hit the target. (Do 3 times 10).</p>	<p>Learners in a line, teacher in front of them</p> <p>Learners do the homework skill once (one direction)</p>	<p>Stickers for participation and previous homework, badges for all who have 9 stickers</p>

Physical Education lesson 8 (Indigenous & invasion games, 30 min.)

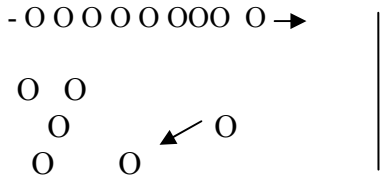
Subject		Life Orientation	Date	15 April	Grade	7
Topic		Physical Education	Lesson aim	Kicking the ball, crows and cranes, crab soccer	Number of learners	8-10
Physical Education theme		Community / Indigenous invasion games	Sub-aim (CAPS)	Participate in community / indigenous games that include the concept of invasion		
Movement concepts		Technique of kicking the ball to a target (keep ankle of the kicking foot locked, keep the knee of the supporting leg slightly bent; place the foot of your supporting leg about a foot away from the ball; lean the body forward to keep the shot low to the ground, or lean the body back to have the ball fly higher)				
Assessment		Kicking ball at target from 5m away (correct technique & number of hits in 1 minute).				
Time	Component	Activity		Organisation	Apparatus	
Introduction						
5 min	Aims, warm-up & assessment of previous homework	<p>- Crows and cranes (Krappe en Kraaie): Learners form two lines next to each other; one line is the cranes and the other one is the crows. When the teachers calls out "cranes", the crows have to chase the cranes to a line about 10m away. When a crow touches a crane, the crane becomes one of the crows. When the teacher calls out "crows", the cranes have to chase the crows to their line etc. When the teacher calls out "crabs", all learners have to stand still; if any learner moves, he becomes a member of the other team.</p> <p>- Stretching: hamstrings (stand with one straight leg in front & touch toes, change legs), quadriceps (stand and bend one leg, pull the foot up behind); calves (stand with one leg in front, keep the back leg straight and foot flat on the floor, lean forward)</p>		 <p>- Learners stand in a half circle around teacher</p>	<p>- 2 cones to mark lines</p> <p>-None</p>	
Primary activities						

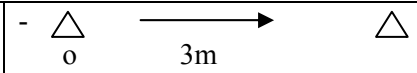
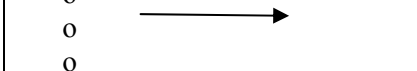
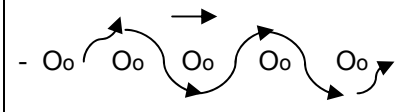
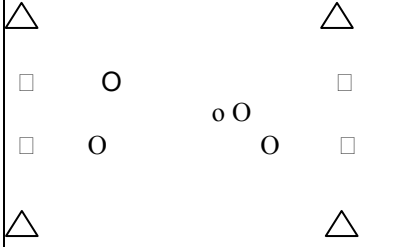
<p>20 min</p>	<p>Sport skill: kicking technique</p> <p>Agility, foot-eye coordination</p> <p>Applying sport skill Agility, hand-eye coordination</p> <p>Applying sport skill game; upper arm, leg and shoulder strength</p>	<p>- Learners do the kick slowly (without the ball) while emphasizing correct technique (see movement concepts above). (NB: These learners know kicking, so emphasize the bent supporting leg and locking the ankle, to kick even better).</p> <p>- Place two beanbags 5m apart. Two learners run around the cones, one learner dribbles the ball, then kicks the ball to the other learner each time they pass the beanbag in the middle (emphasize kicking technique) for \pm 5 minutes.</p> <p>- Shooting triangles: place beanbags/cones in a triangle about 4m apart. Learners 1, 2 and 3 are the shooters and learners 4, 5 and 6 are the retrievers. Learners 1, 2 and 3 have to kick the ball through the cones while 4, 5 and 6 return the balls to the shooters. Change after 2 min.</p> <p>- Crab soccer: two teams of 2 learners each in a square marked by beanbags (about 4x4m); all learners have to move like crabs (stand on the floor with hands on the floor behind the back and feet on the floor in front, lift the buttocks up so that body is supported on the hands and feet); kick ball and try to score a goal between the other team's beanbags, while moving like a crab.</p>	<p>Learners stand in a half circle around teacher.</p>  	<p>-11 balls</p> <p>- 15 beanbags</p> <p>- 1 ball per group of 4, cones to mark lines</p> <p>-4 beanbags, 1 ball</p>
<p>Conclusion</p>				

5 min	Movement concepts, Homework	<ul style="list-style-type: none"> - Recap on correct kicking technique - Homework: Go practise at home – kicking at a target (mark / paper on wall) from ± 5 m away, run past target from about 5 m, kick at target while running past target, get ball and run back to starting point, repeat; see how many times you can hit the target. (Do 3 times 10). 	Learners in a line, teacher in front of them Learners do the homework skill once (one direction)	Stickers for participation and previous homework, badges for all who have 9 stickers
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Homework from lesson 8 to check: Go practise at home – kicking at a target (mark / paper on wall) from ± 5 m away, run past target from about 5 m, kick at target while running past target, get ball and run back to starting point, repeat; see how many times you can hit the target. (Do 3 times 10)

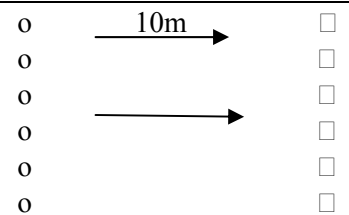

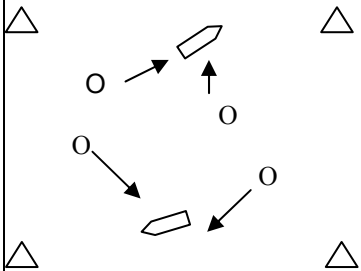
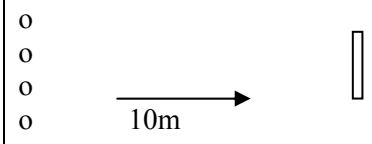
Physical Education lesson 9 (Indigenous & invasion games, 30 min.)

Subject	Life Orientation	Date	8 May	Grade	7
Topic	Physical Education	Lesson aim	Dribbling, adapted soccer	Number of learners	8-10
Physical Education theme	Community / Indigenous invasion games	Sub-aim (CAPS)	Participate in community / indigenous games that include the concept of invasion		
Movement concepts	Technique of dribbling the ball (keep close to ball, change direction using inside or outside of foot, look forward)				
Assessment	Dribbling a ball around obstacles 10m (correct technique & number of times in 1 minute).				
Time	Component	Activity	Organisation	Apparatus	
Introduction					
5 min	Aims, warm-up & assessment of previous homework	<ul style="list-style-type: none"> - Wolf, wolf, what times is it? One learner (the “wolf”) jogs in front of the rest of the learners jogging in a line behind him. The learners in the line call out “Wolf wolf, what time is it?”, the “wolf” answers each time by calling out a time like “1 o’clock” or “5 o’clock” a few times, then suddenly calls out “lunch time!”. When its lunch time the wolf turns around and chases the other learners. The learner he tags becomes the new wolf. Play for about 5 min. - Stretching: hamstrings (stand on one straight leg and pull the other leg up in bent position to the chest, change legs), quadriceps (stand and bend one leg, pull the foot up behind); ankles (stand on one foot, lift the other and twist ankle in both directions, change legs) 	 <p>- O O O O O O O O →</p> <p>O O</p> <p>O O ← O</p> <p>- Learners stand in a half circle around teacher</p>	- 2 cones to mark lines	-None

Primary activities				
20 min	Sport skill: dribbling technique	- Learners stand in a line in front of teacher, two cones placed 3m apart. Learners do the dribble slowly from one cone to the other (about 3m) while emphasizing correct technique (see movement concepts above).	- 	-11 balls, 4 cones
	Agility, foot-eye coordination	- Place the cones 7m apart. The learners dribble the balls to the other line, but when the teacher blows the whistle, each learner has to stop the ball immediately by placing their foot on the ball, see who can stop the fastest and absolutely still. Do for ± 5 minutes.	- 	- 11 balls, 4 cones
	Applying sport skill Agility, foot-eye coordination	- Weave the snake: 2 groups of 5/6 learners each. Learners in a line behind each other, every learner jogs forward while dribbling his own ball. The learner in the back then has to dribble his ball zig-zag through all the learners in front of him until he is in front. Then the learner in the back does the same. Continue until all learners are back in their original positions.	- 	- 11 balls
	Applying sport skill game; upper arm, leg and shoulder strength	- Adapted soccer: four teams of 2 learners each in a square marked by cones (about 4x4m), with bean bags marking the goal posts; each team has to try to dribble and pass the ball and score a goal by kicking the ball through the posts. Play for about 5min.	- 	- 1 ball per group of 4, 8 cones to mark lines, 8 bean bags
Conclusion				
5 min	Movement concepts, Homework	- Recap on correct dribbling technique. - Homework: Go practise at home – dribbling ball zig-zag through 4 obstacles placed 2m apart in a line (use socks /boxes / stones as obstacles), see how many times you can complete one round in 5 min.	Learners in a line, teacher in front of them. Learners do the homework skill once (one direction), place four bean bags / cones in front of every two learners and let them do the round once) (If time is too short, just demonstrate the homework to them)	-20 bean bags / cones Stickers for participation and previous homework, badges for all who have 9 stickers

Physical Education lesson 10 (Indigenous & invasion games, 30 min.)

Subject	Life Orientation	Date	8 May	Grade	7
Topic	Physical Education	Lesson aim	Jukskei skills and rules	Number of learners	8-10
Physical Education theme	Community / Indigenous invasion games	Sub-aim (CAPS)	Participate in community / indigenous games that include the concept of invasion		
Movement concepts	<p>Technique of throwing the skei (stand with one foot slightly in front, body in direction of pen, aim with skei in front of shoulder, then swing skei back with straight arm until arm is almost horizontal to ground behind learner, then swing forward with straight arm and release in front of player's face).</p> <p>Basic rules of Jukskei: two teams of four players each try to throw the pen with skei's; each player gets two chances. If the pen is knocked over, the team scores 3. If the skei ends up closer than 460mm from the pen, the team gets 1 point.</p>				
Assessment	Throwing the skei at pen from 10m (correct technique).				
Time	Component	Activity	Organisation	Apparatus	
Introduction					
5 min	Aims, warm-up & assessment of previous homework	<p>- Dribbling activity that was homework (also assessment of homework): Each learner has 3 beanbags / cones in front of him/her, placed about 2m apart. The learners have to dribble their ball zig-zag around the beanbags/cones for 3 min; count the number of rounds (one round is around all the beanbags/cones and back) and see who can do most. Also state who did it best (technique).</p> <p>- Stretching – yoga (first tell learners that Yoga is ancient Indian stretches still used today. Remember to slowly breathe in and out with every movement): Mountain, pencil, paper clip, L-lunge, cobra, downward dog, R-lunge, paper clip, wood chopper and mountain.</p>	<p>○ ● □ □ □</p> <p>○ ● □ □ □</p> <p>○ ● □ □ □</p> <p>○ ● □ □ □</p> <p>○ ● □ □ □</p> <p>- Learners stand in a half circle around teacher</p>	<p>- 30 beanbags/ cones to mark lines</p> <p>-None</p>	

Primary activities				
20 min	Sport skill: Jukskei throwing technique	- Learners stand in a line in front of teacher, one beanbag placed 10m in front of each learner. Learners do the throwing technique slowly and trying to hit their beanbag while emphasizing correct technique (see movement concepts above), run and get the skei after each throw. Score 3 points each time it hits. Do ten times.		-11 balls, 4 cones
	Agility, hand-eye coordination, spatial awareness	- As above, but when the skei is released, run and try to catch the skei before it hits the ground (do about ten times)		- 11 balls, 4 cones
	Agility, hand-eye coordination, spatial awareness	- Groups of 4 learners in a square of about 10x10m. Two-two learners work together: One learner throws the skei as far away as possible from the other learner, but still within the square. The other learner has to run and get the skei, then stand still and throw it as far as possible away from the first learner, who has to run and pick up the skei. Continue for 5 min. The idea is to make your partner run as much as possible within the square and without hitting other learners or their skei's.		- 8 beanbags / cones, 4/5 skei's per 8/10 learners
	Applying sport skill Agility, hand-eye coordination, speed	- Adapted jukskei: two teams of 2 learners each in front of a pen about 10m away. Each learner throw his skei twice – throw once and then run to get the skei and throw again. The other team counts the points (each time the skei hits the pen = 3 points, each time the skei lands closer than \pm 460mm from the pen, score =1). Play for about 5min and then see which team got the most marks in the allotted time.		- 1 skei and 1 pen per group of 4
Conclusion				
5 min	Movement concepts, stretching Homework	- Recap on correct throwing technique. - Repeat yoga positions from the warm-up. Homework: Go practise at home – 1. Throw skei at target (use box / stone / stick in the ground as pen); see how many times you can hit the pen in 5 min. 2. Yoga positions (see if you can remember the sequence).	Learners in a line, teacher in front of them. Learners do the skei skill once (one direction), then the yoga positions once	-10 skei's -stickers for participation and previous homework

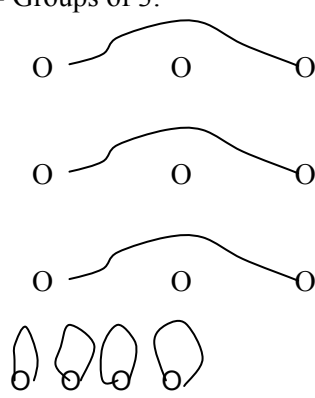
Physical Education lesson 11 (Indigenous & invasion games, 30 min.)

Subject		Life Orientation	Date	15 May	Grade	7
Topic		Physical Education	Lesson aim	Boeresport games	Number of learners	8-10
Physical Education theme		Community / Indigenous invasion games	Sub-aim (CAPS)	Participate in community / indigenous games that include the concept of invasion		
Movement concepts		Definitions of speed (how fast you can move from point A to B) and agility (combination of strength and speed – to be able to change body positions with grace and ease, without losing speed, power, balance or body coordination)				
Assessment		Running between cones against time.				
Time	Component	Activity	Organisation		Apparatus	
Introduction						
5 min	Aims, warm-up & assessment of previous homework	- the jukskei throw that was homework . (throw skei at beanbag target, see how many times you can hit the beanbag in 5 min) - Stretching – yoga (first tell learners that Yoga is ancient Indian stretches still used today. Remember to slowly breathe in and out with every movement) (see attached Yoga positions): Mountain, pencil, paper clip, L-lunge, cobra, downward dog, R-lunge, paper clip, wood chopper and mountain.	Ten learners in a line (use sufficient space) O • □ O • □ O • □ O • □ O • □ - Learners stand in a half circle around teacher		- 30 beanbags/ cones to mark lines -None	

Primary activities				
20 min	Indigenous games: Egg running Agility, speed, hand-eye coordination, spatial awareness	- Learners stand in pairs in a line in front of teacher, one of each pair holding a spoon with a beanbag. 1 Cone placed about 10m in front of each pair of learners. The first learner runs with the beanbag on the spoon around the cone and back, hands over to his partner who then runs around the cone, etc. until all the pairs have completed 6 runs. Repeat doing the run backward.		-20 cones, 20 spoons, 20 beanbags
	Three-legged running: Agility, hand-eye coordination, spatial awareness	- As above, but each pair of learners tie a rope around two of their legs (around the one learner's left leg and the other learner's right leg) so that they will have to move together on three legs by stepping forward with the two tied legs together. Run around the cones 6 times.		- 20 ropes, 20 cones
	Sack races: Agility, balance, hand-eye coordination, spatial awareness	- Learners stand in pairs in a line in front of teacher, one of each pair with his legs in a sack and holding the edges of the sack. 1 Cone placed about 10m in front of each pair of learners. The first learner jumps on two legs forward in the sack around the cone and back, hands over to his partner who then jumps around the cone, etc. until all the pairs have completed 6 sets.		- 20 sacks, 20 cones
	Muscular endurance: sit-ups with beanbag	- Sit-ups where two partners sit about 10m apart. Do sit-up simultaneously, throw bean bag to each other each time they come up. Repeat 10 times catching with both hands, 10 times with one hand and ten times with other hand.		- 20 beanbags
Conclusion				
5 min	Movement concepts, stretching Homework	- Recap on definitions of speed and agility and where they were used in lesson - Stretching – yoga: Mountain, pencil, paper clip and mountain. - Homework: Go practise at home – 1. Run with ball on spoon around object placed 10m away for 2 minutes, see how many runs you can make. 2. Then run backward for 2 minutes. 3. Then try to run while bouncing the ball up and down with the spoon, 2 minutes.	Learners in a line, teacher in front of them Learners do the spoon and ball skill once around the cones, hand over to partners.	-20 balls -stickers for participation and previous homework

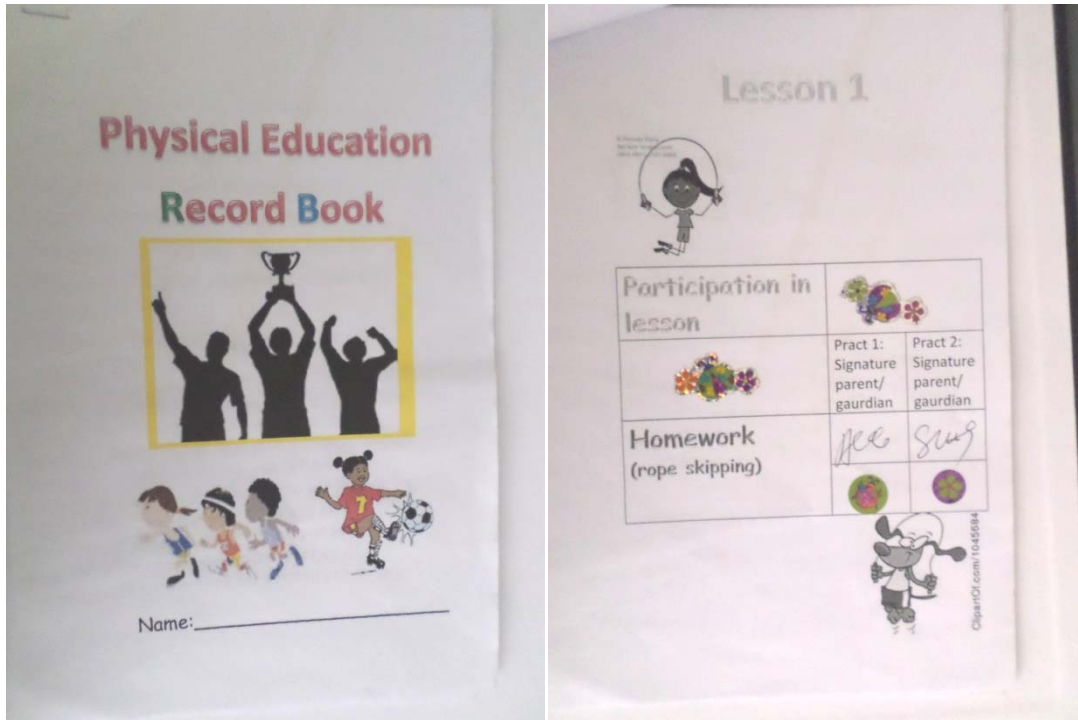
Physical Education lesson 12 (Indigenous & invasion games, 30 min.)

Subject	Life Orientation	Date	22 May	Grade	7
Topic	Physical Education	Lesson aim	Kgati skills	Number of learners	8-10
Physical Education theme	Community / Indigenous invasion games	Sub-aim (CAPS)	Participate in community / indigenous games that include the concept of invasion		
Movement concepts	Rhythm – every person has an <i>internal</i> rhythm (when you do rhythmic movements like walking, running and jumping you move in a set rhythm that comes from within your body) and an external rhythm - when you move according to an externally generated rhythm like music.				
Assessment	2 different Kgati rope skipping skills				
Time	Component	Activity	Organisation	Apparatus	
Introduction					
5 min	Aims, warm-up & assessment of previous homework	Running activities that were homework: 1. Run with ball on spoon around object placed 10m away for 2 minutes, see how many runs you can make. 2. Then run backward for 2 minutes. 3. Then try to run while bouncing the ball up and down with the spoon, 2 minutes. - Stretching – yoga: Mountain, pencil, paper clip, L-lunge, cobra, downward dog, R-lunge, paper clip, wood chopper and mountain.	Ten learners in a line (use sufficient space) O ● <input type="checkbox"/> O ● <input type="checkbox"/> O ● <input type="checkbox"/> O ● <input type="checkbox"/> O ● <input type="checkbox"/>	- 20 balls, 20 spoons, 20 cones -None	

Primary activities				
20 min	<p>Game skill: Kgati</p> <p>Rhythm, agility, total body coordination, spatial awareness</p> <p>Agility, total body coordination, spatial awareness</p>	<p>- Groups of 3/4: 2 learners swing the rope, one learner jumps 10 times, using different jumping skills like one leg, turning while jumping, star jumps, etc (at least two different skills). When the learner in the middle has jumped 10 times, she must take over from one swinging learner (try to take over without the rope stopping) and this learner must try to do the same skills in the same sequence.</p> <p>- Groups of 4 learners, each with a rope, in a square of about 15x15m. One leader is the leader and runs ahead while jumping the rope. The other learners have to try to follow the leader while jumping their ropes.</p>	<p>- Groups of 3:</p> 	<p>-3 ropes</p> <p>- 8 beanbags / cones, 4/5 skei's per 8/10 learners</p>
Conclusion				
5 min	<p>Movement concepts, stretching</p> <p>Homework</p>	<p>- Recap on rhythm concepts.</p> <p>- Homework: Go practise at home – running with the rope.</p>	<p>Learners in a line, teacher in front of them</p>	<p>-homework, certificates and gifts</p>

APPENDIX D

Rewards: homework booklets, stickers, certificates and badges



APPENDIX E Apparatus improvisation

Many kinds of apparatus can be made from different recycled materials. Following are examples of ways to make apparatus in our study.

Paper balls: Tightly rolled up newspapers into a bundle and wrap it in insulation tape.



Cones: Cut the bottle in half or put sand into it, so that it will stand without moving.



Skipping ropes: Collect a bundle of plastic bags, cut off the handles of each bag and cut each rectangle into long strips. Take few of the strips, tape them together at one end and braid them into one long jump rope-sized braid. And then twist the two or three braids together tightly so that the jump rope has enough weight to swing when jumping.



✧ For more examples of improvised apparatus, see the Australian Sport Commission (ASC). 1996. Props pack. *Sportstart and playshop equipment and activity ideas for parents*. Canberra: ASC.

APPENDIX F

Declaration of language editing



Director: CME Terblanche - BA (Pol Sc), BA Hons (Eng), MA (Eng), TEFL
22 Strydom Street Tel 082 821 3083
Baillie Park, 2531 cumlaudelanguage@gmail.com

DECLARATION OF LANGUAGE EDITING

I, Christina Maria Etrechia Terblanche, hereby declare that I edited the chapters 1, 2 and 6 of the study entitled:

The effect of an enhanced quality Physical Education Programme on physical activity and fitness among Grade 7 learners in Potchefstroom

for Haili Tian for the purposes of submission as part of a post-graduates study. No changes were permanently affected and were left to the discretion of the student.

Regards,

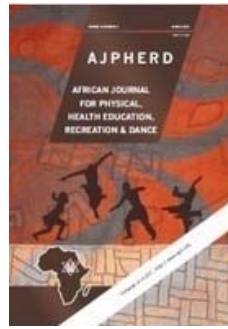
CME Terblanche

Cum Laude Language Practitioners (CC)

SATI reg nr: 1001066

PEG registered

APPENDIX G Guidelines for authors



The African Journal for Physical, Health Education, Recreation and Dance (AJPHERD) is a peer-reviewed journal established to:

- i) Provide a forum for physical educators, health educators, specialists in human movement studies and dance, as well as other sport-related professionals in Africa, the opportunity to report their research findings based on African settings and experiences, and also to exchange ideas among themselves,
- ii) Afford the professionals and other interested individuals in these disciplines the opportunity to learn more about the practice of the disciplines in different parts of the continent,
- iii) Create awareness in the rest of the world about the professional practice in the disciplines in Africa.

GENERAL POLICY

AJPHERD publishes research papers that contribute to knowledge and practice, and also develops theory either as new information, reviews, confirmation of previous findings, application of new teaching/coaching techniques and research notes. Letters to the editor relating to the materials previously published in AJPHERD could be submitted within 3 months after publication of the article in question. Such letter will be referred to the corresponding author and both the letter and response will be published concurrently in a subsequent issue of the journal.

Manuscripts are considered for publication in AJPHERD based on the understanding that they have not been published or submitted for publication in any other journal. In submitting papers for publication, corresponding authors should make such declarations. Where part of a paper has been published or presented at congresses, seminars or symposia, reference to that publication should be made in the acknowledgement section of the manuscript.

AJPHRD is published quarterly, i.e. in March, June, September and December. Supplements/Special editions are also published periodically.

SUBMISSION OF MANUSCRIPT

Three copies of original manuscript and all correspondence should be addressed to the Editor-In-Chief:

Professor L. O. Amusa

Tel: +27 15 9628076

Centre for Bio kinetics, Recreation

Fax: +27 15 9628076/9628035

and Sport Science, University of Venda for

E-mail: amusalbw@yahoo.com

Science and Technology, P. Bag X5050,

Thohoyandou 0950

Republic of South Africa

Articles can also be submitted electronically, i.e. via e-mail attachment. However, the corresponding author should ensure that such articles are virus free. AJPHRD reviewing process normally takes 4-6 weeks and authors will be advised about the decision on submitted manuscripts within 60 days. In order to ensure anonymity during the reviewing process authors are requested to avoid self-referencing or keep it to the barest minimum.

PREPARATION OF MANUSCRIPT

Manuscripts should be type written in fluent English (using 12-point Times New Roman font and 1½ line-spacing) on one side of white A4-sized paper justified fully with 3cm margin on all sides.

Guidelines for Authors 317

In preparing manuscripts, MS-Word, Office 98 or Office 2000 for Windows should be used. Length of manuscripts should not normally exceed 12 printed pages (including tables, figures, references, etc.). For articles exceeding 10 typed pages US\$ 10.0 is charged per every extra page. Longer manuscripts may be accepted for publication as supplements or special research reviews. Authors will be requested to pay a publication charge of US\$ 350.0 to defray the very high cost of publication. The pages of manuscripts must be numbered sequentially beginning with the title page. The presentation format should be consistent with the guidelines in the publication format of the American Psychological Association (APA) (4th edition).

Title page:

The title page of the manuscript should contain the following information:

Concise and informative title.

Author(s') name(s) with first and middle initials. Authors' highest qualifications and main area of research specialisation should be provided.

Author(s') institutional addresses, including telephone and fax numbers.

Corresponding author's contact details, including e-mail address.

A short running title of not more than 6 words.

Abstract

An abstract of 200-250 words is required with up to a maximum of 5 words provided below the abstract. Abstract must be typed on a separate page using single line spacing, with the purpose of the study, methods, major results and conclusions concisely presented. Abbreviations should either be defined or excluded.

Text

Text should carry the following designated headings: Introduction, materials and methods, results, discussion, acknowledgement, references and appendices (if appropriate).

Introduction

The introduction should start on a new page and in addition to comprehensively giving the background of the study should clearly state the problem and purpose of the study. Authors should cite relevant references to support the basis of the study. A concise but informative and critical literature review is required.

Materials and Methods

This section should provide sufficient and relevant information regarding study participants, instrumentation, research design, validity and reliability estimates, data collection procedures, statistical methods and data analysis techniques used. Qualitative research techniques are also acceptable.

Results

Findings should be presented precisely and clearly. Tables and figures must be presented separately or at the end of the manuscript and their appropriate locations in the text indicated. The results section should not contain materials that are appropriate for presentation under the discussion section. Formulas, units and quantities should be expressed in the *systeme 318 Guidelines for Authors internationale (SI)* units. Colour printing of figures and tables is expensive and could be done upon request authors' expense.

Discussion

The discussion section should reflect only important aspects of the study and its major conclusions. Information presented in the results section should not be repeated under the discussion. Relevant

references should be cited in order to justify the findings of the study. Overall, the discussion should be critical and tactfully written.

References

The American Psychological Association (APA) format should be used for referencing. Only references cited in the text should be alphabetically listed in the reference section at the end of the article. References should not be numbered either in the text or in the reference list.

Authors are advised to consider the following examples in referencing:

Examples of citations in body of the text:-

For one or two authors; Kruger (2003) and Travill and Lloyd (1998). These references should be cited as follows when indicated at the end of a statement: (Kruger, 2003); (Travill & Lloyd, 1998).

For three or more authors cited for the first time in the text; Monyeki, Brits, Mantsena and Toriola (2002) or when cited at the end of a statement as in the preceding example; (Monyeki, Brits, Mantsena & Toriola, 2002). For subsequent citations of the same reference it suffices to cite this particular reference as: Monyeki *et al.* (2002).

Multiple references when cited in the body of the text should be listed chronologically in ascending order, i.e. starting with the oldest reference. These should be separated with semi colons. For example, (Tom, 1982; McDaniels & Jooste, 1990; van Heerden, 2001; de Ridder at al., 2003).

Reference List

In compiling the reference list at the end of the text the following examples for journal references, chapter from a book, book publication and electronic citations should be considered:

Examples of journal references:

Journal references should include the surname and initials of the author(s), year of publication, title of paper, name of the journal in which the paper has been published, volume and number of journal issue and page numbers.

For one author: McDonald, A.K. (1999). Youth sports in Africa: A review of programmes in selected countries. *International Journal of Youth Sports*, 1(4), 102-117.

For two authors: Johnson, A.G. & O’Kefee, L.M. (2003). Analysis of performance factors in provincial table tennis players. *Journal of Sport Performance*, 2(3), 12-31.

For multiple authors: Kemper, G.A., McPherson, A.B., Toledo, I. & Abdullah, I.I. (1996). Kinematic analysis of forehand smash in badminton. *Science of Racket Sports*, 24(2), 99-112.

Examples of book references: *Guidelines for Authors* 319

Book references should specify the surname and initials of the author(s), year of publication of the book, title, edition, page numbers written in brackets, city where book was published and name of publishers. Chapter references should include the name(s) of the editor(s) and other specific information provided in the third example below:

For authored references: Amusa, L.O. & Toriola, A.L. (2003). *Foundations of Sport Science* (1st ed.) (pp. 39-45). Mokopane, South Africa: Dynasty Printers.

For edited references: Amusa, L.O. and Toriola, A.L. (Eds.) (2003). *Contemporary Issues in Physical Education and Sports* (2nd ed.) (pp. 20-24). Mokopane, South Africa: Dynasty Printers.

For chapter references in a book: Adams, L.L. & Neveling, I.A. (2004). Body fat characteristics of sumo wrestlers. In J.K. Manny and F.O. Boyd (Eds.), *Advances in Kinanthropometry* (pp. 21-29). Johannesburg, South Africa: The Publishers Company Ltd.

Example of electronic references:

Electronic sources should be easily accessible. Details of Internet website links should also be provided fully. Consider the following example:

Wilson, G.A. (1997). Does sport sponsorship have a direct effect on product sales? *The Cyber-Journal of Sport Marketing (online)*, October, 1(4), at <http://www.cad.gu.au/cjism/wilson.html>. February 1997.

PROOFREADING

Manuscript accepted for publication may be returned to the author(s) for final correction and proofreading. Corrected proofs should be returned to the Editor-In-Chief within one week of receipt. Minor editorial corrections are handled by AJPHERD.

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COMPLIMENTARY COPY OF AJPHERD AND REPRINTS

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APPENDIX H Guidelines for authors

Physical Education and Sport Pedagogy

Physical Education and Sport Pedagogy is the official research journal of the Association for Physical Education (AfPE). The journal provides a forum for high quality educational research intended to have a high impact on both policy and practice for a national and international readership.

General guidelines

- Manuscripts are accepted in English. Any consistent spelling and punctuation styles may be used. Please use single quotation marks, except where ‘a quotation is “within” a quotation’. Long quotations of 40 words or more should be indented without quotation marks.
- Each article should be accompanied by a structured [abstract](#) of 400–500 words. Recent issues of *Physical Education and Sport Pedagogy* have examples of the subheadings we suggest you use to structure your abstract.
- Each article should also have a 150 word summary for practitioners which will be published in the Association of Physical Education partner journal *PE Matters* and should be in plain English.
- A typical manuscript will not exceed 7000 words including tables, references, captions and endnotes. Manuscripts that greatly exceed this will be critically reviewed with respect to length. Authors should include a word count with their manuscript.
- Manuscripts should be compiled in the following order: title page; abstract; keywords; main text; acknowledgements; references; appendices (as appropriate); table(s) with caption(s) (on individual pages); figure caption(s) (as a list).
- Each manuscript should have to 5 [keywords](#).

- Search engine optimization (SEO) is a means of making your article more visible to anyone who might be looking for it. Please consult our guidance [here](#).
- Section headings should be concise.
- All authors of a manuscript should include their full names, affiliations, postal addresses, telephone numbers and email addresses on the cover page of the manuscript. One author should be identified as the corresponding author. Please give the affiliation where the research was conducted. If any of the named co-authors moves affiliation during the peer review process, the new affiliation can be given as a footnote. Please note that no changes to affiliation can be made after the manuscript is accepted. Please note that the email address of the corresponding author will normally be displayed in the article PDF (depending on the journal style) and the online article.
- All persons who have a reasonable claim to authorship must be named in the manuscript as co-authors; the corresponding author must be authorized by all co-authors to act as an agent on their behalf in all matters pertaining to publication of the manuscript, and the order of names should be agreed by all authors.
- Biographical notes on contributors are not required for this journal.
- Please supply all details required by any funding and grant-awarding bodies as an Acknowledgement on the title page of the manuscript, in a separate paragraph, as follows:
 - *For single agency grants:* "This work was supported by the [Funding Agency] under Grant [number xxxx]."
 - *For multiple agency grants:* "This work was supported by the [Funding Agency 1] under Grant [number xxxx]; [Funding Agency 2] under Grant [number xxxx]; and [Funding Agency 3] under Grant [number xxxx]."

Authors must also incorporate a [Disclosure Statement](#) which will acknowledge any financial interest or benefit they have arising from the direct applications of their research.

For all manuscripts non-discriminatory language is mandatory. Sexist or racist terms must not be used.

Authors must adhere to [SI units](#). Units are not italicised.

When using a word which is or is asserted to be a proprietary term or trade mark, authors must use the symbol ® or TM.

All submissions should be made online at the Physical Education and Sport PedagogyScholar One Manuscripts website. New users should first create an account. Once logged on to the site, submissions should be made via the Author Centre. Online user guides and access to a helpdesk are available on this website.

Manuscripts may be submitted in any standard editable format, including Word and EndNote. These files will be automatically converted into a PDF file for the review process. LaTeX files should be converted to PDF prior to submission because ScholarOne Manuscripts is not able to convert LaTeX files into PDFs directly. All LaTeX source files should be uploaded alongside the PDF.

APPENDIX I Guidelines for authors



Mediterranean Journal of Social Sciences

Mediterranean Journal of Social Sciences (MJSS) is a double blind peer-reviewed journal, published three times a year, by Mediterranean Center of Social and Educational Research. The journal publishes research papers in the fields of Mediterranean and World Culture, Sociology, Philosophy, Linguistics, Literature, Education, History, History of Religion, Anthropology, Statistics, Politics, Laws, Psychology and Economics. However, research in all social science fields is welcome. MJSS is open for the academic world and research institutes, academic and departmental libraries, graduate students and PhD candidates, academic and non-academic researchers and research teams.

General rules for text:

Please use the following rules for whole text, including abstract, keywords, heading and references.

Page setup

1. Margins: 1 Inch (2, 54 cm) on all sides (top, bottom, left, right)
2. Font Size and Type: 12-pt. Garamond (preferred) or Times New Roman font
3. Line Spacing: Single space throughout the paper, including the title page, abstract, body of the document, references, appendixes, footnotes, tables, and figures.
4. Alignment: Justified
5. Orientation: portrait
6. Page size: A4

Preparation of text

1. Title: 14 pts, uppercase and lowercase letters bolded and centered
2. Name and personal information (academic title, institutional affiliation and e-mail address) should be placed under the title.

3. Abstract (150-250 words) and should include the following: aim, method, results and conclusion. The abstract must be written in Garamond or Times New Roman, Font Size 10 and Italic.
4. Keywords: up to 5 key words, Garamond or Times New Roman, Font Size 10 and bolded.
5. Spacing: Between abstract and main text, you should leave two empty lines.
6. Subdivision of the article: The papers should be structured in title and subtitle sections and should be numbered: 12 pts, alignment left (the abstract is not included in section numbering). Between title section and main text one empty line should be left.

Example of subdivision of the article:

1. Introduction

1.1 Research Methods

1.1.1 Analysis Result

Tables and figures should be included within the text of the paper and must be numbered.

References and Footnotes:

References should follow the referencing style used by the American Psychological Association (APA) in alphabetical order. All sources cited in the paper must be included in the References section.

Citations in the text

Source material must be documented in the body of the paper by citing the author(s) and date(s) of the sources. Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Avoid citation in the abstract. Unpublished results and personal communications should not be in the reference list, but may be mentioned in the text. Citation of a reference as “in press” implies that the item has been accepted for publication.

Citing and listing of web references

As a minimum, the full URL should be given. Any further information, if known (author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Examples of references:

Reference to a journal publication:

Van der Geer, J., Hanraads, J. A. J., & Lupton R. A. (2000). The art of writing a scientific article. *Journal of Scientific Communications*, 163, 51-59.

Reference to a book:

Strunk, W., Jr., & White, E. B. (1979). *The elements of style*. (3rd ed.). New York: Macmillan.

Reference to a chapter in an edited book:

Mettam, G. R., & Adams, L. B. (1994). How to prepare an electronic version of your article. In B. S. Jones, & R. Z. Smith (Eds.), *Introduction to the electronic age* (pp. 281-304). New York: E-Publishing Inc.

Reference to a web source:

Smith, Joe, (1999), One of Volvo's core values. [Online] Available:

<http://www.volvo.com/environment/index.htm> (July 7, 1999)

Footnotes:

Content footnotes are occasionally used to support substantive information in the text. Place the footnotes at the end of the page: 10-pt. Garamond or Times New Roman.

APPENDIX J Submission and Acceptance Confirmation

29 January 2015

HAILI TIAN, DORITA DU TOIT AND ABEL L. TORIOLA
C/o Dr D. du Toit, Physical activity, Sport and Recreation Focus Area, Faculty of
Health Science, North-West University, Potchefstroom Campus, Potchefstroom2520,
South Africa.

E-mail: dorita.dutoit@nwu.ac.za

Dear Dr Du Toit,

**RE: VALIDATION OF THE CHILDREN'S LEISURE ACTIVITIES STUDY
SURVEY QUESTIONNAIRE FOR 12-YEAR OLD SOUTH AFRICAN
CHILDREN**

I am pleased to inform you that the above-cited paper submitted for publication in
AJPHERD has been accepted and is already in press.

You are kindly requested to attend to the attached invoice, which is meant to defray
the very high cost of publication. You are also requested to sign the enclosed authors'
agreement form and mail it to the Editor-In-Chief at the above address.

Thank you.

Yours sincerely,

Sgd.
Prof. L.O. Amusa
For Editor-In-Chief, AJPHERD

APPENDIX K Submission and Revise Confirmation

Dear Ms Tian:

Your manuscript entitled "The effects of an enhanced quality Physical Education programme on the physical activity levels of Grade 7 learners in Potchefstroom, South Africa" which you submitted to Physical Education and Sport Pedagogy has been reviewed. The reviewer comments are included at the bottom of this letter.

The reviewer(s) would like to see some revisions made to your manuscript before publication. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript.

When you revise your manuscript please highlight the changes you make in the manuscript by using the track changes mode in MS Word or by using bold or coloured text.

Once again, thank you for submitting your manuscript to Physical Education and Sport Pedagogy and I look forward to receiving your revision.

Sincerely,

EDITOR

Professor David Kirk

ASSOCIATE EDITORS

Dr Ann MacPhail

Dr Ashley Casey

Professor Kimberly L Oliver

Dr Leen Haerens

Professor Peter Hastie

APPENDIX L Submission and Acceptance Confirmation

Mediterranean Journal of Social Sciences <mjss@mcser.org>

22 September 2014 16:31

To: haili tian <tianhaili28@gmail.com>

Dear Haili Tian,

It is our great pleasure to inform you that as a result of the reviews and revisions, your following paper:

Effects of a 12-week Physical Education intervention programme on physical and motor fitness of Grade 7 learners in Potchefstroom, South Africa

submitted in the Mediterranean Journal of Social Sciences has been selected for publication in the Vol 5, No 23, Nov. 2014. The article does meet all the criteria of a scientific publication and could be a precious contribution to the journal.

If you agree the publication you are invited to complete the procedure of payment of processing fee within September 27, (for payment received after September 30, papers will be published in MJSS December special issue). Attached you can find the invoice including details of the bank account if you choose the bank for the payment.

On the link below you can complete the payment through PAYPAL by credit or debit cards:

http://www.mcser.org/index.php?option=com_content&view=article&id=4&Itemid=57

If you have any question please do not hesitate to contact us

Best Regards,

Dr. Lisa Licata

Editorial Office, MC SER

Mediterranean Journal of Social Sciences

APPENDIX M Turnitin Originality Receipt

□

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This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

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File size: 1.2M
Page count: 93
Word count: 31,159
Character count: 178,684
Submission date: 15-Oct-2014 10:55AM
Submission ID: 464735516

CHAPTER 2
The effect of an enhanced quality Physical
Education Programme on physical activity
and fitness among Grade 7-learners in
Potchefstroom

Haili Tian
24544647

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