THE DEVELOPMENT OF A PROFESSIONAL DEVELOPMENT PROGRAMME FOR PHYSICAL ACTIVITY PROMOTION IN ADOLESCENTS' PHYSICAL EDUCATION CLASSES, NIGERIA

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SUPERVISORS' PERMISSION TO SUBMIT FOR EXAMINATION

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As the candidate's supervisors, we AGREE to the submission of this thesis for examination.

The chapters are written as a set of discrete traditional chapters, with an overall introduction and final summary.

This is to certify that the contents of this thesis are the original research work of Mr Osifeko, Olalekan Remigious.

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DECLARATION

I, Osifeko Olalekan Remigious, declare that all the research in this thesis/dissertation is my own, original work, and that I am the owner of the copyright thereof (unless where otherwise stated). This work has not been previously submitted for any qualification at any other university. The data in this thesis are primary data from my work and do not contain any other person's data. All other sources I have quoted or used have been specifically acknowledged and have been referenced. This thesis does not contain tables of statistics, or text copied and pasted from internet sources, unless the source has been acknowledged and the exact words used have been placed inside quotation marks, and referenced. All photos in the thesis were taken by the researcher, unless otherwise acknowledged.

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Date: 04 November 2020

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DEDICATION

To my mother and my late father. They have always been the pillars of my educational career. Also to my wife. She has been my strength. I thank you all for the support, love and patience.

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My first sincere appreciation goes to Almighty God who made it possible for me to be able to complete this study without any calamity. Glory be to God.

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LIST OF ABBREVIATIONS

MVPA	Moderate to Vigorous Physical Activity
PA	Physical Activity
PDT	Professional Development Training
FGDs	Focus Group Discussions
PE	Physical Education
SPSS	Statistical Package for Social Sciences
NCCA	National Council for Curriculum and Assessment
NCE	National Certificate in Education
NMS	National Minimum Standards
NNPE	Nigerian National Policy on Education
NTEP	National Teacher Education Policy
NTI	National Teachers Institute
NUT	Nigeria Union of Teachers
PSNT	Professional Standards of Nigerian Teachers
NUEC	Nigerian Universal Educational Committee
UNESCO	United Nations Educational, Scientific and Cultural Organisation
JSS	Junior Secondary School
TLIS	Teaching and Learning International Survey
TRCN	Teachers Registration Council of Nigeria
W H O	World Health Organisation
NSFHDAYPN	National Strategic Framework on the Health and Development of Adolescents and Young People in Nigeria
USDHHS	United States Department of Health and Human Services
NDHS	Nigeria Demographic Health Survey
MDPE	Mandatory Developing Professional Education

KAP	Knowledge, Attitude and Practice

DEFINITION OF TERMS

Adolescents: Adolescents can be defined as the group of young people (teenagers, aged between 12 and 17 years) who are no longer children, but are developing into adults.

Junior secondary schools: These are the school levels for adolescent students. The majority of the students were aged between 12 and 16 years old.

Professional development training: Professional development can be defined as formal and informal training that enables teachers to improve their own skills.

Physical education: Physical education is as an integral part of education, in the school curriculum, characterised by formal instruction in different games, training practices and hygiene, designed to transmit knowledge of the movement and functions of the human body to the students.

Physical activity: Physical activity could be defined as a movement in any part of the body, with the expenditure of energy.

Teaching methodologies: Teaching methodologies are approaches in teaching, used by the teachers to enable students to learn.

Attitude: Attitude can be defined as a state of mind, either conscious or sub-conscious, which determines the way we feel about something.

Practice: Practice can be defined as an exercise regularly performed, in order to achieve improvement and maintain perfection.

Intervention: Intervention could be defined as a programme, systematically planned and implemented in an organisation; structured and targeted to change attitudes and improve an individual's knowledge.

ABSTRACT

Introduction: Nigerian adolescents are physically inactive and unable to enjoy the health benefits of exercise, due to the lack of physical activity (PA) during physical education (PE) classes. Adolescents' PA can be promoted in different environments, such as at school and in the wider community. Schools promote PA through school sports, at lunch break and in PE class. School-based interventions in PE classes have been effective in promoting PA in adolescents and encouraging healthy lifestyles.

Purpose of the study: To develop a professional development programme for PE teachers in junior secondary schools and to evaluate its impact on students in order to improve PA in Nigerian school-going adolescents.

Methods: This study employed a mixed-methods approach, including intact group and action research designs. A purposive sample of 1200 students were recruited from twenty-four junior secondary schools, from the Epe local government area, in Lagos State East senatorial district, Nigeria. The schools were sampled and purposively assigned to an intervention group (n= 14) and a control group (n= 10). Teachers (n=14 intervention; n=10 control) and students (n=695 intervention; n=498 control) participated in the study. Students completed the Attitudes and Practices of PA for Adolescents (Q-APPAA) questionnaire pre- and post-intervention. A PE teacher from each school participated in the teacher-training intervention (n=24) and in focus group discussions pre- and post-intervention.

The professional development training (PDT) was designed, based on the focus group discussions (FGDs) and information from the related literature. The data collection tools for pre- and post-intervention were teacher FGDs and validated student questionnaires. Quantitative data were analysed with the use of a statistical package (IBM SPSS Statistics version 25, US) which performed descriptive and inferential tests and analysed significant differences between pre- and post- intervention.

The one-sample t-test was applied to test for significant agreement or disagreement to statements measuring attitude to PE, pre- and post-scores. Analysis of covariance (ANCOVA) was used to test the post-intervention scores, to determine the interaction effects of categorical interval scale variables. The Wilcoxon Signed Ranks test was applied to observed differences between the two dependent measurements, to discover whether there was a statistically significant difference in mean scores or not. Lastly, the analysis of the qualitative FGDs was carried out with the aid of computer-assisted data analysis software (Nvivo 12), to identify and interpret themes and sub-themes that emerged from the FGDs.

Results

The time allocated for PE classes is below the level recommended by the African Centre for Disease Control and Prevention and the National Guideline on Physical Activity. FGDs indicated that PE classes in Nigeria still have a problem with promoting PA in adolescents. The PDT addressed teaching methodologies (adding new styles: interpersonal style - autonomous support by the researcher; increasing the PA of students during PE without necessarily lengthening class time; lengthening existing PE classes); materials for teaching; the PE syllabus and the content. After the PDT intervention, the PDT programme, in turn, improved teacher outcomes and influenced students' attitudes and practices. Their PA teaching methodologies in teaching the PE syllabus content, and their demonstration of practical PE classes to engage students in PA, improved post-intervention.

In the FGD responses post-intervention, the majority of PE teachers reported that the intervention improved their teaching methodologies and the students were motivated. However, teachers' views did not change on school policy and the limited time allocated for PE class. Teachers reported that this PDT intervention only assisted in making students more active in PE class within the short time allocated; but the teaching of health issues was still not addressed. Therefore, limited time, and lack of facilities and equipment, are still potential barriers facing PE teachers.

Furthermore, the PDT intervention increased Nigerian adolescents' PA participation levels to five to six times a week, for 45 minutes per period during PE class, in school-based PA; and after school. There was a significant difference in students' perceptions of PA promotion post-intervention, $t\ (1181) = -21.350$, $p<0.05$. Students' increased willingness to participate in PA was significant. Post-intervention results showed significant changes in attitudes to, and the practice of, PA ($p<0.05$), in the average number of sports and games in which each student participated during PE classes, at lunch/break and after school.

Conclusions

Teachers need regular training on the promotion of PA and the wellness of adolescents, to reduce physical inactivity and the risk of developing various diseases in the future, throug ongoing PDT and workshops. They also need opportunities to develop good practices and improved attitudes in the area of PA. This study has been able to confirm that PDT is a necessity for teacher development. It should serve as continuous training for PE teachers to learn new ideas for effective teaching. This will ensure that teachers will develop and it will empower the teachers to keep their expertise in, and knowledge of, the subject updated.

Keywords: adolescents; junior secondary students; physical activity (PA); physical education (PE) class; attitudes; practice; professional development training (PDT).

CHAPTER ONE: INTRODUCTION

1.1 Background

The benefits of physical activity (PA) have been reported globally in children and adolescents; but many adolescents are not meeting the recommended levels of PA (Hallal et al., 2012). Moreover, widespread inactivity has been increasing for years, and the harmful effects of this are reflected in health profile documentation (Lonsdale et al., 2016). Hence, the promotion of PA has a become public health issue, both in schools and communities; and especially in childhood and adolescence, according to the World Health Organisation (WHO, 2013).

Researchers from counties in Africa previously used the Report Card on PA model (a means of collecting all data related to adolescent PA levels in a particular country and grading the evidence using a grading system, just like a school report card) to compile and assess the national PA among adolescents (Deirdre, 2016). The countries were then awarded different grades for PA participation. Nigeria (Akinroye et al., 2013), along with Kenya (Wachira et al., 2014), was awarded a C grade; and South Africa (Draper et al., 2014), along with Ghana (Ocansey et al., 2014), was awarded a D grade, which further indicates the low PA levels among adolescents on the African continent.

In 2008 researchers posited that Nigeria's high adolescent mortality rate was linked to modifiable risk factors caused by inadequate PA (Maddison et al., 2014, cited by Akinroye et al., 2013). Furthermore, the National Strategic Framework on the Health and Development of Adolescents and Young People in Nigeria (Mojisola & Oladimeji, 2017; NSFHDAYPN, 2014) indicated widespread obesity and overweight among adolescents in different states in Nigeria. Lagos state recorded 9.4% obesity and 13.8% overweight; Benue state, 1.8% obesity and 9.7% overweight; and Ondo state, 1.1% obesity and 5.8% overweight. Adeniyi et al. (2016) reported that participation in organised sport and PA by Nigerian children, adolescents and youth had still not improved when compared to other countries, and according to the 2013 report card of PA levels. There has been a slight increase in students' leisure exercise, active play and PA in school (Akinroye, et al., 2014). However, considerable numbers of Nigerian adolescents and children are still overweight. This leads to obesity and more sedentary behaviour (Adeniyi, et al., 2011). There was an improvement in some countries like the Netherlands, Malaysia and New Zealand, which recorded satisfactory improvements in adolescent and child PA participation on the 2016 report card (Sharif et al., 2016). However, in Nigeria, the 2016 report card assigned a 'C' grade to adolescent PA in school, and an 'A' was given for overweight and obesity among adolescents and children. This indicates that physical inactivity has increased enormously among overweight adolescents and children in Nigeria, compared to other many developed countries in the world (Adeniyi et al. 2016).

Studies (Omuemu & Omuemu, 2010; Ojofeitimi et al., 2011) have indicated that young Nigerian adults are physically inactive during their adolescence years. Only 30.3% and 47.6% of Nigerian children and adolescents, respectively, are involved in different kinds of PA daily. Furthermore, Nigerian adolescents between the ages of 10 and 15 years are physically inactive. Standardised data (internally consistent data, processing workflow with the same content and format) has shown that Nigerian adolescents are physically inactive and unable to enjoy the health benefits of exercise, due to the lack of PA during PE class. The opportunity for PA for adolescents occurs in different environments, like schools and the wider community in which they live. Understanding this context could be an effective strategy to promote and implement PA in Africa (Adewale et al., 2016). Adolescent physical inactivity at school can be improved through a variety of school-based curriculum activities like PE and school sports (Lonsdale et al., 2016).

The Community Guide on Physical Activity for preventive services (2013), after reviewing PA interventions, advocated that there were opportunities to promote PA during PE classes. This would involve changes in teaching methods, or curricula and PE policies. The Community Guide on Physical Activity for preventive services (2013) has reviewed many studies (Dobbins et al. 2013; Kriemler et al. 2011; Lonsdale et al. 2013; McKenzie et al. 2004; van Sluijs et al. 2011). The results show that an increase of about 10% in the time allocated to PE leads to about 50% more time in PE being spent in PA. Indications are that the intervention strategy of increased time spent on PA is effective in diverse populations.

There is strong evidence that school-based PE intervention is effective in promoting PA in adolescents and increasing physical fitness. Furthermore, PE classes that were conducted for 10% longer, led to more students participating in PA, as compared with normal PE classes (Lonsdale et al., 2016).

Lonsdale et al. (2016) and Adewale et al. (2016) identified the following two interventions to promote PA during PE lessons:

- Teaching methodologies: Teachers learn ways to promote PA through activity selection in PE.

These included the introduction of new styles to modify the existing curriculum; learning teaching techniques that make PE classes more attractive and valuable for the students; the teacher's ability to use an appropriate approach to demonstrate skills and movement patterns in different types of PA; developing more interest in skill-related, health-related PA; and teachers demonstrating interpersonal styles and social behaviour that respect others in the PA setting (Hallal et al., 2012; Ningthoujam, et al., 2017).

- Fitness infusion: Teachers supplement students' participation in sports activities.

This includes building circuit training into PE classes, with at least 50% of students engaging in moderate to vigorous physical activity (MVPA); the teachers planning to include different physical

fitness activities and sports skills, to meet the target fitness goals; and learning to build recovery time (Mojisola & Oladimeji, 2017; Ningthoujam, et al., 2017).

Despite well-designed PE curricula and certified teachers, adolescents are still physically inactive during school PE classes in some countries, including Nigeria. This shows that PE teachers continually need professional development training (PDT) programmes to learn new ideas, which they need to apply in the classroom (Report of National Guidelines on Physical Activity and Sedentary Behaviours, 2016). Physical education classes provide the best opportunity to promote adolescent PA in school, through teaching interventions (De Meester et al., 2009; Draper et al., 2010; Gordon et al., 2011; Dobbins et al., 2013; Lonsdale et al., 2016). Teaching interventions can be conducted using a variety of methods, namely:

- adding new teaching styles;
- lengthening existing PE classes;
- increasing the length of PA station points for students during PE without necessarily lengthening class time (Community Guide on Physical Activity for preventive services, 2018; Emily et al., 2013).

Adeniyi et al. (2016) found no evidence that Nigerian schools have evaluated the effectiveness of government policy in promoting adolescent PA in PE class. The results quoted in the 2013 Nigerian report card (Akinroye et al., 2013) are incomplete due to insufficient evidence in the Nigerian context. Hence, the report could not provide a specific score for the school-based evidence.

The increase in health issues among Nigerian adolescents in junior secondary schools is noticeable. This can be ascribed to the increase in physical inactivity among the students and the lack of guidance to those teaching the subject, to promote PA and encourage healthy lifestyles (Adeniyi et al., 2016). A report from the National Guideline on PA (2013) shows that Nigeria, as a country, still has problems promoting PA during PE classes, despite the modification of well-designed PE curricula, and certified teachers. Physical education is still inadequate and results in adolescent physical inactivity. Research has identified that a PE programme lacking in innovation has led to the low quality of PE, due to the lack of implementation of teaching methods, modified school curricula, and shortages of specialists; leaving PE teachers unable to promote PA in students (Adeniyi et al., 2016).

Studies (Lonsdale et al., 2016; Mojisola & Oladimeji, 2017) are trying to revise the PE curricula to meet the PE standard guidelines for students to demonstrate competency in motor skills, both in PE classes and their spare time, and to perform a variety of physical activities. Learning and performing other physical activities will lead to regular PA. This will enable adolescents to achieve, and benefit from, health-enhancing levels of PA in different settings. Additionally, studies have identified that the

revision of the PE curriculum improves PA for self-expression, health, enjoyment and social interaction (Mojisola & Oladimeji, 2017; Sallies, 2014).

The development of PE interventions should enable Nigerian adolescents to meet the PA levels recommended by the WHO (2013). In particular, PE class-based interventions can be conducted through teaching methodologies: adding new teaching styles, lengthening existing PE classes, and by increasing the PA intensity of students during PE without necessarily lengthening class time, by increasing the time at PA station points during PE class (Emily et al. 2013). All the above are vital in determining the quality of PE classes, which directly affects adolescents.

In addition to factors like barriers to teaching PE in secondary schools, students' interest in PE, modifying existing curricula and teacher professional development interventions have been studied. Akinroye et al. (2013) and Adewale et al. (2016) suggested that interventions designed to improve primary and middle school PE teachers' lesson planning and delivery could improve students' attitudes to, and practices in, PA and PA levels during PE classes. Teacher professional development interventions have provided greater opportunities to promote PA in schools (Report of National Guidelines on Physical Activity and Sedentary Behaviours, 2016).

About 60% of Nigerian adolescents do not have the opportunity for adequate PA in their school PE classes (Akinroye et al. 2013). There is an urgent need to develop effective school-based interventions with the potential to improve the PA levels of adolescents in Nigeria and other low-income countries (Akinroye et al. 2013; Adeniyi et al. 2016; Mojisola & Oladimeji, 2017).

1.2 Statement of the problem

Physical inactivity has become a widespread issue on a national scale, as a developing health problem among adolescents (Ocansey et al., 2014). The proportion of time spent performing vigorous PA (40.5%) during PE is below the recommendation (50%) of the African Centre for Disease Control and Prevention and the national guidelines for PA levels for African children and adolescents (Adeniyi et al., 2016).

Despite well-designed PE programmes, and certified teachers in Nigeria's education system, the level of Nigerian adolescent PA during PE class is unlikely to lead to any health-related benefits, due to the lack of guidelines informing PA during PE class. This could be linked to poor teaching methodologies adopted by teachers during PE classes, but this has not yet been examined in school-based PE programmes in Nigeria, using a large sample of PE teachers and students. PA programmes in Nigerian schools need to modernise through the PDT programmes, with the existing PA in the PE syllabus, to meet global best practice and standards (Adeniyi et al., 2016; Mojisola & Oladimeji, 2017). In addition,

Adewale et al. (2016) indicated that only 47.3% of adolescents in Nigeria were physically active at school.

Currently, some schools in Nigeria have not changed their methods of teaching PE, and in some junior secondary schools, adolescents engage in a particular sport by using one ball or one piece of equipment in a large group. This has led to a drastic decline in the PA levels of adolescents (Emily et al. 2013; Mojisola et al., 2017). The requirements for PE instruction to promote PA are generally low and schools are facing increased pressure to exchange PE periods for other academic subjects. This has been a barrier to implementing PA teaching methodologies within school-based PE in Nigeria. In view of this, Nigeria as a country still has a problem with PDT in teaching methodologies that could promote PA during PE, by implementing teaching methods that could facilitate students' motivation and by practically improving PA in the school environment.

1.3 Rationale

Participation in PA is declining drastically among adolescents in Nigeria. The proportion of time in PE classes spent in PA is 40.5**%** (Akinroye et al. 2014). This is below the level suggested by the African Centre for Disease Control and Prevention and the National Guideline on Physical Activity (Pate et al. 2005), which recommend 50%. Additional teaching strategies and interventions are needed to include more activity in PE classes (Hollis et al., 2017). More PDT intervention programmes on teaching methodology are needed for educators to promote PA during PE classes (Adeniyi et al., 2016).

There is evidence that PDT intervention programmes enhance school-based PE in the delivery of quality PA, through teacher training, specifically on teaching methodologies (Emily et al. 2013). There is a definite improvement in students' PA attitudes and practices after the implementation of a PDT programme (Ajoku et al. 2013; Hills et al. 2015). If teachers understand the purpose of a PDT programme before the training begins, this may encourage them to participate in the PDT programme, which in turn would improve teacher outcomes to influence student practices (Harland and Kinder, 1997; Muijs et al. 2004).

Studies have indicated that, despite a modified and well-designed PE curriculum with certified PE teachers, PE classes in Nigeria still have a problem promoting PA in adolescents during PE classes, even after the appropriate training (Adeniyi et al., 2016; Mojisola & Oladimeji, 2017). A systematic review (Lubans et al., 2016) has shown that school-based PE interventions are one of the ways to promote PA by modifying curricula and policy to increase the amount of time spent on PA during PE classes. In addition, creating and changing free-style activities to adapt to the disposition and physical demands of students can create the possibility for enjoyment that will increase motivation to participate

in PA (Hills et al., 2015). This can be achieved by teaching methodologies to promote adolescents' PA during PE classes (Lonsdale et al., 2016).

Sallis and McKenzie (2014) evaluated the creation and implementation of PE programmes to promote lifelong wellness among adolescents, to increase awareness, and to improve adolescent health through PA. The intervention significantly led to the promotion of fitness components that were focused mostly on the PE syllabus. Students were more responsive to these interventions.

School-based PE classes are a suitable place to intervene to increase levels of PA, locally and globally (Task Force on Community Preventive Service, 2013). To the best of the researcher's knowledge, there have been no PA evaluations, or PE class interventions, at junior secondary schools in Lagos State, Nigeria. The present study will aim to fill this gap in the literature.

1.4 Aim of the study

The aim of the study was to develop a professional development training programme for PE teachers in junior secondary schools and to evaluate its impact on students in order to improve PA in Nigerian school-going adolescents.

1.5 Objectives of the study

The followings are the objectives of this study:

- to determine the PE teachers' current teaching methodologies during PE classes in junior secondary schools;
- to develop a professional development training programme to promote PA in students during PE classes in junior secondary schools using a theoretical framework, literature and current PE curriculum;
- to evaluate the impact of the professional development training programme on the promotion of PA in students during PE classes in junior secondary schools post-intervention; and
- to determine the attitudes and practices of junior secondary students regarding PA promotion, pre- and post-intervention.

1.6 Hypotheses

Alternative hypothesis: The professional development training programme will have an effect on the promotion of PA during PE classes in junior secondary schools.

Null Hypothesis: The professional development training programme will have no effect on the promotion of PA during PE classes in junior secondary schools.

1.7 Significance of the study

The results of the study may give an insight into the professional development of PE teaching methodologies (adding new styles: interpersonal style - autonomous support by the researcher; increasing the PA of students during PE without necessarily lengthening class time; lengthening existing PE classes) to promote PA among Nigerian adolescents during PE classes. The findings of this study should assist with the development of professional guidelines to support the teaching of the PE curriculum, focusing on the expert delivery of practical skills, and contributing to the knowledge on teaching methodologies to promote PA during PE programmes, thereby promoting PA through a deliberately designed PE intervention programme. The PDT programme should lead to conscious and planned activities, which increase health benefits for the individual from the PE curriculum. However, the PDT will also provide opportunities for teachers to express their challenges in teaching PE and how these challenges could be resolved. This may be of particular significance in promoting student PA attitudes and practices.

In addition, the findings should improve students' PA levels; enhance health benefits; increase knowledge about PA; provide details on a range of PA that students will enjoy; increase PA opportunities for school community members; improve the quality of life, and possibly influence lifestyle diseases in adult Nigerians.

The findings will also give an insight into the practical development of teaching methodologies to promote PA in the Nigerian context, through a deliberately designed school PE class programme. This will contribute towards the development of a health benefits promotion programme in the PE curriculum. These programmes will be incorporated in the development of guidelines to support the teaching of the PE syllabus in Nigeria, to promote PA, and to determine the quality of PE classes in junior secondary schools.

1.8 Research methodology

The sample population was selected from Lagos State East senatorial districts which have approximately 103,412 (males, n=50,646; females, n=52,766) junior secondary school students in Class Three (3). Students from Class 3, known as JSS 3, were selected to participate in this study, along with 864 PE teachers from Epe local government area, in Lagos State East senatorial district junior secondary schools in Lagos, Nigeria.

A total of 1,272 participants were purposively selected as a representative sample of PE teachers and students from 24 selected senatorial district junior secondary schools. The study used a self-administered questionnaire (Attitudes and Practices of PA for Adolescents) and focus group discussions (FGDs) as data collection tools. A PE teacher from each school participated in the PDT (n=24) and participated in FGDs pre- and post-intervention. The PDT was designed, based on the FGDs and information from the related literature. Statistical analyses included the paired sample t-test, one-sample t-test and Wilcoxon signed ranks test. ANOVA (analysis of variance) was used to validate the post-intervention scores, to determine the interaction effects of categorical interval scale variables. The analysis of the focus group discussions was carried out methodologically by comparing the groups.

1.9 Structure of the study

This study consists of six chapters:

Chapter 1: Introduction

This chapter includes the background of the study, the research problem, aims, objectives, research questions and hypotheses. The rationale for the study and research methodology, the delimitations and the structure of the study are presented.

Chapter 2: Literature review

This chapter reviews the relevant literature on initiatives for the promotion of adolescent PA during PE classes and describes the benefits of being physically active and the implications of inactivity. It begins with the definition of PA and the content of the physical education curriculum. It then focuses on the teaching strategy intervention connected to the promotion of PA during PE classes. A school-based intervention, connected to moderate-to-vigorous PA intensity measurements, is briefly discussed. Finally, an intervention in implementing PE teaching methods is also discussed.

Chapter 3: Research methodology

This chapter begins with a brief explanation of the theoretical framework of the research methodology in this study; the research design; methods of assessing each objective; the study setting; target

population; and sampling procedures. It also clarifies the survey administration, analytical techniques and ethical considerations of the study.

Chapter 4: Results

This chapter presents the research findings and analysis in relation to the research objectives and hypotheses. It begins with descriptive analyses by reporting the FGDs, AP questionnaire demographics and data collected pre- and post-intervention. The most likely reasons for the physical inactivity of adolescents, preventing them from enjoying the health benefits of exercise, are discussed. Following this, confirmatory factor analysis and inferential statistics are discussed.

Chapter 5: Discussion

This chapter presents a discussion of the significant findings as they are aligned with the literature and the aims and objectives of the study.

Chapter 6: Conclusion and Recommendations

This chapter includes a summary of the main findings of teaching methodologies for PA promotion in adolescents' PE classes in Nigeria. It explains their success in terms of increasing physical activity levels and students' knowledge, and in changing their attitudes and practices. It also offers recommendations for future research.

1.10 Summary

Chapter One has outlined the background of the study, which highlighted the knowledge gap and provided the justification for the study. The aim and objectives of the study were presented. The first chapter also included the research question, hypotheses and rationale for the study. The introduction also provided the structure for the dissertation. In the following chapter, the literature review of the study will be presented.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter discusses initiatives for the promotion of adolescent PA during PE classes and describes the advantages and importance of being active physically, and the implications for not being physically active. Previous recommendations to promote PA through the PE curriculum, professional development programmes and teaching strategy interventions are described. The background to PE classes in Nigeria and the promotion of adolescent PA through school-based interventions are reviewed.

The chapter is presented in the following sections:

Section A: Physical Activity
Section B: Barriers in Implementing Quality Physical Education Programmes in Nigerian Secondary Schools
Section C: The Concept of Teaching
Section D: Conceptualisation of Students' Perceptions
Section E: The Importance and Benefits of PE for adolescents
Section F: The Structure of School Physical Activity to Improve Adolescents' Opportunities to Access Health Benefits
Section G: Professional Development Training Programmes
Section H: Teaching Methodologies as Interventions to Promote PA during Physical Education Classes
Section I: Implementing the Teaching Methods in Physical Education Curriculum Interventions
Section J: Evaluation of the Effect of Training the Teachers on the Enhanced PE Curriculum

2.2 Section A: Physical Activity

PA could be described as movement of any part of the body, which requires energy. This includes everyday movements, with the exception of lying down and sitting (Catherine, 2010). Similarly, the Community Guide on Physical Activity for preventive services, (2018) stated that PA can include going up and down stairs, walking to school, riding a bicycle and cleaning the home. While exercise is a type of PA, not all PA is exercise. The nature of the exercise is to be planned, structured in a conducive environment and actively repeated to promote PA levels.

The words 'physical activity' refer to activity that is natural, physical, human movement, which engineers and accelerates the efficient function of body physiology and biochemistry (Adebayo et al.,

2015). Caspersen et al. (1985) defined PA as body movement, which involves the expenditure of energy, resulting in movement in the skeletal muscles in the human body. The energy spent during the task can be evaluated in kilocalories. PA in everyday life can include job-related working, playing sport, fitness activities, cleaning and housework, schoolchildren exercising, and more. PA comprises exercises that are designed to be repetitive and structured to accomplish specific objectives – either final or intermediate – to promote PA levels to enhance health benefits, like improved mental health, moods, energy levels and a better quality of life (Hills et al., 2015).

Caspersen et al. (1985) identified some terms that can be used to categorise PA. These terms refer to the health benefits of physical fitness in everyday human lives. 'Active living' refers to the idea that every human needs to include and value PA in everyday life. In 'physical fitness' there are percentages of bone, fat and muscle in the body, which must be maintained to avoid obesity. The 'capability of the heart functioning well' refers to cardiorespiratory fitness, which improves through regular exercise, to enable proper functioning of the lungs and blood vessels to supply enough oxygen to working muscles for them to function well when the workload demands. Deirde (2016) opined that activities like running, swimming, walking and biking, which involve the use of the body's large muscle groups, promote cardiorespiratory fitness and help to develop a stronger heart and lungs – when the PA is regular. To enhance health benefits like cardiorespiratory fitness, and to build endurance and aerobic fitness, the individual must engage in regular PA.

Christopher (2015) noted that regular PA prevents chronic disease, and any disease that lasts a long time may progress more slowly, or be cured. They suggested that regular PA for children and adolescents might cure chronic disease completely. It could reduce the risk of developing heart disease, asthma, cancer, depression and diabetes. Exercise is PA that is structured in an organised setting, is repeated and is well planned.

Caspersen et al. (1985) identified four components in PA if it is to have health benefits: frequency (the number of times per week you are active will determine your fitness levels); intensity (how much effort you expend in an activity); time (how many minutes are spent on PA); and type (what kind of PA you do).

2.2.1 Health-Related Physical Activity

Different kinds of PA are related to the promotion of health and good body composition and influence flexibility, muscular endurance and muscular strength.

Caspersen et al. (1985) noted that when one is only engaged in low-intensity PA, it can lead to inactivity when the body demands enough energy to perform; but in some cases, light activity is low intensity, such as slow walking that does not use much energy, cause sweating or more rapid breathing.

The human body needs an amount of moderate-intensity PA exercise, in order to raise the heart rate, and cause sweating and more rapid breathing. While engaging in an activity of moderate intensity, one can still talk while exercising, but not sing a song. On a measurement of 0 to 10, with 10 the highest intensity PA, an activity of moderate intensity is a 5 or 6. Moderate activities include playing tennis, bike riding and walking fast (Goh et al., 2014).

In view of definitions of PA given by Brusseau et al. (2011) and Adebayo et al. (2015), this study regards PA as including leisure activities, sports, and games and organised movements of the body that lead to an improvement of energy levels and health benefits. Regular PA improves energy levels and body alertness. Students who are physically fit have the ability to engage in day-to-day activities like games and sports or leisure exercise without becoming fatigued, and with sufficient energy in reserve.

2.2.2 Physical Health

PA is usually associated with physical health – good flexibility, muscular strength, cardiovascular fitness, endurance and physical fitness. These develop as a result of prolonged, vigorously intense PA and healthy eating (Graham-Clarke et al., 1998). In PE classes, well-designed adolescent PA encourages students to avoid unhealthy eating and harmful substances. Regular PA results in health benefits. Participation in PA involving body movement, both in school-based sports and games and leisure exercise outside schools, will promote physical health and healthy lifestyles (Grastir, 2014).

The World Health Organisation (2013) stated that frequent, well-designed adolescent PA promotes aspects of physical fitness, including muscular fitness; co-ordination and movement control; cardiorespiratory fitness; bone health; and the maintenance of a healthy lifestyle and body weight. All these have been connected with learning processes and cognitive skills. They further explained that when adolescents spend more than 60 minutes in PA daily, it results in additional physical fitness and increased health benefits. PA is globally accepted as a way to improve the health status of an individual. Individuals of different ages can reap great social, physical and mental benefits from participating in regular, adequate PA and sport (Naidoo & Coopoo, 2012).

There is still inadequate research on how PA promotion differs between various countries (Lonsdale et al., 2016). This has warranted investigating what motivates adolescents to be physically active in PE classes. PA is a valid way of improving fitness levels and health outcomes among school-aged children and adolescents. One study was included in the ‘PA promotion guidelines for the teaching of

adolescents in the US'. The United States Department of Health and Human Services (USDHHS, 2005) conducted the research.

The Physical Activity Guidelines Advisory Committee Report's (PAGACR) (2008) review of systematic studies opined that studies on children and adolescents provided little data on their response to PA and various health and fitness phenomena. However, important data on children and adolescents indicates that those who are involved in MVPA for 60 minutes or more, daily, enjoy enhanced health and fitness benefits. To gain comprehensive health benefits, children and adolescents need to exercise three to four days a week, doing different types of physical exercise, such as aerobic exercise, weight-loading activities and vigorous resistance exercise (PAGACR, 2008).

The analyses made between 2005 and 2008 did not include order and planning in reviews of the motivation for PA. This study suggests that PE classes will supply the chance to implement motivation strategies. Since all adolescents access PA through PE classes, it is a convenient place to assess the motivation to adopt healthy behavior (Lonsdale et al., 2016).

Telford et al. (2016) conducted a study on long-term interventions on trained PE teachers, in order to promote the PE curriculum. Trained PE teachers are more likely to increase PA in PE classes, through the PE curriculum, than untrained teachers. This was found in a two-year PA intervention. Another similar study, conducted on PA interventions, with the use of trials using control and intervention groups, was carried out with two PE classes a week. This identified improvements in PA within the school year. The significant finding of this study was that, when the intervention stopped, the benefits of PA were not sustained. They further suggested that to maintain health benefits, a longer-term intervention would be appropriate (Lonsdale et al., 2016). PA has been measured objectively using long-term interventions, but the impact of the interventions on PE class motivation has not been clearly established (Lonsdale et al., 2016).

2.2.3 Physical Activity Records in Nigeria

There is no current data in Nigeria on the deaths of adolescents due directly to physical inactivity, and therefore unable to access the health benefits of PA. However, some research has shown that one-quarter of all adolescent deaths originated from students being unable to access the health benefits of PA (Adebayo et al., 2015). There was an urgent call by NCDs to design PE curricula to support physical activity as a public health programme in Nigeria. To scale-up interventions to promote PA and prevent adolescent deaths in Nigeria, the present study developed PE teaching interventions and new methods of implementation for PE teachers that could promote PA in PE classes and school sport.

Of Nigeria's adult population, 78% met the health recommendation of vigorous-intensity PA in a week, by participating for 75 minutes in physical exercise; or a comparable mixture of activities (World Health

Organisation, 2013). This was greater than the global average of 76.7% (World Health Organisation, 2018). Studies conducted on the promotion of PA show that 22% of adults in Nigeria are still inactive. It should be noted that the current PA estimates for Nigeria were from a national divisions study conducted about two years ago (Adeniyi et al., 2016). Physical inactivity is a public health issue that has been noted and observed because the lack of PA can lead to an increase of NCDs. The Federal Ministry of Health connected with PE teachers at the National Population Commission where they integrated physical activity programmes into the community, and PE teachers served as some of the key facilitators of national health, routinely reported and collected in the Nigeria Demographic Health Survey (DHS) (Adewale et al., 2016). Minor researchers have participated actively in research to promote PA in Nigeria, from 2013 to the present. This warranted the need to develop professional training for PE teachers to provide them with teaching methods to promote PA. The researchers were guided by Hanna's theoretical model. Oyerinde et al. (2013) focused on health promotion through participation in PA. Their study supported the suggestion of Adewale et al. (2016), that a viable approach to promote PA research in developing countries is to develop more professional training and graduate-level programmes among PE teachers. Similarly, the present study focused on teacher-training to improve PA and public health.

Oyerinde et al. (2013) posited that in Nigeria and other African nations, it is advantageous to introduce courses on PA in the curriculum and training of health professionals. This might generate the required professional workforce to move PA research forward in the region. In promoting PA among the adolescent population in Nigeria, there must ultimately be local authorities that could be effectively served through the commitment of dedicated PE teachers from various schools, both private and government.

A limitation of this study is the non-representativeness of the assessment of physical activity in Nigeria. It was calculated from the selected adult sample population in one of the 37 states in Nigeria (Oyerinde et al., 2013). A review of the research indicated that adults were mainly used for the research, forgetting that inactivity begins in adolescence and continues into adulthood. This study has used the adolescent population as a sample and considered teaching methods to promote PA in Nigerian PE classes. It showed that much evidence relevant to improving PA in Nigerian schools has been omitted.

Research conducted by Odunaiya et al. (2010), on adolescents, indicated that 58.8%, 38%, and 3.2% participated in low-intensity PA, PA of moderate intensity, and PA of high intensity, respectively, in schools in Oyo State, Nigeria. In addition, 8.8% were classified as physically inactive and 1.2% were overweight, with body composition indices directly linked to PA levels.

In another study, Adeniyi et al. (2011) discovered a significant lack of PA in Oyo State students, in Ibadan, and this was associated with both school and individual barriers. They noted that the amount of PA in which students participated varied. Lack of PA was common in adolescents in private schools

and was linked to dejection and feelings of severe despondency. Declining levels of PA at secondary schools have become a health issue in most countries, including Nigeria. This warrants further examination. This study has concluded that increasing levels of physical inactivity are largely based on the automation of everyday activities. Urbanisation and motorisation have led to more sedentary behaviour in students and this underscores the need to emphasise rising physical inactivity. This study, therefore, will train teachers using Hanna's theoretical model, which states that teachers must accept that there are problems in their teaching methods, and they must be ready to change their styles of teaching by implementing new teaching methods.

2.2.4 Education in Nigeria

The Nigerian National Policy on Education (NNPE) governs the education system in Nigeria, according to the last revised policy documents (1990). They focus on the unequal provision of education in the different states in the country, paying particular attention to resources and junior secondary education. The Nigerian system of education was designed across six divisions: 6-3-3-4. This translates to six years of primary school, three years of junior secondary school, three years of senior secondary school, and four years of university education, or at another tertiary institution. The drafting of the education policy and its implementation is the duty of the Federal Ministry of Education, which must also ensure that the states provide education within the parameters of Nigerian education policy, as adapted in order to meet local needs. The government reshaped Nigeria's system of education in the 1990s, with additional revisions of the NNPE, with studies of education documents and sectors. The United Nations Children's and Education Fund (UNICEF), in collaboration with the NNPE, produced the Situation Analysis Policy Study (SAPA). A study conducted by Mojisola et al. (2017) investigated the factors preventing students from accessing the components of quality education. Another study conducted in 1997 evaluated how Nigerian students can access learning. The reports showed that students are lacking study and literacy skills.

2.2.5 Physical Education

Physical education is characterised by order and planned instruction in different games, training practices and hygiene in a programme in the school curriculum designed to transmit knowledge of the movement and functions of the human body (Hardman, 2002b). Rashid (2014) submitted that there are three forms of PE: Educational activities, like sport, games, dance and play are taught to students, groups and clubs. Academic programmes at higher institutions teach the academic knowledge and theories related to PE. Professional development in skill ability and training prepares PE teachers and sport coaches to impart knowledge of PE to students and to coach sports during educational activities.

A constant interchange of knowledge occurs because of the relationship between these three forms of PE.

Bibik and Orsega-Smith (2008) conducted research on adolescents' attitudes to PE. The results showed that roughly 45% of the adolescents enjoyed participating in games and sports during PE classes. In addition, PE was rated just after mathematics, English and science by 43% of students, showing that PE was an important subject in their school educational programme. The majority of the PE teachers employed traditional methods to promote PA in junior secondary schools, while teaching PE. PE has a vital role in the implementation of physical activity, but teaching methods must be modified to enhance the quality of PE classes in order to achieve their objectives (Hardman, 2002b).

PE comprises the study of, and scientific approaches to, human movement (Hardman, 2010). It is an important part of school and college sports, games and other exercise-training programmes. PE is included in many school curricula as a subject that develops literacy in the cognitive, affective and psychomotor domains through an exploration of playing and movement (Kirui, 2007). In this study, it refers to a theoretical programme constructed around low levels of motor activities, which helps realise the goal of physical, emotional and mental wellbeing for every adolescent, student and teacher. It involves education in health, personal cleanliness, personal safety, first aid and the teaching of planning skills. It is an essential part of the schooling curriculum. In schools, the abbreviation PE is usually used to refer to physical education.

Naidoo et al. (2012) opined that the life orientation syllabus, newly established in South Africa, included areas of learning that engaged students in PE. It has been incorporated into the South African national curriculum. Their study evaluates the importance of PE in promoting learners' PA. Findings in the PA intervention study indicated that PA in learners improved from 30 to 60 minutes a week in schools promoting PA during the intervention study. However, these outcomes have yet to be used for children's PE. Therefore, they suggested a NAP intervention as an additional measure to help in promoting PA awareness and healthy lifestyles.

The perceived threats to PA during PE class were investigated by looking deeply into the PE position and situation of PE in most schools. The study was funded and conducted by the Nigerian Universal Educational Committee (NUEC) (2009). Data collected indicated that school PE was under threat throughout the country. The study explained that the obstacles to promoting PA in schools are not considered as barriers, yet restricted time allocation for PE classes; the status of PE teachers; the attitudes of the administration; parents' lack of funds; personnel resources; materials; teachers; lesson plans and curriculum trends are all issues that threaten PA during PE classes. To retain PE in schools, and to promote the PA that will really motivate students, there needs to be motivation intervention.

Deirde's (2016) study offers sufficient proof that PE class intervention increased students' PA during participation in PE classes. An intervention was conducted on schoolgirls, and the outcome indicated that it had successfully increased daily PA levels of the primary school girls. It also identified opportunities for the promotion of PA within school hours, and evaluated the influence on the students' daily PA of a whole-school initiative.

2.2.5.1 Position of Physical Education in Nigeria

The practice of PE in Nigeria has the same educational goals as many countries in the world, like the United States, the United Kingdom and South Africa. The PE curriculum for Nigerian students starts in primary school. The PE curriculum in Nigeria emphasises teaching to improve the students' socialisation, physical training and general wellness (Kirui, 2007).

Mojisola & Oladimeji (2017) observed that the PE syllabus for Nigerian schools involved swimming, jumping and dancing, including traditional sports. These were part of the educational programme in PE to promote active lifestyles. The aim has been to build students' knowledge of physical skills and to develop attitudes and practices among adolescent and children in order to attain the primary objectives of PE; but today PE is declining in Nigerian primary and secondary schools (Report of Nigerian Universal Education Committee Board, 2009).

The PE situation differs in schools across countries in Africa. In Nigeria, PE is taught and is examinable at junior secondary school level (JSS 3 Junior Examination Council). It is voluntary at the senior secondary school level (SSS 3 Examination Council) or ordinary ('O') level and advanced ('A') level. Therefore, the inadequacy of new teaching methods to improve the quality of PE, and inadequate equipment and facilities, are barriers to student participation in practical classes (Okonkwo, 2008).

Van Deventer (2011) noted that PE is taught in South Africa, in Grades R to 9, in combination with other components under 'life orientation'. It is not viewed as a subject on its own, but is designed for social development, personal development, health promotion and orientation to the world of work. Similarly, Zimbabwe, in southern Africa, designed their PE syllabus for the primary schools for Grade 1 to 7 learners. PE is a subject in which all learners are required to participate, with a syllabus designed to promote full, fundamental human movement, and to understand the techniques involved. It promotes gender equality, as well as developing active lives in the learners, through the established teaching of PE in schools (Nhamo, 2012).

2.2.5.2 Physical Education as a School Subject in Junior Secondary Schools

Hardman (2010) defined PE as an essential part of education. It is an area which focuses on developing the emotional, social, mental and physical wellbeing of an individual to produce fit citizens through the engagement in organised physical activities, with a view to realising feedback. Many schools should place a greater emphasis on PA in the PE curriculum, in PE classes. The PE curriculum has been reworked in response to changing attitudes to PE as a subject over recent decades.

The change of attitude begins with the PE teachers, who play a vital role in building a standard PE curriculum. Teachers prepare students to grow and progress, and they understand the problems affecting the performance of their students (Martin & Murtagh, 2015). The teacher is main factor in the educational processes of teaching and learning. Therefore, the teaching of PE as a subject requires effective teachers with competent, updated skills. There is no doubt that PE, as a subject in junior secondary schools, is an important subject, influencing the PA of adolescents. (Adebayo et al., 2015).

Abedalbasit (2013) suggests that identifying the barriers affecting PE as a subject will contribute to improving PE and acknowledging school responsibility in this regard. Sports and health talks should increase the opportunity for PA in schools, enabling the PE programme to improve the health benefits to students.

2.3 Section B: Barriers in Implementing Quality Physical Education Programmes in Nigerian Secondary Schools

Morgan and Hanson (2008) classified factors which impede the implementation of quality PE programmes in some schools as institutional problems that may be beyond the teacher's control; or problems generated from teacher attitudes, which are teacher-related problems. Dwyer et al. (2003) investigated teachers' views on the lack of schoolchild participation in regular daily PE in Toronto. In their study, they classified the barriers that affect the quality of PE programmes into the lower priority given to PE relative to other subjects; the lack of performance measurements for PA; and inadequate equipment and facilities. The lack of performance measurements for PA could be caused by teacher incompetence.

Wamae (2009), from Kenya, investigated whether teachers' lackadaisical attitudes to PE undermined the seriousness of the subject, as it is a non-examinable subject. This lackadaisical attitude in PE teachers could be the result of a lack of PA teaching guidelines. The author further noted that new guidelines on foods for healthy living were incorporated into schools in Kenya to improve PA during

PE, and to reorganise PA. The results indicated that they struggled to deliver compulsory PE classes with limited class time and resources (Wamae, 2009).

A review of the literature has shown the lack of certified PE teachers in developing countries, especially in Africa. Therefore, in this study, PA teaching guidelines and training for teachers will be provided. Jenkinson and Benson (2010) conducted a survey using 270 PE teachers in secondary schools in Victoria, Australia. The study focused on perceived barriers to improving the quality of PE and ranked the barriers (as they viewed them) in producing standard PE. The study showed that institutional PE teachers are an obstacle to providing quality PE, due to the lack of training among teachers in Victoria state secondary schools. In view of this evidence, the present study will be guided in developing teacher training, with the use of Hanna's theoretical model.

Another study by Gallo et al. (2006) explained that the biggest barriers affecting the process of assessing students' PA in PE classes were difficulties in awarding scores to students. Based on their abilities and skill levels when creating exercises; teachers find it difficult to allocate enough hours and keep records while working with classes of varying sizes, especially when developing moderate to vigorous PA.

Adebayo (2015) suggested that the teacher should be the most important factor in implementing education. Schooling depends upon teachers developing the students, but not all teachers are the same, and many face difficulties that inhibit their ability to carry out their duties. This affects the progress of students and can disadvantage them. PE is an important subject that develops physical health and affects the entire body. Learning and teaching depends on the teacher who is, therefore, the most important factor in delivering education. It is, therefore, necessary to produce successful teachers who are influential and competent.

School sports programmes in secondary schools include activity in PE class, other games when time allows, and fundraising to facilitate the efficient implementation of PE in school sports programmes. Sports programmes need to be financed. Bucher and Krotee (2002) commented that facilities should be structured and constructed with a view to the near future. Igbanugo (2004) ascertained that some students drop out, or feel reluctant to participate in PA training, because facilities and equipment are inadequate.

The lack of implementation of PE teaching methods primarily occurs in the school system. PE is compulsory in all state schools. However, the PE requirements for instruction are usually lacking (for example two to three times weekly). Many schools require daily PE but schools are experiencing challenges due to persistent pressure to ban PE as a subject, in order to create enough time and periods for other subjects. The Community Guide on Physical Activity for Preventive Services (2018) reports there is strong proof that enhanced school-based PE effectively promotes PA and increases physical fitness.

2.3.1 Competency

The desire for competency is an individual characteristic, which drives teachers to perform well in their jobs, increasing the standard of education, or becoming more efficient and improving the standard of their leadership (Powell, 2007; Grigoryev, 2006; Grossman, 2007; Charland & Leclair, 2007). In order to evaluate teachers' competency, they need to be observed and evaluated (Ovaska, 2007; Meisinger, 2007). To improve the competency of teachers in PE, it is important to design training that can be delivered in a short time, which will immediately address and improve PE teaching methods in the national education system.

Adebayo et al. (2015) determined that PE teachers' competency in secondary schools was affected by the lack of on-going training for PE teachers. Nziramasanga (1999), cited by Adams (2012), found that the PE training programmes in schools are not comprehensive enough and do not conform to a standard. This teacher competency report noted that teachers failed to interpret the syllabus and did not come up with meaningful PE activities. The lack of training in PE teaching methodology also contributed to low PA in Nigerian students. Morgan and Hansen (2008) identified the lack of teacher training as one of the teacher-related barriers to teaching PE. They concluded that if teachers' knowledge, attitudes and practices are updated in PE and sport, students' PA levels will be improved. They suggest that there is a need to develop strategically important interventions for PE teachers on a regular basis. In view of the analysis of previous studies, this study looks at developing teaching methodology training and interventions in secondary schools. This will give teachers professional assistance in studying the syllabus, and understanding and interpreting the content in ways that allow them to modify the rules of games; in other words, to become competent, highly qualified and highly motivated in PE classes.

2.3.2 Time Allocation

The time allocated to daily or weekly PE classes is generally not sufficient to increase PA (Caperson et al., 2000). The suggestion has been made that, in order to promote PA, the focus in PE programmes could be shifted from the traditional methods of promoting PE and sport exclusively in PE lessons, to during the entire school day: schools are child-centred, where they learn the habits and theory that promote healthy activities (Caperson et al., 2000).

PE is a required part of the curriculum for students, from 4 years old to 16 years old, at all levels. The Council for the Curriculum, Examinations and Assessment (2017) recommended that schools should provide adequate time for the PE curriculum, at least two hours a week. At present, schools decide how many hours they want to devote to PE, in line with the recommendations. Deirde (2016) pointed out

that there are several unique opportunities in schools for the promotion of PA, such as students participating in PA at lunchtimes, and engaging students in activity before school, during PE lessons and after school.

Previous interventions targeted isolated, or several, portions within the school day in order to improve student PA; but they failed to motivate activity during PE classes, by giving autonomy and support to the PE teachers, devoting more time for practical PE, providing PE specialists, and focusing teaching on MVPA during PE class. A study of PA interventions in schools, for students aged between 6 and 18, found these kinds of interventions could improve the amount of PA, at which students spent 30 to 45 minutes daily (Dobbins et al. 2013). With adequate time allocation for the PE period, students can sustain a healthy and active lifestyle.

2.3.3 Facilities and Equipment

Physical education facilities and equipment are carefully selected to enhance physical development, help adolescents enjoy physical fitness and show them how to be active throughout their lifetimes. Efficient participation in PE class in junior high schools must be facilitated by providing adequate funds for the purchasing of sporting equipment and facilities for the use of students during PE class, and which can be replaced or repaired when damaged (Lonsdale et al. 2016).

Mojisola et al. (2017) stated that sports facilities, which are used to promote PA in schools, should be designed for long-term future use; but facilities and equipment in many schools are not constructed for long-term future use and are also difficult to maintain. Almost no junior secondary schools in Nigeria have suitable facilities, and older equipment is not easy to exchange. Adesanya et al. (2015) confirmed that facilities and equipment are what motivate adolescents to become involved in PA, and inadequate facilities and equipment are one reason why adolescents drop out of PA training.

Hardman (2010) stated that many countries had below-average quality, or a shortage of, facilities for PE. This was most common in Nigeria and other developing countries. The author indicated that in all Central and Latin American countries, the standard of the facilities was designated as insufficient. This was supported by Caperson et al.'s (2000) study. They observed that African countries have facilities rated at 67%, which indicates that they are insufficient. Bibik and Orsega-Smith (2008) conducted a study in Nigeria, and discovered that there is a relationship between the implementation of the PE curriculum and the availability of facilities used during school PE. Spittle, Petering and Kremer (2012) stated that PE equipment, such as volleyballs, basketballs and footballs, is portable and consumable. However, many schools lack maintenance and follow-up to keep these items in good condition, and the majority are in a very poor condition (Spittle, Petering & Kremer, 2012).

The WHO (2007), reporting on the status of PE in schools worldwide, especially in Africa, noted that most secondary school lack facilities, equipment and sufficiently certified teachers. In addition, they explained that the value of the PE curriculum was undermined in many schools, which regard PE as a non-academic subject and a waste of time. Many primary schools even see it as recreation/playtime. In some African countries, PE facilities and equipment in secondary schools are seldom inspected; and even the meagre time allotted to PE/sports is often diverted to other subjects. This review indicated that PE, as a subject, was neglected and that the lack of apparatus for improving PA and PE is a barrier to implementing improved PE teaching methods to promote PA during PE classes. As O'Sullivan (1990) noted, PE is no longer a school subject in South Africa, but is taught in the learning area of 'life orientation', focusing on physical development and movement, along with personal development, health promotion, social development, and orientation to general education and training, under the topic of work focus, in Grades R to 9.

A study conducted by Luke and Sinclair (1991) showed that facilities and equipment were rated in the lower range, as determinants of student's attitudes to participation in school PE programmes. Their findings were in line with Fernandes and Sturm (2010), who stated that the provision of poor facilities and equipment is a potential barrier to school PE programmes. Given the findings in previous studies, the present study suggests that schools need facilities to implement enhanced PE classes that could improve students' PA levels, especially in schools that are in urban areas. With the implementation of teaching methods and an evaluation of the intervention, this study ensured that the apparatus could be improvised for use in PE class.

2.3.4 Overloaded PE Curriculum

An encumbered load can be defined as 'load with exorbitant burden' (Webster, 2000; Random House, 2009). A PE curriculum that is 'overburdened' suggests some imbalance or unsuitable teaching methods in the discharge of lessons. There is no capacity to implement a PE curriculum that is overloaded. A PE curriculum overloaded with theory will mean less time for PA during PE classes, and this will frustrate PE teachers in their efforts to organise practical classes that will promote PA levels in students. This will not only affect teachers but also students. If we look at a ratio of one teacher to one classroom as critical to children learning, when teachers try to cover the syllabus meant for one month within a shorter period, this results in overload. One teacher may be allocated to teach three sets of classes in a day. The issue of PE curriculum overload mostly affects students' PA.

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2003) suggested that much of the exorbitant curriculum burden is caused by the teachers. Many observers have questioned the exorbitant burden in curricula encountered in schools, and the extent of the overload. In

this study, it appears that teachers need training on how to understand the objectives of a curriculum and how the content can be taught, using their professional knowledge. UNESCO further questioned the tendency to enlarge new, revised curricula, while giving little time for the implementation thereof. In the light of this, this study has developed training in teaching methodology that provides teachers with guidelines to modify the existing curriculum in order to implement the curriculum and increase students' PA in the limited time available.

In another study (NCCA, 2010), the findings showed that the existing curriculum was burdened with the theoretical aspects of PE. The practical aspects, which contribute to children's and adolescents' PA in games and sports (since most students are more interested in playing sports than in knowledge about health) should take up three-quarters of the PE curriculum, in order to promote or develop PA levels first; and thereafter, attitudes will follow as they move to young adulthood. Some teachers focused on these theories because they lack professional competency in the subject and this jeopardised the promotion of PA to enhance health and devastated talented children who had an interest in sport. The present study developed a professional training intervention for PE teachers to give them teaching methods as a guideline for dealing with theory overload in PE, within the scheduled time in the existing curriculum, and by introducing the teaching method of lengthening existing PE classes. Fitness can be built by creating more time for practical classes, making play more attractive.

UNESCO (2003), cited by NCCA (2010), noted that teachers supplied for the study indicated that they had limited time for implementing the PE subject syllabus and to accomplish the stated objectives in the stipulated time given for the subject. UNESCO (2003) also noted that the overloading of the curriculum is a developing issue in many countries. They recommended that this overload be addressed in the size of new/revised curricula.

A review of school curricula by the NCCA (2010) supports this, noting the prominence given to theoretical aspects in the classroom, rather practical skills (NCCA, 2010), requiring supplementary methodologies to reinforce PA teaching and learning. Therefore, it is necessary to develop PA guidelines for enhancing PE teachers' methods of teaching with the use of different, effective methods and organisational settings, as well as the provision of educational resources, to promote students' learning skills.

2.4 Section C: The Concept of Teaching

Teaching is a chain of events: outside skills that are developed to assist the internal acquisition of knowledge or skills through the training experience. Teaching is an outside skill. Training is internal to students. Teachers need to have self-motivation before motivating others. Motives are not seen in both teachers and students, but their attitudes can be seen, which teaching intends to change. Many countries

make it compulsory for teachers to engage in formal training on education principles where the concepts of teaching and skills are taught (Sequeira, 2015). Similarly, Benson (2010) points out that teachers should be involved in teaching strategy training, which may help students to understand how to practise various skills. This training is not common among professional teachers, and some teachers enter the teaching profession without any formal training in education. Teachers should regularly undergo professional training to develop effective teaching and learning processes. Based on the literature review, the present study designed formal training for PE teachers to provide the concepts of the principles of education to build effective teaching through the intervention.

2.4.1 Role of the Teacher

Sequeira (2015) opined that the role of the teacher is divided into the 'traditional role', which is teacher-centred; and the 'modern role', which is student-centred. Changes have occurred between the traditional and modern roles. Student PA increases during PE class when the teacher builds on the students' KAP and training experience (Sequeira, 2015). Reviews of earlier studies have shown that direct experiences are student-centred and the current study introduced training in teaching methods that would involve student participation in problem-solving, like increasing PA intensity. In indirect experiences, the contents are carefully designed and organised by the teacher through modifying the rules of games for students to spend more time participating.

Teachers interviewed in a previous study by Mojisola, et al. (2015) commented that teaching consists of methods or styles applied in conveying the material in a personal manner; so in a PE class, the teacher might provide extra activities to prolong the time spent on PA. In the light of current theoretical frameworks on the conceptualisation of teaching methods, this study will use Hanna's model of Precursors to Change for Teacher Development to develop a programme to train teachers on PE methods and techniques to promote students' health and their understanding of the attitudes and practices of PA.

It appears, from the interviews reported in the study conducted by Bates (2015), that the students were indifferent to the teaching method used; although he noted that students enjoyed PE practical classes that involved games. He further stated that, over the last 100 years, there have been many empirical studies on how adolescents perceived knowledge and productive methods of teaching. A strong, direct theoretical base, as well as research-based practices, shaped all the data collected from the research. Best practices were based on teachers' teaching experience. This has been validated by research into professional development theories. The present study has employed Hanna's professional development theory, 'Change for Teacher Development', as the results of previous research into the best methods of teaching to promote learning are not always globally accepted. Even if one teaching method becomes accepted practice among teachers, who see it as an appropriate way to teach their subject, even with

strong evidence to support this, there will still be some limitations. Nevertheless, most of the effective PE teachers sometimes felt they were not teaching PE as was expected of them. Before they teach effectively they need to receive professional development training in areas of specialisation, giving them the ability and emotional connection to deal with students. Many good, untrained teachers rapidly gain experience with daily teaching, through trial and error. Because of this, it is not enough to teach PE as a subject, giving rise to arguments over implementing teaching methodologies to promote PA in secondary schools in Nigeria.

There is a need for urgent research and studies, which will make recommendations. Adeniyi et al. (2016) and Mojisola et al. (2017), based on their findings on a 12-week intervention on the implementation of PA promotion, by objectively measuring the improvement of PA among adolescents in secondary school. Results showed that adolescents were impacted by multiple factors, which were associated with behaviour and the PA levels of students in Nigeria. They concluded that increasing PA levels of adolescents in Nigeria would warrant an urgent, effective intervention for PA promotion within schools

Tony and Bates (2015) advanced that a good teacher must have a range of techniques and approaches that they can use to teach PE, depending on the situation. Teachers differ individually in their personal attributes to effective teaching, which are also based on their perspectives concerning knowledge. Nevertheless, these obviously contradicting statements should not be a barrier to the development of PA teaching guidelines to promote the health benefits for students, or which include principles to guide and influence decisions concerning teaching. On this point, the present study deliberately used Hanna's guiding model that says teachers should be trained in models of change to identify their own teaching development, based on their classroom performance, and on areas where they perform less effectively, based on their own personal self-assessments, as well as feedback from students. This study aimed to develop PA teaching guidelines for PE teachers in junior secondary schools.

For these teaching methodology implementations to work, we need to explore some new innovative teaching methods developed to promote PA within the existing PE curriculum. These innovations are rarely discussed in PE methodology classes, teaching about the syllabus or the existing PR curriculum.

2.4.2 Effective Teaching

The crucial element in the implementation of any educational programme is teaching, which is the foremost component in educational planning. Good teaching plays a vital role in implementation, yet the outcomes are not definite. The efficacy of teaching is determined by the interrelationship that connects teachers' knowledge about the subject matter, and their ability to have good outcomes. Seyithan (2015) studied the interrelationship between teachers' ability to teach and their knowledge of the subject matter and concluded:

1. Some teachers may have a considerable knowledge of the subject matter, yet they still not be able to develop and carry out instructional implementation of methodologies to influence students' attitudes to promoting PA, due to a lack of teaching ability to promote PA during PE classes. This justifies the development and evaluation of teaching methodologies for the promotion of PA in this present study.

2. Conversely, some teachers may have common and general methodology abilities, but they have little knowledge of the subject matter, making them ineffective teachers. This justifies the model principle guidelines used in this study: Hanna's model says that teachers must be aware of problems in their teaching performance and must be prepared to change.

These comments from Seyithan (2015) indicate that an efficient teacher requires knowledge of the subject matter, as well as methodology capability. The professional teaching skills development training in this study agrees that knowledge on the subject matter is a requirement for good delivery teaching, but it cannot be the main factor.

Previous studies on teacher effectiveness and guidance (Dunkin & Doenau, 1980; Fisher, Berliner, Filby, Marliave, Cahen & Dishaw, 1980; Brophy & Good, 1986; Walls, 1994) focused on the teachers' methods of teaching students, which they called 'process'; and after knowledge was imparted to the students, teachers expected achievement, which was called the 'product'. Their research was therefore based on process and product. The theoretical framework of this study explains that teachers must be trained in specific processes and teaching methods in order to produce products that show what the students have achieved. For this, theoretical professional development models for teacher development were used in the study, guided by Hanna's Model of Precursors to Change for Teacher Development.

Other research on teacher effectiveness (Walls, 1994) says that teachers are responsible for facilitating learning; which is a good approach to teaching. The present study developed PA teaching guidelines for PE teachers in junior secondary schools, systematically implementing methods for promoting PA during PE class, based on an intervention programme to enhance students' Knowledge, Attitude and Practice (KAP) and increase the health benefits they could enjoy. This guide will assist teacher self-examination to improve student learning and bring order out of potential disorder.

Seyithan (2015) opined that students still do not improve their KAP in regular PE lessons, despite teachers' knowledge of the subject matter. Teaching PE to students who do not improve their KAP is a challenging task for PE teachers, as the numbers of students with poor KAP have increased. However, a partnership among teachers, setting common goals, developing effective teaching methodologies, and providing some basic modifications to the existing PE curriculum, could help students to be more engaged and successful in PE classes.

2.4.3 Professional Skills Development in Teaching Physical Education and the Promotion of PA

Glickman et al. (2012) stated that schools must provide strong leadership in the education and promotion of PA among adolescents, either during the school day or outside of school. All local educational agencies and schools should strive for high uality PE, which must be based on skills development and opportunities for everyday PA in PE.

According to Rink, Hall and Williams (2010), an excellent PE programme is the foundation of a comprehensive school effort to improve the PA levels of students. PE teachers are responsible for giving students the knowledge, attitudes, practices and motivation required to develop healthy lifestyles.

Quality PE should focus on the use of teaching guidelines to promote PA, and on standards-based instruction. This includes intense PA lasting for 50% of the PE class period. This can be achieved through skills development and appropriate interventions to promote students' PA (NASPE, 2003). PE teachers and school administrators should not forget that skills development in teaching PE as a subject serves as a major vehicle for promoting PA over the lifetimes of students.

Research has shown that teachers' use of autonomy support, as a teaching method in PE class, can promote PA in PE classes. It embraces student perceptions and engagement, and they can positively estimate their own autonomy support in PE class. It was indicated that teachers' used autonomy support strategies as a means of influencing students' performance, and they were relevant in developing teaching methods to increase students' PA levels (Taylor et al., 2009).

Another study by Tessier et al. (2013) revealed several fascinating relationships that connect students to teachers when teachers used autonomy support and when teachers gave students a chance to choose the activity. According to PE teachers' perceptions, when students choose the activity, it only moderately motivates the students; which is proof that it cannot be used as a method of teaching. Teachers' use of autonomy support has been shown to be related to improved levels of student PA. The relationship between PE teachers' and students' choice of activity, and PE teachers' use of autonomy support, reflected small-to-moderate-to-vigorous activity, without combining with different teaching styles that form the teaching methodology. This may be explained by the difficulties experienced in teaching styles within a particular PE class. Some schools are still unable to implement teaching due to the lack of professional training intervention in PE teaching methods. This can be examined in order to determine their practical credibility in the demands for the PDT on teaching methodology for promoting PA in PE classes. Furthermore, Tessier et al. (2013), assessed a PE teachers' intervention group against a PE teachers' control group regarding interpersonal styles. The results indicated that students in the intervention group improved in their PA activity levels by 40% more than the control group students. They also showed that when PE teachers did not use teaching styles alongside autonomy support to

teach PE, it resulted in low student PA levels. The promotion of PA has mostly been disregarded in PE research.

Therefore, the present study conducted an intervention to train PE teachers in teaching methods, along with the use of autonomy support in teaching the PE syllabus in schools, for the improvement of student PA levels. New variations of this style were developed as teaching guidelines for the promotion of PA.

Quality PE classes must apply teaching guidelines to promote PA, and the present study has developed appropriate teaching methodologies to effectively implement new methods for the purpose of promoting PA during PE classes.

2.4.3.1 Professional teaching skills development

Enhancing the teaching ability and practices of PE teachers can be classified as professional development (Coulter, 2012). Skills development that enhances teachers' knowledge and practices enables them to change their attitudes and methods and improve the way they teach adolescents (Guskey, 2003). Research has shown the merits of professional teaching skills development in training teachers to meet the challenges encountered today by many schools in society. A successful PE system depends on developing professional teaching skills and practices (Coulter, 2012).

Practical teaching skills need to be improved through frequent professional development training, which supports the implementation of evidence-based PA practices in classrooms, in order to maintain teachers' skills development to deliver effective PE programmes (National Institute of Child Health and Human Development, 2000). Gersten and Brengelman (1996) suggested that successful teacher skills development occurs when the approaches and content of evidence-based PA practices match with the teacher's beliefs, values and goals.

McKeen et al. (2007) studied the performance of 46 students after an intervention to train the teachers in the use of teaching skills to promote PA. It was observed that students' participation in PE class was good. They analysed the PA of students in each class and found that students were happy with the intensity of their PA. Their results indicated that teaching methods contributed to improving each class's performance, which students ranked as 'moderate intensity'. However, the promotion of lifelong PA in adolescents through PE is a challenge. PE teachers need to be trained to recognise alternative approaches to modifying games in PE class. This may be necessary if adolescents are to be engaged in enjoyable and quality classes which challenge their knowledge and experience. Teachers need to cater for students with different PA abilities and levels of interest. These results demonstrated that developing teaching methods as a facet of professional skills development has the potential to promote PA among students.

2.4.3.2 Models for teacher development change

The theory of change defines and guides the principles for professional teaching skills development (Wayne et al., 2008). Change for teachers includes enhanced knowledge and involves confidence in the procedure, and recognition that reform and development are important (Government of Ireland, 1999a). The changing teacher plays a central and critical role in professional development. Sparkes (1990) reported that, in PE classes, change might occur at one of three identified levels: surface change (new curricula), changes in teaching methods (new teaching activities), and changing one's level of confidence. Desimone (2009) suggested a theory of change that advanced the process of change as an interactive, non-recursive relationship between potential teaching methods to promote PA in PE classes, and teacher knowledge; professional training; attitudes and confidence; class size practice; and outcomes of the student.

A study by Guskey (2002b) proposed a linear model for change for professional development, by training teachers to improve the teaching of their subject. He pointed out that making use of classroom practices for training teachers would make a difference in the outcomes of what they learn; and changing the attitudes of teachers, including their beliefs, has the most potential for promoting PA in class situations.

A study conducted by Jackie (2016) stated that most professional development theory today is ineffective in bringing about lasting changes. Professional development needs to consider more than instruction and change. Several models for teacher development have been proposed. One study suggested that Hanna's model of Precursors to Change for teacher development has the potential for making lasting changes in teaching skills. The study evaluated 45 participants who were guided by the principles of Hanna's model for implementing teaching programmes. The results showed that the intervention achieved positive changes in their work environments. Teachers should be trained in models of change to identify their own teaching development, based on their classroom performance in promoting student PA; and on areas where they perform less effectively, based on their own personal self-assessments, as well as feedback from students.

2.5 Section D: Conceptualisation of Students' Perceptions

Zealand (2011) explained students' perceptions as the way students perceive and experience PE as one of their school subjects. The study of PE has proved that understanding and identifying some elements, which are related to student participation in PA, are important for the improvement of PA during PE classes, and for lifelong PA (Chung & Phillips 2007). Rikard and Banville (2006) linked which students are perceived as eager to the confidence the students have about themselves. Perceptions build ones' attitudes and determine how one engages in daily activities.

2.5.1 Promotion of Adolescents' Physical Activity during PE Classes

According to Owen et al. (2014), promotion is an approach to inspire individuals to sustain performance. It is a way of encouraging individuals to act in a specific way. Recent literature has shown that PA interventions still fail to understand motivation; yet the effective promotion of PA needs to understand the motivation for promoting and implementing PA in schools (Martin et al., 2015; Marcus et al., 1996). Their findings were corroborated in the study by Adesanya et al. (2015), which stated that there is a lack of motivation in PA interventions because an understanding of the importance of motivation was absent. However, motivation is the best strategy to ensure adherence to PA.

Bryan, Charity, Solmon and Meelinda (2012) submitted that success in promoting a positive attitude to PE depends on understanding the individual and learning how to improve their motivation because it is important during adolescence. This has to be done by teachers to avoid a decline in PA in adolescents. Motivating adolescents to sustain PA levels has to do with regular participation in PA and this will develop psychological, physical and social well-being; so frequent PA is important in the adolescent years and through to adulthood.

The school curriculum has had an influence on promoting PA levels among adolescents through the PE syllabus (Martin et al., 2015). Much research has been examined on the promotion of adolescent PA, specifically to develop possible opportunities for increasing PA intensity during PE class (Lonsdale, 2016). Another study, conducted by Owen et al. (2014), cited by Deirde et al. (2016), stated that research is still lacking on the importance of promoting PA in schools, which can lead to health benefits. Furthermore, Lonsdale et al. (2016) opined that PA could be motivated by both intrinsic motivation and extrinsic motivation. Intrinsic motivation is internal (autonomous) to the individual; extrinsic motivation relies on external factors.

They further explained that autonomous styles motivated students to increase PA by more than 20%; far better than when external factors were applied in motivating students. Martin et al. (2015), who stated that autonomous motivation in adolescents was found to correlate significantly with the measurement of PA during school-based PE intervention, corroborated this. PE teachers can use autonomous factors to motivate students and promote PA during PE lessons (Owen et al., 2014). Current research indicates that intervention can be effective when PE teachers are trained to use motivation strategies in PE classes to improve adolescent attitudes to PA. Adolescent MVPA during PE class can be promoted through interventions, but little attention has been given to interventions in schools (Sallies, 2014).

2.5.2 Student Perspectives on Practices in, and Attitudes to, Physical Activity

Students' perspectives on physical activity interventions are important (Adewale et al., 2016). Consideration of student perspectives early in the process helps develop satisfactory and remarkable interventions with specified outcomes, and which are effective and sustainable (Van Sluijs and Kriemler, 2016). Students' views could reveal their understanding, interpretation and negotiation, and their reactions in everyday life (Martin et al., 2015). Structured interviews to determine student perceptions can be used to increase students' PA at school, as they would help ensure that lessons accommodate their preferences. As a result, student participation increases during the intervention (Deirdre et al., 2016). Limited research has linked student perspectives in PA development interventions with the promotion of adolescent health. This warrants more study (Jago et al., 2011; Edwardson et al., 2015).

Students are more likely to have positive attitudes to, and practices in, PA during PE class, when PE teachers modify the rules of games in their teaching methods and adopt autonomous support (student choice of activity) to promote PA. With this evidence, the present study aimed at using school-based PE classes to promote PA among adolescents in Nigeria. It sees PE teaching methods as important in improving the attitudes and practices of students regarding healthy lifestyles.

Xu et al.'s (2017) research found that increasing student knowledge of health is the best strategy in PA development programmes. A group study, examining the PA habits among junior high school students (n=1899) in Nanjing, included a successful year-long follow-up in 1859 (97.9%) of the students. Students were evaluated at pre-intervention to determine their knowledge and healthy attitudes, and their PA levels were measured before the implementation. The authors reported that, after nine months, 1318 (70.9%) students were more knowledgeable, with better levels of PA, when they were re-assessed using the same validated questionnaire. The intervention students spent more time on PA, compared to the students in the control schools.

Ali et al. (2013) noted that factor analysis confirmed that knowledge and practise of, and a good attitude to, PA has a positive effect on the physical, mental and social aspects of student health. They used a descriptive analytic survey, and 665 students (54.9% female and 45.1% male) were sampled using a clustering sampling method. The collection of data was done via questionnaires. The results indicated that the mean score of knowledge for males was 73±1.72; attitude was 79.18; and practice was 228.78 minutes per week. The mean score of knowledge for females was 78.90± 1.66; attitude was 74.33 and practice was 174.41 minutes per week. The results indicated that no students met the optimal levels of PA. They suggested that there should be more focus on specific topics and some teaching measures to enable students to meet optimal PA.

Ziari et al. (2017) conducted a questionnaire study aimed at determining student knowledge of, and attitudes to, PA; and their participation therein. They used a questionnaire to collect data on knowledge, attitudes and practices of PA, as part of an experimental study of a design intervention within two groups. The authors investigated 421 students as a targeted sample, with 165 (39.2%) male students, and 256 (60.85%) female students, participating. The mean results for AP were 48.74 ± 16.01; 58.91 ± 9.02; and 232.5 ± 334.42 minutes per week, compared to the control group (59.88 ± 8.20). No significant correlation was seen between the groups ($P > 0.05$).

Most of the students had moderate PA and their KAP improved. The study suggested more focus on improving students' PA. Therefore, this study used a questionnaire on attitudes and practices for the collection of data.

Johanna et al.'s (2011) study examined the PA attitudes and practices of students in specific high school assessment programmes. The study described the PA attitudes and practices of 390 students (aged 15-17 years) who participated in the study. The authors pointed out that focus group discussions and questionnaires were used for the data collection, and all the participants gave their consent before answering the structured questionnaire. The results showed that the participants knew that PA would affect their quality of life, but knew less about the impact of exercise intensity on PA levels. Most of the students (50.5%) enjoyed games or sports and 40% had a positive attitude to physical exercise. The interviews showed that most participants (52.8%) lacked sufficient knowledge about PA, and a few students (3.8%) took part in prescribed exercise programmes. As in Mojisola et al.'s (2017) study, only short-term benefits were identified, with no increase in PA. The study regarded this as a health problem, which warranted the development of teaching methodologies to promote PA during PE classes to improve the quality of adolescents' lives.

2.6 Section E: The Importance and Benefits of PE for adolescents

Adolescents benefit physically, mentally and socially through regular PA in PE classes. Benefits include physical development; healthy growth; strong muscles and bones; weight control; better body composition; balanced posture; an improvement in cardiovascular health; reduced cholesterol; reduced stress; reduced anxiety and depression; enhanced self-esteem and more opportunities to make friends (Stergiadis, 2014).

Christopher (2015) noted that engaging in regular PA in PE class helps adolescents grow normally. It maintains healthy bones, joints and muscles; and promotes development. It helps to reduce chronic diseases like cardiovascular disease. It reduces the risk of developing obesity and reduces type-2 diabetes. It also promotes the psychological well-being of adolescents and schoolchildren.

UNICEF (2011) stated that students learn PE through different methods of teaching and their senses (physical, auditory, visual and tactile). Physical methods of teaching academic PE concepts may nurture a student's kinaesthetic intelligence through school-based PE programmes. Moya (2015) opined that students should be given effective learning opportunities that promote quality PE classes, in order to learn more physiological, psychological, mechanical and social aspects of PA.

Through quality PE programmes, students can understand ways of developing activity that will enhance the benefits of PA in preventing health problems. Both the pros and cons of PA will be easy to analyse in relation to lifelong health. They can learn to analyse information, and apply the principles of motor co-ordination in new ways, developing their ability to contrast and compare (Jennifer, 2014).

Stergiadis (2014) stated that PE builds self-esteem and boosts a healthy lifestyle. The development of both confidence and competence in sporting performance and motor skills is because of quality PE programmes that increase PA. On-going participation in PA teaches the rudiments of knowledge and improves attitudes to, and participation in, PA which improves fitness levels related to health benefits. Students choose from a selection of activities, based on their interests.

Nyoni (2016) explained that the benefits of a PE programme for junior school students are important as they grow into progressively more independent, diversified and complex everyday lives. Some of the physical and health benefits gained from PA through PE programmes include improved mental health, better protection against injury, disease prevention, and reduced mortality, including premature mortality.

Despite the importance of the benefits of PE as a unique programme that gives students the chance to better understand PA and to acquire knowledge of, and develop, their motor skills and fitness (WHO, 2012), some school curricula still do not implement PE teaching. This denies their students the benefits of PA. The present study evaluates PE classes, after an intervention, to determine the importance and benefits of PE classes for adolescents in junior secondary schools, Nigeria.

2.7 Section F: The Structure of School Physical Activity to Improve Adolescents' Opportunities to Access Health Benefits

Deirdre (2016) reported that school-based PA promotion might provide the greatest opportunity for improving PA levels in students, as most of their waking hours are spent in the school environment. The MVPA initiative proposed that students should be allowed to complete 20 minutes of MVPA at school (Rush et al., 2012), which is why schools proposed a minimum of 30 minutes of MVPA for students daily. This is the most repeatedly cited target in studies (Martin et al. 2015). Adolescents spend most of their time at school working (Owen et al., 2014). However, researchers submitted that out of

the 60 minutes recommended for MVPA, 30 minutes should be completed daily at school, which is 50% of the recommended daily MVPA (Martin et al. 2015).

Deirdre's (2016) and Nettlefold et al.'s (2011) studies indicated that 54.5% of South African children aged 8 to 12 years achieved a daily school target of 30 minutes of MVPA. Furthermore, the results of the South African evaluation on MVPA recommendations are not illustrative of a typical child, or of adolescent PA in African countries. Deirdre (2016) noted that school administrative structures impact on PE class opportunities and approaches for promoting PA in adolescents.

Edwardson et al. (2015), in a study conducted in Nigeria, believe further research is warranted to improve the implementation of teaching methods to promote PA in PE classes. The comprehensive conclusion of much research is that schools should integrate PA into the educational structure from the primary level to the higher school level; and PE teachers should implement PA teaching strategies during class so that students can meet daily MVPA requirements in order to reap the health benefits. PA will become popular when it is integrated into quality PE academic lessons; as a subject, and to improve student PA levels.

2.7.1 Daily Physical Activity Guideline in School Hours

PA in school hours may improve the students' chances of being more physically active if they spend more time participating in PA at school (Dobbins et al., 2009; Naylor et al., 2006). The energy consumption project indicated that MVPA for 20 minutes should be accomplished during the school day (Rush et al., 2012); while most schools cited 30 minutes minimum for MVPA as their daily target.

Research has revealed that the available guideline, which was later developed, is based on working out the hours to guide the student: to know the number of hours spent during school, time spent walking, and how many of these hours can contribute to their overall daily PA. Studies further showed that students spent half of their waking hours at school (Howells et al., 2010; Pate et al., 2006). The US National Taskforce on Community Preventive Services Report (2005), in their study, recommended 60 minutes of MVPA; which implies that over 50% of PA should be accumulated at school.

Other studies examined whether students reached the recommended target of 30 minutes of MVPA at school, and accelerometers were used for measurement (Nettlefold et al. 2011; Walter, 2011). They explained that among Canadian children, 90% of 8 to 11-year-olds participated in MVPA for 30 minutes; and 54.5% of South African 8 to 12-year-olds accumulated 30 minutes of MVPA, thus meeting the daily target for school. The Canadian reports are not generalised, globally, to children's PA. The boys and girls spent 63.5 and 52.9 minutes, respectively, in MVPA during school, indicating that they were close to reaching the recommended daily target of 60 minutes of MVPA at school (Nettlefold et al., 2011). Globally, almost all schoolchildren and adolescents do not meet the daily requirement for

PA during school (Centers for Disease Control and Prevention, 2005; Riddoch et al., 2007b; Woods et al., 2010). Further study is necessary to determine and develop PA guidelines for students in their school day. There is little data to confirm participation in MVPA of 20 or 30 minutes, or whether this can be achieved during school hours.

2.7.2 Guideline for Promoting Physical Activity during PE Classes

There is no guideline on the amount of MVPA for students during PE class. In most schools, the students spend their time in classrooms, sitting quietly, listening to the teacher's instruction. They normally need to listen to educational information (Belton et al., 2010; Donnelly et al., 2009; Goh et al., 2014; Locke et al., 2006; Tudor- Sturm, 2005).

According to Fairclough and Stratton (2005), PE allows a constantly energetic, structured lesson; and it's also an opportunity for students to achieve the minimum amount of exercise required daily in school. Some recommendations have been made, which serve as the guidelines for promoting PA (Public Health Service, 1991; UK Association for Physical Education, 2008; US Department of Health and Human Services, 2000).

In PE classes, in the United States, spending up to 50% of the time in MVPA was suggested as an interstate guideline. Most schools target PA in a specified way, which is achievable practically (US Department of Health and Human Services, 2000).

A study conducted by Fairclough and Stratton (2006) found that, on average, 34.2% of PE time was spent doing MVPA in PE classes. The study used pedometers, accelerometers and observational methods, and also examined the students' heart rates. A review study was conducted by Hollis et al. (2015), on students' between the ages of 12 and 15. The study systematically reviewed 13 papers published between 2005 and 2014. The review analysed their PA during PE using accelerometers, and it was observed that, on average, 44% of the daily recommendation of MVPA was accumulated in PE classes (Hollis et al., 2015).

These studies showed that students, on average, accumulated fewer hours of MVPA in PE than the recommended daily target (Hollis et al., 2015; UK Association for PE, 2008; Fairclough and Stratton, 2006; US Department of Health and Human Services, 2000).

The PA target in PE has been achieved during intervention studies that purposefully aimed to improve students' PA levels (Lonsdale et al. 2013; McKenzie et al. 1997). Fairclough's (2003) study targeted an increase in PA levels and served as a guideline to reach the PA target. This was determined using the broad objectives of PE, such as the teaching of social development, the teaching of skills (motor skills, psychological skills and affective competencies) and teaching the benefits of PA (Meyer et al., 2011).

Fairclough and Stratton (2005) stated that PE teachers must endeavour to follow the guidelines, in order to structure their classes to meet MVPA goals, and bearing in mind that students' activity in PE class must reach these levels. Students who were inactive during PE class were frequently 'forced' to engage in PA (Chow et al., 2008). Their study explained that one of the potential ways of making sure students meet the PA targets is by measuring their practices and attitudes regarding PA pre-intervention, with the use of a PA questionnaire. This gives PE classes a purposeful aim in meeting PA targets (Cardon et al., 2004b; Chow et al., 2008).

Armstrong and Trost's (2007) study stated that, globally, many schoolchildren do not meet the daily target of PA in PE classes. This has warranted further studies to determine whether PE classes can use PA guidelines as the primary goal of PE classes to increase students' PA levels in order for them to enjoy long-term health benefits.

2.7.3 Physical Activity during PE Class Interventions

The school, as an institution**,** has some particular times for promoting PA, like during PE class, at break/lunch-times and after school. Interventions conducted in schools to promote PA, to avoid overweight or obese students, noted that a significant amount of the students' waking time spent was spent at school (Dobbins et al., 2009), and the schools were recognised as an avenue for promoting students' PA.

A review of PE class interventions for promoting PA in students between the ages of 6 and 18 found that these types of interventions significantly increased the amount of time spent on PA per day by between 5 and 45 minutes, and sometime more (Dobbins et al., 2013). In addition, PE class interventions improve the students' participation in more kinds of MVPA, than just during the school-based PE class, compared to the control groups (Dobbins et al., 2013).

Physical education is a branch of the educational programme in which both boys and girls are engaged in the PE class activities, with general academic instruction from the PE teachers who impart information on health benefits (Tudor-Locke et al., 2006). Studies have indicated that the same factors influence boys' and girls' participation in PA during PE; and fitness levels are the same. Therefore, there is no significant difference between the genders (Brusseau et al., 2011; Sarkin et al., 1997; Tudor-Locke et al., 2006). Other studies conducted on MVPA levels used accelerometer measurements taken in PE classes. The reports showed that students accumulated fewer than 400 steps in PA – that is equivalent to 9% of their hourly steps at school. To date, limited studies have been carried out on students' PA in PE class interventions (Belton et al., 2010; Brusseau et al., 2011; Donnelly et al., 2009; Goh et al., 2014; Nettlefold et al., 2011& Sturm, 2005).

The surveys carried out by Rush et al. (2012) and Martin and Murtagh (2015) evaluated the MVPA of students, aged 8 to 9 years, from Irish schools; and of students from New Zealand, and aged 8 to 11 years, during their PE classes. The results showed that they did not reach MVPA targets during PE classes. The Irish students registered three minutes of MVPA, out of 24.8 minutes, representing 1.2% of MVPA during school PE classes. The students from New Zealand managed to spend 13.2 minutes in MVPA during their PE classes in school, which accounted for 19.6% of their MVPA daily requirement.

Nettlefold et al. (2011) submitted that students between the ages of 8 and 11 years participated in MVPA during PE classes and accumulated 33.8 to 40 minutes during PE classes, which represents approximately 60% of their daily MVPA. These findings are different to the findings of Martin and Murtagh (2015), Rush et al. (2012) and Brusseau et al. (2011). They discovered that students accumulated their least MVPA during PE classes. Therefore, all the studies highlighted the need to develop ways of improving PA levels during PE classes in the future (Brusseau et al., 2011; Martin and Murtagh, 2015; Rush et al., 2012).

In summary, PE programme interventions to promote students' PA during PE classes are drastically lacking. This warrants further research.

2.7.4 Students' Attitudes and Practices after School in Response to the Influence of PA Interventions

Studies have revealed that most school-based interventions only examine schoolchildren's PA at school (Erwin et al., 2011; Goh et al., 2014; Martin Murtagh, 2015; Murtagh et al., 2013), which raises the question whether students would sustain their improved PA attitudes and practices in their day-to-day life, to reap the health benefits. Therefore, increasing PA during the school day becomes more important. It can be promoted both at break/lunch times and in PE class.

Many studies have been conducted on the possible influences on after-school PA by investigating student PA on a daily basis, outside and inside PE (Meyer et al., 2011; Morgan et al., 2003; Murtagh and McKee, 2013; Pate et al., 2011). Studies have identified that students participated in higher-intensity PA on days they had PE classes, even out of PE class (Meyer et al., 2011; Morgan et al., 2003; Murtagh and McKee, 2013; Pate et al., 2011). Their studies suggest that students adjust their PA after school to compensate for the absence or presence of PE at school. Another study conducted by Mallam et al. (2003) found the opposite result: that students who participated in PE classes for at least 1.8 to 2.2 hours per week improved their performance of after-school PA far more than the students who engaged in .09 hours of PA per week in PE classes.

The researcher explained that students increased their PA after school in response to the low level of PA in school time. Most research has shown that students increased their after-school PA on days with PE classes. These results propose that increasing opportunities for PA in school-based interventions and during PE will significantly increase students' day-to-day PA. Additionally, student PA in PE class intervention programmes must be evaluated across all the days of the week to accurately confirm if improvements continue after school.

In studies of an intervention in Portuguese and Belgian students' PA, Lopes et al. (2009) and Verstraete et al. (2006), examined the impact of modifying the rules during PE classes and providing games' equipment to the schools. The studies used portable games equipment, such as balls and skipping ropes. In the studies, some groups were given instructions based on modified rules for ball games, which could be demonstrated with the available equipment. The findings indicated that the Belgian students, aged 9 to 15 years, had significantly improved MVPA during PE classes, compared to the other groups that were not provided with equipment (Verstraete et al., 2006). In a similar study by Lopes et al. (2009), on Portuguese students aged 6 to 12 years, it was shown that a higher percentage of student PA in PE classes was recorded. This implies that PA levels increased when they had games equipment, coupled with instructions on modified rules; compared to PE classes where no equipment was available.

The findings suggest that the availability of games apparatus, coupled with instructions for modified game rules, can help increase student PA during PE classes. Researchers have suggested that evaluating daily school PA among schoolchildren and adolescents is warranted to determine how students respond to interventions after PE class. In addition, they opined that the sustainability of PA levels and the long-term effects of these initiatives are unknown, and warrant further investigation. The present study has therefore aimed to develop long-term teaching guidelines that will be used regularly in teaching PA during PE classes, to promote sustainable PA levels in adolescents.

Some studies investigated the impact of semi-structured, structured and longer PE classes, also using break time to promote student PA (Howe et al., 2012; Huberty et al., 2011; Larson et al., 2014; Stellino et al., 2010; Scruggs et al., 2003). Scruggs et al. (2003) conducted a study on 15-to-20-minute structured fitness in longer PE classes with break times, over three schools' days, with the intervention supervised by PE teachers. The result indicated that 15-year-old American students significantly increased their PA levels in the additional fitness-structured, longer PE class, with breaks, compared to the normal unstructured break times without longer PE classes with break hours (Scruggs et al., 2003).

Another study by Howe et al. (2012), of an intervention with structured fitness in lengthened PE classes with break/lunch times, examined students aged 15 to 19 years from America. During the intervention over nine weeks, 22 games were used in the research. Participation was significantly increased in the intervention during the structured fitness, lengthened PE classes with break/lunch times; and daily MVPA at school improved when compared to non-intervention groups (Howe et al., 2012). Huberty et

al. (2011) and Larson et al. (2014) conducted another two studies on semi-structured fitness in lengthened PE classes with break times. The interventions were designed to allow a relaxed atmosphere in order for students to switch activity stations.

The study was implemented for seven months and it was well planned by the PE teachers and the school staff timetable planner. They modified the lengths of PE classes when students were not active. The findings showed that American students aged 9 to 15 years had significantly increased MVPA due to the longer time spent during the semi-structured fitness in longer PE class with break times; compared to unstructured break times and without longer PE classes (Larson et al., 2014; Huberty et al., 2011). The 9 to 15-year-old students from America who participated in the semi-structured activities in longer PE classes with break times increased their MVPA daily at school, compared to the baseline evaluation (Huberty et al., 2011). These results indicated that formal or semi-formal activities in break time, added to PE class in order to lengthen the time spent in PA, can help increase adolescents' PA levels to gain health benefits.

Comprehensively, evidence has shown that implementing teaching methodologies, such as autonomous support; the provision of games equipment; increasing the students' PA in PE classes, without necessarily lengthening class time; modifying the rules of games to suit students; and lengthening existing PE classes with formal or semi-formal activities at break time, increases students' PA levels successfully and promotes healthy lifestyles.

Further investigations into interventions to promote adolescent student PA in PE classes must be examined. This has justified the present study, which has developed teaching methodologies for the promotion of PA in adolescent PE classes, Nigeria, to determine how students' attitudes and practices determine to the sustainability of health benefits for life after school and long-term.

2.8 Section G: Professional Development Training Programmes

Professional development can be described broadly as all formal and informal learning that enables teachers to improve their own practice (Early & Bubb, 2004). With reference to teachers, it can be referred to as any activity which enhances their knowledge and skills and enables them to consider their attitudes and approaches to the education of children, with a view to improving the quality of the teaching process (Bolam, 1994). There is growing evidence for, and recognition of, the importance of PD in preparing educators to meet the challenges faced by today's schools (Guskey, 2003).

Ajoku (2013) explained that the lack of literacy skills emanated from a lack of professional development, which led to poor standards of implementing PE teaching methods. The professional standard for Nigerian PE teachers considers the re-training of teachers (professional development) and

the provision of on-going learning opportunities to teachers, which gives them the instruments to meet professional demands, and makes certain that they are up-to-date in new methodologies in their areas of specialisation. Anho (2001) agrees that the best approach to developing quality teachers is through constant professional training for serving teachers. In order to provide the opportunities for teachers to develop professionally, the Nigerian government admitted and approved the Teacher Registration Council of Nigeria (TRCN) in 1993, with the task of executing a Mandatory Developing Professional Education (MDPE) to keep teachers updated with new developments in the practice and theory of the profession.

To achieve this goal, the teachers' registration council has been given the mandate to address professional concerns in the area of educational development in order to support the teaching profession in Nigeria with the objective of creating for the schools an effective education system by supporting qualified and professional teachers (Anho, 2001). With the growing global demand for quality education, Rose and Reynolds (2007) explained that the professional development of teachers is regarded as the key factor in improving learning and learning.

Similarly, Fraser et al. (2007) referred to teachers' professional development as 'staff skill development' or 'training' as it means different things to different individuals. They further stressed that staff skill development is an ongoing review and reflection that individuals need to promote learning. In addition, teachers' skill development programmes require a strategy of systematic activities to develop teachers for their effective teaching. This may include implementation, initial training, in-service training, and learning new teaching methods when courses are regulated in the curriculum within the schools.

Ejima (2012) stated that teacher professional development involves conducting important high-quality intervention programmes for teachers, in order for them to acquire and broaden their knowledge and skills to deliver effective teaching. Guskey (2000) stated that a successful intervention programme enables teachers to succeed in innovations or ideas developed for implementation. In order for teachers to have influence within the school setting, they must be able to change and update their skills and knowledge, and be familiar with the different methods of teaching, to meet the tasks they are likely to face in a changing society.

Guskey (2000) further described the benefits of PDT and its effects on the teachers and students and possible ways of evaluation. The participants' responses are best evaluated in focus groups, as this permits investigation of observed problems, and the causes and perceptions of participants, in order to have insight, and a deeper expression of the benefits. The measurement of the impact of PDT on the focus group participants is harder to determine, but it can be evaluated with questionnaires, pre-intervention and post-intervention. In addition, it was recorded that quality PDT changes teachers' attitudes and practices when schools give support to the development of PDT in general. PDT, designed

to communicate new knowledge and skills for teachers to use or implement, could be evaluated with the use of a formal educational system and classroom monitoring for some periods. Finally, the impact on students' needs to be considered, although evaluating this can be difficult.

2.8.1 *Models of Professional Development Training*

PDT models consist of direct teaching on courses or workshops; peer teaching and coaching in schools when learning is taking place; meaningful research discussions with friends; supervising the task with the planning teams; and educating outside the school environment, such as through study networks, partnerships with universities and paying visits to schools (Lieberman, 1996). Edmonds and Lee (2002) submitted that the direct teaching on courses or workshops, peer teaching and coaching in school, were fundamentally communication methods, which allow teachers some control in their personal learning. The models are transformational, facilitating improvement while allowing for professional autonomy. In addition, the models of PDT consider the problems facing teachers and transformative models provide the solution to the problems, giving more professional autonomy, which allows teachers to determine their own educating pathways (Edmonds and Lee, 2002).

Researchers have identified apprenticeships and partnerships as models, engaging the school community and both student and teacher input and output. Kennedy (2005) suggested that none of the models of PDT have been shown to be effective. Coulter (2012) stated that PDT has three stages: There is a need to assess previous methods or trends; there must be planning; and ways to deliver training and evaluation at the final stage. The stages must be followed in the implementation of this study. Interactive models are the best for sustainability and effectiveness to carry out a study. The stages in PDT design ensure there is a critical analysis of the situation to enable the training and implementation of interventions to focus on the problems of the participants. The PDT evaluation stages are vital to ensure there is successful implementation before the adoption of successes and the correction of the deficiencies.

2.8.2 Understanding the Professional Development Training of Teachers in Nigeria

The implementation of the PDT for PE teachers was also the framework provided by the Nigerian National Policy on Education (NNPE) (2004). There are different education documents on the policy that agitate for PDT to meet teachers' needs in Nigeria. Central to some policy documents is the Professional Standard for Nigerian Teachers (PSNT), which was designed for teachers' PDT in 2010, to develop them at all education levels.

The PSNT sees PDT based on the speciality of skills that gives teachers the information they need to evaluate within the time stipulated, to develop knowledge with techniques to meet professional tasks, and to guarantee that teachers are updated with the details for testing. The PSNT documents further states that there should be constant training for teachers who are still in service. The Teachers Registration Council of Nigeria (TRCN, 1993) was established in order to supply the teachers with the professional teaching status and to make sure there is accurate PDT planning in Nigeria. The objectives of TRCN in Nigeria are also in line with Hanna's Model of Precursors to Change for Teacher Development theory, the National Guideline on Physical Activity and Muijs et al. (2004). Teachers should focus on current developments in the theory and practising of the profession. These are obligatory for the executive of the TRCN.

2.8.4 Model for Change

There are two theories of professional development: the theory of change and the theory of instruction (Wayne et al. 2008). The theory of change involves teachers accepting changes in their professional status to enhance knowledge. Teachers must believe in the planning and accept that development is needed and important for renewal. The teacher plays a critical and central role in changing methodologies and subject content. Knowledge of changing methodology is necessary to know what details to present, and when, and for the presentation to influence students to achieve formal knowledge through the learning experience (Shulman, 1987).

Richardson (1999) stated that the teacher's ability to link the subject matter with the methodology needs to be premised on what they know about teaching. When teachers cannot make the connection, teaching becomes a methodological problem. Therefore, they have to focus on methodology content for extensive teaching. Rovegno (2003) sees PDT intervention programmes as an aspect of methodology content knowledge, focusing on procedures in acquiring new content knowledge of teaching methods and expanding it for integration.

In Nigeria two models of PDT mainly exist in the training teachers. These are the professional support model for school-based teachers, and the workshop model. The prevailing form of professional development is the workshop model (Fareo, 2013; Muhammed, 2006). The professional support model for a school-based teacher is for teachers that are still in work. It is a strategy to train teachers in-service. The workshop model is the process by which teachers are invited to a particular place or venue for the workshop, where a specialist informs them about innovation, skills and information to meet their various tasks. The workshop could be long or short, depending on the nature of skill, which could be acquired in various ways.

In view of the concept and the prevailing stance of professional development in Nigeria, it has widened this researcher's understanding that PDT programmes need to quickly provide teachers with professional standards because there still a lack of professional skills in the implementation of quality PE teaching to promote PA during school-based PE (Adeniyi et al., 2016; Mojisola et al., 2017). This lack is due to not having regular PDT, which would skill the teachers in new methodologies to teach the PE curriculum and promote PA, in line with professional standards. It necessary for schools to have PE teachers who are exposed to professional development programmes on PA promotion, innovative methods to teach the existing PE curriculum, and teaching methodology**.**

In this researcher's opinion, PDT intervention programmes for PE teachers have to focus on teaching methodologies for PA promotion in PE classes; on educating teachers on the value of PE as a subject that aims to improve students' health; and on the importance of the health benefits to society and the students in their classrooms. This will improve teachers' knowledge of physical and health education, and it would be helpful to take the context of the concerned teachers into consideration. This would increase the chances for PE teachers to improve their professional skills and develop a professional relationship through discussions to identify their needs within the school setting.

It may also be helpful to contemplate other models of changing teaching practices or training teachers, such as Hanna's Model of Precursors to Change for Teacher Development: a practice model alongside the intervention programmes to follow up the changes, through active engagement. The model can assist teachers in changing their practices of, and attitudes to, the promotion of PA during PE classes, further encouraging them to be more dynamic in their teaching methods, as the syllabus content allows.

In return, PE teachers will benefit their students through skilled teaching methods and the responsibility to put into practice their knowledge of health benefits in PE class, which will help in improving students' PA levels. Students who increase their PA levels during school-based PE classes have better PA habits and attitudes to daily and regular activity, both in school and after school in their community.

2.9 Section H: Teaching Methodologies as Interventions to Promote PA during Physical Education Classes

In the study conducted by Lim (2015), cited in Mohd (2013), any teaching methodology includes getting students' attention at the beginning of the class. This is important, for students are required to be mentally, physically and emotionally ready to participate in the class. A good introduction is important as it enhances students' motivation to participate in in-class activities. It makes the teaching and learning procedures meaningful and interesting, simultaneously (James & Coolier, 2011).

Even though there are many teaching methodologies, there is no one, best, methodology. The reason is that there are many factors that influence the efficacy of teaching methodologies, as well as the skills ability of the teachers (Siwatu, Frazier, Osaghae & Starker, 2011): the teacher's knowledge of the students' backgrounds (Allen, Taleni & Robertson, 2009); the methodological content and ideas for teachers (Park & Oliver, 2008; Shulman, 1987); the classroom control process and practice (Daniels, 2009; Hue, 2007; Weiner, 2010); and class space and size management (Gottfredson & DiPietro, 2011).

In a previous study conducted by Lim (2015), the research identified five teaching approaches: guidance; encouragement; positive reinforcement; praising and ignorance. The study further explained the impact of teaching approaches on student acquisition of attitudes. These perceived effects included students' participating in in-class activities; answering questions; initiating proactive actions and facilitating group activities.

However, overall findings suggest that the effectiveness of a good lesson introduction is determined by the approach and teacher's methodology, content knowledge and creativity. They also found that not all approaches fit all circumstances. It more important to develop attractive plans and initiate lesson notes to suit students' interests. The findings further provided insight into effective teaching practices to improve students' attitudes in the classroom. The study suggested that there should be instructional principles and guidelines to assist with the students' improvement in the classroom. The approaches can be systematically implemented in a range of educational contexts (Solmon & Carter, 1995).

The previous study on professional development designed for teacher ability has not provided a clear understanding of the fundamental educational principles and guidelines for effective teaching and approaches to teaching. There is a need for an empirical study to investigate principles and guidelines for determining teaching effectiveness in the classroom. Due to practical limitations, the current study evaluates the methodologies used by teachers, guided by Hanna's model, during PE classes (Hanna, 2013).

Based on the implementation of teaching methodologies, and gaps in the evidence (Community Preventing Service Task Force Finding and Rationale Statement, 2013), they made a suggestion for additional research that will investigate the teaching efficacy in PE class within different subgroups. This study was carried out to evaluate the teaching methods used by the teachers during the intervention programme to promote students' PA during PE classes in order for the students to develop healthy lifestyles, and to improve the quality of PE classes.

2.9.1 Intervention Programme Motivates Students to Participate in PE Classes

In their study, Adeniyi et al. (2016) designed instructions for PE students to determine the usefulness of intrinsic, versus extrinsic, motivation in attaining activity goals. Results indicated that intrinsic motivation leads to positive goal attainment. Therefore, employing autonomous factors to motivate students during PE class should have positive outcomes. Conversely, using extrinsic motivation has a negative effect on goal attainment. These outcomes have suggested that PE teachers must focus their teaching styles on students' intrinsic motivation, to increase active participation in PE classes.

Mojisola et al. (2017) studied possible motivations to improve adolescents' PA levels in school PE classes. Lonsdale et al.'s (2016) study showed that the promotion of PA in schools must be specifically designed, using various teaching methods, so that students have enough opportunities for increasing their MVPA during PE classes.

In another study by Lonsdale et al. (2016), student PA motivation becomes the determinant of teaching styles for PE. A review by Martin et al. (2015) concluded that there are seven categories of teaching styles. The first category explains the reasons for the contemporary issues in the PE syllabus. Rhythmic activities, traditional and contemporary dances, and creative movement are covered in the sixth part. These styles are in line with the information provided by Sallies (2014) about important aspects of the PE programme, including how a variety of activities could be taught within the limitations of the typical classroom, showing how PE can be linked with other subjects, like rhythmic activities in the school programme.

A small, elite study has evaluated students' interest in PE activities. Hallal et al. (2012) assessed 16,032 ratings of 648 activities in the PE classes of sampled students in Grade 11 and 12 classes. The results were reported on a four-point scale, and ratings of PA units ranged from 3.15 to 3.62, indicating that students are (more) interested in the PA. However, they are also more interested in some activities than in others ($p < .001$); and they developed more interest in skill-related, health-related PA. In view of this result, teaching styles should be integrated into PA motivation interventions. They further advised on qualities and ideas that are acceptable and favourable to students, leading to positive behaviour and attitudes to PA (Hallal et al., 2012).

It is important for teachers to have a deep understanding of the different strategies and methods of teaching, to make sure that they are in line with class lessons and content, about which they must be aware. This knowledge will improve the teacher's ability to use an appropriate approach for the content. Then teachers will be able to motivate students in PE classes.

To establish the existing facts about PA interventions, there must be a proper understanding of the determinants of PA, before incorporating PA promotion, through counselling and intervention. Earlier

studies, subsequently examined, indicated that the guidelines were not clear in their concept of intention, for involvement in the intervention (Sallies et al., 2014).

According to Sarto (2014), the decrease of adolescent PA in many countries is implicated in health problems, such as obesity, sedentary behaviour and the transmission of disease (Currie et al., 2012). In previous studies, it was indicated that two or more intervention strategies have been used to promote PA in adolescent PE classes. This study will use a school-based intervention teaching methodology, which has a different motivation.

Studies have shown that, as adolescents approach adulthood, their interest in PA, either in PE classes or recreational sports, decreases (Rush et al., 2012). Therefore, the PE teacher must design teaching methodologies that will suit the interests of the students, allowing them to enjoy the PE class. To counter these disturbing trends and maximise the opportunity for Nigerian adolescent PE students to engage in adequate PA to enjoy the related benefits of been healthy, professional teaching skills need to be developed. The present study developed practical teaching methodology interventions by gaining insight into adolescents and identifying the importance of PE classes for them.

2.9.2 Features of Professional Teaching Methodology Development

The development of effective, professional teaching methodologies has been of interest to researchers. Some of the major characteristics of professional development on teaching methodology have been established. The Community Guide (2013), reporting on the national guidelines for PA (2013), recommended adding new teaching styles, lengthening existing PE classes, and increasing the PA intensity of students during PE, without necessarily lengthening class time. All are vital in improving the quality of PE classes, which will directly promote adolescent PA. These features were factored into the design and implementation of this project.

Teaching methodologies include:

- adding new teaching styles (following autonomous support by the researcher);
- increasing the PA of students during PE without necessarily lengthening class time. Train PE teachers how to modify the rules of games to suit students, so that they may spend more time exercising;
- lengthening existing PE classes. Build fitness by creating more time for practical classes, making play more attractive and increasing time allocation;
- providing national guidelines on PA in the PE curriculum.

These are all key in the promotion of PA during PE class.

2.9.2.1 Adding new teaching styles (autonomous support or teacher choice):

Autonomous support, or teacher choice, was introduced in this study as a new, innovative teaching style for school-based physical education classes to promote PA. This enables students to participate regularly in PA during PE classes, throughout adolescence to adulthood.

According to Yew et al. (2013), when students experience autonomous support, it encourages them to give of their best, putting effort into PA during PE classes. Teachers are required to offer choices that are meaningful to students for the promotion of PA and to achieve their goals.

In recent years, different research has evaluated the impact of interventions based on the optimisation of PE teaching styles. A study by Hagger et al. (2013) evaluated the purpose of intervention among ten PE teachers using autonomous support as a teaching method. The results showed that autonomous support improves the sense of choice by the teachers and promotes positive feedback. Listening to student opinions allows the teachers to understand and acknowledge difficulties within the PE classes.

The study also indicated that the students of teachers implementing the intervention based on increased autonomous support improved their PA levels when compared to the control group. However, as was acknowledged in the study, autonomous support was not used along with additional teaching methods to promote PA in PE class.

In similar studies, Cheon et al. (2015) and Assor et al. (2002) evaluated the effects of a PE teachers' training programme to be more autonomously supportive during PE classes through workshop-like group discussions. The studies ascertained that, after the intervention programme, students from the experimental group improved their PA levels with the autonomous support teaching method, in comparison with the control group. They extended the study by observing the same subjects a year later and found that the changes had been maintained.

Lonsdale et al. (2016) investigated the effects of an intervention programme with PE teachers to develop autonomous support as a teaching strategy. The study showed that students in the intervention groups significantly increased their PA participation scores on teacher perception of choice, which means the teacher provided choice by autonomous support.

Ntoumanis et al. (2013) carried out a PE teacher-training programme, aimed at improving teaching styles. The study is important in that a teaching method training programme was developed with PE teachers in group discussions in order to create the necessary methods to provide learning environments to promote PA, characterised by autonomous support. They suggested that, for teaching methodologies

to be effective in improving adolescent PA levels, a combination of teaching styles, along with autonomous support, lead to good health outcomes.

A survey study on school PE validated the benefits of improved motivation in teachers and students, when teachers apply autonomous support as an interpersonal teaching style, to meet students' need for psychological satisfaction.

Similarly, the previous study suggests that autonomous support as a form of motivation leads to positive cognitive and behavioural changes. It can be concluded that empirical research can be guided through the use of interventions. Studies conducted on PE interventions outline some practical recommendations:

- Teaching methods are flexible and able to communicate knowledge to PE teachers on their vital role, which is necessary in providing students with opportunities to improve their attitudes to PA. The choice of activity, listening to student perceptions, and creating peer-learning in demonstrations, are adaptive processes or ways to structure PE classes to motive students and meet their psychological needs.
- The PE teacher may apply autonomy-supportive strategies when observing that students are not showing an interest in specific PA. The strategies include supplying a reasonable activity that is important for the promotion of healthy lifestyles; always considering students' reactions and views concerning the activity supplied; and letting one's language imply choice rather than control (as in 'you can do better if you want to', rather than 'you have to').

James et al. (2011), writing on teachers' autonomous support, indicate significant improvement in PA during PE classes, along with a time effect, when PE teachers offered autonomous support to students as their teaching method. They followed the autonomous support group, with multiple comparisons, which showed that the autonomous support group scored higher in post-intervention, than in pre-intervention, tests ($p = 0.001$). Moreover, the autonomous support intervention group had higher scores, post-test, relative to the control group ($p = 0.001$). It was also observed that no difference was recorded during pre-intervention testing.

Standage et al.'s (2006) study reported that the students who had received the autonomous support intervention from their PE teachers showed a bigger increase in their PA levels than those students in normal PE class, as well as during PE classes overall. The study was evaluated using a student AP questionnaire with questions on levels of PA. These questions were designed using a Likert scale with a range of choices: e.g.: 'I think my PE teacher listens to our opinions in class.' The results were analysed with Cronbach's alpha at 0.76.

Kahar et al. (2018) noted, in their experimental design study conducted during a three-month autonomy-supportive intervention programme, that autonomous supportive PE teachers generate autonomous

motivation for PA in the students in their PE classes. The participants were students and their PE teachers. The participants were randomly divided into intervention and control groups. The intervention group was trained with autonomous support for three months. The intervention was evaluated on PE students through pre- and post-intervention tests to provide data on autonomous support as a PE teaching method. The results indicated that the students whose PE teachers used the intervention showed significantly higher levels of daily MVPA (WHO, 2013) in their leisure time, than students in the control PE classes post-intervention ($P = 0.001$). Therefore, it was submitted that school PE class might contribute to promoting PA and healthy lifestyles, in both students and PE teachers, when students experience autonomous support in PE classes.

Yew et al. (2013) opined that supplying the of choice of activity during PE class increases students' PA levels in PE classes and improves perceptions of students about autonomous support. The study examined 257 participants from different high schools during PE classes. They were randomly assigned into two groups – the intervention and control groups. The intervention group was given a chance to choose their own activity in their school PE. Students in the second group, the control group, continued to engage in their normal PE classes led by the normal teacher. The evaluation was conducted pre- and post-intervention for the 15-week programme. The findings showed that the lack of autonomous support in choice of activity during PE in the control group led to the students having negative perceptions of autonomous support; while the students in the intervention group had a very positive view.

The above-mentioned studies agree that if autonomous support is provided by the PE teacher, students will improve their PA levels during PE class. However, this researcher sees it as an additional teaching style that could be combined with other professional teaching skills developed as PE teaching methodologies to promote PA in adolescent PE classes. As established by Lonsdale et al. (2016) and Yew et al. (2013), autonomous support increases the PA of students during PE without necessarily lengthening existing PE classes. They complement each other in the effective implementation of teaching methods in PE class. Based on this information, this study developed a teaching methodology intervention programme for PE teachers to offer a choice in their PE classes to address individual difficulties. It should improve perceptions of autonomous support and increase PA levels in PE classes.

The lack of implementation and the major factors affecting the implementation survive in the educational system. These barriers could be as a result of insufficient PE equipment, facilities and instruction (e.g. some schools participate in PE two to three times in a week and yet they make PE compulsory for their students). The Community Guide (2013) submitted that there is strong evidence that effective PE classes increase PA levels of students; and through PE teaching methods physical fitness is promoted. Therefore, high- and middle-level schools need PE in their day-to-day activities. But the majority of schools preferred making space and time available for other academic subjects,

rather than taking more time for PE. Some schools are looking for ways to abolish PE and see it as a waste of time.

2.9.2.2 Increasing the students' PA during PE class, without necessarily lengthening class time; modifying games rules in PE classes:

Physical education class interventions to promote PA and healthy lifestyles in students include modifying existing curricula to improve the length of time adolescents spend in MVPA during PE. If game rules have been modified to suit students' interest, this could lead to more participation in PA. This can be done by increasing the PA of the students in different games from moderate to vigorous, without necessarily lengthening class time (exchange football for softball; make the games rule simpler for students in order to have a higher number of students that are actively participating in PA).

The innovations presented in the previous article on effective teaching methodologies provided modifications to the PE curriculum. Modifications are regarded as significant in improving student participation in all PA tasks in PE classes. The modifications described in the article are easy to implement, for example: 'modify the rules of games to suit students'. This will increase PA in PE classes and improve students' chances for a healthy lifestyle. Enhanced school-based PE to promote PA among students involves a modification of the PE curriculum and increasing the time students spend doing MVPA in PE class (James, et al., 2011).

The PE curricula should be implemented through the intervention of trained PE teachers. The intervention may include developing teaching methods and implementing teaching guidelines for PA during PE classes, and providing teachers with appropriate training. The Community Preventive Services Task Force (2013) believes that quality PE programmes increase PA, and found strong evidence of the efficacy of PE in promoting PA levels during student participation in MVPA, and increasing the amount of time spent. Quality PE interventions have reported a 10% increase in MVPA participation.

Participants in the teaching methodology intervention group increased activity by 6% more than students in the control group. In the control group, 45% of class time was spent on MVPA; while half way through the intervention, students assigned to the intervention group had accumulated a 14% improvement in PA during PE (Community Preventive Services Task Force, 2013).

Lonsdale et al.'s (2016) study noted that participants who had been involved in quality PE programmes participated in 24% more MVPA, compared to the control group for normal PE. Participants who received normal PE classes accumulated 43% of MVPA during classes. The results indicated an

approximate difference of 10%, in favour of those assigned to the intervention group. As a result, 53% of the PE lesson was spent by the participants in the intervention group in MVPA.

Lonsdale et al. (2016) also found, in a study of a PE class intervention, that participants from the intervention had spent a suitably large number of hours in MVPA. This was after differentiating the two groups' participation, to evaluate the impact of the intervention programme.

The Community Preventive Services Task Force (2013) reviewed 14 studies on the quality of PE classes for enhanced PA, with a teachers' training programme. In 11 studies out of the 14, there was a significant difference ($p < 0.05$) statistically in the results. In six out of the 14 studies, the participants assigned for the intervention accumulated 50% MVPA during PE. Across all 14 studies, participants from the intervention groups spent longer in PE class hours doing MVPA, compared to the control groups. Respectively, the weighted means were 17.8 and 14.4. The teaching methodology intervention introduced in the present study was developed for, and critically evaluated, the promotion of student PA in PE class.

2.9.2.3 Lengthening existing PE classes: building fitness by creating more time for practical classes, making play more attractive and increasing time allocation

Many enhanced school-based PE interventions also included teaching about the benefits of fitness in preventing cardiovascular disease. This instruction plays a vital role in using PE classes to promote PA and makes it difficult to remove health education from PE lessons.

Two studies conducted on the theoretical teaching approach showed increases in the amount, and percentage, of the time spent doing MVPA during PE. In the first study, the students spent 50.3% of PE class time in MVPA, showing an increase ranging from 6.0% to 125.3%. In the second research, the time spent in participating in MVPA increased by 10% during PE class, and ranged from 3.3% to 15.7%. Another study reporting on pre-test values showed an increase of 762% post-intervention (Taymoori and Lubans, 2008; King et al., 2002)

Studies evaluating school-based PE class interventions used the same data and evidence that are applied to examine the efficacies of teaching strategies. Pate et al. (2007) and King et al. (2002) suggested promoting PA through PE lesson plans, among elementary and high school students. The interventions were successful among both high school and elementary students. Across the board, results showed that interventions like this may be effective in different populations and situations; as long as suitable caution has been taken in adapting to the target of the intervention.

In PE curricula that incorporate circuit training and fitness programmes by lengthening existing lessons, changes may include implementing and developing teaching methods and providing teachers with

training in the appropriate methodology. The training programmes may be school-based PE class interventions which promote students' knowledge of, and attitude to, the health benefits and the required time which should be used in participating in MVPA.

In a study conducted on incorporating fitness training into PE lessons, participants assigned to the intervention group accumulated 16% more time in MVPA in PE class than participants in the control group. The control group spent 27% of lesson time on MVPA, suggesting that participants in the intervention group spent 61% of the time on MVPA. Studies using fitness training to promote PA had an additional 10 minutes of lesson time (Sallis et al., 1999). Another study reported higher PA levels (the accumulation of time used by the students for MVPA in PE class, motor skills and physical fitness levels) in the participants assigned to the intervention group who were taught by trained PE teachers, compared to the control group who were taught by ordinary class teachers (Lonsdale et al., 2016).

Results from Sallis et al. (1999) and Strong et al.'s (2005) studies (Physical Activity Guidelines Advisory Committee, 2008) showed that participation in school-based PE class may have health benefits, which include lower levels of stress and anxiety. This can improve academic performance, and positively affect concentration, classroom attitudes and memory among adolescents. Nowhere in the literature is there any evidence that students are harmed by improved PE classes.

The present study recommends making play more attractive and increasing time allocation, as a teaching method. This improves basic human locomotor ability (e.g., kicking techniques; balancing ability;, the ability to play with a ball; the ability to throw and catch a ball) in ball games. This necessitates the extension of the existing PE curriculum to allow students to be more active in PE classes.

2.9.3 Focusing on Physical Education Curriculum Content to Promote PA

It is accepted, generally, that a curriculum should be developed within some conceptual framework. Adewale et al.'s (2016) study showed that conceptual frameworks for PE curriculum development were evaluated according to their criteria. The knowledge and concepts that were presented guide in the development of conceptual frameworks and of the knowledge that is required. They focused on efficient incentives to impart new knowledge. The findings revealed that the primary concern of PE is the individual human being interacting with his environment.

Important information for the design and data collection for professional development studies comes from the ability to examine and understand the subject content taught, and how the content is taught (Coulter, 2012). The major strands of PE in the Nigerian PE curriculum are athletics, ball games, traditional sports and first aid subjects. This curriculum is lacking human movement studies and health-

related subjects. Therefore, there is a need for the NPE to implement a new PE curriculum in order to use adolescent PE classes to encourage healthy lifestyles.

Lonsdale et al. (2016) cited, in their study, research that has evaluated the impact of intervention development to promote intense PA in PE classes (Lonsdale et al., 2016). This evaluation has included larger control trials in some countries like the United States, undertaken with the intention of promoting PE teachers' lesson plans and delivery (Sallies, 2014). They noted that previous interventions focusing on the curriculum successfully improved lesson delivery through the intervention of lesson plans to promote intense PA in PE classes (Lonsdale et al., 2016).

Telford et al. (2016) conducted a study on PA intervention. PE is an educative part of the school curriculum. Specifically, it was designed to promote physical fitness. While promoting PA was its primary objective, which set it apart from other parts of the curriculum, experts focused on the principles of PE teaching; on pleasure and involvement, and on improving the social skills and motor skills to inspire physically active lifestyles. Reviews have indicated that the PE curriculum and programme need to include the academic material to assist in the reduction of chronic diseases and to teach the benefits of PE and PA.

Linda and Dominiqu (2006) conducted a study of a school-based PE intervention, similar to Smith et al.'s (2000) study. They examined the perception of efficacy of PE curricula for promoting PA levels, and high school students' attitudes to fitness and the sports activities taught in PE. Six high schools and 17 PE classes agreed to participate. Questionnaires were used to collect data from 515 students; 159 of whom were involved in FG interviews. Results indicated that students desired a wider selection of fitness activities and sport, which are the tasks targeted to improve their PA levels during PE, as well as increasing the motivation for students to participate in PA both at and after school.

Yew et al., (2013) found that providing the choice of PA in PE improved students' perceptions of autonomy support, with a subsequent improvement in their PA intensity in PE classes. In addition, the attitudes of students in the intervention group regarding participation in fitness activities improved, due to knowing about the health benefits, compared to the control group ($p<0.005$). Most students embraced PE classes that included playing different games. Based on student recommendations in the study, strategies were suggested to improve instruction and to group students by skill level for appropriate tasks during PE classes. Therefore, there is a need to add interesting activities that include active participation during PE classes.

2.9.4 Attitudes and Practices of PE Teachers regarding the Promotion of PA

The Task Force on Community Preventive Services (2013), cited in Paffenbarger et al.'s (1994) study, suggested that informational approaches to increase PA were designed to increase PA through providing

the necessary knowledge to motivate and to change students attitudes, as well as to encourage and maintain new practices. Primarily, the interventions used educational strategies to increase overall knowledge of both PA and health benefits (including improving attitudes to prevent low levels of physical activity), as well as particular information about exercise and PA. Their study explained that the provision of information changed ideas about the benefit of PA; improved perceptions of opportunities for PA in schools; explained ways to overcome impediments and non-acceptable attitudes for PA; and increased engagement in school PA. The results of intervention programmes showed that improved health benefits could be achieved through enhanced classroom-based PE, focusing on attitude, practice and practical skills associated with the promotion of PA (Blair et al., 1995).

Another study by Hu et al. (2000) explained that schoolteachers, especially teachers in elementary schools, could play a vital role in developing students' knowledge, attitudes and healthy practices in their various schools. It was established in their study that school PE teachers have a potentially vital role in PE programmes, and have contributed to some students' knowledge of PA and healthier lifestyles. They further stated that the role of teachers in promoting PA as the students are developing is critical.

Their study suggested that there should be further studies on the use of teachers in promoting PA during PE classes. However, the teachers may need the training to deliver such a task: the lack of training on the implementation of teaching methods to enhance healthy student lifestyles has been shown to prevent teachers from teaching students effectively. The study supports a study conducted by Mojisola et al. (2017) which found that, in order to solve the lack of implementation of teaching methods to promote PA, there must be a good positive approach to PE. The teachers themselves need to have good knowledge, attitudes and practices regarding the promotion of PA.

A recent study has shown that teachers' knowledge of PA was inadequate. The authors suggest that if teachers know how to promote PA, this will influence the knowledge, attitudes and practices of the students regarding PA in school-based PE (Deidre, 2016).

Adebayo et al. (2016) conducted a mixed study of experimental instruction aimed at determining the teachers' knowledge about the promotion of PA. Results showed that 36% of teachers concluded that irregular training on the implementation of teaching methods to promote PA could affect their knowledge of PA. It is important to note that only 17.3% concluded that school policy could affect the implementation of teaching methods to promote PA. Moreover, they suggest that it is important for teachers to have regular training in order to promote PA and healthier lifestyles in students. Therefore, in this study teaching methods have been developed and implemented to evaluate the study to promote PA.

Alexandre et al. (2014) evaluated the PE teacher's contribution to promoting PA in their students, thereby preventing and managing several chronic diseases, through analysing the relationship between

the teacher's attitudes to, and practices in, PA, with the used of self-reporting to determine the promotion of PA in high schools. They designed an online questionnaire to collect data. Participants were 185 PE teachers who answered the questions. The questions were multiple-choice to provide qualitative data on teachers' attitudes and practices regarding PA, and used self-reported measurement of PA to determine the increase of PA achieved by PE teachers. Results showed the number of PE teachers that agreed (n = 30) with the statement, and those who agreed completely (n = 154), representing 99% in total, who indicated having promoted PA in their students to prevent chronic diseases. Significantly, correlations were found between the PE teachers' practice of, and attitude to, PA, and the benefits thereof. PA measurements showed an increase (0.251, $P < .01$ and 0.180, $P < .05$). The important role of PE teachers in promoting PA seems to be conclusive in their study and their survey underlines the importance of promoting PA. However, PE teachers are unable to implement this. Therefore, there is need for teachers' training programmes to emphasise teaching the fundamentals of PA.

The Task Force on Community Preventive Services (2013) review noted that all teachers (100%) knew that their positive influence on physical fitness knowledge and practice could prevent chronic diseases among their students and lead to healthier lifestyles. About 56.7% of teachers were aware that positive attitudes to PA improved its health benefits. Around 47.3% of teachers knew that regular exercise can prevent illness; 14% of teachers accepted that it can reduce fatigue and 15.3% of teachers said that it assists in weight loss and prevents obesity. About 20% of teachers accepted that regular exercise can reduce health problems (Taymoori et al., 2008; Maganur et al., 2017).

When teachers' attitudes were measured (Maganur et al., 2017), it was observed that all the teachers (100%) accepted the fact that maintenance of a healthy attitude is the individual's responsibility. About 91.3% of teachers accepted that regular exercise is required to maintain good health and only 7.3% of teachers denied it. In the study, around 34% of teachers said they were unable to implement teaching methods to promote MVPA during PE classes. The intervention was similar to those in earlier studies (Mojisola et al., 2017; Adewale et al., 2016) and analysis revealed that there was an average increase in the duration of PA, when teaching methods to promote PA were implemented in PE classes. Therefore, the present study identified an urgent need for effective school-based interventions with the potential to improve the attitudes of adolescents to PA. The impact of these targeted teaching methods in promoting PA needs to be evaluated in Nigeria.

2.10 Section I: Implementing the Teaching Methods in Physical Education Curriculum Interventions

According to Kriemler et al. (2011), as cited in, Deirdre (2016), generally, interventions that target PA in physical education class and incorporate curriculum or environmental changes are more effective in improving children's PA, than curriculum-only interventions. To support his findings, this study will implement more intervention methodologies. A PE curriculum that includes a health-related programme can be an opportunity for students to sustain PA during PE classes, with 97% of schoolchildren benefitting from improved PE classes (Sallies et al., 2014).

The implementation includes improved curriculum content and delivery of theory in PE. It concentrates on the improvement of the adolescents' biokinetics and uses chosen movements to achieve educational results related to increased knowledge and better orientation in life. It aims to introduce gradual changes in the conceptual framework for PE curriculum development. A taxonomy of human movement and health-related topics should be used (Mudekunye & Sithole, 2012).

The new strategy for PE was incorporated into the curriculum. The development of the PE curriculum was guided by the outline developed by the Federal Ministry of Education (1985), as cited in a study conducted by Adewale et al. (2016). They explained that PE teachers, as major implementers, must understand the intervention process. They have a vital role to play by understanding the underlying methods. Teachers are reluctant to change their teaching from the way they were taught. The implementation failed in some cases when teachers lacked the specific training to apply the teaching methodologies. However, this study will support the implementation, pre-intervention and post-intervention.

2.10.1 Review of School-Based Physical Education Classes and Teacher Training Interventions to Promote PA

Students can be provided with constant, efficient learning during PE programmes, from childhood to adolescence. The public health organisations in the US, as government agencies, have suggested 150 minutes of PA in elementary school PE classes a week. They also recommend 225 minutes a week for students in secondary school. In addition, they suggested that students should spend 50% of the time in PE class doing MVPA (Institute of Medicine, 2013; National Association for Sport and Physical Education, 2018; CDC, 2011).

In a comprehensive report on the status of NCDs, Nigeria had approximately 79 260 deaths caused by non-communicable diseases in (2008). Many were related to the high-risk factors caused by inadequate

PA. Nigeria has a significantly high number of non-communicable diseases, as a developing country with a large population. The risk factors are set in motion during adolescence and lead to diseases in adulthood (NCD, 2014).

Studies conducted by Deirdre (2016) and Peterson and Fox (2007), posited that schools provide an unparalleled opportunity to reach the vast majority of children, as most children attend school from an early age through to adolescence, for 180 days a year, and for several hours a day. Along with spending a significant amount of their active time at school, Dobbins et al. (2009) and Strong et al. (2006) noted that adolescents from different socio-economic backgrounds attend school. According to Naidoo and Coopoo (2012), classroom-based interventions promote and sustain physical activity levels among learners, with between 45 and 215 minutes of MVPA a week during school hours.

Furthermore, the school has more regular, intensive contact with children than any other institution in the first 20 years of their lives (Strong et al., 2006). Internal interventions conducted within this setting avoid condemning overweight individuals (Dobbins et al., 2009). For these reasons, schools have been identified as the ideal setting to improve PA in children and adolescents.

Sarto's (2014) study indicated that the promotion of adolescent PA used interventions which were quantitatively assessed and evaluated, after the intervention for PA, and for correlation between two groups. Results showed that school-based PA interventions met the criteria.

According to Deirdre (2016), some studies focused on school-based interventions. Schools have several unique chances to increase PA, such as during school, outside school hours, in PE classes, in the classroom, and at break and lunchtime. Previous interventions targeted one time, or several times, in the school day to improve the PA of children and adolescents. A review of school-based PA interventions in students aged between 6 and 18 years found that these types of interventions can increase the amount of PA from 35 to 45 minutes a day (Dobbins et al., 2013).

School-based PA interventions improve the likelihood of students participating in about three times more moderate to vigorous physical activity during the school day, in comparison to their non-participating peers (Dobbins et al., 2013). Lonsdale et al. (2016) conducted another study on adolescent PA interventions.

Different studies have discussed interventions intended to assist PE teachers in schools, focusing on their lesson planning and delivery of the PE syllabus content, in order to increase the time adolescents spent on MVPA in PE classes. However, adolescents are physically inactive in school, and even during PE classes, PA intervention programmes were used in many schools to encourage adolescent participation (Deirdre, 2016). These PA interventions provided more opportunities for students to improve the PA levels in their class. No one has proved that changing attitudes can be effective in

changing MVPA in PE classes. The content of previous interventions was designed to focus on enjoyable PA in schools.

Rohan et al. (2013) opined that a school-based PA intervention conducted in Australia was evolved to guide researchers that report replicable and transparent studies. Another study by Metcalf et al. (2012) focused on PA interventions attempting only to improve healthy lifestyles. Increasing PA during PE classes is possible, and a study analysing a PA intervention designed to promote PA during PE classes indicated that adolescents in the PE intervention group spent 24 % more time in the class period in MVPA than the control group. Similarly, another intervention study used two randomised groups in a controlled trial for a week. This study indicated that PA increased during school hours over one year (Kriemler et al., 2011).

However, many physical activity intervention studies do not follow these guidelines and thus contain methodological flaws, such ignoring the reliability and validity of the PA intervention (Adewale et al., 2016). Self-reporting is a useful tool to measure the effect of interventions on PA. This form of evaluation has been recommended for further research among adolescents (Dobbins et al., 2013). This measurement tool also allows comparisons within the daily physical activity intensity guidelines. However, only a few intervention studies use it for their physical activity evaluations (Dobbins et al., 2013). Furthermore, many school-based PA interventions only measure adolescent physical activity at a particular place and time, or during school hours only. This is problematic, as it may overestimate the total daily changes in physical activity (Metcalf et al., 2012).

Another study, conducted by Martin et al. (2015), employed a quasi-experimental design to study an intervention programme among schools students. The sample of 15 girls, aged between 7 and 12 years, participated in an eight-week intervention study from pre-intervention to post-intervention. Significantly, accelerometer results pre- and post-intervention showed an increase in class time spent doing MVPA, from 29.7% (16.6 minutes) of lesson time to 34.9% (19.3 minutes) during the intervention class ($p < 0.05$).

A review study by Naidoo and Coopoo (2009) on school-based PA interventions indicated that some interventions could improve PA participation in the classroom and at break/lunch time. They used RCT to sample 798 selected learners aged from 10 to 15 years, of both sexes, over an 18-month intervention study. Self-reporting and tests (BMI) were used to measure the effect of the intervention. The study showed significant improvement ($p \leq 0.05$), as the intervention had positive, short-term effects on learners' MVPA at school.

Adewale et al.'s (2016) study found that girls reported a bigger increase in PA levels ($P<0.001$) compared to boys, after a school PA intervention ($P <0.009$). The study adopted a cross-sectional survey and self-reported PA was used to measure PA, with an adapted version of the Activity Questionnaire

for Adolescents and Young Adults. They sampled 1006 adolescents aged between 12 and 18 years, of which 50.4% were girls. The intervention lasted seven days, with different PA locations: at school, during leisure time and at home. Significantly, MVPA (P= 0.024) and total PA (P = 0.049) increased more in the younger children than in the older children.

2.11 Section J: Evaluation of the Effect of Training the Teachers on the Enhanced PE Curriculum

According to Coulter (2012), it is necessary to explore and evaluate the effect of training the teachers (professional development) on the students' and teachers' performance, through research, in order that professional development is evidence-based. Several strategies have been developed to examine the impact of training and development on PE programmes.

An evaluation of training the teachers in the intervention allows for an assessment of the outcomes and the process, pre- and post-intervention.

Guskey (2000) adapted Kirkpatrick (1959)'s model for different levels of evaluation of education. The model has been extended to five levels of evaluation:

- Level 1 evaluation focuses on the participants' reactions to see the influence of professional development.
- Level 2 says evaluation centres on measuring the skills, attitudes and knowledge of the participants.
- Level 3 evaluation centres on changes and organisational support.
- Level 4 focuses on the assessments of teachers of the new innovations in their professional practice.
- Finally, level 5 assesses students and how a professional development programme may influence them. It was recommended that future study on educational programme interventions should emulate the guidelines for the model of evaluation and research design when reporting the study findings.

According to Deirdre et al. (2016), few studies were found that assimilated participant opinions on the development of PA interventions for adolescents. From this evidence, the development of interventions that consider school-aged student's perspectives is warranted to assist in creating successful PA interventions in the future.

Corbin and Pangrazi (2008) have noted that American adolescents and children are unfit and inactive (Peter, 2007). This trend continues into adulthood, to the extent that two-thirds of American adults are

physical inactive and do not exercise regularly (Centre for Disease Control, 2005). The U.S. Department of Health and Human Services (2009) stated that 22% of people aged 18 and older engage in PA for at least 30 minutes, five or more times per week. In addition, this study has shown that adequate knowledge about the concepts of physical fitness is lacking among most Americans (Lund, 2010). This warranted a study conducted on PE programmes that motivated professionals to take on the challenge to ensure that children are fit (Kasser, 2015).

Gabriel (2013) elaborates that physical fitness is central to the PE curriculum in terms of quality PA promotion. Santrock (2010) suggested that attaining physical activity and fitness, either through a series of activities leading to physical fitness, or as a basic component of the PE curriculum in which students participate, all serve as concepts that promote PA and health benefits. Lund (2010) suggested that many PE programmes suffer from the lack of a strong fitness component, because studies have shown that PE programmes centre on team sports.

Kasser (2015) explained that, if the traditional sports skills model of PE continues, fitness scores will continue to decline. However, many PE teachers complain about teaching methods: they do not understand what to teach, or how to make PE class more physically active. They find is difficult to modify the sports skills model (Salomi, 2014). These complaints suggest a need to train the PE teachers to modify the teaching of sports skills and to examine the focus placed on knowledge of PA concepts in preparing training programmes for prospective PE teachers.

Hardman (2010) reported low levels of PA in adolescents. PE teachers lacked a knowledge base that made it difficult for them to teach physical fitness concepts along with the sports skills model. However, there is a need to support teacher-training programmes, which provide prospective teachers with adequate knowledge to promote PA; and to examine the degree to which knowledge impacts on increasing PA, and the effect of methods and activities on developing optimal levels of PA in students. In a study conducted by Salomi (2014), PE teachers in intervention groups demonstrated superior knowledge about PA when compared to PE teachers in control groups, after the intervention programme.

According to Patty (2009), PE programmes have not really changed for the last 40 years, and students' needs are yet to be met. Effective curricula will need to match the content with students' needs and interests. The student population has increased enormously, and some massive changes have occurred at the same time. Students are individuals, from various religious, cultural and ethnic groups, with their own customs and preferred PA. In the northern part of Nigeria, female students only play handball and male students prefer football. This is as a consequence of the complicated traditional clothing; but the PA in those sports is not intense enough, unless they are modified, or students spend more time playing them. On the other hand, students from the south-west participate in all sporting codes (Lufwinho, 2015).

Fredricks (2010) illustrated that the beliefs and values of PE teachers affect the decisions they make during PE classes. Their aspirations for their students should be reflected in the structure of their programmes to focus on the teaching content. For example, a belief that students should use physical exercise and sport to develop a positive attitude to their health should be reflected in programmes that that include a variety of physical activities that are challenging, but well within the range of the students' ability.

Gabriel (2013) stated that the extent to which PE, as a subject, is linked to other subject areas, depends on the sport skills taught, and our educational beliefs. If an unlimited amount of time were allotted to teach PE, the PE teacher could teach all the important content to promote PA. PE teachers should be careful about combining students' needs, interests and the content. Student success depends on quality PE, which depends on the PE teachers' competency; with no time limits, and adequate facilities and equipment (Kalcata, 2013).

The present PE syllabus of Nigeria has been criticised for been largely traditional, using one teaching methodology, and has not modified the rules of games to promote physical activities. Old, traditional methods of teaching are used (Mojisola, et al., 2017). Despite the large content in the PE curriculum, and teaching implementations to improve the quality of PE classes, there has been a decline in the promotion of students' physical fitness levels in PE, because the syllabus makes no provision for the students' knowledge and practice of, and attitude to, enhancing their personal health (Adebayo, et al., 2016).

The PE guidelines introduced by NCATE/NASPE (2015) for prospective PE teachers state that they should be prepared to exhibit knowledge, attitudes and skills to promote PA and fitness in association with health, through the implementation and evaluation of PE programmes which are enthusiastically received by the students. The curriculum should give careful consideration to the students' needs and interests, regardless of their gender, and there should be support from school administrators. Therefore, this study develops and evaluates teaching methodologies to promote PA in adolescent physical education classes at junior secondary schools in Nigeria.

2.12 Brief of Interventions to Promote PA in Adolescents

The PA intervention to promote adolescents' PA can be integrated into the PE curriculum and regular PDT programme with a focus on long-term health benefits. Previously, studies on the effects of PDT programmes on interventions to promote PA have been conducted mostly in the advanced countries and evidence has indicated that they show similar results to the interventions conducted in Africa.

Martin and Fairclough (2008), from England, proved that school-based PA interventions had positive short-term effects on students' PA at school. Their results showed that there was an increase in student engagement in PA during intervention classes. Webber et al. (2008), from the USA, pointed out that PE teacher training interventions to promote student PA levels in MVPA, outside of class, showed that PA participation was reinforced by an improvement in students' PA level. Another study, conducted in South-Africa by Naidoo and Coopoo (2012), observed that PA interventions had significantly positive short-term effects on learners' physical activity participation, as well as increasing PA participation during formal instruction and at lunch breaks. Adewale et al. (2016), from Nigeria, examined the effects of a school-based PA intervention among young students. The results indicated that PA interventions improve PA more in younger students than in older groups.

In summary, the interventions have improved PA participation by increasing the time spent in PE classes; adding interpersonal styles for the teaching of PE; increasing the duration of the class; and using different strategies by modifying teaching methodologies. The most successful interventions have merged the various teaching approaches. Many studies of PA interventions on school-based PA promotion are set out in the PDT programme component. This prevents duplication of the studies. Broadly, intervention studies have been shown to have a positive impact on PA promotion and attitudes to active lifestyles.

2.13 Theoretical Framework

The researcher used the principles in the model of Professional Development Theory by Hanna, (2002), which assisted in answering various questions on how teachers' personal self-assessments, as well as feedback from students, could be used to improve and change their teaching approach and methods. Their answers were used to identify important aspects of teaching methodology to increase PA in PE classes. A theory consists of a series of ideas that explain a principle and predict future results.

Most professional development theory today is ineffective in bringing about lasting changes (Hanna, 2002). Professional development needs to consider more than instruction and must able to bring about a lasting change in teachers' attitudes. Several models for teacher development have been suggested, and Hanna's Model of Precursors to Change for Teacher Development (Hanna, 2002) was adopted for this study. It is driven by the teacher him- or herself and is based on modelling change, which results in deep, meaningful, lasting changes. The model tries to explain how teacher-change happens in schools. Teachers should be trained on models of change to identify their own teaching development, based on their PA classes' performance, and on areas where they perform less effectively, based on their own personal self-assessments, as well as feedback from students. This necessitates follow-up interventions

to make positive changes in their work environments (Jackie, 2016). In addition, the researcher examined the following principles with reference to teachers' change regarding PE in schools.

The model was guided by seven principles:

- a sense of necessity: teachers must see a reason for the change;
- willingness or readiness: teachers must be willing to experience anxiety or difficulty during the process of change;
- awareness: a problem in one's teaching performance exists and must be identified;
- teachers must focus on, and pay attention to, the problem;
- effort towards change: teachers need to take action to resolve the identified problem;
- hope for change: teachers should believe that change will happen and have expectations based on the effort;
- social support for change: people must be found to support teachers while they are making the relevant changes; and follow-up is needed to assist teachers in the process of changing (Hanna, 2002).

Theory and research philosophy assist researchers in gaining insight into, and studying, objects and subject beliefs that are vital for an understanding of the knowledge pertaining to subjects' attitudes, involvement and interest in situations. Understanding teachers' difficulties with, and their perception of, PE enhances our understanding of their views, and readiness to change (Jackie, 2016).

In the conceptual frameworks in previous studies (Creswell 2014; Dobbins et al. 2013; Huberty et al. 2011; Hallal et al. 2012), quasi-experimental designs were used to evaluate the effects of school-based PA interventions. The present study has also adopted a quasi-experimental design (pre-test and post-test design) with an intact group and an action design. This study developed a professional development-training programme for teachers to promote PA during school-based PE classes, using the existing PE syllabus with the new modification methods; and guided by Hanna's model of precursors to change (Hanna, 2002).

This study involved a large sample and there was a need to test the hypotheses at the site of the study, and the impact of the generalised findings on the knowledge of PA promotion, following the professional development-training programme implementation. Therefore, a mixed-method approach was adopted. The quantitative method was adopted to test the impact and hypotheses. The qualitative method for the collection of data was adopted to explore and interpret teachers' developmental needs in promoting PA during PE classes, and to consider multiple aspects before reaching conclusions. This mixed-method approach provided rich data to support the purpose of the study.

2.14 Summary

Chapter Two has reviewed the literature on existing initiatives for the promotion of adolescents' PA during PE classes, with information on the scope of PDT interventions used in teacher training to motivate student PA in schools, globally. The lack of PA interventions, and the increase in adolescent physical inactivity in Nigeria, have warranted the present study to develop PDT for PE teachers in junior secondary schools in Nigeria.

Previous studies were reviewed in sections. The first section focused on the concept of PA, including PA records in Nigeria and education in Nigeria, with detailed literature on PE in junior secondary schools as part of the educational curriculum in Nigeria. The literature review on the background to education in Nigeria indicated where the PDT needed to be implemented. The next section covered PA barriers in implementing quality PE programme in Nigerian secondary schools. The following section discussed the concept of teaching, along with the role of the teachers and effective teaching. Teaching methods were highlighted by focusing on teachers' practices in PE. Some details were covered in the next section, on the conceptualisation of students' perceptions, with focus on the promotion of adolescent PA during PE classes. Section E covered the benefits of PE for adolescents; while section F elaborated on the structure of school-based PA to improve adolescent opportunities for accessing health benefits.

Models for a PDT, and a model for change, were considered; and a PDT programme for teachers in Nigeria was discussed. The PDT was reviewed and programmes were evaluated. Section H covered the literature on teaching methodologies as interventions to promote PA during PE classes, coupled with the features of professional teaching methodology development in line with the PE curriculum content to promote PA, and across the attitudes and practice of PE teachers towards PA promotion. The following section looked at previous implementations of teaching methods in PE curriculum interventions. It also reviewed school-based PE classes and teacher training interventions to promote PA. The last section reviewed the effect of training teachers on the enhanced PE curriculum. The theoretical foundation for the PDT was provided by the literature on PDT implemented for effective teaching, showing how the PDT was developed for promoting changes from pre-intervention to post-intervention, and evaluating the school-going adolescents.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

A research methodology is a process that ethically and systematically examines and simplifies practical issues. It refers to the complete research process: the theoretical substructure; the approaches adopted; and the collection and examination of the data (Kothari, Kumar & Uusitalo, 2014). The research methodology's primary aim is to find solutions for problems; to detect and examine existing realities, cases and problems; to detect more wide-ranging issues; to generate new approaches and to produce new ideas and information (Flick, 2014).

This chapter begins with the explanation of the research design, the research methodology and the research philosophy. The chapter continues to describe the study setting, target population, sampling procedures and intervention procedures and protocol. Finally, a brief explanation of the assessment of the validity and reliability of the research instruments; the techniques used for the elimination of prejudice; the limitations of the study and the ethical considerations is given.

3.2 Research Design

This study employed a mixed methods approach, including an intact group design and an action research design. The mixed methods design was used to combine the qualitative and quantitative components in expanding and strengthening the conclusions of the study. This study used an explanatory type of mixed method research, designed to collect qualitative data for baseline information in the first phase, followed by the collection of quantitative data. The same process was applied to the final phase during the data collection. Thereafter, the data from the two methods were integrated for the final findings. The qualitative research was important in understanding the problems and knowing how to solve them, while the quantitative phases evaluated the study before and after the intervention. Mixed methods research is both a method and methodology for conducting research that involves collecting, analysing and integrating quantitative and qualitative research into a single study. This form of research, that is both qualitative and quantitative, combines to provide a better understanding of the research problem (Creswell, 2014). Since the researcher adopted a pragmatic research philosophy for this study, the survey (quantitative), coupled with focus group discussions (qualitative), were used for data collection and analysis. The quantitative data in this study was collected via questionnaires, while the qualitative data was collected through focus group discussions.

3.2.1 Action Research Design

Action research is used to solve an immediate problem, or in a reflective process of progressive problem solving led by individuals working with others in teams. It involves actively participating in a changing situation, often via an existing organisation, whilst simultaneously conducting research. Larger organisations or institutions can undertake action research. Action research can be assisted or guided by professional researchers, with the aim of improving their strategies, practices and knowledge of the environments within which they practise (Adewale et al., 2015).

3.2.2 Intact Group Design

An intact group is a pre-existing group of people in an organisation (a classroom of students in school, a political organisation, or a church group). No selection procedure is used, but the entire group is used to target a larger population, without random assignment to treatment or control, because it is a naturally constituted group. An intact group design typically allows the researcher to select schools to make two groups: some will be experimental groups and others will be control groups. This could be decided by flipping a coin against the name of each school, thereby assigning each school to either the experimental or control group (Belton, and Mac Donncha, 2010).

Thereafter, the experimental groups receive the intervention (experimental instruction), while the control groups receive no intervention. After the implementation of the intervention, both the groups are evaluated to give the researcher post-test results for the study. This involves the creation of a comparison group, to be used to identify possible similarities with the intervention group in terms of baseline (pre-intervention) characteristics. By comparing groups, the researcher is able to determine any effects of the intervention, when compared with the non-intervention control group, thereby evaluating the effect of implementing an intervention (Swam, 2015; Martin et al., 2015). Table 3.1 shows the brief of methods and the methodology research design in this study.

Table 3.1: Brief of methods and methodology research design

Phases	**Target group**	**Research design**	**Instrument**	**Method of data collection**
Pre- and post-intervention	PE teachers	Action design/ Intact design	Focus group discussions	Qualitative
Pre- and post-intervention	Students	Intact design	Questionnaire	Quantitative

3.3 Study Setting

The study was conducted in Nigeria in the state of Lagos (an urban area). Lagos is one of 36 states in Nigeria. Lagos has three senatorial districts, namely Central, West and East. The Lagos East Senatorial district was selected as the study setting. The East Senatorial district is further divided into three local government areas (LGA): Epe LGA, Ibeju-Lekki LAG, and Ikorodu LGA. This study was conducted in Epe LGA in the three local council development areas (LCDAs) that constitute Epe LGA.

Table 3.2 shows the number of public junior secondary schools(24) in the three LCDAs in Epe LGA.

Table 3.2: The number of public junior secondary schools

Lagos East District	**Epe-Central LCDA**	**Agbowa-Ikosi LCDA**	**Eredo LCDA**	**Total**
Public schools	06	08	10	24

Source: Lagos State School Census Report 2011-2014.13/02/2018

3.4 Sampling Plan

Sampling is a useful technique which, if reliable and valid, can be employed when the study population is too large, in order to select representatives to give answers to research questions (Saunders et al. 2011). Cooper and Schindler (2009) note that employing a small representative as a sample for the study, rather than all the data, reduces money and time and adheres to data entering restrictions.

3.4.1 Target Population

A target population is the total group of individuals from which the sample might be drawn – a group of people with similar characteristics for inclusion in the study (Creswell, 2015). The target population for this study consisted of all students from junior secondary schools in Class Three (3), and their respective PE teachers from the Lagos state senatorial districts. Students from Class 3, known in full as JSS 3 (n=12,000), and PE teachers (n= 592), were the target population for the survey.

3.4.2 Sample and Sampling Procedure

The sample is the group of people who take part in the survey study, and who will be able to assist with the relevant research in order to apply the findings of the study to the target population (Bryman and Bell, 2015).

The process by which the group is formed determines the validity of results from this kind of sample. The schools were assigned to either experimental groups or control groups in their various LCDAs, through the process of intact group design (based on the distance between the schools, the groups should be in the same LCDA area to allow mutual communication during the implementation, when the need arises). A purposive sample of PE teachers (n=24) and students (n=1,200) was selected to participate in the study. The number of PE teachers was determined, based on the intact group. The number of students selected comprised 10 % of the target population.

Table 3.3 shows the sample distribution.

Table 3.3: Sample distribution

Epe LGA (Urban)	**Intervention schools (n)**	**Control schools (n)**	**Teachers: intervention (n)**	**Teacher: control (n)**	**Students: intervention (n)**	**Students: age (years)**	**Students: control**
Epe-central LCDA	3	3	3	3	150	13-16	150
Agbowa-ikosi LCDA	5	3	5	3	250	13-16	150
Eredo LCDA	6	4	6	4	300	13-16	200
Sub Total	14	10	14	10	700		500
Grand Total	24		24			1,200	

Teachers and students who adhered to the following inclusion criteria were allowed to participate in this study:

Inclusion criteria:

- PE teachers
- Junior Secondary School (JSS) Class 3 students

Exclusion criteria:

- Part-time PE teachers

The sample comprised 24 schools (14 intervention and 10 control); 24 PE teachers (10 control and 14 intervention); and 1,200 adolescents (700 intervention and 500 control).

3.5 Procedures and Protocol

Ethical clearance (Appendix 2) was obtained from the Social and Humanities Research Ethics Committee (SHREC), University of KwaZulu-Natal. Permission was obtained from the Lagos State Ministry of Education through the Permanent Secretary (Appendix 3), who granted access to the researcher to conduct this study in the schools in Epe LGA. An information sheet and informed consent forms seeking permission to conduct the study were handed out to principals (Appendix 4) and PE teachers (Appendix 5). Student/parental information and consent forms were distributed to the students prior to the study (Appendix 6). The information sheet described in detail the purpose of the study; while it was clarified in the consent form that participation in the study was voluntary and participants were informed that they could withdraw at any time during the study with no negative consequences.

Figure 3.1 represents the summary of the procedures and protocol stages of the study.

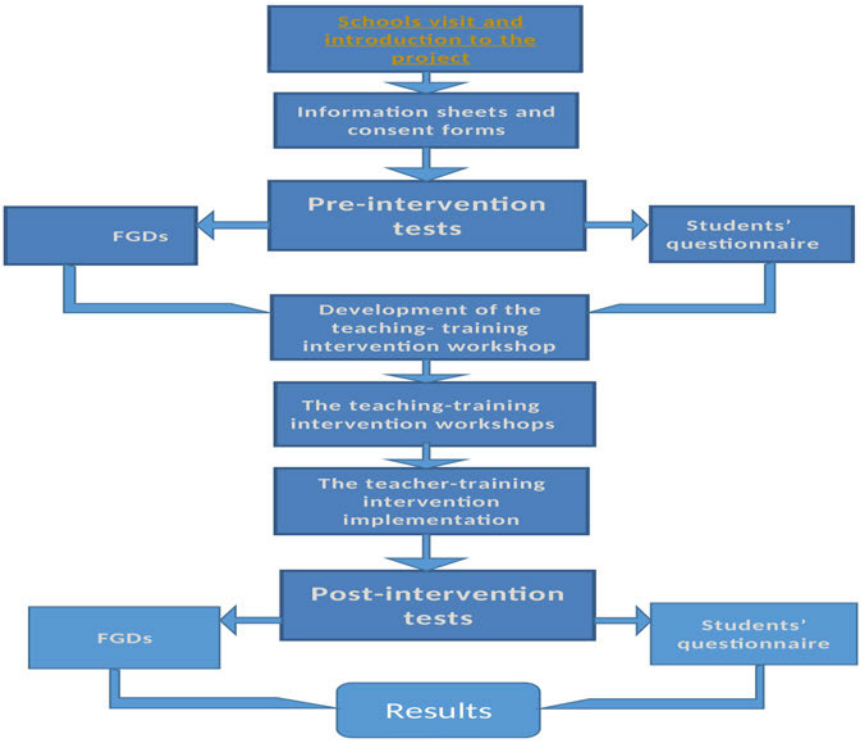


Figure 3.1: The summary of the procedures and protocol stages of the study:

3.5.1 Procedures

3.5.1.1 The implementation of the project in the schools followed the stages outlined below:

Stage 1: School visits and introduction to the project:

This included:

- preliminary visits to meet with principal and PE teachers to discuss the study;
- setting dates to conduct the focus group discussion (FGD), and the workshop for teachers to begin the study;
- setting dates to administer questionnaires to student's, pre-intervention.

Stage 2: Information sheets and consent forms:

- Information sheets were handed over to the PE teachers to read, so the students were aware of the purpose of the study.
- Consent forms were handed over to the PE teachers to read and sign before they participated in the study.
- Students'/parents' assent/consent forms were given to the students for their parents, who had to provide consent for their child's participation.

Only participants who provided written consent participated in the study.

3.5.2 Protocol

Stage 3: Pre-intervention tests:

The purpose of this stage was to gather baseline information on the PA teaching practices using FGDs; and student attitudes to, and practices of, physical activity, using a questionnaire for adolescents (APPAQ-A), (Appendix 8) regarding PA during PE classes. Figure 3.2 shows a FGD session with teachers and the researcher.

Figure 3.2: A focus group discussion session at one of the schools

Stage 4: The development of the professional development-training programme (teaching – training intervention workshop):

- Based on the information gathered from the teachers' FGD and students' responses from the APPAQ-A, as well as recent literature, the researcher developed the professional development-training programme. The Lagos state PE syllabus for junior secondary schools was also analysed and used to guide the development of the workshop.
- Additionally, the researcher monitored the intervention, by meeting with the teachers to obtain feedback regarding their progress during the implementation stage. A social platform (Whatsapp) was used once a month for a two-hour session to determine whether any implementation difficulties were experienced.

Stage 5: The teaching-training intervention workshop:

The teacher-training intervention workshop consisted of three, six-day workshop training sessions with three separate groups of teachers (each group was from the same school), during a week. Appendix 12 contains a summary of the content used to develop the workshop paper.
In addition, each group attended two workshop sessions and two consecutive two-hour-long workshops were conducted to accommodate those who could not attend the first workshop.

Stage 6: The teaching-training intervention implementation:

The intervention was implemented across two school terms, for a period of five months, from April to August 2019. The professional development training programme was intended to introduce teaching methodologies for PA promotion during PE classes within the existing PE syllabus content. The PE teachers implemented the skills learnt from the professional development intervention workshops, over five months, across two school terms separated by two weeks of school holidays. At the resumption of the new school term after two weeks' holiday, the researcher spent two days training in PA teaching methodologies during the implementation. The researcher followed-up the implementation for two hours, at one-day intervals, on a weekly basis.

Stage 7: Post-intervention tests:

The purpose of this stage was to gather post-intervention information on the teaching practices; and student attitudes and practices regarding PA during PE classes. The same process was followed as per Stage 3:

- The researcher conducted FGDs with the teachers about their teaching background, teaching practice, the existing PE syllabus and on their attitude to, and practice of, physical activity.
- Questionnaires on APPAQ-A were then administered to students.

Table 3.4 shows the intervention programme timeframe.

Table 3.4: The intervention programme timeframe

Stages	Activity	Duration
Pre-intervention	Research assistants' training	1 day
	Teachers' FGDs	3 days
	Administration of students' questionnaires	2 weeks before the workshop
Intervention	Two-days teacher-training workshop	6 days (first 6 days of the intervention)
	Implementation of the PA teaching methodologies (intervention schools)	40 days (last 40 days of 1st term period of the school)
	Two-day PA teaching methodologies (FGD) during the implementation	3 days (beginning of 2nd term period of the school)
	Continuation of implementation of the PA teaching methodologies (intervention schools)	3 months
	Two two-hour follow-up sessions	3 months for both 1st and 2nd school terms
Post-intervention	Teachers' FGDs	6 days before the evaluation
	Students' questionnaires	2 weeks before the end of the school term

3.6 Instrumentation

Research instruments are measurement tools designed to obtain data on a topic of interest from research subjects. Morris (2008) classifies data into two sources (primary and secondary). Primary data are raw data gathered specifically for the study, for analysis and interpretation; while secondary

data has already been collected. The quantitative data collecting tools are interviews, questionnaires, tests and observation (Easterby-Smith, Horpe et al., 2012). Self-administered questionnaires and FGDs were used to collect data in this study.

3.6.1 Focus Group Discussions

The second instrument was FGDs for PE teachers using semi-structured questions (Appendix 7). Each school was represented by a teacher, with 24 teachers participating in this phase of the study. The meeting consisted of three days of FGDs at the start of the pre-intervention and two days during the implementation. The FGDs aimed to gather information from the PE teachers about their teaching background, teaching practice, the existing PE syllabus and their attitude to, and practice of, physical activity. The FGDs were recorded using a voice recorder and field notes were taken to record non-verbal cues.

3.6.2 Questionnaire

The Attitude and Practice on Physical Activity Questionnaire for Adolescents (APPAQ-A) is a standardised instrument, developed by the Center for Disease Control Prevention (CDCP) (2010). The questions for the questionnaire was extracted from the main standardised questionnaire to ensure the cultural relevance of the research questions and objectives. The APPAQ is divided into three sections, covering attitudes, practices and demographic characteristics, and assessment of PA levels, with regards to PA and PE class. It was adapted to the situation of the intended participants, was approved by a group of professionals in the field of sports science; and its constructs and the content validity were calculated, with the alpha values for attitudes and practices at 0.68 and 0.60. Since the instrument is a standardised, the reliability was ascertained from the pre-tests and post-tests of this study intervention.

Responses were specified in each section of the questionnaire: Section B used a five-point Likert-scale, while Section C had multiple-choice, and tick-in-the-blank questions. This questionnaire took approximately 20 to 30 minutes for each participant to complete.

Section A assessed the demographics of the students, with inputs such as code, sex, age, level of class and school. Section B assessed the attitudes to PA and comprised nine questions. The answers were organised into options: strongly disagree, disagree, neutral, agree and strongly agree. Section C assessed the practices regarding PA during PE class and PA at break or after school and comprised 25 questions. They were organised into multiple-choice options that were appropriate to the participants.

3.7 Data Collection

The researcher supervised data collection. The researcher and a trained research assistant conducted the FGDs with the teachers. The research assistants were third-year undergraduate/honours students of the Department of Human Kinetic, the University of Ibadan, Nigeria.

The researcher and the research assistants administered the students' questionnaires (APPAQA) and remained throughout the completion of the questionnaire, to assist with any queries. The researcher also read the questionnaires to ensure proper understanding of the questions and options.

3.8 Statistical Analysis

Data analysis consists of 'evaluation, synthesis, organisation, interpretation, hypothesising, pattern finding and comparison (Peck, Olsen et al., 2015). Furthermore, Polonsky and Waller (2011) wrote that data analysis requires 'organising, and interrogating data in ways that permit researchers to identity themes; see patterns; discover relationships; make interpretations; develop explanations and generate theories'. In this regards, quantitative data collected from the questionnaires were analysed using appropriate statistical tools.

The qualitative data from the FGDs was used to developed possible solutions to the PA teaching methodologies training needs of the teachers and were used to support the responses gathered in the quantitative data.

3.8.1 Focus Group Discussions

The FGDs were analysed with the aid of computer-assisted data analysis software, NVIVO 12, to identify themes. Thematic analysis of the data was used to identify patterns and categories, and to interpret the concepts that emerged from the transcribed FGD data. The data were reduced to key ideas using a six-stage process described below (Braun & Clark, 2006):

1. The data was transcribed from a voice recorder to a text file.

2. The researcher familiarised himself with the data by reading it through several times.

3. The researcher generated the first set of codes and data was categorised into themes and sub-themes as determined by the schedule of FG interview questions. The identified themes were:

- the practices of PE teachers regarding PA teaching methodologies; and

-the perceptions of PE teachers on the professional development training programme (PDT).

4. The themes were reviewed and changes to the emerging themes were made in relation to the objectives of the study.

5. The themes were redefined and named and then interpreted.

6. The final report from the emergent themes was produced and then written up.

3.8.2 Questionnaires

The data collected were coded, entered into an excel spreadsheet and analysed. Descriptive and inferential statistics were used to test significant differences, from pre- to post-intervention. This included the means and standard deviations of respondents' ages and the percentages of each gender, with frequencies represented in tables and graphs. The paired sample t-test was used to test the statistical difference and compares the means of two (pre- and post-intervention) variables for a single group.

The one-sample t-test was applied to test for significant agreement or disagreement to statements measuring attitude to PE, pre- and post-scores. The analysis of covariance (ANCOVA) was used to test the post-intervention scores, to determine the interaction effects of categorical interval scale variables. Lastly, the Wilcoxon Signed Ranks test was applied to observed differences between the two dependent measurements, to discover whether there was a statistically significant difference in mean scores or not.

3.9 Ethical Considerations

According to Shamoo and Resnik (2009), 'Respondents' involvement in research work must be voluntary participation. This is essential and participants should have the right to give consent and the right of free choice, without the persuasion of force, constraint, deceit and fraud.' Ethics define the standards of conduct and distinguish between right and wrong. They help to determine the difference between acceptable and unacceptable behaviour by the participants. Ethical standards prevent the fabrication or falsifying of data and, therefore, promote the pursuit of knowledge and truth, which is the primary goal of research (Mujtaba, 2018).

To conduct this study, permission was obtained from the Lagos State Education District Board, Nigeria. Ethical clearance was granted from the University of KwaZulu-Natal's Social and Humanities Research Ethics Committee (HSS/1750/018M), with approval from the Lagos Ethics Committee. To this effect, guarantees of confidentiality were given to all respondents and the necessary steps were taken to obtain written, informed consent for the students from their parents or guardians. Their anonymity was also guaranteed.

PE teachers also completed informed consent forms. They had a clear understanding of the research topic. Identities of all participants were coded and identity codes are only accessible by the researcher. Six years after completion of the study, all documentation pertaining to this research will be destroyed. The benefits of the study were explained to the participants and they were assured that this study was voluntary. In addition, respondents were informed that their involvement in this study, or the choice not to be involved, would not affect their academic futures.

3.10 Summary

This chapter has dealt with the theoretical framework, research philosophy, research design, methodology, study setting, sampling plan, and procedures and protocol for the intervention. The research methodology for this study was designed using the mixed method (qualitative and quantitative research). In addition, the pragmatism research philosophy was applied in this study. The following chapter will discuss the analysis of the data and presents the findings of the study.

CHAPTER FOUR: RESEARCH FINDINGS

4.1 Introduction

This chapter describes the findings of the data, captured using both qualitative and quantitative methods. The results will be presented in the following three main sections:

(a) the teacher focus group discussions (FGDs), pre- and post-intervention;

(b) the professional development training (PDT) programme and implementation;

(c) students' questionnaires, pre-intervention and post-intervention.

4.2 Teachers' Focus Group Discussions, Pre- and Post-Intervention

The purpose of the FGDs, pre-intervention, was to gather information from the physical education (PE) teachers on the professional development training on physical activity (PA) teaching methodology in their schools and to use this information to develop the intervention. The FGDs post-intervention were used to evaluate the impact of the intervention. Three focus groups, with eight respondents per group, were conducted. The demographics of the sample of teachers is represented in Table 4.1 below.

4.2.1 Teachers Demographical Characteristics

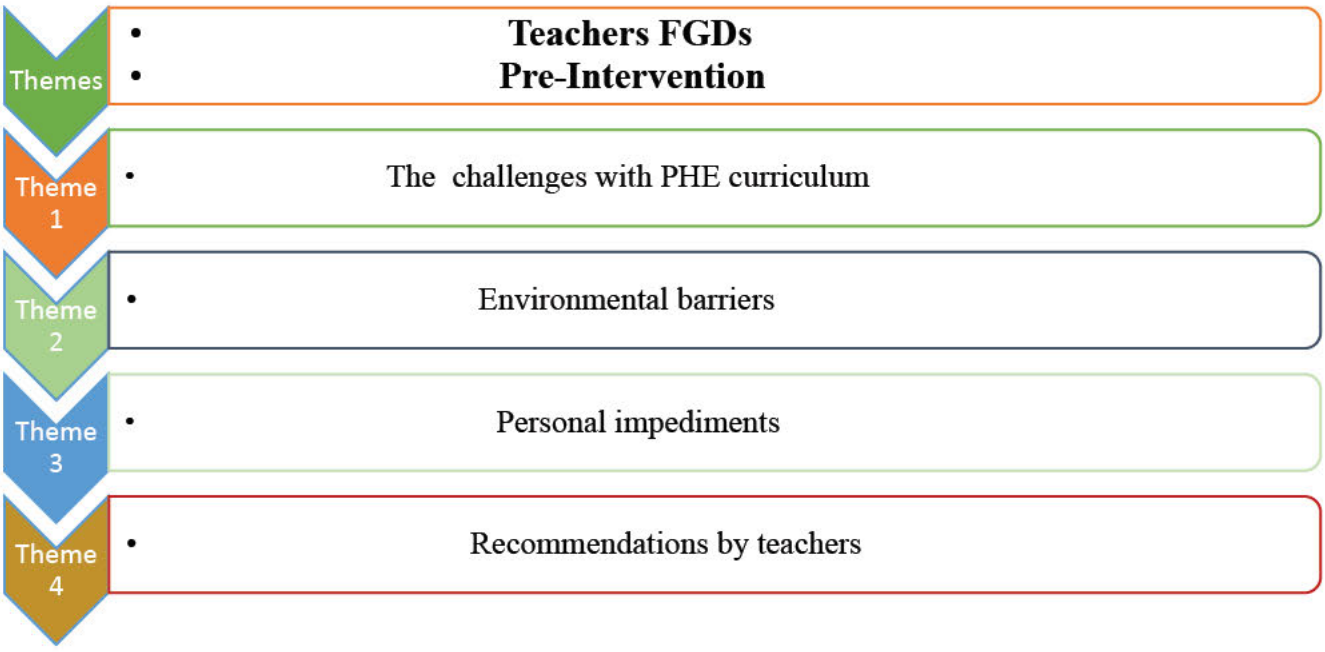
Table 4.1 presents the demographic information of the teachers. Sixteen male and eight female teachers participated in the FGD, with a mean age of 27 years. At least half of the sample were aged between 25 and 30 years. Thereafter, 14 teachers comprised the intervention group, and the remaining 10, the control group.

Table 4.1: Teacher demographics

Variables		Frequency (n)	Percentage (%)
Gender	Male	16	66.7
	Female	8	33.4
Groups	Intervention: Male	9	37.5
	Female	5	20.9
	Control: Male	7	29.2
	Female	3	12.5
Age	25-30 years	12	50.0
	31-40 years	8	33.4
	41-50 years and above	4	16.7
Qualifications	BSc.Ed.: Male	12	50.0
	Female	7	29.2
	M.Ed.: Male	4	16.7
	Female	1	4.7
Teaching experience	1-5 years	11	45.9
	6-10 years	10	41.7
	11-15 years and above	3	12.5

4.3 Focus Group Discussion, Pre- and Post-Intervention

Table 4.2 presents the themes and sub-themes that emerged from the FGDs. Prior to the start the FGDs, it was noted that the subject, PE, is now called 'physical and health education' (PHE). Therefore, the abbreviations will be used interchangeably. The following four themes emerged, based on the pre-intervention FGDs with teachers, as illustrated below.



4.3.1 The Emerging Themes and Sub-Themes from the Pre-Intervention FGDs with PE Teachers

Table 4.2: Themes, sub-themes and illustrative quotes (pre-intervention)

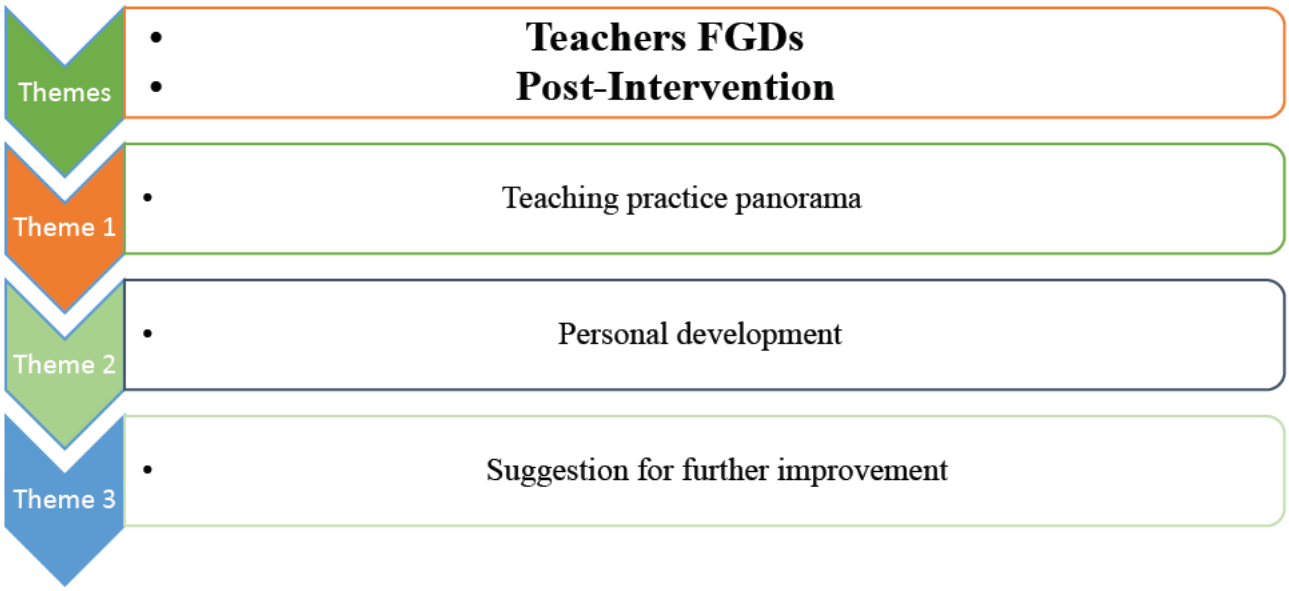
Theme 1: CHALLENGES WITH PHE CURRICULUM	
Sub-themes	**Quotes**
Professional development training	*"I obtained teaching methods in class management. Excluded outdoor activity in the syllabus." (Teacher 4)* *"I attended PE syllabus interpretation by PE association body in Nigeria, not specifically for PA participation but focusing on teaching content." (Teacher 7)*
Poor training on PA teaching practice	*"No training relating to sustainable knowledge of PA teaching." (Teacher 2)* *"By ourself, we source-out for the teaching guide in any PA teaching. Sometimes we teach without a guideline." (Teacher 1)*
Outdated PHE teaching methodologies adopted	*"Our schools PHE methods has no combination with PA teaching methods." (Teacher 9)* "*We engaged students* in *walking and running activity most of our PHE classes." (Teacher 14)*
Inadequate PHE programme structure	*"We taught different content for the same term in their different schools since there are no acceptable PA methodologies." (Teacher 5)* *"Time allocated for the teaching of PE was not enough to hand stated content in the syllabus."* (*Teacher 8*)
Inadequate teaching experience in PHE	*"Some of us have no ideas on skills and preventive measure of games and sport." (Teacher 4)* *"I don't have interest in PA teaching because am health education graduate." (Teacher 19)*
Lack of competency in implementing PA teaching	*"Upgrade on (my) qualifications is needed in sports coaching." (Teacher 11)* *"I need training on syllabus interpretation for the specific concepts that I would be teaching." (Teacher 3)*
Theme 2: ENVIRONMENTAL BARRIERS	
Lack of equipment	"*Due to the lack of equipment our PE class are boring." (Teacher 12)* *"We improvised for some affordable equipment like football." (Teacher 17)*
Large student numbers	*"Students' population sometime determines our class effectiveness, when equipment is limited, no effective class." (Teacher 6)* *"In our schools, we use the group method for PA, due to the large student numbers."(Teacher 10)*
Poor PHE facilities	*"School sport poor facilities have made us divert attention into health-related topics in the PHE curriculum." (Teacher 16)* *"I found it impossible to deliver effective PA class, due to a lack of facilities like basketball courts, volleyball courts and swimming pools."(Teacher 8)*
Transportation difficulties	

	"Most of us are not staying close to our schools, so we find it difficult to organise sport for students." (Teacher 22) *"When there is a training or workshop, venues are taking far away from where we stay." (Teacher 18)*
Theme 3: PERSONAL IMPEDIMENTS	
Teachers lack incentive	*"Due to no incentive from an authority, the majority of us are negligent to create fitness stations to enhanced students' PA intensity." (Teacher 11)* *"We are not motivated to teach PA aspect in PHE curriculum." (Teacher 23)*
Lack of confidence	*"I prefer training on the evaluation of skill developed in our syllabus. Training on improvisation of equipment." (Teacher 5)* *"I prefer training on subject knowledge and teaching proficiency." (Teacher 9)*
Teachers lack social interaction	*"Our religion did not permit me to have social participation in PA, so it affects my PA teaching." (Teacher 2)* *"PE syllabus is my main source of teaching, I did not use social media like google or WhatsApp for solving problems when having a difficult task." (Teacher 24)*
Financial difficulties	*"Financial difficulties and workload affect us to attend training or workshop." (Teacher 13)* *"We are required to have our copy of the curriculum each for teaching but we do not have money to buy." (Teacher 1)*
Teachers' negative attitudes towards PE	*"Inabilities to promote the value of PE, due to reluctance and laziness of some teachers." (Teacher 7)* *"When dealing with a large number of students, I find it difficult to make improvisation since the resources may not go around the students." (Teacher 14)*
Theme 4: RECOMMENDATIONS BY TEACHERS	
Training and development	"*Fundamental basic training on the promotion of PA in our teaching.*" (*Teacher 19)* *"There should be regular workshops on student motivation; the utilisation of equipment; improvisation and skills acquisition."* (*Teacher 16)*
Modify teaching approach	*"Training on student assessment base on physical fitness promotion and knowledge of the benefits of physical activity." (Teacher 20)* *"Utilisation and modify of skills in various sports." (Teacher 18)*
Improved resources	*"Upgrade staff qualification to meet the update use of appropriate facilities and equipment provided." (Teacher 4)* *"There is need for proper storage space for available materials for learning and equipment." (Teacher 6)*
Collaboration between governing authorities and teachers	*"Encouragement and motivation from school's authority to attend workshops." (Teacher 1)* *The school principal should create enough time for teaching and change their mindset that PE is not just a waste of time." (Teacher 10)*

Encourage student-centred learning	*"Design ideas and initiative to engage our students in play way method that will allow them to have more play."* (*Teacher 9*) *"I use the knowledge of the student model role as a PE teacher to motivate my students when developing subject content." (Teacher 15)*
Involve specialist PE teacher	*"PDT on the practical aspect of PHE subject should highly engage specialist PE teacher within the schools."* (*Teacher 13*) *"Qualified and certified PE teachers should be employed to teach PE in schools, not just any teachers because they have ideas of sports." (Teacher 22)*

Results from the post-intervention FGDs with teachers reflected the three overarching themes, as illustrated below.

Each theme will be presented, together with its corresponding sub-themes, as well as illustrative quotes from teachers. The comments and responses from teachers are presented from both the intervention and control groups, and for pre-intervention and post-intervention.



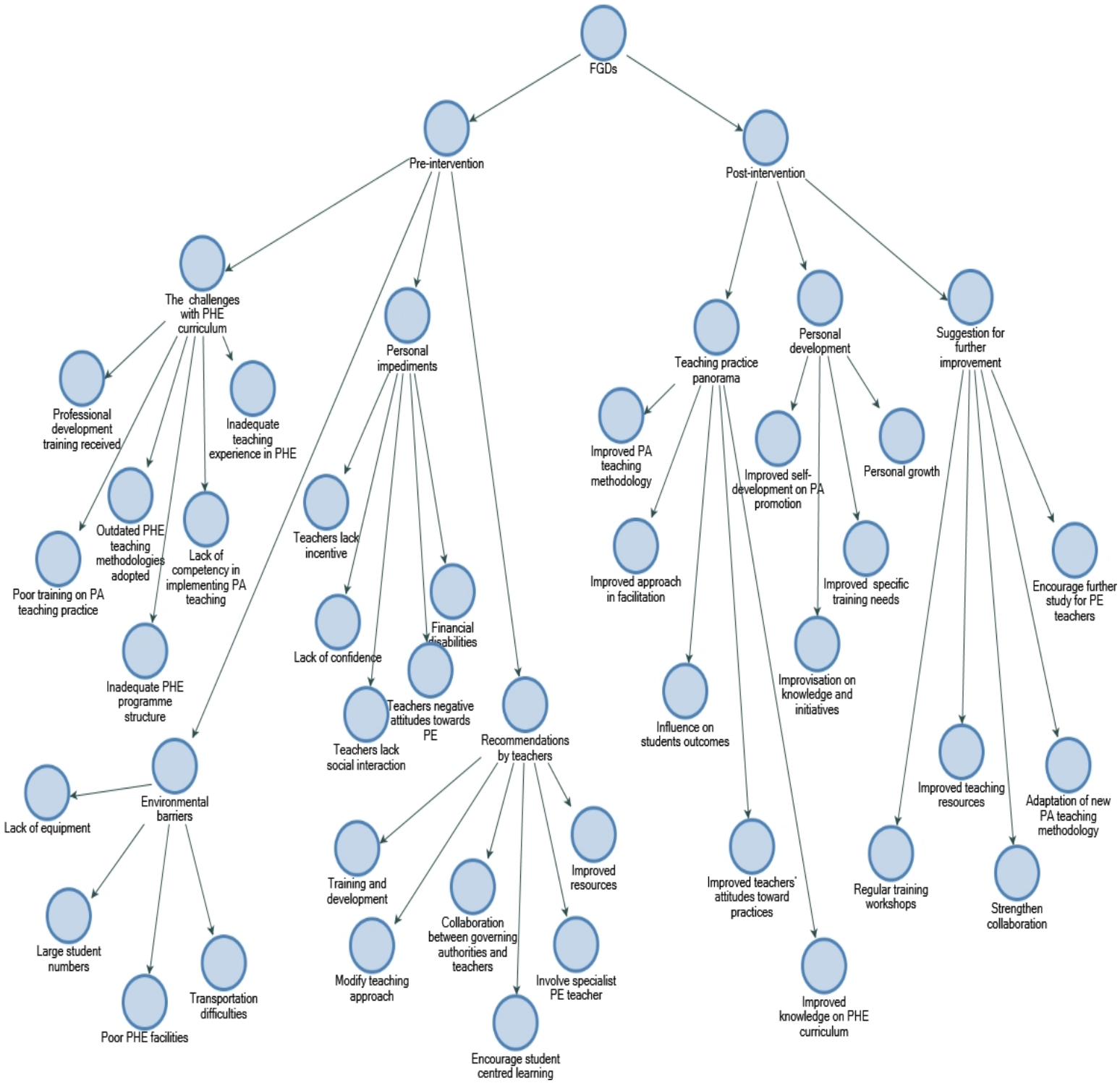
4.3.2 The Emerging Themes and Sub-Themes from the Post-Intervention FGDs with PE Teachers

Table 4.3: Themes, sub-themes and illustrative quotes (post-intervention)

Theme 1: TEACHING PRACTICE PANORAMA	
Sub-themes	**Quotes**
Improved PA teaching methodology	*"Positive practices achieved in our PA teaching methodology without physical stress." (Intervention: Teacher 4)* *"We followed the new teaching methods when teaching PHE topics from existing standards curriculum (smiling)." (Intervention: Teacher 10)*
Improved teachers' attitudes to practices	*"It increased our attitudes and practices towards the good implementation of new ideas discovered." (Intervention: Teacher 2)* *"We are not motivated either encouraged with our normal methods, our practices not improved." (Control: Teacher 9)* *"Training contributed to our positive and persisted practices towards PA promotion during PE classes."* *(Intervention: Teacher 12)*
The improved approach in facilitation	"*The well-being in PHE classes are not achieved both teachers and students, our approaches are boring to the students." (Control: Teacher 24)* *"Teaching training intervention supported the existing PHE curriculum to deliver effective teaching." (Intervention: Teacher 14)*
Improved knowledge of PHE curriculum	*"Training broadens our knowledge to carry out the PA skills to perform the long activity within the allotted time, to achieve health benefits."(Intervention: Teacher 20)* *"My students gained the ability to participate in an exercise like jumping and landing, in the way that skills are taught in the workshop." (Intervention: Teacher 16)*
Influence on student outcomes	"*Students enhanced health benefits." (Intervention: Teacher 22)* "*It motivates all aspect of important of PA."(Intervention: Teacher 14)*
Theme 2: PERSONAL DEVELOPMENT	
Improved self-development on PA promotion	*"It built our physical wellness and ability to maintain quality of life through a demonstration of the innovation."(Intervention: Teacher 2)* *"The training helps us as we female PE teachers to have boldness in organising PA for students during PHE class." (Intervention: Teacher 18)* **"***Through training* and *colleagues' interaction, we achieved a better understanding of specific knowledge."(Intervention: Teacher 4)*
Improved specific training needs	*"I am inexperienced PE teacher. I graduated in health education. The workshop improved my experience with PA practices." (Control: Teacher 6)* *"Training improved my development for an ongoing cycle of driving force for enhancing the teacher's productivity and performance."(Intervention: Teacher 24)*
Personal growth	

	"The training gave me additional coaching skills which improved my knowledge and skills as a qualified PE teacher." (Intervention: Teacher 10) *"PDT was the most effective training that improved my understanding and teaching ability." (Intervention: Teacher 4)*
Improvisation on knowledge and initiatives	*"We achieved sustainable knowledge of PA and PE methodology."(Control: Teacher 17)* *"Developmental changes occur in our students' activity intensity through our personal development." (Intervention: Teacher 5)* *"We preferred continuity workshops on how to source for PA teaching guideline in supporting PE curriculum." (Intervention: Teacher 3)*
Theme 3: SUGGESTION FOR FURTHER IMPROVEMENT	
Regular training workshops	*"We suggested that they extended this intervention programme to all other states in the country." (Intervention: Teacher 19)* *"Teachers advocated forming division workshop groups meeting as PE teachers to collaborate and share resources on all aspects of the teaching of PE." (Intervention: Teacher 2)*
Adaptation of new PA teaching methodology	*"The evaluation of objective of PHE classes at every level of PHE subject should be included for the subsequent workshop." (Control: Teacher 9)* *"I find it difficult to increase students' PA intensity with my teaching method because I do not use new PA teaching methods when I teach practical PE class." (Control: Teacher: 14)*
Improved teaching resources	*"Government should provide the latest textbooks that will contain a demonstration of games and sports, with new rules and regulations." (Intervention: Teacher 18)* *"Authorities should modify PE class time to accommodate enough PA." (Intervention: Teacher 23)* *"Government should make provision for all schools on facilities and equipment." (Control: Teacher 17)*
Strengthen collaboration	*"School authorities and PE experts should be involved in the restructuring of the PE curriculum." (Intervention: Teacher 21)*
Encourage further study for PE teachers	*"Then the government should incorporate this type of intervention to all schools if they want PE subject to gain stand."* (*Control: Teacher 4)* *"District PHE standards curriculum should be used in conjunction with these new teaching methods." (Intervention: Teacher 6)* *"Government should make provisions for teachers' scholarship to further their study." (Intervention: Teacher 8)* *"Quarterly, the authority should organise a workshop for all teachers irrespective of their levels."(Control: Teacher 4)*

Figure 4.1: The themes and sub-themes emerging from the PDT on PA teaching methodologies



4.4 FGDs Pre-Intervention

4.4.1 The Challenges with the PHE Curriculum

This section describes the sub-themes identified under the theme 'challenges with the PHE curriculum'. These include *professional development training*; *poor training on PA teaching practice*; *outdated PHE teaching methodologies adopted*; *inadequate PHE programme structure*; *inadequate teaching experience in PHE*; *lack of competency in implementing PA teaching*.

(a) Professional development training received

The teachers reported that the training they had received previously did not provide adequate PA teaching methodology. The training was based on classroom management. For some teachers, the last training they had attended was two to three years earlier. Not all the PHE teachers attended a PE curriculum-related workshop. The majority of the teachers reported that the training received was at sports clinics, which was organised by the association of PHE teachers.

(b) Poor training on PA teaching practice

The PHE teachers reported that their poor training affects their PA teaching methods. The majority lack knowledge about the development of PA in schools. Others reported that they used an autocratic method. Some teachers believed their understanding of these methods was not accurate and their teaching lacked; and this influenced the students' participation. Teachers source the teaching materials for PA teaching.

(c) Out-dated PHE teaching methodologies adopted

All the PHE teachers reported that they used different teaching styles when teaching PA during their PHE classes. Based on the responses in the focus group discussion, it was evident that they used traditional teaching methods, based on the knowledge they had acquired about methods of teaching students at all levels of PHE class; which they also believed was outdated. Teachers used methods like demonstrations, group methods and play, which they believed were not adequate for teaching the PHE content.

(d) Inadequate PHE programme structure

The teachers reported an inadequate PHE programme structure. Furthermore, their teaching methods and practices were affected by the curriculum, personal factors, or the policy of the school authority.

(e) Inadequate teaching experience in PHE

The majority of the teachers reported having similar teaching experience in PHE. Some health education graduates were employed as teachers and had no idea how to combine their teaching with teaching sport and PA. Teachers reported that they looked for PE teaching resources on the internet.

(f) Lack of competency in implementing PA teaching

The PE teachers explained that, based on their qualifications, most of them knew little about sport coaching techniques. They further explained that there was a lack of training on skills demonstration; syllabus interpretation; the implementation of PE through the objectives of games or sport; and officiating.

4.4.2 Environmental Barriers

This section describes sub-themes identified, above, under the theme 'environmental barriers'. These are *lack of equipment*; *large student numbers*; *poor PHE facilities*; *transportation difficulties*.

a) Lack of equipment and poor PHE facilities

Teachers reported that the majority of the schools lacked sports equipment and facilities. Teachers also reported that some facilities were provided specifically for soccer pitches and athletic tracks, but there was no equipment for sport or coaching. This made it difficult to teach PE classes and led to less PA during PE classes.

b) Large student numbers

The teachers reported that the large student numbers influenced their teaching. They believed that these large numbers did not allow for effective teaching of PA in PE.

c) Transportation difficulties

The lack of availability of transport for teachers was reported as a barrier to effective PA and sport in schools. Personal transport was a challenge and prevented teachers from going the extra mile and attending training and workshops on teaching PA and improving PE classes.

4.4.3 Personal Impediments

The theme 'personal impediments' encompassed several sub-themes, namely: *teachers lack incentive*; *lack of confidence*; *teachers lack social interaction*; *financial difficulties*; *teachers' negative attitudes to PE*.

a) Teachers lack incentive

The majority of the PE teachers complained that there was no motivation from school authorities or government, especially no free workshops for teachers. School authorities are not involved in the improvement of school PE. They see PE class as a waste of time in school programmes. The teachers were left feeling disillusioned

b) Lack of confidence

The majority of the PE teachers' responses indicated that they lacked confidence in the teaching of PA in their PE classes. They avoided practical classes, as they were unqualified to demonstrate sport skills and were uncertain about the latest rules in sport.

c) Teachers lack social interaction

Some of the female PE teachers responded that they are not interacting with their colleagues, due to religion. The majority of the male teachers complained that insufficient data or airtime affected their social interaction. This limited the chance to learn from their peers and get support from their colleagues, possibly preventing them from improving their PE programmes.

d) Financial difficulties

PHE teachers reported that insufficient funds affected their teaching, particularly the finance to develop sport or PA for students. Funding restrictions further hindered teachers from attending workshops to improve their teaching.

e) Teachers' negative attitudes to PE

The majority of the PE teachers' responses indicated negative practices in the teaching of PA in their PE classes. They avoided taking the students for physical activity because there was no room for practical demonstration in the syllabus and not enough time for fresh initiatives, which contributed to their negative attitudes to PE classes.

4.4.4 Recommendations by Teachers

The theme 'recommendations' included the sub-themes *training and development; modify teaching approach; improved resources; collaboration between governing authorities and teachers; encourage student-centred learning; involve specialist PE teachers*.

a) Training and development

Teachers believed that basic training in PA and PE is necessary to improve the programme. Teachers also believed that workshops should be practical, helping with facilitating student motivation and assisting with practical skills development.

b) Modify teaching approach

Some teachers identified the need to be trained in teaching approaches to PA and PE. Teachers also believed that they needed skills to modify their approach to the teaching of, and learning in, the PE curriculum.

c) Improved resources

All the PHE teachers suggested that there is a need to improve staff qualifications to teach the standard curriculum content since there are no standard PE textbooks. They also believed that school authorities should make materials available, or prescribe appropriate textbooks for teaching.

d) Collaboration between governing authorities and teachers

Teachers indicated that the government needs to encourage schools by sponsoring workshops and providing facilities, equipment and infrastructure. Some indicated the need to increase the time allotted for PE classes. They further suggested there should be workshops for school authorities and that all teachers need to change their mindset about PE and PA in schools.

e) Encourage student-centred learning

Most of the teachers suggested that there is a need for training on practical, student-centred teaching skills to promote PA. They indicated the need for students to assume leadership roles in the development of the curriculum.

f) Involve specialist PE teachers

Teachers suggested that the government should employ PHE specialists for teaching PA in schools. Most school authorities are aware that PE teachers in the school are not specialists, but due to the shortage of PE teachers, they are forced to involve other teachers with little experience in sports. Teachers also suggested that regular professional training should only involve specialists, assisting with their PA teaching methods in school.

4.5 The Development and Implementation of the PDT Intervention Programme on PA Teaching Methodologies

Information from the related literature and the Lagos state education district PE syllabus for junior secondary schools was also used for the development of the intervention. As part of the intervention, PE teachers received training workshops on teaching methodologies for the PE aspect of PHE, to promote PA in junior secondary schools.

The workshop for teachers was conducted prior to the beginning of the school term. This allowed the teachers to implement their training. The researcher monitored the implementation process. Teachers reflected on their training workshop practices during the implementation. Hence, the researcher was able to assist the teachers with queries and challenges during the implementation phase, particularly by modifying and adjusting their teaching and learning methods.

The major PA teaching methodology training components included the following:

(a) introducing new teaching styles (autonomous support style);
(b) increasing the intensity of PA of students during PE, without necessarily lengthening class time (modify the rules of games to suit students); and
(c) lengthening existing PE classes.

4.5.1 Introducing New Teaching Styles (autonomous support style)

In this section, PHE teachers were presented with the syllabus content on PA and effective teaching methods to deliver that content. Various teaching methods were applied throughout the intervention programme, which continued through the second and third terms of the school year. The methodological procedures used included providing clear instructions before a PA; providing opportunities for choice and input of activity from the students; empathising with the students' perspective; developing tasks that could be done by the students along with their choice and input as groups or individuals; demonstrating and/or establishing peer-learning groups, and planning for efficient transitions. These motivated the teachers and gave them ways to adapt and structure PHE classes.

The autonomous support teaching style was introduced, and thereafter the PE teachers reported that there was an improvement in the level of physical activity, and therefore an improvement in their ability to promote PA. This enabled students to participate regularly in PA during PE classes.

"It facilitates us an opportunity to involve students more in practical classes that involved students' choice of physical activities for a short duration of participation and goals was achieved" (Intervention: Teacher 6)

Autonomous-support teaching styles can easily be adapted when the teacher acknowledges that students may have psychological needs which, if satisfied, will improve their learning; and the teacher offers a choice of activities that is meaningful to students. An autonomous-support teaching style can be combined with methods of teaching physical activity to motivate students. For example, the teacher supports the students by providing opportunities to learn a variety of skills in handball (catching, throwing and bouncing), then instructs the students to demonstrate any handball skills, pairing them up for easy demonstration.

"The students love this as they were given opportunities for choice of physical activities. The students were able to demonstrate a lot of fitness activity and achieved the intensity of PA within the short allotted period for PHE class" (Intervention: Teacher 1).

"The use of providing opportunities for choice of activity related games skills actually helped me to teach handball concepts easily and students got the practical and students actively engaged" (Intervention: Teacher 10).

The researcher emphasised the importance of providing an opportunity to choose an activity, which was classified under autonomous support. Teachers were taught how to create the necessary styles to provide learning environments, with the use of autonomous support as a new innovative teaching method for PA. Intervention PE teachers reported the importance of providing opportunities to choose an activity during their PE classes, after a demonstration of skills. Students start demonstrating the skill of their choice, either throwing or catching or individual bouncing, as it is of interest to them, before breaking it down into learning.

"I now use the interpersonal style of autonomous support as my new teaching style for practical skills demonstrations when I teach PE subject. (Mostly practical classes I provided opportunities for choice of activity for my students)" (Intervention: Teacher 14)

"When students get the skills by the free demonstration of their choice, it reduces unnecessary pressure on how can I make it; but with choosing any of the skills concepts for class, it promotes their physical activity intensity and fitness levels during the class"(Intervention: Teacher 2)

One of the key components of the intervention teaching methodology for the promotion of PA during PE class was to provide effective teaching styles for the existing PHE syllabus content to promote a conducive learning environment and to increase students' physical activity levels, leading to good health outcomes. Teachers were taught to be innovative; to observe; to empathise with students' basic psychological needs and perspectives; and to provide opportunities for choice (autonomous support). However, this depends on the syllabus content and the students' situation. The PE intervention teachers reported that this component was the most effective motivator in this intervention teaching methodology, as students were keen to improve their PA levels.

"I have always wanted to look for good demonstrations among student…. Never knew that students who know how to demonstrate skills correctly do not mean he or she is physically fit or increase in fitness levels" *(Intervention: Teacher 16)*

This programme has trained teachers to improve their teaching skills to actively engage large numbers of students to have more interest in PHE class, and to participate in skills demonstrations at a level of their choice, for sustained exercise. It is now easy to motivate intense physical activity in the students.

"Students are motivated to come out for practical class since they knew they would be given the choice of activity the PE classes are no more bored for both the teachers and the students. This helps us to get them active in PE class" (Intervention Teacher 4).

4.5.2 Increasing the PA of Students during PE without necessarily Lengthening the Class Time

The PE teachers in the schools selected for the intervention were actively engaged in promoting PA and healthy lifestyles in students while teaching PE classes. They received training on modifying the rules of the games to suit the students, but using the traditional PE curriculum. For example, using a volleyball, the researcher instructed the teachers that they could allow their students to play without applying the standard rules, such as allowing the ball to touch the court; but proper skills were applied in the demonstration. The teachers increased the PA of students while teaching PE as a subject by using teaching methods developed for the intervention workshops, and modifying the existing curricula (games) to increase the amount of time adolescents spend in moderate or vigorous activity during PE classes. The teacher allows students to participate more actively, meeting their specific needs by modifying the games to interest them. This is done by implementing the teaching methods introduced in the intervention.

Teachers reported that students were encouraged to participate in PA, in both PE classes and at break times, when the rules of games were modified. Teachers organised school fun runs to motivate female students to participate in physical activity.

"Regardless of gender, both males and females actively participated and it improves their physical activities levels. Student was able to have activity intensity from moderate to vigorous, without necessarily lengthening class time" *(Intervention: Teacher 7)*

"I substituted soccer for softball by making the game simpler for both males and females students and by this method; students were more active in PE classes" (Intervention: Teacher 24)

Most of the PE teachers started applying the modified game rules method to teach PA during PE classes.

The intervention PE teachers reported that, when they have both health-related and PA content during PE class, they talk more about the benefit of PA to their lives, and this motivates the students to participate in more active lifestyles.

4.5.3 Lengthening Existing PE Classes

The PE teachers from the selected intervention schools participating in the implementation of the new teaching methods were encouraged to promote PA during PE classes by lengthening existing PE classes due to the short time allocated for the class. This was achieved by building more fitness activities and making use of break time as an informal PE class, which was characterised by more PA. This occurred after teachers had built student motivation through the autonomous support of the choice of activity. Modifying the rules of games allowed students to enjoy participating in PA, because they were playing simple games, so most of the students were motivated and involved in the school break-time sports. The intervention PE teachers indicated that most of the students took the PA tasks learned in formal PE class out to break time when they continued the sort of PA that they would have been taught in PE class. Some did it independently, while the teachers instructed some of the students who were slow learners to become involved in school break-time sports, also encouraging their students to participate in PA outside the PE class.

"Our students participated in the school break time. Some teachers also organised break-time sport in relation to what they have been taught in the PE curriculum. With this, many of my students participated in the ball games for competition." (Intervention: Teacher 19)

"We assigned students to do a specific physical activity during break time, example ''make sure you run around of soccer field three times before participating in the game''... I talk about how important is physical fitness for them to stay healthy whenever they run and participated in vigorous physical activity intensity" (Intervention: Teacher 22)

The intervention PE teachers reported that they discussed with the school authorities the short periods allotted for PE as a subject. As a result of their personal growth, the teachers could suggest that there should be a lengthening of PE classes to allow students to be more active.

4.5.4 The Strengths of the PDT Intervention Programme on PA Teaching Methodologies

The PE teachers at the intervention schools reported that the training that they received on the practical aspects of class PE in the workshop transformed and improved their PA teaching methodology and their attitudes to positive practices. Previous training had focused on classroom efficiency, which was not helpful in improving the practical demonstration of games and sporting skills during PE class. However,

the limited time (40 mins) allocated to teaching PE is also a barrier to promoting PA during PE classes; it does not allow time for the teachers to implement the practical aspects of PE. The main strength of the present study is that the professional development training on PA teaching methodology enhanced and promoted student PA during PE classes. The PE teachers were the participants who facilitated and used the implementation.

The intervention school teachers reported that the training workshop has improved their approaches in facilitating students' PA. It changed their practices and methods of teaching and helped them to understand their students better as individuals who have the right to choose an activity, for which teachers have to give a reasonable demonstration. In addition, they indicated that this intervention came at the appropriate time. Students have become physically inactive in PE class and it is a challenge to include PA, as it is contained in the syllabus; but the limited time in which to teach the subject has always been the problem. Teachers' comments included:

"In most cases*, we don't give practical assistance on PA to students, but now based on the training workshop we received…. I have so much practical teaching on PA sessions that I put in practices for my students during PE class and at break time" (Intervention: Teacher 2)*

A teacher from one of the intervention schools had no PE qualification, but was a biology graduate, and was the only one employed to teach of PE in his school. He and another female teacher commented on the training.

"After the training workshop, my pattern of teaching changed and I can teach the practical class to promote PA. For instance, I allow my students to modify game rules to suit their performance, as long as it will increase their PA intensity and fitness levels in order to promote PA during PE class" (Intervention: Teacher 13)

"I make used of autonomous support to encourage my students to choose from any demonstrated skills for their practical demonstration class. For instance, I taught skills in handball (chest pass, catching and bouncing), and when is time for students' demonstration, I gave options to choose the easier one to demonstrate from simple to complex. This gives confidence and motivation to start from any of the skills, some we meet one another and seek for help within themselves on how to perform better. I only support whatever they are doing regardless of my choice" (Intervention: Teacher 4)

A few of the teachers in the intervention schools, despite being qualified PE teachers, still indicated that they did not know how to modify rules of games in PE classes to promote PA. This could have been due to a lack of concentration at work, due to personal factors. During the follow-ups, however, the researcher was able to enlighten them more about the effective teaching of PA. Most teachers indicated that their knowledge of the PHE curriculum improved. Extending the demonstration of practical skills through break time had never occurred to them until this workshop enlightened them on how to utilise

this to promote students' PA. This has reduced students' physical inactivity in school PE and has influenced student PA.

"The workshop received and implemented has improved our practical teaching skills to assess the moderate to vigorous physical activity intensity of students. Our PE classes are not more bored and it motivated our students" (Intervention: Teacher 14)

The teachers reported on the value of this intervention in improving their effectiveness in the practical teaching of PE, and in implementing the syllabus. Teachers' comments included:

"It has benefit to practices regarding teaching method in PE. We can now plan lesson content on PA teaching. More so, knowledge and initiatives for improvisation were obtained, it also changes our idea of usually command style of teaching and put fear into students, but now we are able to give students respect as an individual for the choice of activity and students-centred teaching approaches. Now I can easily conduct PA class, there is no avoiding practical classes. (Intervention: Teacher 2).

4.6 FGDs Post-Intervention

The post-intervention focus group discussion yielded the following overarching themes and sub-themes.

4.6.1 Teaching Practice Panorama

The teaching practice panorama was the first overarching theme, post-intervention, with the following sub-themes: *improved PA teaching methodology; improved teachers' attitudes to practices; improved approach in facilitation; improved knowledge of PHE curriculum; influence on student outcomes*.

a) Improved PA teaching methodology

The intervention teachers reported that they were able to manage the limited time and provide a choice of activities to engage students without replacing equipment. They created fitness stations, and the objectives of the practical topics were achieved. The teachers further reported that the PA teaching methods developed in the intervention were the most effective training they had experienced because they really dealt with some of the practices and challenges affecting the lack of PA, poor teaching methods, and a lack of competence in the demonstration and evaluation of physical fitness.

b) Improved teachers' attitudes to practices

Despite all the shortages facing PE subject teachers at the intervention schools, the PA teaching development implementation built and developed teachers' attitudes to, and practices in, teaching practical game skills regularly in PE. Teachers persisted with positive attitudes and succeeded.

c) The improved approach in facilitation

Teachers in the intervention schools indicated that they were motivated by the workshop and the approach to facilitating and promoting PA during PE classes, which improved their students' participation in PA. Teachers noted that the training exposed them to new approaches to teaching PA. Teachers further reported that when they had a larger number of students, the approach learned during the intervention programme facilitated effective learning.

d) Improved knowledge of PHE curriculum

Teachers in intervention schools were now constantly aware of the health benefits for students' during PE class. Most of the teachers in the intervention schools had increased their knowledge of the PHE curriculum. This also improved during the implementation of PA teaching methods. Teachers from the control group still expressed a lack of knowledge of the PE curriculum.

e) Influence on student outcomes

The intervention school teachers said that they achieved their stated objectives for their PE classes. Some benefits reported during the post-intervention FGDs included improved well-being and general health, and increased PA intensity during PHE classes. Teachers believed that the teaching training intervention supported the existing PHE curriculum and enabled them to deliver effective teaching to promote PA.

4.6.2 Personal Development

This section revealed the sub-themes which emerged from the FGDs under the theme 'personal development'. These included: *improved self-development on PA promotion; improved specific training needs; personal growth; improvisation on knowledge and initiatives*.

a) Improved self-development on PA promotion

All the intervention school PHE teachers who attended the PA teaching methodology workshop reported that the intervention had improved their skills in PA teaching during PE classes. They felt that they had improved personally as PE teachers, and in influencing student engagement in PA during PE.

b) Improved specific training needs

PHE teachers from the intervention schools indicated that their specific training needs were met through the intervention training development programme.

c) Personal growth

The intervention school PHE teachers reported that the PDT improved their personal skills. They further indicated that the PA teaching intervention was the most effective training that they had attended as it had increased their understanding and teaching of PHE.

d) Improvisation on knowledge and initiatives

Both the intervention school teachers and the control school teachers complained that it is difficult for them to improvise due to large student numbers and the lack of adequate facilities. However, the intervention school teachers recorded some improvement as they had the knowledge and initiative to improvise to include PA in PHE classes.

4.6.3 Suggestions for Further Improvement

The sub-themes that emerged under 'suggestions for further improvement' were: *regular training workshops; adaptation of new PA teaching methodology; improved teaching resources; strengthening collaboration; and encouraging further study for PE teachers*.

a) Regular training workshops

The control schoolteachers gave their suggestions on how to improve PA teaching methodology, and these included that the workshops should be organised quarterly. The intervention group reported that the training had provided them with information about promoting PA. They appreciated the workshops and they suggested that the school policy for the time allotted for PE should be revised, and the revisions implemented by the school timetable committee. They believed that this intervention programme should be held regularly to support teachers in teaching and promoting PA.

b) Adaptation of new PA teaching methodology

The intervention group school teachers reported that their knowledge of their jobs had been transformed, along with their attitudes and working habits. Teachers mentioned that the professional development training assisted in improving their coaching skills, which would improve the sporting skills taught to students.

c) Improved teaching resources

The intervention school teachers suggested, in the post-intervention FGDs, that the curriculum should be made available to all teachers. Since textbooks on health-related topics with PE are the only sources of information and knowledge used for effective teaching, they requested that the authorities should make adequate provision for them, in combination with the PA teaching workshop. Without textbooks, practical classes are not possible. School authorities should also provide facilities and equipment to enhance practical teaching during PE.

d) Strengthen collaboration

Teachers from the intervention schools reported that teachers need to collaborate with the authorities to organise health talks on the importance of PE, in order to enhance PA teaching and promote a good learning environment. The government should incorporate training that will include demonstrations of games and sports, with new rules and regulations, and where ideas on the new intervention on PA teaching could be shared. Teachers believed that, through collaboration, a better knowledge of the subject, and of PA in PHE, would be promoted.

e) Encourage further study for PE teachers

Both the control and the intervention school teachers suggested that the government should provide comprehensive regulations for PE teachers' further study. The teachers who participated in the intervention suggested that unqualified PE teachers could be sponsored to study. Teachers believed that further studies could reshape all aspects of the teaching of PHE.

4.7 Summary of the Effect of the PDT on PA Teaching Methodologies: Their Development and Implementation

Prior to the PDT programme, in all the FGDs, the PE teachers indicated that there was a lack of PA teaching methods. Teachers suggested the need for a PDT programme to promote PA, which would support inexperienced or untrained PE teachers. Very few of the teachers had adequate training on general classroom management and ways of assessing the theory taught. In addition, they indicated the need for training on practical demonstrations of skills in games and sport during the school periods, in order to improve students' physical fitness levels.

The information gathered from the FGDs played a vital role in the development of the PDT, in order to meet the teachers' needs. After the intervention, the PE teacher intervention groups reported that there was an increase in students' PA participation during class, unlike the teachers in the control group. Teachers in the intervention schools indicated that they were motivated by the workshop and the intervention exposed them to student-centred teaching methods, especially when they had larger numbers in classes.

The PE teachers in the intervention schools reported that the introduction of the PA intervention programme resulted in the promotion of PA during PE classes. The introduction of new teaching styles, modifying game rules and lengthening PE class to create more fitness activity had promoted physical activity among students. Teachers also improved their approach to PE practical classes, and this motivated them and the students. They reported that they gained the ability to instruct, demonstrate skills and organise physical fitness activity, which enhanced the effectiveness of their teaching and

motivated the students. The physical activity teaching methodologies intervention encouraged PE teachers to apply their initiative in changing hard games into soft play and encouraging their students to participate in physical activities, both in PE classes and at break time.

The promotion of PA in schools came in the form of practical classes conducted in PE class, and PA both during the class and at break time. Teachers encouraged students to participate in physical activity, relating to what had been taught during PE class; and due to the limited time for PE, teachers extended the PA into break time. A major benefit of the teaching methods intervention came in the form of guidelines for teaching physical activity, which teachers received, to enable them to objectively involve students in practical games and sport skills demonstrations; and to increase the intensity of physical activity. This enabled them to increase student PA and to motivate them by convincing them of the enhanced health benefits.

4.8 Student Questionnaires

A total of 1,200 students participated in the study at the pre-intervention stage, drawn from the 24 schools (14 intervention schools and 10 control schools). The data analysed came from 1,193 students who participated in both the pre-intervention and post-intervention stages, from April 2019 to August 2019. There was a negligible dropout rate of seven students (0.59 %). This comprised students who were absent from school during the administration of the questionnaires, or for the post-intervention evaluation.

Students completed the questionnaire on Attitude and Practice on Physical Activity Questionnaire for Adolescents (APPAQ-A). The presentation of the data analysis addresses the following three sections in the questionnaire for both the intervention and control groups: demographic data; attitudes to PA; and practices regarding PA (PA during PE classes and PA at break or after school).

4.8.1 Section A: Student Demographics

In this section, the demographic information of the students who participated in this study is presented in Table 4.3. The ages of the respondents ranged between 13 and 16 years old. The majority fall into the 13 and 14-year-old age groups. There are more females than males.

Table 4.4: The demographical data of the students

Variable	Categories	Full sample Frequency (%)	Intervention Frequency (%)	Control Frequency (%)
Gender	Male	490 (41.1)	288 (41.4)	202 (40.6)
	Female	703 (58.9)	407 (58.6)	296 (59.4)
Age	13 years	436 (36.5)	253 (36.4)	183 (36.7)
	14 years	309 (25.9)	176 (25.3)	133 (26.7)
	15 years	288 (24.1)	168 (24.2)	120 (24.1)
	16 years	160 (13.4)	98 (14.1)	62 (12.4)

4.8.2 Section B: Attitudes to Physical Activity

In this section, the responses to questionnaires, pre- and post-intervention, will be presented.

A one-sample t-test was applied to test for significant agreement or disagreement to nine statements measuring attitude to PE. These items used a 5-point Likert response scale, where 1 = strongly disagree and 5 = strongly agree. The average agreement score was tested against the central/neutral score of '3'. This analysis was applied to pre- and post-intervention scores. It was also broken down by group. (See Appendix 9 for the detailed results). The results are summarised in Table 4.5.

Table 4.5: Students' attitudes to PA pre- and post-intervention; a comparison between groups

		Intervention group (n=695)		**Control group (n=498)**	
Items on ATTITUDE to physical activity	**Period**	**Mean ± SD**	**p-value (t-test testing for sig agreement or disagreement)**	**Mean ± SD**	**p-value (t-test testing for sig agreement or disagreement)**
1. I would like to have more time to play sport or games with my friends.	Pre	2.99 ± 0.821	0.853	3.10 ± 0.717	0.003*
	Post	4.25 ± 0.654	<.0005*	3.13 ± 0.753	<.0005*
2. I enjoy doing physical activities and playing physical games with my friends.	Pre	3.03 ± 0.795	0.273	3.07 ± 0.772	0.043*
	Post	4.31 ± 0.581	<.0005*	3.14 ± 0.818	<.0005*
3. I find my physical education class interesting.	Pre	2.98 ± 0.773	0.404	2.92 ± 0.773	0.021*

	Post	4.39 ± 0.671	<.0005*	2.93 ± 0.815	0.069
4. I am excited about physical education.	Pre	3.04 ± 0.763	0.18	2.94 ± 0.787	0.069
	Post	4.27 ± 0.687	<.0005*	3.01 ± 0.764	0.86
5. Physical education classes are boring.	Pre	2.89 ± 1.119	0.014*	2.92 ± 1.065	0.102
	Post	1.46 ± 0.659	<.0005*	2.94 ± 1.033	0.207
6. I do not have fun when I am doing physical activity.	Pre	2.99 ± 1.208	0.9	2.77 ± 1.193	<.0005*
	Post	1.37 ± 0.598	<.0005*	2.94 ± 1.172	0.219
7. The games and physical exercises we do in physical education class make learning fun.	Pre	3.00 ± 0.926	0.902	2.84 ± 0.764	<.0005*
	Post	4.28 ± 0.831	<.0005*	2.89 ± 0.802	0.003*
8. I feel uncomfortable or embarrassed in exercise clothes during PE classes.	Pre	2.91 ± 1.203	0.041*	3.06 ± 1.183	0.226
	Post	1.58 ± 0.787	<.0005*	3.08 ± 1.174	0.156
9. I see long sessions of exercise during PE classes as a punishment.	Pre	2.64 ± 1.202	<.0005*	2.49 ± 1.226	<.0005*
	Post	1.53 ± 0.640	<.0005*	2.50 ± 1.239	<.0005*

*significance p≤ 0.05; SD=standard deviation

Before the intervention, the intervention group indicated significant disagreement that: PE classes are boring; they feel uncomfortable/embarrassed in exercise clothes during PE, and long sessions of exercise in PE are punishment. After the intervention, the intervention group indicated significant agreement that: they would like to have more time to play sports/games with friends; they enjoy doing physical activities and games with friends; they find PE class interesting; they were excited about PE, and they agreed that the games and physical exercises they do in PE class make learning fun. In the same way, they indicated significant disagreement that: PE classes are boring; they do not have fun when they are doing PA; they feel uncomfortable/embarrassed in exercise clothes during PE, and long sessions of exercise in PE are punishment.

Before the intervention, the control group indicated significant agreement that: they would like to have more time to play sport or games with friends; they enjoy doing PA and games with friends; they find PE class interesting; they do not have fun when they are doing PA, and the games and physical exercises they do in PE class make learning fun. After the intervention, the control group indicated significant disagreement that long sessions of exercise in PE classes are punishment. They also indicated significant agreement that: they would like to have more time to play sport or games with friends; they enjoy doing PA and games with friends; they find PE class interesting; they do not have fun when they are doing PA, and the games and physical exercises they do in PE class make learning fun.

4.8.2.1 The ANCOVA analysis of the post-intervention results

Analysis of covariance (ANCOVA) is applied to test if the intervention exercise significantly affected their attitude to physical activity. This analysis tests for significant differences in the POST agreement scores after being corrected for using the PRE-agreement scores. The results are summarised in Table 4.6.

Table 4.6: The effect of the intervention on the responses, using ANCOVA

	Estimated mean agreement scores POST intervention		**p-value**
Items on ATTITUDE to physical activity	**Intervention group (n=695)**	**Control group (n=498)**	
1. I would like to have more time to play sport or games with my friends.	4.25	3.13	<.0005
2. I enjoy doing physical activities and playing physical games with my friends.	4.31	3.14	<.0005
3. I find my physical education class interesting.	4.39	2.93	<.0005
4. I am excited about physical education.	4.27	3.00	<.0005
5. Physical education classes are boring.	1.46	2.94	<.0005
6. I do not have fun when I am doing physical activity.	1.36	2.94	<.0005
7. The games and physical exercises we do in physical education class make learning fun.	4.28	2.89	<.0005
8. I feel uncomfortable or embarrassed in exercise clothes during PE classes.	1.58	3.08	<.0005
9. I see long sessions of exercise during PE classes as a punishment.	1.53	2.50	<.0005

After the intervention, compared to the control group, the intervention group showed significantly more agreement that they would like to have more time to play sports/games with friends; they enjoy doing PA and games with friends; they find PE class interesting; they were excited about PE, and the games and physical exercises they do in PE class make learning fun. Compared to the intervention group, the control group showed significantly more agreement that PE classes are boring; they do not have fun when doing physical activity; they feel uncomfortable/embarrassed in exercise clothes during PE classes, and long sessions of exercise during PE classes are punishment.

4.8.3 Section C: Practices Regarding PA

Students were asked how many times they had done each of the nine activities in PE classes in the previous five days. A total activity score was calculated by summing the responses across the nine activities. Therefore, it can take on values from 0 – 27, where zero means that a person did no physical activity and 27 means they did every activity, five or more times in the five days. The analysis of the detailed results for the overall amount of PA across all sports in PE classes in the last five days/week is shown in Table 4.7. (Details are in Appendix 10.)

The Wilcoxon signed ranks test was applied to test for significant change in the amount of activity from pre- to post-intervention. This was applied to the two groups separately.

Table 4.7: PA across all sports in PE classes

Variable	Period	Intervention group (n=695)			Control group (n=498)		
		Mean ± SD (Median)	Z	p-value	Mean ± SD (Median)	Z	p-value
The amount of PA across all sports in PE classes, in the last five days	Pre	9.15 ± 4.363 (9)	-22.277	<.0005*	9.32 ± 4.380 (9)	-0.706	0.480
	Post	19.18 ± 2.969 (19)			9.13 ± 4.358 (9)		

*significance p≤ 0.05; SD=standard deviation

For the intervention group, the analysis clearly shows that there is a significant increase from pre- to post-intervention in the amount of PA, across all sports in PE classes, in the last five days/week.

4.8.3.1 The analysis of how often students were very active in PE classes

Students were asked how often they had been very active during their PE classes in the previous five days. Their response options were never; hardly ever; sometimes; quite often and (nearly) always. The Wilcoxon signed ranks test was applied to test for significant changes, pre- to post-intervention. The analysis was done for each group separately. The results are shown in Table 4.8.

Table 4.8: Frequency of activeness during PE classes

Variable	Period	Intervention group (n=695)			Control group (n=498)		
		Mean ± SD (Median)	Z	p-value	Mean ± SD (Median)	Z	p-value
In the last 5 days, during your PE classes, how often were you very active?	Pre	2.97 ± 0.985 (3)	-20.074	<.0005*	3.15 ± 1.061 (3)	-3.104	.002*
	Post	4.38 ± 0.611 (4)			2.89 ± 1.133 (3)		

*significance p≤ 0.05; SD=standard deviation.

The analysis shows that, following the intervention, there was a significant increase in the intervention group in how often students had been very active in the previous five days, during PE classes. However, the control group shows a significant decrease in how often they were very active during PE classes, from pre- to post-intervention.

4.8.3.2 PA the students did during PE classes on each day of the previous week

Respondents were asked how much PA they did during PE classes on each day of the week. The response options were: 0 = none at all, 1 = a little, 2 = quite a bit and 3 = a lot. A single ordinal score was formed combining responses for all five days on the amount of PA done during PE classes over the week. The total PA score can take on values from 0 to 15, where 0 means that a person did no PA and 15 means they did a lot of PA in the five days. The Wilcoxon signed ranks test was applied to test for significant changes in the amount of PA done during PE classes over the week, pre- to post-intervention. The analysis was done for each group separately. (See detailed results in Appendix 12.)

Table 4.9: PA participation during PE classes

Variable	Period	Intervention group (n=695)			Control group (n=498)		
		Mean ± SD (Median)	Z	p-value	Mean ± SD (Median)	Z	p-value
How much physical activity did you do during PE classes on each day, last week?	Pre	7.22 ± 3.362 (7)	-11.751	<.0005*	7.95 ± 3.079 (8)	-2.520	0.012*
	Post	10.61 ± 1.705 (10)			7.57 ± 3.007 (8)		

*significance p≤ 0.05; SD=standard deviation

Results show that, for the intervention group, there is a significant increase from pre- to post-intervention; while there is a significant decrease in this activity for the control group.

4.8.3.3 Analysis of the number of periods of formal PE lessons that involved vigorous PA

Respondents were asked how many periods of formal PE lessons, involving vigorous PA, they had attended in the previous week. A paired samples t-test was applied to test for significant differences, pre- to post-intervention. The analysis was done for each group separately. (See result details in Appendix 13.)

Table 4.10: Periods of formal PE lessons that involved vigorous PA

Variable	Period	Intervention group (n=695)			Control group (n=498)		
		Mean ± SD	t	p-value	Mean ± SD	t	p-value
How many periods of formal PE lessons, that involved vigorous physical activities, did you have last week?	Pre	2.75 ± 0.766	-18.405	<.0005*	2.78 ± 0.720	492	0.333
	Post	3.46 ± 0.611			2.74 ± 0.753		

*significance p≤ 0.05; SD=standard deviation

For the intervention group, results show that there is a significant increase in the number of periods of formal PE lessons that involved vigorous PA, pre- to post-intervention. There is no significant change in this activity for the control group.

4.8.3.4 Time students spent doing vigorous PA in PE classes

Respondents were asked how much time they spent doing vigorous physical activities in PE classes, in the previous week. The response options were: up to 30 minutes; 31 – 45 minutes; 46-60 minutes; or >60 minutes. The Wilcoxon signed ranks test was applied to test for significant change, pre- to post-intervention. The analysis was done for each group separately. (See detailed results in Appendix 12.)

Table 4.11: Time spent performing vigorous PA in PE classes

Variable	Period	Intervention group (n=695)			Control group (n=498)		
		Mean ± SD (Median)	Z	p-value	Mean ± SD (Median)	Z	p-value
How much time did you spend doing vigorous physical activities in PE classes, in the last week?	Pre	2.30 ± 1.045 (2)	-16.735	<.0005*	2.18 ± 0.914 (2)	-0.472	0.637
	Post	3.29 ± 0.574 (3)			2.16 ± 0.901 (2)		

*significance p≤ 0.005; SD= standard deviation.

The results show that, while there was no change pre- to post-intervention for the control group, the intervention group showed a significant increase in time spent doing vigorous exercise in this period.

4.8.4 Section D: Times Students Participated in PA at Break or After School

Respondents were asked to indicate how many times they had done each of a list of 16 activities in the previous seven days after school or during the break. These responses were combined across the 16 activities to yield a single ordinal score. The Wilcoxon signed ranks test was applied to test for significant change, pre- to post-intervention. The analysis was done for each group separately. (See detailed results in Appendix 12.)

Table 4.12: PA frequency during break or after school

Variable	Period	Intervention group (n=695)			Control group (n=498)		
		Mean ± SD (Median)	Z	p-value	Mean ± SD (Median)	Z	p-value
How many times did students do any of the following activities in the past seven days in their spare time, either at break or after school?	Pre	17.25 ± 8.149 (16)	-22.413	<.0005*	17.12 ± 7.979 (17)	-0.524	0.600
	Post	36.92 ± 5.514 (37)			16.84 ± 8.431 (17)		

*indicates significant difference at alpha = 0.005; SD=standard deviation

Results show that, for the intervention group, there is a significant increase, pre- to post-intervention in how many times students participated in PA at the break and after school, in the previous seven days. No significant change is evident for the control group.

4.8.4.1 The analysis of the responses about what students normally do at lunch/break

Respondents were asked what they normally did at lunch/break (besides eating lunch), in the previous five weekdays. Responses included the following: sat down (talking, reading, doing schoolwork); stood around or walked around; ran or played a little bit; ran around and played quite a bit; ran and played hard most of the time. The Wilcoxon signed ranks test was used to test for significant change pre- to post-intervention. The analysis was done for each group separately. (See detailed results in Appendix 12.)

Table 4.13: Lunchtime activities

Variable	Period	Intervention group (n=695)			Control group (n=498)		
		Mean ± SD (Median)	Z	p-value	Mean ± SD (Median)	Z	p-value
In the last five weekdays, what did you normally do at lunch/break (besides eating lunch)?	Pre	1.88 ± 1.108 (1)	-20.727	<.0005*	1.88 ± 1.082 (1)	-0.253	0.801
	Post	3.70 ± 0.723 (4)			1.88 ± 1.031 (1)		

*significance p≤ 0.005; SD= Standard Deviation

For the intervention group, the analysis clearly shows that there is a significant increase from pre- to post-intervention in the level of activity students did at lunch/break in the previous five weekdays. No significant change was found for the control group.

4.8.4.2 Days students played a sport, danced, or played games after school

Respondents were asked how many days, after school, they did sport, danced, or played games in which they were very active, in the previous five days. The response options were: none; one day last week; two days last week; three days last week; four days last week; five days last week. The paired-samples t-test was used to test for significant differences pre- to post-intervention. The analysis was done for each group separately. (See result details in Appendix 13.)

Table 4.14: Days spent after school playing a sport

Variable	Period	Intervention group (n=695)			Control group (n=498)		
		Mean ± SD	t	p-value	Mean ± SD	t	p-value
How many days, after school, did you do sport, dance, or play games in which you were very active, in the last five weekdays?	Pre	2.97 ± 0.763	-31.150	<.0005*	2.98 ± 0.765	2.641	0.009*
	Post	4.40 ± 0. 951			2.85 ± 0.834		

*significance p≤ 0.05; SD=Standard Deviation

For the intervention group, results show that there is a significant increase in the number of days they had played a sport, danced, or played games in which they were very active, in the previous five weekdays, after school, pre- to post-intervention. However, there was a significant decrease in these activities for the control group.

4.8.4.3 Times students played a sport, danced, or played games

Respondents were asked how many times they had played a sport, danced or played games in which, they were very active over the past weekend. Response options were: not at all; one time; two times; three times; four-to-five times; six or more times. The Wilcoxon signed ranks test was used to test for significant change pre- to post-intervention. The analysis was done for each group separately.

Table 4.15: Sport frequency

Variable	Period	Intervention group (n=695)			Control group (n=498)		
		Mean ± SD (Median)	Z	p-value	Mean ± SD (Median)	Z	p-value
How many times did you do sport, dance, or play games in which you were very active, over the past weekend?	Pre	2.80 ± 0.732 (3)	-16.989	<.0005*	2.83 ± 0.680 (3)	-1.588	0.112
	Post	3.69 ± 0.673 (4)			2.76 ± 0.721 (3)		

*significance p≤ 0.005; SD= Standard Deviation.

Results show that, for the intervention group, there is a significant increase, pre- to post-intervention, regarding how many times students played a sport, danced, or played games in which they were very active, over the previous weekend. No significant change is recorded for the control group.

4.9 Summary

This chapter presented the analysis of the data collected from the focus group discussions and questionnaires from all the participants. Both descriptive and statistical tests were conducted, and findings were reported. The following chapter will discuss these findings in view of the literature and the objectives of the study.

CHAPTER FIVE: DISCUSSION OF RESEARCH FINDINGS

5.1 Introduction

The previous chapter presented the results of the study. This chapter is divided into five sections. Each section relates to the study objectives and hypotheses, under specific sub-headings. Thereafter, the aim of the study will be discussed, in relation to the objectives. The results of this professional development training (PDT) programme have been used to prepare a manual to guide the future training of PE teachers. (Details are in the attached document, along with the thesis).

5.2 Discussion

5.2.1 Physical Education Teachers and Teaching Methodologies

The first objective was to determine the teaching methodologies used by physical education (PE) teachers during PE classes in junior secondary schools. The current study found that PE teachers continue to have challenges regarding the teaching of PE. A major challenge identified was the limited knowledge of practices and teaching methodologies for the PE curriculum. Teachers identified other challenges, including receiving insufficient professional development training; outdated physical and health education teaching methodologies; poor training on physical activity (PA) teaching practice; and the lack of competency in implementing PA teaching and learning.

The inability to design an appropriate, valid and reliable PE programme to promote PA was another challenge identified by teachers in this study. Dwyer et al. (2003) opined that less priority was given to PE compared to other subjects, which could lead to the lack of development of appropriate PE programmes. Furthermore, the lack of appropriate PE programmes could be due to environmental barriers and personal impediments such as lack of equipment, large student numbers, poor PE facilities, transportation difficulties, and teachers' limited knowledge and skills regarding PA (Coulter, 2012). These challenges could be influencing the teachers' ability to design effective PA teaching methodologies.

The promotion of PA in schools in Nigeria, and many other countries in the world, has been neglected, due to both individual and school factors (Adeniyi et al., 2011), and this has become a health issue. This study further highlighted that the major problem concerning the lack of PA promotion during PE classes has not been the curriculum content, but the lack of specialists and innovative teaching methodologies for PA during PE classes. Hence, the lack of appropriate and varied teaching methods has led to the

poor quality of the PE programme in Nigeria (Adeniyi et al., 2016). The Nigerian Universal Educational Committee (NUEC) (2009) reported that school PE is under threat because of the lack of PA teaching methods throughout the country. The lack of teaching methods appropriate for PA; the restricted time allocation for PE classes; and the attitudes to PA, teachers, lesson plans and curriculum trends, are all issues that threaten PA during PE classes. Seyithan (2015) suggests that an efficient teacher with knowledge of the teaching methods appropriate for PA and PE as a subject, would have the ability to promote PA during PE classes.

Additionally, with limited time allocated for PE, and without the proper equipment and facilities, the effective delivery of PE outcomes becomes very difficult (Mojisola et al., 2017). Adequate and appropriate facilities and equipment are essential to enhance adolescents' physical development and their physical fitness. A lack of sufficient equipment and facilities affects the quality of PE (Lonsdale et al., 2016; Mojisola et al., 2017). Okonkwo (2008) indicated that inadequate equipment and facilities are barriers to students' participation in practical classes. The information received from the PE teachers participating in this study's FGDs was in line with the findings of the Nigerian Universal Educational Committee (2009) and Okonkwo (2008), who noted that teaching practices must be changed to increase PA during PE classes. There is a need for PE teachers to develop teaching methods that promote and enhance PA in order to improve students' participation in their PE practical classes (Coulter, 2012). This requires the development of sustainable teaching methods to promote PA, such as the new PA teaching methods in the intervention.

The findings of this study show that the PDT intervention effectively influenced teachers to achieve positive changes by promoting regular PA among students. A successful PE system depends on developing professional teaching skills and practices (Coulter, 2012). The teachers' development was guided by the principles conceptualised in Hanna's model which considers that change is vital to address identified problems. This model sees the teacher as an implementer who must surrender to the process of change to solve current problems that could differ from situation to situation. The model explains how teacher-change happens in schools and acknowledges that, for teaching methods to be effective, teachers need to recognise and accept their personal shortcomings in their teaching methods and must be ready to change (Hanna, 2002). In the FGDs, it became apparent that teachers had personal problems, such as lacking incentive, confidence and social interaction. They experienced financial difficulties and had negative attitudes to PE. These hindered the effective teaching of PA in PE. According to Hanna's (2002) model, teachers must accept their shortcomings in order to solve their personal problems through the PDT programme.

Mohd (2013) argued that any teaching methodology must include capturing students' attention at the beginning of the class. This is important, as students need to be physically, mentally and emotionally

engaged before participating in the PE class. Telford et al. (2016) and Lonsdale et al. (2016) suggested that the PE curriculum should include PA teaching guidelines to assist teachers with effective PA lesson delivery. Various studies on teacher effectiveness and guidance (Brophy & Good, 1986; Dunkin & Doenau, 1980; Fisher, Berliner, Filby, Marliave, Cahen & Dishaw, 1980; Walls, 1994) focused on 'process and product' research: When a teacher undertakes the 'process' by obtaining professional development with effective teaching training and implementing it while teaching, it will result in student achievement – the 'product'.

Seyithan (2015) indicated that the interrelationship between a teacher's knowledge of the subject matter and his or her teaching ability is complex and that a teacher may possess a considerable amount of subject matter knowledge, yet be unable to design and implement instructional methods to enhance students' PA. Walls (1994) noted that an effective teacher requires competence in both subject knowledge and methodology. Therefore, in the current study, the PDT attempted to build subject matter knowledge in association with PA teaching methodologies, including PA intensity, which remains a prerequisite for effective teaching in PE classes; but not the sole determinant.

5.2.2 The Development of the Professional Development Training Intervention Programme

The second objective of the study was to develop a PDT intervention programme to promote PA in students during PE classes in junior secondary schools. This objective was achieved based on the responses from objective one, together with teacher recommendations from FGDs, the existing PE curriculum, literature, and using Hanna's model's principles for teacher development as a theoretical guide. Teachers recommended that the training and development of PE teachers are needed, as well as a modified teaching approach; and resources must be provided through collaboration between governing authorities and teachers. Teachers must be encouraged to use student-centred learning approaches and a PE specialist should be involved in teaching PE subjects or guiding the PE curriculum in order to promote PA in schools.

Findings from the pre-intervention FGDs showed the need for an intervention in both training and development, including basic knowledge and training on PA teaching methodology, with workshops on student motivation; the utilisation and improvisation of equipment and the modification of sports skills; and skills acquisition. This is similar to the urgent call by national curriculum development to design PE curricula to support PA as a public health programme in Nigeria (Adebayo et al., 2015). The PE teachers in junior secondary schools, Lagos State, lacked training in PA teaching methods and implementation to promote PA during PE.

The PDT intervention programme addressed concerns over the lack of PA teaching methodologies in junior secondary school PE programmes. The training intervention included various styles and teaching methodologies, in line with the content for PE classes; and at the same time ensured that PA was prioritised in the content. The intervention was therefore focused on interpreting and understanding the teaching methodologies to promote adolescent PA.

The PDT intervention programme included teacher-training workshops for PE teachers. The workshops integrated the new approaches into teaching methodologies to promote PA during PE classes. These new approaches are discussed in the sections below: adding new teaching styles (autonomous support style); increasing the PA of students during PE without necessarily lengthening class time (modify the rules of games to suit students), and lengthening existing PE classes (build more fitness activities).

1) Adding new teaching styles (autonomous support style):

This is a basic factor in the promotion of PA in PE, and for the optimal motivation of students (Ntoumanis and Standage, 2009). The autonomous support teaching style was used as a new teaching style for PA in order to motivate students. It explains how teaching methods motivate students' attitudes and practices. PE teachers offer the students a choice of PA in their PE classes, in order to intensify the PA. When students realise that they have the opportunity to make choices, and their choices are valued, the level of PA is increased in PE classes. Hagger et al. (2013) support this teaching style. Their study showed that autonomous support improves the sense of choice by the teachers and promotes positive feedback in students. Listening to student opinions allows the teacher to understand and acknowledge difficulties within the PE classes. An autonomous support structure is a strategy to motivate students to increase their PA intensity from moderate to vigorous, simply by valuing students' attitudes and practices during PE class (Standage, Duda and Ntoumanis, 2006). The current study showed that, with the adoption of autonomous support theory, the PE teachers were able to motivate students to participate in PA during PE lessons as well as during break/lunch time.

Bryan, Charity, Solmon and Meelinda (2012) reported that success in promoting a positive attitude to PE depends on understanding the individual and learning how to improve their motivation, because it is important to engage with each individual adolescent. Adesanya et al. (2015) stated that there has been a lack of motivation in PA interventions because an understanding of the importance of motivation was absent. However, in the present study, teachers indicated that the PDT intervention provided an effective motivation for PA participation through autonomous support. Mojisola et al. (2017) reviewed possible motivations to improve adolescents' PA levels in school PE classes and concluded that the PA behaviour

of adolescents in Nigeria is influenced by multiple factors, and proposed effective school-based interventions.

A similar study by Yew et al. (2013), studying students' experiences of autonomous support, found that it encouraged the students to give of their best, putting effort into PA during PE classes. Physical education classes may serve as an effective platform to promote an active lifestyle among students when teachers provide students with the experience of autonomy (WHO, 2013).

2) Increasing the PA of students during PE without necessarily lengthening class time (modify the rules of games to suit students):

The current PDT intervention proposed the increased uptake of PA during PE without necessarily lengthening class time. This is one of the teaching styles supporting the existing PE syllabus, by modifying games rules or sports skills instead of replacing and changing the entire programme. The Community Preventive Services Task Force (2013) recommends increasing the amount of time students spend performing moderate to vigorous physical activity (MVPA) during PE classes. In line with this recommendation, rules of games were modified to suit students' interests, hence promoting more participation in PA. On the other hand, by increasing the intensity of the activity or game from moderate to vigorous PA, without necessarily lengthening class time (for example, substituting soccer for softball and simplifying the rules of the game), PA is promoted (James et al., 2011).

The National Institute of Child Health and Human Development (2000) has recognised that, in order to maintain teachers' skills to deliver effective PE classes, there should be frequent PDT, supporting the implementation of evidence-based PA practices in PE classes. There is a need to support teacher-training programmes, which provide prospective teachers with adequate knowledge to promote PA (Hardman, 2010). Similarly, teachers in the current study indicated that the PDT intervention assisted them in modifying teaching approaches regarding the PE curriculum and various sports skills; enabling them to teach the students about the benefits of PA; and promoting a healthy lifestyle. In addition, the PDT intervention provided the teachers with the skills to improvise during the implementation of PA, specifically when facilities and equipment are not provided. Morgan and Hansen (2008) reported that progressive PDTs for PE teachers need to be developed strategically and on a regular basis in order to update their PE knowledge, attitudes and practices, to increase students' PA levels.

3) Lengthening existing PE classes (build more fitness activities):

The PDT intervention used the existing PE syllabus content when increasing PA during PE class. This method was guided by the principles of Hanna's model, where teachers used their discretion to resolve

the identified problem and hoped for change based on the effort (Hanna, 2002). Teachers reported that this method provided clear instructions for teaching PA; provided opportunities for fitness activities by creating more time for practical classes; made play more attractive and increased time allocation; and encouraged student participation in peer-learning groups. Seyithan (2015) indicated that to be an effective teacher, competency in subject knowledge and a clear methodology are vital.

School PE curricula that incorporate circuit training and fitness programmes by lengthening existing lessons may include providing teachers with training in the appropriate methodology. The training programmes may be school-based PE class interventions, which improve student knowledge of, and attitudes to, health benefits (Fraser et al., 2007).

5.2.3 The Impact of the Professional Development Training Intervention Programme

The third objective of this study was to evaluate the impact of the PDT intervention programme on the promotion of PA in students during PE classes in junior secondary schools, post-intervention. Physical activity teaching methodologies were developed and implemented for the intervention. The impact was determined through data gathered from FGDs among the participating junior secondary school PE teachers, post-intervention, on challenges and feedback.

After the PDT intervention programme, there was an evident improvement in teaching methods and positive practices regarding PA. Additionally, it was recorded that the new teaching methods enhanced the quality of the PE classes without physical stress. This is in keeping with several studies, which found that the key to the successful teaching of PE in school is the use of an extensive array of approaches, teaching styles and methodologies (Graber, 2001; Graham, 2008). Adebayo (2015) explained that the teacher should be the most important factor in implementing education. As long as PE teachers were participating in the development of the teacher-training intervention, there was a significant impact on teaching attitudes to, and practices in, the promotion of PA in post-intervention findings.

Physical education teachers indicated that the Lagos state educational district had not provided adequate training in PA teaching methods. Therefore, interventions of this nature are important for the effective teaching of quality PE. Great insight was gained into teachers' practices in PA teaching in post-intervention discussions. Teachers indicated that their PA teaching methodology improved; teachers' attitudes to various practices improved; there was an improved approach to facilitation, imparting leadership roles to students with easy approaches; and students were able to verbalise positively influenced outcomes. Coulter indicated similar trends (2012), where PDT was classified as a way of improving the teaching skills and practices of PE teachers. Moreover, the teachers reported that the impact of PDT broadened their knowledge of the PE curriculum subject matter and improved their attitudes to, and practices in, the successful implementation of new teaching methods. Similarly,

a study by Guskey (2003) showed that professional teacher development allows teachers to meet the challenges encountered today by many schools in society.

Moreover, it was indicated that there was an improvement in the quality of PE classes due to the teachers' training in the promotion of PA; their training in specific aspects of the curriculum; their personal development and growth; their improved knowledge of improvisation and initiatives; and their improved attitudes to, and practices in, teaching PE, post-intervention. These findings corroborate the study conducted by Guskey (2003), in which teacher training development enhanced teachers' knowledge and practices and enabled them to change their attitudes and methods to improve personal development in teaching adolescents.

Many of the teachers agreed that students developed components of PA, which influenced and enhanced the students' derived health benefits, and their moods. The PDT intervention provided motivation in all important aspects of PA and facilitated self-confidence in teachers. According to Rink, Hall and Williams (2010), a high-quality PE intervention programme is the foundation of a comprehensive school effort to promote the PA of students. PE teachers are responsible for giving students the knowledge, attitudes, practices and motivation required to develop healthy lifestyles.

Some teachers reported that the teaching methods in the PDT intervention encouraged them to motivate students to participate in PA during PE class, at break time and outside school. Similar trends were found by Sallis et al. (1997) in that school programmes could not provide the recommended amount of PA activity for students. It was therefore imperative to deliberately encourage and motivate students to participate in PA beyond the classroom. Teachers were encouraged to socialise with each other during the implementation. This served as a motivating strategy for teachers to work together, having enough time and opportunity for skills improvement in the implementation stage, which motivated all the PE teachers at intervention schools to be involved in the activities. This corroborates previous studies by Deirdre (2016), Dobbins et al. (2013) and Caperson et al. (2000) which showed that, to implement effective PA teaching methods, there should be adequate motivating techniques, several working opportunities and the allocation of enough time to establish the promotion of PA.

Participating teachers also recommended that further improvement in PA teaching methodologies requires regular training workshops; the adaptation of new PA teaching methodologies; improved teaching resources; strengthened collaboration; and encouragement of further studies for PE teachers. Additional suggestions from teachers in the current study included a necessary shift from the traditional focus on the promotion of sport and PE exclusively, to the entire school day. Schools should be child-centred, as it is the context in which they learn the habits and theory that promote healthy activities and behaviour.

5.2.4 The Attitudes and Practices of Junior Secondary Students Regarding Physical Activity

The fourth objective of this study was to determine the attitudes and practices of junior secondary students regarding PA, pre- and post-intervention. In the current study, the majority of students demonstrated improved attitudes to, and practices in, PA in PE classes following the PDT intervention programme. Pre-intervention findings of this study showed that the majority of the students had negative attitudes to PA and incorrect perceptions of the benefits of PE classes. This was similar to a study by Strand and Scantling (1994), in which the researchers believed that gaining insight and understanding into student perceptions of the benefits of PE was a critical step in understanding their attitudes, interests and involvement regarding PA.

In terms of students' attitudes, the new innovative teaching methodology balanced learning and provided opportunities for teachers to instruct efficiently and receive feedback accordingly. Similarly, How et al. (2013) found that new teaching approaches and methodologies used by PE teachers resulted in improved attitudes to PA in PE classes. Furthermore, an intentional effort was made by PE teachers to motivate students using the new methods during PE classes, and this is reflected in the students' positive attitudes to PA. Physical education teachers can contribute to the improvement of students' attitudes to PA (Alexandre et al., 2014).

The students' responses showed that their perceptions of, and attitudes to, PE class changed from negative to positive, to participation in PA which promotes healthy lifestyles, post-intervention. Similar findings by McKenzie et al. (1994) showed that students' attitudes to participation in PA were significantly changed post-intervention, with a positive change in attitude in the intervention group to PA participation, while no change was recorded in the control group for PA participation.

Taber et al. (2011) suggest that both curricular and non-curricular interventions serve as a model in facilitating PA in adolescents. Similarly, Camacho-Min et al. (2011) identified strategies to maximise fun and movement in student skill levels. The current study's PDT intervention programme evaluated ways to motivate students to participate in curricular and non-curricular activities and encouraged the students to improve their skill levels after school. A substantial number of studies have emphasised the importance of improving PA in schools (McKenzie et al., 2009; Scruggs et al., 2003). In a study by Zakrajsek (1993), school students stated that their biggest reasons for disliking PA, either in school-based PE class or school sports, were the dull choices of activities and the limited time allocation. Overall, student attitudes to PA participation during PE class improved significantly post-intervention.

Several studies have designed and implemented interventions to determine student practices regarding PA (Draper et al., 2010; La Torre et al., 2017). Based on comments about practices regarding PA during

PE classes, it was seen that there were changes to almost all the statements for the intervention group, post-intervention. As an example, an increase of over 45 minutes was registered, post-intervention, in the time students spent on vigorous physical activities in PE classes, against the previous 30 minutes. As in the findings of the present study, Draper et al. (2010), La Torre et al. (2017) and Arbeit et al. (1992) all reported changes in the length of time students spent on PA after formal PE class interventions. Similar interventions have reported that there were positive changes in PA practices among students during PE classes, post-intervention (De Meester et al., 2009).

The current study showed that the PDT intervention programme improved the students' attitudes to PA participation. A positive attitude resulted in increased PA participation. Students' participation in PA during PE lessons, at lunch breaks and after school was increased. Similarly, a study by La Torre et al. (2017) reported a significant improvement in student practices in the intervention groups, compared to the control groups, post-intervention. This is supported by findings from an intervention programme conducted by Draper et al. (2010), which showed improvement in student practices of, and attitudes to, PA in PE classes, post-intervention, in the intervention group. No improvements were found in the control group.

5.5 The Development of a Professional Development Training Programme for PE Teachers in Nigeria

The aim of the study was to develop a PDT programme for PE teachers in junior secondary schools. This aim was achieved, following the completion of the four above-mentioned study objectives. (Please refer to the PDT document at the end of this chapter.)

The barriers to teaching PE were identified. These included challenges with the PE curriculum, environmental barriers and personal impediments in PE teaching methods. Recommendations from teachers were factored into the development of the PDT programme.

The PDT programme was designed to introduce different teaching methodologies (an autonomous support style; modifying the existing PE syllabus; conducting practical skills demonstrations for PE practical classes; providing for the improvisation of equipment; organising hand-outs covering strategies and content to apply teaching methods), to promote PA during PE class within the existing curriculum. Overall, it is evident that the PDT has had a positive impact on the promotion of PA during PE classes in junior secondary schools, thus accepting the study hypothesis.

5.4 Summary

This chapter presented the findings, which were discussed with the relevant literature. The PE teachers reported an improvement in self-development; specific training needs; personal growth; and knowledge of improvisation and initiatives in their PE teaching methods to promote PA during PE class. Students now perceived PE classes as being fun, and they and their peers were able to demonstrate and practise various skills. Students recorded positive attitudes to, and practices in, PE classes and student PA was improved, post-intervention.

Challenges to promoting PA during PE lessons included unqualified teachers, the non-provision of facilities and equipment, a decreased time allocation for PE and the lack of encouragement from school authorities. These impediments, caused by environmental barriers and personal factors, have been observed to affect the role of PE teachers in schools.

Lastly, the teachers reported that a benefit of the FGDs was to provide them with a platform on which to collaborate with their colleagues, thus enhancing the value of their teaching methodologies, which contributed to them being more effective PE teachers.

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PROFESSIONAL DEVELOPMENT TRAINING PROGRAMMES FOR PE TEACHERS: TOWARDS EFFECTIVE TEACHING PRACTICES FOR PHYSICAL ACTIVITY PROMOTION IN ADOLESCENTS' PHYSICAL EDUCATION CLASSES, NIGERIA

Author: Osifeko Olalekan Remigious

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Definition of words

Professional development training: Professional development can be defined as formal and informal training that enables teachers to improve their own skills.

Physical education: Physical education is defined as an integral part of education, characterized by formal instruction in different games, training practices and hygiene in the school curriculum, designed to transmit knowledge of the movement and functions of the human body to the students.

Physical activity: Physical activity could be defined as a movement in any part of the body, with the execution of energy.

Teaching methodologies: Teaching methodologies are approaches in teaching, used by the teachers to enable student to learn.

Adolescents: Adolescents can be defined as the group of young people (teenagers) who are no longer children, but are developing into adults.

Attitude: Attitude can be defined as a state of the human mind, either conscious or unconscious, which determines the way we feel about something.

Practice: Practice can be defined as an exercise regularly performed, in order to achieve improvement and maintain perfection.

Intervention: Intervention could be defined as ɑ programme, systematically planned and implemented in an organisation; structured and targeted to change attitudes and improve an individual's knowledge.

Abbreviation of words

PDT	Professional Development Training
PA	Physical Activity
PE	Physical Education
NNPE	Nigerian National Policy on Education
NTEP	National Teacher Education Policy
PSNT	Professional Standards of Nigerian Teachers
NUC	Nigerian Universal Educational Committee
TRCN	Teachers Registration Council of Nigeria
MDPE	Mandatory Developing Professional Education

Preface

Professional development training (PDT) can be described broadly as all formal and informal learning that enables teachers to improve their own practice (Emily et al., 2013). With reference to teachers, it can be referred to as any activity, which enhances their knowledge and skills, and enables them to consider their attitudes and approaches to the education of children, with a view to improving the quality of the teaching process (Bolam, 1994). There is growing evidence for, and recognition of, the importance of PDT in preparing educators to meet the challenges faced by today's schools (Guskey, 2003). The implementation of this PDT for physical education (PE) teachers was also the framework provided by the Nigerian National Policy on Education (NNPE) (2004). There are different education documents in the policy, which advocates for the implementation of PDT to meet teachers' needs in Nigeria. At the heart of some policy documents is the Professional Standard for Nigerian Teachers (PSNT), which was designed for teachers' PDT in 2010, to develop them at all levels of education.

The Nigerian Universal Educational Committee (NUEC) (2009) conducted a literature review on the perceived threats to physical activity (PA) during PE class in Nigeria. It was found that school PE was under threat throughout the country. Researchers have highlighted that adolescents are physically inactive and unable to enjoy the health benefits of exercise, due to the lack of physical activity

(PA) promotion during physical education (PE) classes (Adeniyi et al., 2016; Mojisola et al., 2017). The literature has provided strong evidence that a school-based intervention in PE classes is effective in promoting PA in adolescents and encouraging healthy lifestyles (Chris et al., 2016).

The PDT programme can be designed to introduce new, different teaching methodologies into the PE curriculum that will promote student PA. It is evident that the PDT has a positive impact on the promotion of PA during PE classes in junior secondary schools. The PE teachers report an improvement in self-development; personal growth; knowledge of improvisation and initiatives in their PE teaching methods; and that their specific training needs had been met; to enable them to promote PA during PE class. Students now perceive PE classes as being fun, with the demonstration of skills, often by their fellow students, integrated into the lesson. Students record positive attitudes to, and practices in, PE classes and student PA improves.

1. Introduction

Education is an essential tool to accomplish positive change and consistently, in society, it promotes the cultural life of individuals. Many important agents influence people through this essential tool, and teachers are among the agents. The teacher plays a vital role in education, and the teacher professional development training (PDT) was designed to examine the methodological challenges facing teachers in teaching the content of different curricula. Potentially, teachers have the ability to develop society and build students to achieve their learning objectives. The physical education (PE) teachers are the main agents influencing students positively, to improve attitudes and practices regarding physical activity (PA) during PE classes. For this purpose, PE teachers attended the PDT to improve their knowledge of PA teaching and other educational processes, and to develop better teaching skills, in order to show consistent development in their PE teaching. The PDT importantly enhanced teachers' academic studies and training. The PDT programme has to be incorporated into the continuing education process for the teachers to upgrade themselves. They must be mentored by a specialist in their field of study, enabling them to introduce the PDT intervention programme, organise workshops, implement and evaluate.

Since ideas are not static and learning is a continuous process, teaching can be improved beyond the traditional base with which teachers are familiar. This should be based on theory, and it should be data-driven, based on evidence from research. Borko (2004) submits that empirical data are what work in education as a source of knowledge. Nowadays, there are many different PDT programmes globally, in universities and schools, which are available to assist lecturers, instructors and teachers to improve their learning periodically, and to keep up-to-date (Ajoku 2013). Since learning is a continuous process, concerned with improving teaching skills and positive practices, and obtaining innovative knowledge about the subject matter, when this knowledge is put into practice it will in turn influence students' attitudes and practices. Therefore, any PDT must be systematically planned and applied in the continuous educational process for the development of skills.

2. Professional Development Training Programmes

Professional development training (PDT) can be described broadly as all formal and informal learning that enables teachers to improve their own practice (Early & Bubb, 2004). Coulter (2012) stated that PDT was a way of improving the teaching skills and practices of teachers. With reference to teachers, it can be referred to as any activity which enhances their knowledge and skills, and enables them to consider their attitudes and approaches to the education of

children, with a view to improving the quality of the teaching process (Bolam, 1994). There is growing evidence for, and recognition of, the importance of PDT in preparing educators to meet the challenges faced by today's schools (Guskey, 2003). Guskey (2000) further described the benefits of PDT and its effect on the teachers and students and possible ways of evaluation. The participants' responses are best evaluated in focus groups, as this allows deeper exploration of observed problems, and the perceptions of participants, in other to gain insight into the effect, and a deeper understanding of the benefits.

Ejima (2012) stated that teacher professional development involves conducting important high-quality intervention programmes for teachers, in order for them to acquire and broaden their knowledge and skills to deliver effective teaching. Guskey (2000) stated that a successful intervention programme enables teachers to successfully implement innovations and ideas. In order for teachers to have influence within the school setting, they must be able to change and update their skills and knowledge, and be familiar with the different methods of teaching, in order to meet the tasks they are likely to face in a changing society. Similarly, Fraser et al. (2007) referred to teachers' professional development as 'staff skill development' or 'training' as it means different things to different individuals. They further stressed that staff skills development is an ongoing review and reflection that individuals need to promote learning. In addition, teachers' skills development programmes require a strategy of systematic activities to develop teachers to deliver effective teaching. This may include implementation, initial training, in-service training, and learning new teaching methods when courses are regulated in the curriculum within the schools.

3. Professional Development Training Programmes in Nigeria

Ajoku (2013) explained that the lack of literacy skills emanated from a lack of PDT, which led to poor standards in implementing PE teaching methods. The professional standard for Nigerian PE teachers considers the re-training of teachers through PDT and the provision of on-going learning opportunities to teachers, giving them the instruments to meet professional demands, and making certain that they are up-to-date in new methodologies in their areas of specialisation. Anho (2001) agrees that the best approach to developing quality teachers is through constant professional training for serving teachers. In order to provide the opportunities for teachers to develop professionally, the Nigerian government admitted and approved the Teacher Registration Council of Nigeria (TRCN) in 1993, with the task of executing a Mandatory Developing Professional Education (MDPE) to keep teachers updated with new developments in the practice and theory of the profession.

To achieve this goal, the teachers' registration council has been given the mandate to address professional concerns in the area of educational

development in order to support the teaching profession in Nigeria with the objective of creating for the schools an effective education system by supporting qualified and professional teachers (Anho, 2001). With the growing global demand for quality education, Rose and Reynolds (2007) explained that the professional development of teachers is regarded as the key factor in improving learning and learning.

The implementation of PDT for PE teachers is within the framework provided by the Nigerian National Policy on Education (NNPE) (2004). There are different education documents on the policy that advocate for PDT to meet teachers' needs in Nigeria. At the heart of some policy documents, is the Professional Standard for Nigerian Teachers (PSNT), which was designed for teachers' PDT in 2010, to develop them at all levels of education.

According to the PSNT, PDT development is based on the specialisation of skills that gives teachers information on their needs to match the evaluation within the time stipulated, to develop knowledge with techniques to meet professional tasks; and guarantees that teachers are updated in terms of the details of the test. The PSNT documents further support that there should be constant training for teachers who are still in service. The Teachers Registration Council of Nigeria (TRCN, 1993) was established in order to supply the teachers with professional teaching status and to make sure there is accurate PDT planning in Nigeria. The objectives of the TRCN in Nigeria are also in line with Hanna's Model of Precursors to Change for Teacher Development theory, the National Guideline on Physical Activity and Muijs et al. (2004), that teachers should be the focus in the current development in the theory and practising of the profession. These are obligatory for the executive of the TRCN.

4. Types of Professional Development Training Programmes

Professional development training programmes vary. Richards and Farrell (2005) have identified two common types of PDT: institutional professional development and individual professional development. In addition, Pelochino (2014) recognised another five types of PDT in order for teachers to keep abreast of new teaching techniques and continually develop in their teaching careers. He described in-house professional development; district-wide or organisational-wide professional development; institution-based professional development; professional inquiry groups; and coaching professional development.

Figure 1

a. In-House Professional Development Training

This is the type of PDT which is organised at schools for teachers. One of the staff members, as the facilitator, gives the training to their colleagues. This can be rotated between the staff members, with many sessions. It can last for weeks and becomes time-consuming.

b. District-Wide or Organisational-Wide Professional Development Training

District-wide or organisational-wide PDT demands a combination of various sites in accordance with the training schedule, and might take a long time. The training can be in the form of workshops or conferences and it take half a day, a full day, or many days of training, depending on the schedule. For this type of PDT, participants will benefit from helpful training that is collaborated by the literature and will address challenges that arise within a particular profession. This is an opportunity for the members of the profession to learn common things together. Such PDT entails inviting guest in the same field to attend, lead and speak on prevailing issues.

c. Institution-Based Professional Development Training

This type of PDT involves long periods and is based particularly on common content. Such training focuses on teaching methods and assessment. This type of PDT occurs frequently in universities; secondary schools; primary

schools and research institutions. It is specifically for teachers; the events may be sponsored, and sometimes teachers who participate will be given compensation.

d. Professional Inquiry Group Training

Groups of people in the same profession collaborate on a regular basis to, together, learn something new; and some discuss their challenges, which can be addressed through development. This group training can take place at one permanent site, or at different locations, where the teachers can meet regularly. The teachers come together in groups to update their knowledge; develop their personal growth; and share teaching experiences.

e. Coaching Professional Development Training

In coaching PDT, the teachers are attached to an expert in the field of study who will be their coach, either on site, or in the district, which can be planned by the school authorities. These coaches play a vital role in helping and supporting teachers in various ways. Especially, beginner teachers may have a new coach to explain the purpose of their jobs, and to assist them by helping them to obtain the mandatory certificates.

5. Guidelines for Developing a Professional Development Training Programme for PE Teachers

Of the types of PDT described above, the current PDT adopted the institution-based professional development and district-wide professional development types for the training of the PE teachers in junior secondary schools, Lagos East Senatorial District, Nigeria. The information from the related literature was coupled with information gathered from the PE teachers and the Lagos state education district PE syllabus for junior secondary schools, which all served as background for the PDT.

The procedures and protocol stages of the Professional Development Training

Prior to the PDT, facilitators need to gather information about the challenges faced in teaching methodology, and other information is needed to help in meeting the aims of the PDT intervention. Workshops can be used to fulfil the requirements of the PDT, with experts training the teachers to keep abreast of new knowledge in their field of study. Thereafter, the effects of the PDT intervention must be evaluated, to identify the impact on the teachers and its influence on students' practices and attitudes.

Suggested timeframe for the PDT programme

Stages	Activity	Duration (Depends on types of PDT)
Before the PDT	Facilitators and facilitators' assistants must understand the purpose of the PDT.	2 - 3 Days
	Visit schools and inform the authorities on the PDT.	3 - 5 Days
	Collect information to meet the teachers' needs.	3 - 5 Days
	Administer questionnaires if there is need to use them.	1 - 3 Weeks before the PDT
	Build the PDT training content.	
PDT Intervention	Teachers' training workshops	3 Weeks or 1 months
	Implementation process after the workshops	3 Weeks or 1 months
	Implementation of the PDT intervention	3 Weeks or 1 months
	Follow-up during the implementation	3 - Weeks
	Continuation of implementation of the PDT intervention	3 Weeks or 1 months
	Feedback on challenges while implementing	6 Days or 2weeks
After the PDT Intervention	Collect data to determine the impact of PDT	6 Days or 2 weeks
	Collect data to determine the influence on students.	6 Days or 4 weeks

With a timeframe, facilitators can be guided to decide how long the training will be. Before the PDT intervention, information is gathered at baseline, to provide a good background for the PDT programme. The PDT shows that training teachers regularly could solve the problems concerning the limited knowledge of practices and teaching methodologies for the PE curriculum, which was identified as a major challenge in the current PDT programme, in addition to insufficient professional development training; outdated physical and health education teaching methodologies; poor training on PA teaching practice; and the lack of competency in implementing PA teaching and learning.

The development of the professional development training programme

The information gathered, and prevailing problems with the PE syllabus, can be used to guide the development of the PDT. The training workshops are necessary to implement the teacher training for PE teachers.

The teaching-training intervention workshop

The teacher-training intervention workshop may last for weeks. In addition, teachers can be divided into smaller workshops to avoid crowding, and to allow all participants to be involved. Supplementary workshops must be conducted to accommodate those who could not attend the first workshop.

The teaching-training intervention implementation

There should be an implementation of the training to determine the impact of the PDT, and to assess if teachers have improved their skills. This must be done for a certain time period. The teachers will implement what they have learnt from the PDT intervention workshops, over the period scheduled for the training. It is important that the facilitator or researcher follow-up the implementation, to check if the teachers are actually implementing the right things. This exercise can be scheduled for two hours per day until the all sites have been covered. Additionally, the PDT must be monitored by meeting with the teachers to obtain feedback regarding their progress during the implementation stage. A social platform, such as WhatsApp, may be used once a month for a two-hour session to determine whether there are any implementation difficulties at the schools. After the completion of the implementation, there should be an evaluation to determine the impact of the PDT programme. Different ways of collecting the data can be applied.

After the Professional Development Training implementation

At this stage, there will be evaluation in order to discover the positive changes that have occurred in the teachers' practices. The impact may be determined through data collection from the participants, giving feedback and information on their challenges. There is evidence that PDT improves teachers' knowledge and leads to positive practices in

their profession. Additionally, it has been recorded that PDT enhances educational outcomes. Several studies have found that the key to the successful teaching of PE in school is the use of an extensive array of approaches, teaching styles and methodologies (Graber, 2001; Graham, 2008). PDT provides motivation in all-important aspects of education and facilitates self-confidence in teachers. It also allows the students to demonstrate an improvement in attitude and in their academic performance. According to Rink, Hall and Williams (2010), a high-quality PE intervention programme is the foundation of a comprehensive school effort to promote the PA of students. PE teachers are responsible for giving students the knowledge, attitudes, practices and motivation required to develop healthy lifestyles.

6. Importance of Professional Development Training

The professional development training programmes for teachers are critical in any educational setting and at any educational level. At all stages, teachers are required to be up-to-date with their training in their different fields; to keep abreast of subject matter; and to change their attitudes and teaching practices. PDT programmes will help sharpen teachers' teaching skills and improve their personal growth, hence providing quality school education and promoting students' attitudes and learning. The PDT leads to an improved use of the curriculum contents and positive changes in the teaching thereof. Another vital point about PDT is that it facilitates teachers' self-confidence and efficiency. The PDT provides motivation in all important aspects of learning and it allows teachers to focus on more than the content taught during their school days.

Lastly, PDT caters to the needs of professionals, such as teachers, in their places of work, in order to assist them in achieving their goals. Addressing the context, in regular training, will improve the teacher's teaching knowledge as it is relevant in the district in which they practise. Well-designed PDT addresses the students' needs. Therefore, teachers have to obtain regular and quality training in the updating of old methods to the new, different approaches to teaching and evaluation. Effective PDT leads to reform in educational institution. Therefore, it will be of great benefit if teachers are trained regularly. In this regards, PE teachers are urged to update through the PDT to promote co-operative discussion with their students, facilitating their learning, and helping them to develop all the processes to acquire cognitive skills, in order to achieve the standards of education and learning.

7. Future Solutions for Quality Physical Education Teaching Improvement

Teachers, as important agents that influence people to gain a good education, need important and good quality training, in order for students to achieve their goals. Therefore, some recommendation were made for the future:

i. The Ministry of Education should establish a database for all PE teachers in order to ensure accessibility of the workshops to all teachers.

ii. The school authorities should consider their ability to reach those who are less active and for the teachers to have a platform where they can communicate among themselves, in case of any difficulties in their PA teaching methods.

iii. The Ministry of Education should organise regular workshops on the general administration of physical and health education (at six-month intervals) to achieve self-development.

iv. The workshops must be designed to understand the needs of teachers and students in order to implement effective teaching, taking into consideration the PE curriculum content, and exposure to practices and attitudes regarding PA in the school.

v. For future purposes, development of PE programme interventions should focus on the potential obstacles affecting the decline of PA programmes during PE classes by engaging the PE teachers.

vi. Since long distances have been identified as a barrier in this study, affecting PE teachers' participation in PDT programmes, there should be on-line training and virtual conferencing as a means of achieving teachers' sustainable professional development in their teaching skills, to transform their practice and update their skills.

vii. This research recognised that the limited time allotted for the subject of PE is a challenge, which limits the time for students' participation in PA. Therefore, there should be an extension of time for PE class, to allow students to be more active in PE classes.

8. Conclusions

Professional development training could be an effective way of improving teaching and successful learning when well organised and delivered by an expert. However, it must be offered regularly and in order to provide for the teachers' needs and the demands of the institutions in general. PE teachers need to be included in the PDT programmes. Because there is no limit to knowledge, teachers should accept that they are lifelong learners, and be

ready to participate in ongoing learning processes. However, teachers and PDT programmes are not just about learning, but they should cover new information on effective approaches for teaching methodologies. Therefore, the stages of PDT are complex. There is a need for continual professional training in the PE curriculum if African countries aspire to accomplish change in educational institutions, which would have an impact on both teachers and students, and in evaluation.

Physical education teachers play a vital role in PDT, as they have a major influence on students in schools. PDT allows many teachers to add to their knowledge of their subject, even years after their training. The teachers are encouraged to be involved with their students through problem-solving during the PDT and teachers see how their teaching approaches can change following the PDT intervention; as well as the benefits of problem-solving for students. They will also have opportunities to develop good practices and an improved attitude in their special area of study. During the workshops, PDT provides ideas for school authorities and teachers to collaborate to improve the PE syllabus content. PDT workshops provide the opportunity to share experiences about increases in PA, student experiences and teacher understanding, which could contribute to the restructuring of the PE curriculum.

The PDT implemented by this researcher has confirmed that PDT is a necessity for teacher development education. It should serve as continual training for PE teachers to enable them to learn new ideas for effective teaching. This will ensure that teachers will develop and it will empower the teachers to keep their expertise, skills and knowledge of the subject updated. PDT in school-based PE class in Nigeria has also been shown to have some benefits for Nigerian PE teachers, in terms of teaching proficiency and personal growth.
PDT programmes result in significant changes in the students' attitudes and practices regarding PA during PE classes, pre- to the post-intervention. These PDT programmes can be a tool to improve the methodologies and approaches used by teachers who are responsible for teaching the subject of PE.

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CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter concludes the study. The concluding chapter also provides recommendations for stakeholders and future researchers. The chapter includes the study limitations.

6.2 Conclusions

The aim of the study was to develop a professional development-training (PDT) programme for PE teachers in junior secondary schools and to evaluate its impact on students in order to improve physical activity (PA) in Nigerian school-going adolescents. The PDT intervention programme developed was used to promote PA for students during physical education (PE) classes in junior secondary schools in Nigeria.

Physical education teachers played a vital role in the study, as they are major promoters of PA in children in junior secondary schools. Many teachers had more knowledge of the subject matter after the PDT training, with focus on long-term health benefits. In the current study, the teachers encouraged the involvement and participation of their students through problem-solving, in order to increase the amount of PA in PE classes. During the focus group discussions, teachers were able to express how their teaching approach changed following the PDT intervention, as well as the problem-solving benefits raised by students. As professionals, teachers are critical in impacting students' health through such PDT programmes. Their role is essential in subsequently improving the promotion of PA in schools, which will hopefully have a positive influence in community life.

Teachers need regular training on PA promotion during PE classes through future, ongoing PDT and workshops. They also need opportunities to develop good practices and improved attitudes in the area of PA. This study has been able to confirm that PDT is a necessity for teacher development. It should provide on-going training for PE teachers to learn new ideas for effective teaching. This will ensure that teachers will develop and it will empower the teachers to keep their expertise in, and knowledge of, the subject updated. Moreover, there is remarkable scope for PDT to improve adolescent health through the successful implementation of methodologies to increase PA, which can benefit a significant portion of the population.

Furthermore, this study showed that many PE teachers who were non-PE graduates taught PE classes, and were teaching and developing PE in junior secondary schools in Nigeria. This emphasises the need

for untrained PE teachers to access effective teaching and development tools through PDT, and to update their knowledge. The teachers in this study learnt strategies on the PDT programme, on the practical demonstration of skills in games and sport, within the short time allotted for PE periods; and for achieving set objectives for practical classes and intense physical activity. Teachers who have been trained in the PDT intervention programme will, potentially, have the capability to effectively teach PE to promote PA and healthier lifestyles among adolescents in junior secondary schools in Nigeria. When PE teachers gain experience in implementing the PDT intervention, thereby promoting PA in school-based PE classes, it will allow them to concentrate on PA teaching and this should, in turn, motivate students. It will facilitate effective teaching and increase the participation of students in PE classes. The students' knowledge of, and perceptions about, PA improved during the study and should lead to an increase in PA during PE class, at lunch breaks and after school.

The PDT provides ideas for school authorities and teachers to collaborate on ways of improving the PE syllabus content, during workshops. PDT workshops provide the opportunity for teachers to share their experiences in PA uptake, student attitudes and their understanding, which could contribute to the restructuring of the PE curriculum. This study has suggested that PE teachers and school authorities need to contribute by sharing their experience in the development of a successful PDT. PE teachers are in the best position to promote adolescents' health and development since adolescents spend a lot of their time in schools. The current PDT in school-based PE classes in Nigeria has also shown some benefits to Nigerian PE teachers, in terms of teaching proficiency and personal growth.

The PDT programme resulted in significant changes in the students' attitudes and practices regarding PA during PE classes, pre- to post-intervention. There were positive changes in the responses to all the questions in the intervention group, post-intervention. Students' attitudes and practices regarding PA can definitely be influenced and addressed by adopting new PA teaching methodologies. Furthermore, the intervention had a great impact on PA in school-based PE class, at break time and after school. The training development positively affected the intervention group's PA participation: their PA increased to three to five times at the weekends, after school, post the PDT intervention, when they engaged actively in PA and different kinds of sport.

Thoroughly engaging teachers and school authorities in developing and planning of PDT programmes, in collaboration with government, should result in quality interventions. There should be a willingness to change some identified barriers that contributed to students' physical inactivity by introducing school policies, such as extended time for PE class as well as training for teachers. The school authorities need to support teacher learning and should organise a seminar on the benefits of PE classes for students, which should be considered as an appropriate environment in which to reduce physical inactivity among adolescents. The government should provide equipment and facilities for schools and improve

infrastructure to enhance effective teaching and a good learning environment. This will influence teaching practice and attitudes regarding PA promotion.

Lastly, the governing authorities and heads of institutes should provide PE teachers with opportunities to attend teaching methodology workshops on PA. This would in turn influence students' lifestyles. Specifically, these training workshops for PDT focused, and should remain focused, on specialist skills to improve PE teaching approaches in junior secondary schools within the school PE curriculum. These PDT programmes can be a tool to improve the methodologies and approaches used by teachers who are responsible for teaching the subject of PE in Nigeria. PDT on PA interventions should address the factors determining adolescents' attitudes to, and practices in, PA. In this study, the PDT intervention resulted in PE teachers becoming confident in their approaches to teaching and enhanced their ability to increase students' participation in PA during PE classes. It is hoped that this will lead to a decrease in sedentary behaviour in adolescents. More individual teaching approaches must be adopted and sufficient time for PA must be allowed. Subject to the findings of the current study, some recommendations were suggested for future PDT programmes in Nigerian schools.

6.3 Recommendations

The following recommendations are suggested based on the findings of this study:

i. The Ministry of Education in Nigeria should establish a database for all certified PE teachers in order to ensure accessibility of the workshops to all teachers.

ii. The school authorities should consider their ability to reach those who are less active and provide the teachers with a platform where they can communicate with each other, in case of any difficulties in their PA teaching methods.

iii. The Ministry of Education in Nigeria should organise regular workshops on the general administration of physical and health education (at six-month intervals) to achieve self-development.

iv. The workshops must be designed to understand the needs of teachers and students in order to implement effective teaching, taking into consideration the PE curriculum content, and exposure to practices and attitudes regarding PA in schools.

v. In the future, the development of PE programme interventions should focus on the potential obstacles leading to the decline of PA programmes during PE classes by engaging the PE teachers.

vi. Since long distances have been identified as a barrier in this study, affecting PE teachers' attendance at PDT programmes, there should be on-line training and virtual conferencing as a means of achieving teachers' sustainable professional development, to transform their practice and update their skills.

vii. This research recognised that the limited time allotted for PE as a subject is a challenge, which affects the time students have to participate in PA. Therefore, PE classes should be longer to allow students to be more active in PE classes.

6.4 Limitations

Due to the sampling techniques used in the current study, the results may not be generalised in a larger population. A purposive sample was used to access participants in Nigerian schools, resulting in a non-probability sample. This approach meant the selected participating schools were not of equal sample size. Therefore, the allocation of PE teachers and students into the intervention and control groups meant they were also not the same size.

There was an inherent weakness in the focus group discussions (FGDs). Some of the PE teachers who participated in the FGDs felt reluctant to speak openly about the challenges in their teaching methods and the PE curriculum, within the groups and in the presence of the other group members. Although some of the older teachers, who are close to retirement, were bold in expressing their thoughts, younger teachers were not as verbal. Selected teachers suggested a phone interview, which would allow them to express their thoughts freely.

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Appendix 1 Letter to Lagos State Ministry of Education

The Permanent Secretary
Lagos State Ministry of Education
Alausa, Secretariat - Ikeja
Lagos State.
21st November, 2018

Dear Sir/Madam

REQUEST TO CONDUCT PhD RESEARCH PROJECT IN EPE LGA SCHOOLS

I am writing to seek permission to conduct research in junior secondary schools under education district III in Epe LGA of Lagos State. I am currently a PhD student in sport science, which is research-based at the University of KwaZulu-Natal in South Africa. My interest in research lies in junior secondary school PE teachers experiencing challenges in implementing teaching strategies for the promotion of physical activity during PE classes. Previous studies by Adeniyi et al. (2016) and Mojisola et al. (2017) stated that there should be further study on the implementation of teaching strategies for PE classes in Nigeria. Despite well-designed curricula for the PE programme and certified teachers, I observed that large number of junior school students are physically inactive and will not access the health benefits of exercise.

Therefore, I would like to intervene in this matter through implementing an intervention programme, titled '**Teaching Methodologies for Physical Activity Promotion in Adolescents' Physical Education Classes, Nigeria'**. This will help to improve the quality of active PE classes and promote healthy lifestyles among junior secondary school students and will provide a teaching guide for the PE syllabus in the existing curriculum.

The study will be conducted for five months, in two terms, starting in November 2018. The research project is going to be funded by the College of Health Sciences. University of KwaZulu-Natal, South Africa.

The primary aim of this study is to develop teaching strategies for physical activity promotion during adolescent PE classes. A secondary aim is to develop a physical activity teaching guidelines for PE teachers in junior secondary schools.

I would like to set up a meeting with you to discuss the details of the study. I look forward to a favourable response.

Osifeko, O. R (Researcher)
lekanfeko5@gmail.com
+2348066037751
University of KwaZulu-Natal

University of KwaZulu-Natal
Prof. Rowena Naidoo (Research supervisor)
+27 837772813
email: naidoor3@ukzn.ac.za

Appendix 2 UKZN Human Social Science Ethical Approval

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

31 October 2018

Mr Olalekan Remigious Osifeko 218081626
School of Health Sciences
Westville Campus

Dear Mr Osifeko

Protocol Reference Number : HSS/1750/018M
Project title: Teaching methodologies for Physical Activity Promotion in adolescents' Physical Education classes, Nigeria

Full Approval – Full Committee Reviewed Protocol

In response to your application received 28 September 2018, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

[redacted]

Professor Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

Cc Supervisor: Dr Rowena Naidoo
cc Academic Leader Research: Professor P Govender
cc. School Administrator: Ms P Nene

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** ximbap@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

Appendix 3 Gate-keeper permission

LAGOS STATE GOVERNMENT

22nd April 2019

The ANCOPSS Chairperson
Epe

LETTER OF INTORDUCTION

RE: RESEACRH ON TEACHING METHODOLOGIES FOR PPYSICAL ACTIVITY PROMOTION IN ADOLESCENT PHYSICAL EDUCATION CLASES IN NIGERIA.

The Tutor General/Permanent Secretary has approved Mr. Olalekan Remigious Osifeko to carry out a Research on Teaching Methodologies for physical activities promotion in Adolescents Physical Education Classes in Nigeria.

Mr Osifeko S.O is a student of University of Kwazulu Natal School of Health Science, Westville Campus, South Africa.

The researcher is requesting for permission to access information by administering questionnaires to Physical Education Teachers in Junior Secondary Schools in Epe Local Government Area.

Please accord the Researcher all necessary assistance.

[redacted]
Mr. Matti Saheed Olubunmi
For: Director A & HR

MINISTRY OF EDUCATION
EDUCATION DISTRICT III
122 Awolowo Road Falomo, Ikoyi, Lagos, Nigeria Tel: 08113898099, 08033482542
E-mail: [redacted]

Appendix 4 Principal/teacher information sheet

TEACHING METHODOLOGIES FOR PHYSICAL ACTIVITY PROMOTION IN ADOLESCENTS' PHYSICAL EDUCATION CLASSES, NIGERIA

Dear Participant,

You are being invited to take part in this research project described below. Before you decide to do so, it is important you understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. We thank you for considering our request.

The aim of this study is to develop teaching strategies for physical activity promotion during adolescent PE classes, and a secondary aim is to develop physical activity teaching guidelines for PE teachers in junior secondary schools in Epe LGA. PE teachers and JSS 3 students will participate in this study.

Should you agree to take part in this project, you will not receive any direct benefits from participating in this study, and there are no disadvantages or penalties for not participating. You may withdraw at any time or not answer any question if you do not want to. As PE teachers, you will be interviewed. These interviews will be focus group interviews, which will consist of a review of PE in the curriculum, your teaching styles and current knowledge, attitude and practices to promote PA during PE classes. Any information you give to me will be held securely and confidentially. You will be allocated a number and alphabetical code to ensure that confidentiality and anonymity is maintained throughout the study.

You will be interviewed twice, at the beginning and then again towards the end of the project. You will be also required to attend one five-day, one two-day and six two-hour training sessions during the study. Additionally, you will participate in six one-hour group discussions. All interviews and group discussions will be recorded using a phone recorder. The study will take place over two school terms. There are minimal risks in this study, as you will continue as per normal with your teaching. The only difference will be changes in your teaching strategies for the promotion of PA in the physical education curricular.

This study include health benefits for students and an improvement in knowledge, attitude and experience for PE teachers through a teaching guide for promoting physical activity. During and after

the intervention, you will be more knowledgeable about physical education teaching methodologies and students will possibly spend more time participating in physical activity during PE class. There will be no costs incurred by you as a result of participation in the study. Refreshments will be provided after all interviews and group sessions. During the training, meals and refreshments will be provided.

Results of this project may be published, but any data included will in no way be linked to you. The data collected will be securely stored in such a way that only the researchers will be able to gain access to it. At the end of the project any personal information will be destroyed immediately, as in accordance with the university's research policy. Raw data on which the results of the project depend will be retained in a secure storage place for five years, after which will be destroyed by incineration.

This study has been ethically reviewed and approved by the UKZN Human Social Science Ethical Committee (approval number **HSS/1750/018M**).

If you have any queries, concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the UKZN Research Ethics Committee:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557- Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Thanking you

Researcher: Osifeko Olalekan, R

University of KwaZulu Natal

Mobile: 08066037751

Email: lekanfeko5@gmail.com

Supervisor: Prof. Rowena Naidoo

University of KwaZulu-Natal

Tel work: +27 837772813

Email: naidoor3@ukzn.ac.za

Appendix 5 PE teachers' consent to participate

Please sign below to provide consent for your participation in the study.

I …… (name of teacher) give informed consent to participate in the above-mentioned study. I have read and fully understand the information about the study.

I understand that my participation in the project is entirely voluntary. I understand that I can stop participating at any stage simply by saying that I would no longer like to be involved in the research study. The data will be destroyed at the conclusion of the project but any raw data on which the results of the projects depend will be retained in secure storage for five years, after which it will be destroyed. The results of the project may be published but my anonymity will be preserved.

Signature of PE teacher: **DATE:**

…… ……..

Witness: **DATE:**

…… ……

<u>Additional Consent</u>

I hereby provide consent to:

Audio-record my interview and group discussions.

YES	**NO**

Signature of participant: …… DATE: ……..

Witness: …… DATE: …….

Appendix 6 Re: Information sheet for parents and Permission for your child to participate in a research study

TEACHING METHODOLOGIES FOR PHYSICAL ACTIVITY PROMOTION IN ADOLESCENTS' PHYSICAL EDUCATION CLASSES, NIGERIA

Dear parent / guardian

You are invited to participate in a research study conducted by Osifeko Olalekan Remigious, a PhD student. The purpose of this research is to develop teaching strategies for the promotion of physical activity during adolescent PE classes for your children to be able to embrace healthy lifestyles. Thank you for showing an interest in this project. Please read this information sheet before you and your child decide whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you of any kind and we thank you for considering our request.

Your child's participation will involve completing a questionnaire about their knowledge, attitude and practice of physical activity during PE classes. The questionnaire will be completed four times throughout the duration of the two school terms, at the beginning and end of each term. The reason for this is to determine if there is a change in their knowledge, attitude and practices of physical activity. Your child will also be asked to participate in structured physical activities that will be introduced by his/ her teacher, during physical education lessons. The activities are in line with the school syllabus.

There are no known risks associated with this research. The research is being undertaken as the requirement for my Doctor of Philosophy degree in the discipline of Biokinetics, Exercise and Leisure Sciences at the University of KwaZulu-Natal. The aim of the study is to develop teaching strategies for physical activity promotion during adolescent PE classes; and a secondary aim is to develop physical activity teaching guidelines for PE teachers in junior secondary schools in Epe LGA, which will assist in promoting your children's healthy lifestyles. The benefits of this study include more knowledge and experience gained by students and teachers about physical activity promotion. During and after the intervention, the students will be motivated to spend more time participating in physical activities. Possibly even after school, they will sustain a positive attitude towards physical activity.

Your child will be allocated a number and alphabetical code to ensure that confidentiality and anonymity is maintained throughout the study. Results of this project may be published but any data, including records identifying the child, will be maintained and we will do everything we can to protect your child's privacy. The data collected will be securely stored in such a way that only the researchers will be able to gain access to it. At the end of the project any personal information will be destroyed immediately, as in accordance with the University's research policy. Raw data on which the results of the project depend will be retained in a secure storage place for five years, after which it will be destroyed by incineration.

Participation in this research study is voluntary. You may refuse to allow your child to participate, or withdraw your child from the study at any time. Your child will not be penalised in any way should you decide not to allow your child to participate, or withdraw your child from this study.

If you have any questions or concerns about this study, or if any problems arise, please contact the researcher or the supervisor. You can also contact the UKZN Humanities and Social Sciences Research Ethics Committee.

This study has been ethically reviewed and approved by the UKZN Human Social Science Ethical Committee (approval number: **HSS/1750/018M**).

Consent:

I have read this parental permission form and have been given the opportunity to ask questions. I give my permission for my child to participate in this study.

Participant's signature_____ Date: _____

Child's Name: _____

A copy of this parental permission form will be given to researcher.

Appendix 7 FGD questions for the Intervention Schedule for PE teachers

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

TEACHING METHODOLOGIES FOR PHYSICAL ACTIVITY PROMOTION IN ADOLESCENTS' PHYSICAL EDUCATION CLASSES, NIGERIA

Class: ……..

School: ……

What is your highest level of education…….

Practices of teachers regarding PA teaching

1 Do you teach physical education in your curriculum?

If they answered YES: Continue with the interview

2 Are the PA classes combined with health related topics in the physical education syllabus?

3 Do you follow any national, state, or district physical education standards or guidelines?

4 Do you have the junior secondary school physical education curriculum at your school?

If they answered YES:

4.1 Are you required to use this curriculum and do you have your own copy?

5 Do you plan how you will assess or evaluate students in PE, in your lesson plans for physical activity?

6 Are you provided with goals, objectives, and expected outcomes for PE; such as knowledge of the benefits of physical activity?

7 Must students take PE as a compulsory subject while they attend this school?

8 As a PE teacher, how many PE class do you conduct per week?

9 What is the duration of this/these classes?

10 What determines the number of physical education classes held per week?

11 What staff development, relating to physical activity and physical education, have you been involved in, in the last two years?

12 What teaching methods do you use in physical education? Give examples.

13 What activities do you conduct during your class?

14 What do you do if you have limited equipment?

15 Do you have suggestions as to how the teaching of physical education could be improved?

16 When teaching the class, how often do you provide students with options for performing physical activities at varying skill levels?

17 Have you ever asked students to perform volunteer work with a local physical activity programme or event, for example Little League or a fun run?

18 In your PE class, do you give skill performance tests related to physical education?

19 Do you provide students with an explanation of what their fitness test scores meant?

20 Do you ever introduce initiatives to increase the PA to meet recommended, moderate-to-vigorous intensity standards in PE class without changing the existing syllabus?

21 How do you assess students based on promotion of physical fitness?

22 What PE activities are you teaching currently in your lessons?

23 How do you currently teach your students about the benefits of physical activity?

24 How long have you been teaching and what is your role as a PE teacher?

Training

1 What training do you need (if any) to teach physical education better?

2 During your teaching training, did you have any training relating to physical education?

If respondent had some kind of training relating to physical education ask:

2.1 What did this training consist of?

3 Would you be interested in taking further training regarding teaching physical education?

3.1 What topics would you like to be included in such additional training?

4 Does the training help in teaching PE?

5 Explain your understanding of Physical Education professional training.

6 What is your understanding on training for promotion of Physical Activity in PE class?

7 What challenges do you encounter in participating in a training program?

8 What would be the best method of training PE teachers on how to promote physical activity?

9 What are your own professional development needs, for improving students' attitude and practices in PE?

Appendix 8 Questionnaire for Adolescent

UNIVERSITY OF KWAZULU-NATAL, WESTVILL CAMPUS
DURBAN, SOUTH AFRICA
COLLEGE OF HEALTH SCIENCES, DEPARTMENT OF SPORTS SCIENCE

PHYSICAL ACTIVITY QUESTIONNAIRE FOR ADOLESCENT ON ATTITUDES AND PRACTICES REGARDING PHYSICAL EXERCISE

Dear respondents,

This researcher is interesting in gathering data to develop teaching methods, through this questionnaire designed to find out about your attitudes and practices of physical activity both in physical education classes and in your spare time. To this end, the researcher would appreciate it if you would provide unbiased and honest responses to the questions. All responses obtained from you are purely for academic purposes and they will be treated with strict confidentiality. Please answer all these questions, even if you do not consider yourself to be a physically active person.

Instruction: Please read the questions below carefully and tick the relevant columns to indicate your responses.

Researcher: Osifeko, O. R

Please answer all the questions as honestly and accurately as you can. There is no right or wrong answer.

Section A Demographic data

Name: _____ **Age:** _____

Gender:

Male	Female

Class: _____

School: _____

Today's date: _____

Section B Attitude towards physical activity

Indicate your agreement with the following statements

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. I would like to have more time to play sport or games with my friends.					
2. I enjoy doing physical activities and playing physical games with my friends					
3. I find my physical education class interesting					
4. I am excited about physical education					
5. Physical education classes are boring					
6. I do not have fun when I am doing physical activity.					
7. The games and physical exercises we do in physical education class make learning					
8. I feel uncomfortable or embarrassed in exercise clothes during PE classes.					
9. I see long sessions of exercise during PE classes as a punishment.					

Section C Practices regarding physical activity

Physical activity during PE classes

10 Indicate how many times you did the following activities in the past 5 days (last week) IN PE CLASSES? **(**Tick **ONE** option only for each activity)

Physical activities	I did not do this activity	1-2 times	3-4 times	5 or more times
10.1 Aerobics				
10.2 Swimming				
10.3 Football				

10.4 Dance				
10.5 Badminton				
10.6 Soccer				
10.7 Volleyball				
10.8 Basketball				
10.9 Athletics				

11 In the last 5 days, during your PE classes, how often were you very active (playing hard, running, jumping, throwing, etc.)? (Tick **ONE** option only)

Never I don't do PE	Hardly ever	Sometimes	Quite often	Always/Nearly always

12 Indicate how much physical activity you did during PE classes (like playing sports, games, doing dance, or any other physical activity) on each day last week.

	None at all	A little	Quite a bit	A lot
12.1 Monday				
12.2 Tuesday				
12.3 Wednesday				
12.4 Thursday				
12.5 Friday				

13 How many periods of formal PE lessons, that involved vigorous physical activities, did you have last week?

None	One period	Two periods	Three periods	Four periods	Five periods

14 In total across all PE classes last week, how much time did you spend doing vigorous physical activities in PE classes?

Up to 30 minutes	31 - 45 minutes	46 - 60 minutes	>60 minutes

Physical activity at break or after school

15 Indicate how many times you did any of the following activities in the past 7 days (last week) IN YOUR SPARE TIME EITHER AT BREAK OR AFTER SCHOOL **(**Tick **ONE** option only for each activity)

Physical Activities	Not at all	1-2 times	3-4 times	5-6 times	7 or more times

15.1 Tag					
15.2 Walking for exercise					
15.3 Cycling					
15.4 Jogging or running					
15.5 Aerobics					
15.6 Swimming					
15.7 Baseball, softball					
15.8 Dance					
15.9 Football					
15.10 Badminton					
15.11 Soccer					
15.12 Volleyball					
15.13 Hockey					
15.14 Basketball					
15.15 Tennis					
15.16 Athletics					

16 In the last 5 weekdays, what did you normally do at lunch/break (besides eating lunch)? (Tick **ONE** option only)

Sat down (talking, reading, doing schoolwork)	Stood around or walked around	Ran or played a little bit	Ran around and played quite a bit	Ran and played hard most of the time

17 In the last 5 weekdays, on how many days after school, did you do sport, dance, or play games in which you were very active? (Tick **ONE** option only)

None.	1-day last week	2 days last week	3 days last week	4 days last week	5 days last week

18 On the past weekend, how many times did you do sport, dance, or play games in which you were very active? (Tick **ONE** option only)

Not at all	1 time	2 — 3 times	4 — 5 times	6 or more times

19 Did anything (e.g. illness, being away, etc) prevent you from doing your normal physical activities in the past week?

Yes	No

19.1 If **Yes to Q19**, what prevented you? _____

Appendix 9 A one-sample t-test analyses on attitudes towards Physical Activity

A one-sample t-test was applied to test for significant agreement or disagreement to 9 statements measuring attitude to PE. This analysis was applied to pre- and post-scores (Q1-9)

One-Sample Statistics

Group		N	Mean	Std. Dev at on	Std. Error Mean
Intervent on	PRE1. I wou d ke to have more t me to p ay sport or games w th my fr ends.	695	2.99	.821	.031
	PRE2. I en oy do ng phys ca act v t es and p ay ng phys ca games w th my fr ends	695	3.03	.795	.030
	PRE3. I f nd my phys ca educat on c ass nterest ng	695	2.98	.773	.029
	PRE4. I am exc ted about phys ca educat on	695	3.04	.763	.029
	PRE5. Phys ca educat on c asses are bor ng	695	2.89	1.119	.042
	PRE6. I do not have fun when I am do ng phys ca act v ty.	695	2.99	1.208	.046
	PRE7. The games and phys ca exerc ses we do n phys ca educat on c ass make earn ng fun	695	3.00	.926	.035
	PRE8. I fee uncomfortab e or embarrassed n exerc se c othes dur ng PE c asses.	695	2.91	1.203	.046
	PRE9. I see ong sess ons of exerc se dur ng PE c asses as a pun shment.	695	2.64	1.202	.046
Contro	PRE1. I wou d ke to have more t me to p ay sport or games w th my fr ends.	498	3.10	.717	.032
	PRE2. I en oy do ng phys ca act v t es and p ay ng phys ca games w th my fr ends	498	3.07	.772	.035
	PRE3. I f nd my phys ca educat on c ass nterest ng	498	2.92	.773	.035
	PRE4. I am exc ted about phys ca educat on	498	2.94	.787	.035
	PRE5. Phys ca educat on c asses are bor ng	498	2.92	1.065	.048

	PRE6. I do not have fun when I am do ng phys ca act v ty.	498	2.78	1.193	.053
	PRE7. The games and phys ca exerc ses we do n phys ca educat on c ass make earn ng fun	498	2.85	.764	.034
	PRE8. I fee uncomfortab e or embarrassed n exerc se c othes dur ng PE c asses.	498	3.06	1.183	.053
	PRE9. I see ong sess ons of exerc se dur ng PE c asses as a pun shment.	498	2.49	1.226	.055

The effect of the intervention on the responses using ANCOVA for the analysis

Tests of Between-Subjects Effects

Dependent Var ab e:1. I wou d ke to have more t me to p ay sport or games w th my fr ends.

Source	Type III Sum of Squares	df	Mean Square	F	S g.	Part a Eta Squared
Corrected Mode	363.600[a]	2	181.800	374.099	.000	.388
Intercept	979.570	1	979.570	2015.713	.000	.631
PREq1	.052	1	.052	.107	.743	.000
Group	362.674	1	362.674	746.292	.000	.388
Error	572.955	1179	.486			
Tota	17856.000	1182				
Corrected Tota	936.555	1181				

a. R Squared = .388 (Adjusted R Squared = .387)

Estimates

Dependent Var ab e:1. I wou d ke to have more t me to p ay sport or games w th my fr ends.

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	4.253[a]	.027	4.201	4.305
Contro	3.127[a]	.031	3.066	3.189

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE1. I wou d ke to have more t me to p ay sport or games w th my fr ends. = 3.04.

Estimates

Dependent Var ab e:1. I wou d ke to have more t me to p ay sport or games w th my fr ends.

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	4.253[a]	.027	4.201	4.305
Contro	3.127[a]	.031	3.066	3.189

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE1. I wou d ke to have more t me to p ay sport or games w th my fr ends. = 3.04.

Tests of Between-Subjects Effects

Dependent Var ab e:2. I enjoy do ng phys ca act v t es and p ay ng phys ca games w th my fr ends

Source	Type III Sum of Squares	df	Mean Square	F	S g.	Part a Eta Squared
Corrected Mode	393.684[a]	2	196.842	415.214	.000	.413
Intercept	914.496	1	914.496	1929.016	.000	.621
PREq2	2.793	1	2.793	5.891	.015	.005
Group	392.101	1	392.101	827.088	.000	.412
Error	558.933	1179	.474			
Tota	18199.000	1182				
Corrected Tota	952.617	1181				

a. R Squared = .413 (Ad usted R Squared = .412)

Estimates

Dependent Var ab e:2. I enjoy do ng phys ca act v t es and p ay ng phys ca games w th my fr ends

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	4.307[a]	.026	4.256	4.359
Contro	3.139[a]	.031	3.078	3.200

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE2. I enjoy do ng phys ca act v t es and p ay ng phys ca games w th my fr ends = 3.05.

Tests of Between-Subjects Effects

Dependent Var ab e:3. I f nd my phys ca educat on c ass nterest ng

Source	Type III Sum of Squares	df	Mean Square	F	S g.	Part a Eta Squared
Corrected Mode	607.953[a]	2	303.976	563.242	.000	.489
Intercept	1027.582	1	1027.582	1904.020	.000	.618
PREq3	.028	1	.028	.053	.819	.000
Group	607.402	1	607.402	1125.464	.000	.488
Error	636.295	1179	.540			
Tota	18141.000	1182				
Corrected Tota	1244.248	1181				

a. R Squared = .489 (Adjusted R Squared = .488)

Estimates

Dependent Var ab e:3. I f nd my phys ca educat on c ass nterest ng

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	4.388[a]	.028	4.333	4.443
Contro	2.933[a]	.033	2.868	2.998

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE3. I f nd my phys ca educat on c ass nterest ng = 2.95.

Tests of Between-Subjects Effects

Dependent Var ab e:4. I am exc ted about phys ca educat on

Source	Type III Sum of Squares	df	Mean Square	F	S g.	Part a Eta Squared
Corrected Mode	461.155[a]	2	230.578	444.430	.000	.430
Intercept	982.454	1	982.454	1893.645	.000	.616
PREq4	4.815E-5	1	4.815E-5	.000	.992	.000
Group	459.309	1	459.309	885.301	.000	.429
Error	611.684	1179	.519			
Tota	17646.000	1182				
Corrected Tota	1072.839	1181				

a. R Squared = .430 (Ad usted R Squared = .429)

Estimates

Dependent Var ab e:4. I am exc ted about phys ca educat on

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	4.273[a]	.027	4.219	4.327
Contro	3.006[a]	.032	2.942	3.070

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE4. I am exc ted about phys ca educat on = 3.00.

Tests of Between-Subjects Effects

Dependent Var ab e:5. Phys ca educat on c asses are bor ng

Source	Type III Sum of Squares	df	Mean Square	F	S g.	Part a Eta Squared
Corrected Mode	633.750[a]	2	316.875	455.000	.000	.436
Intercept	619.793	1	619.793	889.960	.000	.430
PREq5	3.357	1	3.357	4.820	.028	.004
Group	629.439	1	629.439	903.810	.000	.434
Error	821.090	1179	.696			
Tota	6558.000	1182				
Corrected Tota	1454.839	1181				

a. R Squared = .436 (Ad usted R Squared = .435)

Estimates

Dependent Var ab e:5. Phys ca educat on c asses are bor ng

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	1.461[a]	.032	1.398	1.523
Contro	2.941[a]	.038	2.867	3.014

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE5. Phys ca educat on c asses are bor ng = 2.91.

Tests of Between-Subjects Effects

Dependent Var ab e:6. I do not have fun when I am do ng phys ca act v ty.

Source	Type III Sum of Squares	df	Mean Square	F	S g.	Part a Eta Squared
Corrected Mode	708.152[a]	2	354.076	453.085	.000	.435
Intercept	768.198	1	768.198	983.008	.000	.455
PREq6	.393	1	.393	.503	.478	.000
Group	704.891	1	704.891	901.999	.000	.433
Error	921.361	1179	.781			
Tota	6454.000	1182				
Corrected Tota	1629.513	1181				

a. R Squared = .435 (Adjusted R Squared = .434)

Estimates

Dependent Var ab e:6. I do not have fun when I am do ng phys ca act v ty.

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	1.364[a]	.034	1.298	1.431
Contro	2.937[a]	.040	2.859	3.015

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE6. I do not have fun when I am do ng phys ca act v ty. = 2.90.

Tests of Between-Subjects Effects

Dependent Var ab e:7. The games and phys ca exerc ses we do n phys ca educat on c ass make earn ng fun

Source	Type III Sum of Squares	df	Mean Square	F	S g.	Part a Eta Squared
Corrected Mode	551.550[a]	2	275.775	410.723	.000	.411
Intercept	1196.171	1	1196.171	1781.507	.000	.602
PREq7	.065	1	.065	.097	.756	.000
Group	546.060	1	546.060	813.269	.000	.408
Error	791.625	1179	.671			
Tota	17507.000	1182				
Corrected Tota	1343.175	1181				

a. R Squared = .411 (Ad usted R Squared = .410)

Estimates

Dependent Var ab e:7. The games and phys ca exerc ses we do n phys ca educat on c ass make earn ng fun

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	4.275[a]	.031	4.214	4.337
Contro	2.891[a]	.037	2.819	2.964

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE7. The games and phys ca exerc ses we do n phys ca educat on c ass make earn ng fun = 2.93.

Tests of Between-Subjects Effects

Dependent Var ab e:8. I fee uncomfortab e or embarrassed n exerc se c othes dur ng PE c asses.

Source	Type III Sum of Squares	df	Mean Square	F	S g.	Part a Eta Squared
Corrected Mode	642.178[a]	2	321.089	343.001	.000	.368
Intercept	908.029	1	908.029	969.994	.000	.451
PREq8	.319	1	.319	.341	.560	.000
Group	641.300	1	641.300	685.063	.000	.368
Error	1103.684	1179	.936			
Tota	7487.000	1182				
Corrected Tota	1745.862	1181				

a. R Squared = .368 (Ad usted R Squared = .367)

Estimates

Dependent Var ab e:8. I fee uncomfortab e or embarrassed n exerc se c othes dur ng PE c asses.

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	1.580[a]	.037	1.507	1.652
Contro	3.076[a]	.044	2.991	3.162

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE8. I fee uncomfortab e or embarrassed n exerc se c othes dur ng PE c asses. = 2.98.

Tests of Between-Subjects Effects

Dependent Var ab e:9. I see ong sess ons of exerc se dur ng PE c asses as a pun shment.

Source	Type III Sum of Squares	df	Mean Square	F	S g.	Part a Eta Squared
Corrected Mode	270.180[a]	2	135.090	153.691	.000	.207
Intercept	841.711	1	841.711	957.605	.000	.448
PREq9	.383	1	.383	.435	.510	.000
Group	270.034	1	270.034	307.215	.000	.207
Error	1036.311	1179	.879			
Tota	5747.000	1182				
Corrected Tota	1306.492	1181				

a. R Squared = .207 (Adjusted R Squared = .205)

Estimates

Dependent Var ab e:9. I see ong sess ons of exerc se dur ng PE c asses as a pun shment.

Group	Mean	Std. Error	95% Conf dence Interva	
			Lower Bound	Upper Bound
Intervent on	1.533[a]	.036	1.463	1.603
Contro	2.504[a]	.042	2.421	2.587

a. Covar ates appear ng n the mode are eva uated at the fo ow ng va ues: PRE9. I see ong sess ons of exerc se dur ng PE c asses as a pun shment. = 2.58.

Appendix 10: The Wilcoxon signed ranks test was applied to test for significant change

The analysis of the detailed results for the overall amount of PA across all sports in PE classes. The test for significant change in the amount of activity from pre- to post-intervention. This was applied to the two groups separately. (Q10 and Q11)

Statistics

Group			PRE10 The amount of PA across a sports n PE c asses, n the ast f ve days	10 The amount of PA across a sports n PE c asses, n the ast f ve days
Intervent on	N	Va d	795	489
		M ss ng	0	6
	Mean		9.15	9.18
	Med an		9.00	9.00
	Std. Dev at on		4.363	2.969
	M n mum		1	3
	Max mum		5	5
	Percent es	25	2.00	4.00
		50	3.00	4.00
		75	3.00	5.00
Contro	N	Va d	498	493
		M ss ng	0	5
	Mean		9.32	9.13
	Med an		19.00	9.00
	Std. Dev at on		4.380	4.358
	M n mum		1	1
	Max mum		5	5
	Percent es	25	3.00	2.00
		50	3.00	3.00
		75	4.00	3.00

Statistics

Group			PRE11 In the ast 5 days, dur ng your PE c asses, how often were you very act ve (p ay ng hard, runn ng, ump ng, throw ng, etc.)?	11 In the ast 5 days, dur ng your PE c asses, how often were you very act ve (p ay ng hard, runn ng, ump ng, throw ng, etc.)?
Intervent on	N	Va d	695	689
		M ss ng	0	6
	Mean		2.97	4.38
	Med an		3.00	4.00
	Std. Dev at on		.985	.611
	M n mum		1	3
	Max mum		5	5
	Percent es	25	2.00	4.00
		50	3.00	4.00
		75	3.00	5.00
Contro	N	Va d	498	493
		M ss ng	0	5
	Mean		3.15	2.89
	Med an		3.00	3.00
	Std. Dev at on		1.061	1.133
	M n mum		1	1
	Max mum		5	5
	Percent es	25	3.00	2.00
		50	3.00	3.00
		75	4.00	3.00

Appendix 11: The Wilcoxon signed ranks test was applied to test for significant change

Overall measurement of the amount of PA across groups during break and after school, on how much PA the students did during PE classes. The test shows significant change from pre- to post-intervention (Q12, Q14, Q16 and Q18).

Test Statistics[c]

Group		POSTQ12 - PREQ12	14 In tota across a PE c asses ast week, how much t me d d you spend do ng v gorous phys ca act v t es n PE c asses? - PRE14 In tota across a PE c asses ast week, how much t me d d you spend do ng v gorous phys ca act v t es n PE c asses?	POSTQ15 - PREQ15	16 In the ast 5 weekdays, what d d you norma y do at unch/break (bes des eat ng unch - PRE16 In the ast 5 weekdays, what d d you norma y do at unch/break (bes des eat ng unch	18 On the past weekend, how many t mes d d you do sport, dance, or p ay games n wh ch you were very act ve? - PRE18 On the past weekend, how many t mes d d you do sport, dance, or p ay games n wh ch you were very act ve?
Intervent on	Z	-11.751[a]	-16.735[a]	-22.413[a]	-20.727[a]	-16.989[a]
	Asymp. S g. (2-ta ed)	.000	.000	.000	.000	.000
Contro	Z	-2.520[b]	-.472[b]	-.524[b]	-.253[a]	-1.588[b]
	Asymp. S g. (2-ta ed)	.012	.637	.600	.801	.112

a. Based on negat ve ranks.

b. Based on pos t ve ranks.

c. W coxon S gned Ranks Test

Appendix 12: The paired samples t-test was used to test for significant differences pre- and post-intervention

Analysis of the number of periods of formal PE lessons that involved vigorous PA and on how many days after school students played sport, danced, or played games in which they were very active. The test shows significant differences pre- and post-intervention (Q13 and Q17).

Statistics

Group			PRE13 How many per ods of forma PE essons, that nvo ved v gorous phys ca act v t es, d d you have ast week?	13 How many per ods of forma PE essons, that nvo ved v gorous phys ca act v t es, d d you have ast week?	PRE17 In the ast 5 weekdays, on how many days after schoo , d d you do sport, dance, or p ay games n wh ch you were very act ve?	17 In the ast 5 weekdays, on how many days after schoo , d d you do sport, dance, or p ay games n wh ch you were very act ve?
Intervent on	N	Va d	695	689	695	689
		M ss ng	0	6	0	6
	Mean		2.75	3.46	2.97	4.40
	Std. Dev at on		.766	.611	.763	.951
	M n mum		1	2	1	2
	Max mum		6	5	6	6
Contro	N	Va d	498	493	498	493
		M ss ng	0	5	0	5
	Mean		2.78	2.74	2.98	2.85
	Std. Dev at on		.720	.753	.765	.834
	M n mum		1	1	1	1
	Max mum		6	6	6	6

Appendix 13: Workshop topics

Overview of the Junior Secondary School PE Syllabus Nigeria

Aims

Objectives

Methodology

Content structure

Junior Secondary School PE Syllabus.

Time table allocation

Schemes

Study areas

Resources

Assessment

Teaching Methodologies

- Adding new teaching styles (autonomous support)
- Increasing the PA of students during PE without necessarily lengthening class time.
- Lengthening existing PE classes by creating more time for practical classes.

Teaching Methods

Demonstration

Play away

Students centred approach

Evaluation

- Focus Group Discussion on skill assessment
- PA Questionnaire for evaluation the impact of the intervention on students PA assessment
- Equipment Improvisation by the teachers

Appendix 14: Project summary and intervention programme

Table 3.3

Phase	Duration	Activity
Pre-intervention	5 days	Introduction of the project, and meeting the principals and PE teachers
	2 days	Research assistant training
	5 days	PE teacher interviews
	10 days	Students' pre-intervention assessments (APPAQ-A) and (PAQ-A) with demographic characteristics of the students
Intervention	5 days	PE teacher training Teaching methodologies: new teaching styles with emphasis on lengthening existing PE classes, by infusing fitness to create more time for involvement in practical activities to increase the time spent on PA by adolescents in PE class. Increasing PA stations of students during PE without necessarily lengthening class time; emphasising training PE teachers on how to modify rules of games to suit students. Emphasising guidelines to support PE teaching methodologies for the existing curriculum to promote PA; correcting the low status of the subject and providing adequate facilities to reap health benefits.
	2 months	Teaching methods implementation (first two months) FGDs and interview
	5 days	End of the teaching implementation Students assessments with APPAQ-A
	2 weeks	School holiday period

		Teacher interviews for feedback on challenges Focus group discussions
	10days	Students' assessments at the beginning of the third term session
	5 days	PE teacher training, based on the feedback on challenges and responses from the student's assessment
	2 months	Teaching methods implementation (second two months) Focus group discussions and interviews
Post-intervention	5 days	End of teaching methods implementation Teacher interviews Final student measurement on (APPAQ-A) and (PAQ-A)

Appendix 15: Editor's letter of proofreading and editing

ETHEL ROSS

English language editing and proofreading

31 July 2020

To whomever it may concern:

This letter serves to confirm that I worked as the proof reader and language editor on Olalekan Remigious Osifeko's PhD thesis:

Teaching Methodologies for Physical Activity Promotion in Adolescents' Physical Education Classes, Nigeria

In no way did I change the content.

Yours faithfully

[redacted]

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Appendix 16: Turn it in report