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Title	An evaluation of the fidelity of the implementation of quality PE programmes and its outcomes on final-stage primary-level pupils' attitudes toward physical education, physical activity behaviour, wellbeing and academic performance
Authors	Kingston, Úna
Publication date	2024
Original Citation	Kingston, Ú. 2024. An evaluation of the fidelity of the implementation of quality PE programmes and its outcomes on final-stage primary-level pupils' attitudes toward physical education, physical activity behaviour, wellbeing and academic performance. PhD Thesis, University College Cork.
Type of publication	Doctoral thesis
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Download date	2026-10-29 12:13:33
Item downloaded from	https://hdl.handle.net/10468/17418

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An evaluation of the fidelity of the implementation of quality PE programmes and its outcomes on final-stage primary-level pupils' attitudes toward physical education, physical activity behaviour, wellbeing and academic performance

Thesis presented by

Úna Kingston, B.Ed., M.Ed. for

the degree of

Doctor of Philosophy

University College Cork

School of Education

Head of School: Professor Nicola Ingram

Supervisors: Dr. Joao Costa, Dr. Emmanouil Adamakis & Dr. Diarmuid Lester

2024

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Declaration

"This is to certify that the work I am submitting is my own and has not been submitted for another degree, either at University College Cork or elsewhere. All external references and sources are clearly acknowledged and identified within the contents. I have read and understood the regulations of University College Cork concerning plagiarism."

Candidate:	**Student I.D No.:**	**Date:**
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Acknowledgements

This research project would not have been possible without the principals and teachers who so generously gave up their time to engage in efforts to carry out the scheme of work that was necessary for this research over the course of an academic year. Their commitment to undertaking such an endeavour provided a truly pupil-informed perspective on the fidelity of the implementation of QPE programmes and its outcomes on final-stage primary-level pupils' attitudes toward PE, physical activity, wellbeing and academic performance.

I wish to acknowledge the financial support of Department of Education, Ireland for financing my PhD. This support allowed me to dream big in my research design and overall research aims.

To my supervisors, Dr. Joao Costa, Dr. Emmanouil Adamakis and Dr. Diarmuid Lester, thank you sincerely for your expert advice, constant encouragement and support throughout my PhD journey. I would like to pay particular gratitude to Dr. Joao Costa who has accompanied me on my learning journey since 2016. He has been exemplary in all respects and has made my learning experience all the more meaningful and enjoyable. I would also like to acknowledge the role of my critical friend, Ena O' Regan and to thank her for her contribution to this research.

To all of the educators that I encountered on my education journey to date. There have been many who have influenced my career path and have further compounded my belief that teachers, school leaders, and college lecturers have such an important role to play in the lives of their pupils and students. They are a powerful force and their positions and the potential influence should never be underestimated.

To my family, your endless support and encouragement has allowed me to follow my dreams. In particular, I would like to thank my mother, Kitty for instilling the value of education

in me from a very young age. This was a priceless gift which has enriched my life significantly. And finally, to my husband, Ger and four sons, Bill, Harry, David and Gerard for their patience and understanding throughout my PhD studies.

Sincere thanks to all.

Abstract

Background: Although children and youths currently form the most active segments of the population in developed societies, there is a marked trend toward an increase in sedentary lifestyle and a decrease in physical activity (PA) among school-aged children. In the Irish context, primary education sets-up the foundations for students to progress to Junior Cycle (JC), with Physical Education (PE) framed under the wellbeing (WB) perspective as a holistic concept valuing WB. The successful implementation of a quality PE (QPE) programme at primary level lays the foundation for a well-adjusted and balanced student in post-primary school. However, research is warranted on the extent to which the quality PE programmes and their fidelity of implementation sustain pupils' outcomes on attitudes toward PE (ATPE), physical activity behaviour (PAB), WB and academic achievement (AA).

Purpose: The purpose of this research is to evaluate the extent to which QPE programmes with differing levels of implementation fidelity, support the pupils' ATPE, PAB, WB, and AA at the final stage (5th and 6th class) of their primary education. This study explores the existing research on the topic as well as examining international and national perspectives and policy. We discuss how these policies and interventions have impacted on QPE programmes in schools, in particular primary schools and its outcomes.

Methods: A mixed-methods approach was utilised in this research. The qualitative and quantitative methods included a number of evaluative tools such as, a PE School Self-Assessment Survey (PE-SSAS), a PE External Qualitative Observation Tool (PE-EQOT) and a pupil survey. To begin, a scoping review of the available qualitative and quantitative literature relating to the evaluation of implementation fidelity of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, WB and AA, was conducted according to the

PRISMA extension for scoping reviews guidelines (Tricco et al., 2018). Secondly, to ensure the suitability of the PE-SSAS and the PE-EQOT as two aspects of the same measuring tool, a mixed-methods data collection and analysis approach was employed that was guided by the themes identified in the scoping review (Kingston et al., 2023). The stratification took place based on the results of the PE-SSAS. The gathering of data to determine the impact of a QPE programme on the four targeted outcomes (PAB, ATPE, WB and AA) took place through the pupil survey and standardised test results for literacy and numeracy. The study included 257 pupils from 5th and 6th class (age 10-12 years) in six primary schools in the province of Munster.

Results: Following the identification of QPE themes from the scoping review, a QPE evaluation tool was designed and tested, involving an internal PE-SSAS completed by an extensive sample of schools, and a PE-EQOT applied to a selection of six stratified schools on the basis of their self-reported QPE measures. By combining the PE-SSAS QPE self-reported measures with the PE-EQOT evidence, the selected schools were classified in terms of quality and fidelity of PE implementation as grade 1 (lower QPE), grade 2 (moderate QPE) or grade 3 (higher QPE). By comparing the pre and post pupil outcomes in ATPE, PAB, WB and AA over one academic year, the results demonstrated that the implementation of a QPE programme on 5th and 6th class pupils in six primary schools in the Munster province of Ireland, had a positive outcome on pupils' ATPE. The same programme had positive effects on only certain aspects of a particular group of participants' PAB, but for the most part pupils' PAB stayed the same or did not negatively affect pupils PAB. There were no differences on WB scores between pupils at the different grades and all pupils decreased almost equally their WB scores over time, between the two timepoints. In relation to effects on AA, pupils at grade 3 (higher QPE) slightly increased their literacy scores over the two time points and the numeracy levels of the pupils showed statistically significant differences in all 3 grades. The findings stemming from this inquiry enable schools to optimise pupils' holistic development by favouring positive outcomes

on some elements of the outcomes ATPE, PAB, WB and AA. This is based on the provision of QPE programmes and the fidelity of its implementation.

Discussion: The QPE programme focuses on the many benefits of PE at school. PE is framed as a holistic subject with positive influences on pupils' physical and mental health, as well as on AA. Designing a protocol that examines the fidelity of a QPE programme, implementing it in various school settings over the course of one academic year and evaluating its outcomes on four specific areas, makes this study one of a few of its kind. Through a research-informed comprehensive evaluation protocol, this study is designed to gain knowledge on a broad variety of implementation issues and give detailed information on PE programme delivery and outcomes. The study's results will better inform future practice and policy both nationally and internationally.

The study has implications for research, practice and policy, with an eye on the JC WB programme (NCCA, 2019), the Primary Curriculum Framework (PCF) (DE, 2023) and the Draft WB Curriculum Specification (NCCA, 2024).

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A2	The acute effects of multiple components in a whole-school physical activity policy on executive functions of primary level students Article *in* Revista de Psicologia del Deporte · May 2021. https://www.rpd-online.com/index.php/rpd/issue/view/6/4
A3	Published Paper: Kingston, Ú., Adamakis, M., Lester, D., & Costa, J. (2023). A scoping review on quality physical education programmes and their outcomes on primary-level pupils. *International Journal of Environmental Research and Public Health (IJERPH) 20(4):3575*. https://doi.org/10.3390/ijerph20043575

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Chapter 1 - Introduction

1.1. Publications and Conference Proceedings

Journal Articles – Published

Kingston, Ú. Adamakis, M., & Costa, J. (2020). Acute effects of physical education, structured play, and unstructured play in children's executive functions in primary school. *Journal of*

Physical Education and Sport, *20*. https://doi.org/10.7752/jpes.2020.s6442

Kingston, Ú. Adamakis, M., & Costa, J. (2020). The acute effects of multiple components in a whole-school physical activity policy on executive functions of primary level students. *Revista de Psicologia Del Deporte*, *29*(5). https://www.rpd-online.com/index.php/rpd/issue/view/6/4

Kingston, Ú. Adamakis, M., Lester, D., & Costa, J. (2023). A scoping review on quality physical education programmes and their outcomes on primary-level pupils. *International*

Journal of Environmental Research and Public Health, *20*(4). https://doi.org/10.3390/ijerph20043575

Oral Presentations

Kingston, Ú. (2022)

An evaluation of the fidelity of the implementation of quality PE programmes and its outcomes on final-stage primary-level pupils' attitudes toward physical education,

physical activity, wellbeing and academic achievement. *CACSSS Post Graduate Conference,*

22/02/2022, UCC.

1.2. Introduction to Thesis

PE has been identified as a fundamental right for every human being by the United Nations Educational, Scientific and Cultural Organization (UNESCO), mandated to support PE and Sport (UNESCO, 1978). Further to this, the importance of providing QPE to all children has been acknowledged (Mc Lennon & Thompson, 2015; Woods et al., 2010). QPE seeks to enable all young people, whatever their circumstances or ability, to take part in and enjoy PE, Sport and PA, and endeavours to empower all children to develop physical literacy (IPPEA, 2010). It also strives to promote young peoples' health, safety and WB, as well as supporting all young people to improve and achieve in line with their age and potential (IPPEA, 2010). QPE can promote positive ATPE, reduce the chances of young people engaging in risky behaviour, and impact positively on social inclusion and AA (CDC, 2010; Mc Lennon & Thompson, 2015). Other benefits of QPE highlighted include increased levels of fun for pupils during PA and improved self-esteem and confidence as well as better overall health (Kretchmar, 2006). Although many of these benefits claimed for PE are mediated by contextual, social and pedagogical factors (Bailey et al., 2009), the available evidence suggests that PE in a child's formative years can be an important influence for future PA patterns (Green, 2012). In this context, the critical importance of PE in primary education has been espoused, with suggestions that primary PE is particularly key to the development of lifelong PA and should be prioritised accordingly (Griggs, 2007).

Yet, the provision of QPE has been identified as problematic in many contexts, particularly when delivered by primary school teachers who are trained as generalist

teachers (Morgan & Hansen, 2007; Sloan, 2010; Tsangaridou, 2012; UNESCO, 2014). Issues on generalist teacher preparation have been raised in relation to the time allocated to PE in initial teacher education (ITE) programmes (INTO, 2007), the ongoing meaningful professional development of teachers (Murphy & O'Leary, 2012; Patton et al., 2015) teachers' content knowledge (Decorby et al., 2005; Sloan, 2010) and their confidence to teach PE (Morgan & Hansen, 2007). Consequently, there is considerable debate surrounding the most appropriate means of primary PE provision (Jones & Green, 2015). Even the very aims of PE itself have been questioned, with the agenda of health and sport ideologies competing with more traditional educational discourses of PE (Coulter & Ní Chróinín, 2013; Griggs, 2015). Set against this turbulent background, it is imperative to further explore PE programme delivery and outcomes. From this we can gain knowledge on a broad variety of implementation issues and give detailed information that has the potential to influence government policy and future practice. Given the growing calls for change in primary PE which have emerged in recent years (Griggs, 2015; Jess & Collins, 2003; Kirk, 2012; Petrie, 2008; Thorburn et al., 2011), the need for further research within primary PE appears great.

1.2.1. The Background

The rationale for the research was twofold and stemmed from my own personal interest in PE and my initial experiences as a teacher and as a school leader, in relation to the provision and quality of PE in primary schools. With respect to the first element, it is important to acknowledge that a researcher's world view has an important bearing on the research process (Creswell, 2014; Lincoln & Guba, 1994). Within the subjective social constructivist outlook I adopted, it is particularly important to position myself within the context of the research. To this end, a brief personal biography of my

background is presented with reference to the experiences which have helped to motivate my interest in this area and shape this particular research.

From a young age I had a special interest in PE, identifying it as my favourite subject in primary and post-primary school. My experiences of PE in school were quite typical, in that I experienced a games-dominated PE curriculum with a limited amount of exposure to dance, gymnastics and outdoor and adventure activities. Competitive extra-curricular school sport was emphasised and was highly valued in the schools I attended. Even from a young age, I understood that PE had the potential to make children feel happy in school and for some, when they felt the more academic subjects were challenging and upsetting at times, PE was a subject that was accessible to all. This childhood understanding became clearer to me as an adult when I began to teach children and see first-hand the power that a QPE programme could bring to individual pupils and to a school community as a whole. As a school leader, this experience played out in front of my own eyes. Starting from a baseline where PE was a low priority and going to a place where PE and PA were embedded in the fabric and culture of the school. It was accessible to all, achievements acknowledged, and participation celebrated. Once PE and PA became a daily part of the school routine my general observations were that when pupils were happy in school, enjoyed participating in PE and PA activities, they performed better in other subjects in school. This positive atmosphere effected their WB, ATPE, PE and PA levels and in some cases AA.

This experience over a period of five to seven years renewed my interest in further study and I set about contacting University College Cork on how I should apply for a Masters in Education. Having successfully achieved my Masters qualification, my interest levels sustained and I set about contacting my supervisors on how I would go about applying for a PhD programme in the college.

It was at this point that engagement with the research literature provided me with further rationale for this study at the second element. Having discussed some of my initial ideas with my supervisors they suggested I review some of the related research and to refine my ideas into a research proposal. Whilst an abundance of literature relating to PE was available, upon initial review I found there was a dearth of research available relating to the provision of QPE programmes in primary schools and how they would sustain pupils' outcomes on ATPE, PA, WB and AA. This finding strengthened my conviction to research this area and aided my preparation of an initial proposal for research. On acceptance of my proposal, with the support of my supervisors, I became immersed in the 'PE world'. I made many new acquaintances and was exposed to new ideas, as well as new perspectives in the literature which challenged my preconceptions. During this time period, my experiences as a principal of a school, as a leadership professional development advisor within the Professional Development Service for Teachers (PDST), and as a primary school inspector strengthened my fascination and ever evolving understanding of primary PE. This sense of curiosity and passion for primary PE led to the emergence of further questions within my initial research and a strong desire to continue to research further.

1.2.2. Overview of the Research Design

This research was exploratory and interpretative in nature, and data were generated qualitatively and quantitatively through a sequential process across three studies. Qualitative methods of enquiry were employed throughout as a means of illuminating the features and outcomes of QPE programmes in school and devising the QPE tools. Quantitative methods were employed to validate the QPE tools and analyse the four outcomes (ATPE, PAB, WB, AA) relative to the overall QPE in schools. Further details

relating to the design of each study within this research are provided in the methodology section of this thesis, but by way of introduction, an overview of the three phases of data generation is provided in this section.

In Study 1, a scoping review was carried out on the literature relating to the evaluation of the implementation of QPE programmes and related outcomes on final-stage primary-level pupils' ATPE, PAB, WB and AA. A thematic analysis was used to inductively and deductively analyse the studies for common themes of features of QPE programmes in primary schools, arising from nine different countries, considering the four outcome dimensions (ATPE, PAB, WB and AA). The common themes identified as features of QPE across all four dimensions were as follows: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships. Based on these findings, recommendations were made for an evaluation framework on QPE in primary education.

In Study 2, the aim was to validate an evaluative protocol used to examine QPE and fidelity of implementation in primary schools. The evaluation protocol underpinning all the research project consists of five components, framed as independent and dependent variables:

1) Independent Variables:

a. quality of the PE programme;

b. fidelity of implementation of the PE programme.

2) Dependent Variables:

a. Pupils' ATPE - The tool used to investigate the pupil's ATPE is The Pupils' Attitudes toward PE Questionnaire;

b. Pupils' PAB - To measure the outcomes on pupils' PAB, The International Physical Activity Questionnaire (IPAQ) Short Form was used;

c. Pupils' WB - Outcome measure data for WB of pupils was collected by using the Stirling Children's Wellbeing Scale (SCWBS);

d. Pupils' AA - The methodology used to examine the outcomes on pupils' AA, was to compare the literacy and numeracy standardised test results from the end of one academic year (June 2022) with the results from the following academic year (June 2023). The Mary Immaculate Reading Attainment Test (MICRA-T) or the New-Drumcondra Primary Reading Test (N-DPRT) was used for literacy and the Standardised Irish Graded Mathematics Assessment- Test (SIGMA-T) or the Drumcondra Primary Mathematics Test-Revised (DPMTR) was used for numeracy.

Given the fact that the researcher was the school inspector, every effort was made to remain non-biased and all participants were invited to participate willingly, with the option to withdraw at any stage while the research was being carried out. An external critical friend during the observation stage supported neutrality throughout this research and displayed complete professionalism at all times. Prior to phase one, approval was sought and granted by the Social Research Ethics Committee (SREC), code 2022-096, in University College Cork (UCC). The design of the protocol followed a systematic literature research process to consider elements of context, process, and outcomes on

ATPE, PAB, WB and AA. The evaluative framework is made up of a PE-SSAS and a PE-EQOT. The validation of the protocol included 179 PE leaders and teachers from sixty-eight primary schools in the Munster province of Ireland. Following a two-phase procedure, the PE-SSAS was developed as a fifty-six-item scale-type instrument with seven factors and a forty-four-item instrument with seven factors in the PE-EQOT was generated, both of which were subject to validation. Taken together, my analyses supported the overall validity and reliability of this instrument for assessing QPE programmes and fidelity of implementation in primary schools.

In Study 3, an investigation took place to assess the impact of QPE and the fidelity of its implementation on four targeted outcomes, PAB, ATPE, WB, and AA. The study was carried out on 5th and 6th class primary school pupils in the province of Munster, Ireland. A cross-sectional sample (n = 257) of pupils, enrolled at six different schools that are representative of higher (n = 2), moderate (n = 2) and lower (n = 2) levels of a QPE was included. The *154 (IPAQ) short form,* (Craig et al., 2002), *the Stirling Children's Wellbeing Scale* (Liddle & Carter, 2015) *and the Attitudes toward PE: Students Attitudes toward PE scale* (Gouveia et al., 2019) was utilised to measure the impact of a QPE on the PAB, WB and ATPE. The N-DPRT (ERC, 2018) and the MICRA-T (Wall & Burke, 2007) was utilised to measure the impact on pupils AA in literacy. The DPMT-R (Elliott et al., 2007) and the SIGMA-T (CDU, 2007), was utilised to measure the impact on pupils' AA in numeracy. Data analysis indicated a significant variation in the levels of PAB, ATPE, WB and AA across different levels of QPE.

The evidence reported as a result of the implementation of QPE on 5th and 6th class pupils in six primary schools in the Munster province of Ireland, that the implementation of a QPE programme had a positive outcome on pupils' ATPE. The results show that the same programme had positive effects on only certain aspects of

PAB, pupils' PAB stayed the same or did not negatively affect pupils PAB. There were no differences on WB scores between pupils at the different grades. In relation to effects on AA, pupils at grade 3 slightly increased their literacy scores over the two time points and the numeracy levels of the pupils showed statistically significant differences on numeracy in all 3 different grades.

1.2.3. Significance of the Study

There are several important areas where this research makes an original contribution. Firstly, there is little existing data investigating the QPE and the fidelity of its implementation in primary schools. As well as this, there were very few studies that explored the effects of a QPE programme on the four educational outcomes, ATPE, PAB, WB and AA. This research, therefore, addresses a gap in the international literature by providing empirical research relating to the provision of QPE and the fidelity of its implementation on 5th and 6th class pupils in primary school settings and the outcomes on pupils' ATPE, PAB, WB and AA. As little is known about the provision of QPE programmes and related outcomes in Irish primary schools, it also provides insights for the first time into the Irish school setting.

The research may also be of interest to educational stakeholders in Ireland, as there do not appear to be any studies in an Irish context which have previously explicitly considered QPE in primary schools and its effect on pupils' outcomes. The results of this study may prove particularly insightful for both principals and teachers by highlighting the potential for the pupils' holistic development as well as AA as a result of experiencing a QPE programme in school.

Finally, this research may be of particular interest to ITE. Insight is provided into both theoretical and practical aspects of delivering QPE programmes in schools which

can contribute to the education of future teachers. Specific to an Irish context, this research is timely and can help inform the design of newly reconceptualised PE elective programmes in ITE. Valuable insights are provided into the potential impact of the provision of QPE in schools which can be undertaken by Irish primary school teachers, as well as the traits which could consequently be developed and prioritised amongst potential future PE leaders in pre-service education.

1.3. Aims and Objectives of the Study

The aim of this study is to evaluate the extent to which the quality of PE programmes and their fidelity of implementation sustain pupils' outcomes on ATPE, PAB WB and AA. It is designed to gain knowledge on a broad variety of implementation issues and give detailed information on PE programme delivery and outcomes at the primary school level. The results of the study have the potential to influence government policy and future practice.

1.4. Research Questions

The main research question investigates the fidelity of the implementation of a QPE programme and its outcomes on final-stage primary-level pupil's ATPE, PAB, WB and AA. Based on the evaluation protocol classification, the following hypothesis can be advanced:

H1: Schools with higher quality and higher fidelity of their PE programme have significantly higher pupil outcomes on ATPE, PAB, WB and AA;

H2: The differences of quality and fidelity of the QPE programme reflect differences of pupil outcomes on ATPE, PAB, WB and AA.

1.5. Thesis Structure

There are seven chapters in this thesis. Subsequent to this introductory chapter, chapter 2 presents a broad review of literature which sets up this thesis as a coherent and cohesive whole as it unfolds throughout the three core studies. The broader context of international primary education is first addressed within this review, before more specific topics such as PE internationally and PE in the Irish primary school system are then considered. Chapter 3 refers to the first study, as it builds on the literature review presented in the previous chapter by carrying out a scoping review on the literature relating to the evaluation of the implementation of QPE programmes on final-stage primary-level pupils while considering the four outcomes ATPE, PAB, WB and AA. In chapter 4, the second study builds on the first study insights to inform the design and validation of an evaluative protocol which was then used to examine QPE programmes and the fidelity of implementation in primary schools. Chapter 5, the third and final study, carries out the evaluative protocol to investigate the impact of QPE and the fidelity of its implementation on the four targeted outcomes. The application of this methodological approach in the design of Study 1 (chapter 3) is presented in chapter 5, along with a description of the results generated and a discussion of these results. Chapter 6, contains an overall discussion encompassing all three studies and chapter 7 outlines the references used throughout the thesis.

1.6 Definition of Terms

Academic achievement: AA represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college, and university (Steinmayr et al., 2014).

Attitude towards physical education: Is in connection with students' engagement in PE classes and with the development of an active lifestyle (Gouveia et al., 2019).

Mental wellbeing: A dynamic state that refers to individuals' ability to develop their potential, work productively and creatively, build strong and positive relationships with others and contribute to their community" (Beddington et al., 2008).

Physical activity: PA is defined as any bodily movement, produced by skeletal muscles, that requires or results in energy expenditure. This includes activities undertaken while working, playing, carrying out household chores, travelling, and engaging in recreational pursuits (WHO, 2022).

Physical education: PE is the planned, progressive learning that takes place in the school curriculum timetabled time and which is delivered to all students. This involves both 'learning to move' (i.e., becoming more physically competent) and 'moving to learn' (e.g., learning through movement, a range of skills and understandings beyond physical activity, such as cooperating with others) (Association for Physical Education, 2019).

Quality physical education: QPE seeks to enable all young people, whatever their circumstances or ability, to take part in and enjoy PE, sport and PA and endeavours to empower all children to develop physical literacy (IPPEA, 2010). It also strives to promote young peoples' health, safety and WB, as well as supporting all young people to improve and achieve in line with their age and potential (IPPEA, 2010).

Wellbeing: WB is a fluid way of being and needs nurturing throughout life (WHO, 2019).

1.7 List of Abbreviations

AA	Academic Achievement
ACARA	Australian Curriculum, Assessment and Reporting Authority
AfPE	Association for Physical Education
ATPE	Attitudes Towards Physical Education
CDC	Center for Disease Control and Prevention
CSPPA	Children's Sport Participation and Physical Activity Study
CSPAP	Comprehensive School Physical Activity Program
CPD	Continuous Professional Education
CDU	Curriculum Development Unit
DEIS	Delivering Equality of Opportunity in Schools
DE	Department of Education
DPMT-R	Drumcondra Primary Mathematics Test-Revised
DPRT-R	Drumcondra Primary Reading Test-Revised
ERC	Educational Research Centre
ESR	Environmental Systems Research Institute
EC	European Commission
EUPEA	European Physical Education Association
EU	European Union
EFA	Exploratory Factor Analysis
FMS	Fundamental Movement Skills
GCSE	General Certificate of Secondary Education
HPE	Health and Physical Education
HE	Health Education
ICT	Information and Communication Technologies
IT	Information Technologies
ITE	Initial Teacher Education

IPAQ	International Physical Activity Questionnaire
INTO	The Irish National Teachers' Organisation
IPPEA	Irish Primary Physical Education Association
ISM	Irish Sports Monitor
JC	Junior Cycle
JCT	Junior Cycle for Teachers
MICRA-T	Mary Immaculate College Reading Attainment-Test
MWB	Mental Wellbeing
MDGs	Millennium Development Goals
MBP	Model-Based Practice
MVPA	Moderate-to-Vigorous Physical Activity
NASPE	National Association of Sport and Physical Education
NEPS	National Educational Psychological Service
NGBs	National Governing Bodies
NCCA	National Council for Curriculum and Assessment
NCSE	National Council for Special Education
N-DPRT	New-Drumcondra Primary Reading Test
NSW	New South Wales
Ofsted	Office for Standards in Education, Children's Services and Skills
OECD	Organisation for Economic Co-Operation and Development
PhD	Doctor of Philosophy
PDHPE	Personal Development, Health and Physical Education
PES	Physical Education and Sport
PE-EQOT	Physical Education- External Qualitative Observation Tool
PE-SSAS	Physical Education-School Self-Assessment Survey
PETE	Physical Education Teacher Education
PCF	Primary Curriculum Framework

PLC	Primary Language Curriculum
PMC	Primary Mathematics Curriculum
PDST	Professional Development Service for Teachers
QA	Quality Assurance
QPE	Quality Physical Education
QPETE	Quality Physical Education and Teacher Education
SHPPS	School Health and Policies and Programs Study
SSE	School Self-Evaluation
SESE	Social, Environmental and Scientific Education
SHAPE America	Society of Health and Physical Educators America
SPHE	Social, Personal And Health Education
SREC	Social Research Ethics Committee
SPARK	Sports, Play, and Active Recreation for Kids
SIGMA-T	Standardised Irish Graded Mathematics Attainment-Test
SPSS	Statistical Package For The Social Sciences
SCWBS	Stirling Children's Wellbeing Scale
SP	Structured Play
SDGs	Sustainable Development Goals
TGfU	Teaching Games for Understanding
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
US	United States
UP	Unstructured Play
WB	Wellbeing
WHO	World Health Organization

Chapter 2 - Literature Review

2.1. Global Status of Primary Education

Primary education aims to provide quality learning experiences that foster cognitive, social, emotional, and physical growth. It lays the foundation for lifelong learning and wellbeing (WB) (Lynch, 2017). It concentrates on the holistic development of the child by nurturing well-rounded individuals. This can be done by addressing various dimensions, including academic, social, and physical aspects. Inclusivity is also a fundamental goal, ensuring access to education for all, regardless of background, abilities, or socio-economic status, (Marron et al., 2023).

Primary education forms the bedrock of development and nurturing skills that extend far beyond the classroom walls (Joshi & Shukla, 2019). This level of education equips children with essential reading, writing and mathematical skills and provides them with the foundational abilities to prepare them for life, work, and active citizenship (UNICEF, 2019). Great strides have been made in the last number of decades in closing the gap in the universalisation of primary schooling. In the 1950s, nearly fifty percent of primary aged children worldwide were not attending school. In the 2020s, that figure has reduced to eleven percent. However, only two thirds of children from low-income countries are estimated to have completed primary school (Educational Opportunities, 2016). Children living in emergency accommodation and refugee children have less of a chance of completing primary school (UNICEF, 2020) and girls that come from disadvantaged backgrounds are more likely to drop out or never attend primary school (Educational Opportunities, 2016). Primary education plays a key role in the development of children and good quality education empowers them and safeguards

their health and WB. This is why attending and completing primary education should be a key priority for governments in all countries in particular poorer countries.

2.1.1. Broad Goals of International Primary Education

Few global goals have been as consistently and deeply supported than the idea that every child in every country deserves to complete at least a primary education (Bruns et al., 2003). This goal was set at the 1990 World Conference on Education for All and was expected to be achieved by 2000. In the year 2000, the World Education Forum took place and this commitment was extended. This decision placed an emphasis on schooling quality while, at the same time, acknowledging that more work needed to be done to ensure that every child should at least complete their primary school education. This issue of concern was echoed, when universal primary education and gender equity in primary and post-primary schools was listed as one of the Millennium Development Goals (MDGs) in 2000 (Fukuda-Parr, 2004).

The external positive outcomes associated with primary education require children to attend school for at least five to six years, therefore completion is the priority and not access to primary school (Kellock, 2020). Education builds human capabilities, which is the essential and individual power to reflect, make decision, have a voice in society and have a better quality of life (Bouronikos, 2023).

Similar thinking occurs, when the Sustainable Development Goals (SDGs) (UN, 2024) encourage all children to complete free, equitable and quality primary education, leading to relevant and effective learning outcomes by 2023 (UNICEF, 2013). Political commitment and targeted strategies along with equitable financing and resource distribution are collectively required to strengthen education systems (World Bank and UNESCO, 2021). Improving the quality of primary education needs strategic reform

across the education system. This includes appropriate curricula and pedagogy, developmental programmes, effective teacher training, parental involvement and robust quality assurance and data systems (UNICEF, 2019a). Reimagine (2019) initiative attempts to close the gaps in primary education, allowing for better access, enhanced learning experiences, and using digital means to improve learning outcomes.

It advocates that the future of learning is a blended approach between the formal education system and learning outside the classroom. Collectively, governments, partners and UNICEF are working to build political commitment for quality primary education, ensuring equitable financing and distribution on resources, while providing equitable access (UNICEF, 2019). The initiative aims to enhance young people's digital skills, bridging the digital gender divide, connecting every school to the internet and bringing accessible technologies to children. This is particularly poignant today as many children are living in a world of conflict, disaster and poverty. It also aims to improve opportunities for girls who are kept out of classrooms (UNICEF, 2019).

Primary education seeks to nurture each child's individuality, allowing them to explore their talents, interests, and abilities fully. Three broad goals in the Primary Education Curriculum have been identified by the European Union (EU) to ensure that children are enabled to live a full life and to realise their own potential. The goals include, (a) creating a foundation for lifelong learning and personal growth, (b) developing the child as a social being, through interactions, cooperation, and shared experiences, (c) preparing the child for continuous learning by serving as a stepping stone for further education, including post-primary and third level education. It equips children with essential skills, knowledge, and a curiosity for learning and by fostering a love for learning, and it ensures a smooth transition to higher levels of (European Commission, 2023). All three goals emphasise the holistic development, social

integration, and lifelong learning for the child, laying the foundations for a well-rounded individual that is equipped to live a full life and participate in society.

2.2. Irish Primary Education

Irish primary education caters for children's first eight years in school, from age five to twelve (junior infants to 6th class). It consists of a comprehensive primary school curriculum (DES, 1999) which outlines the "what" and "how" of children's learning. The curriculum aims to develop each child's potential to the full, encourage a love of learning and to help children develop skills they will use all their lives (DES, 1999). The experience of primary school is one element in an educational continuum that includes pre-school care and development, post-primary as well as further and higher education and training, along with life experience. Lifelong learning, which involves a continuing process of updating knowledge and renewing skills, can help to equip the individual to cope with the rapidly changing nature of modern life, with its unpredictable patterns of life and work (Bozat et al., 2014). A commitment to lifelong learning can be nurtured from the earliest years in school, thus laying the foundation for the development of self-reliance in learning and a sense of responsibility for personal fulfilment. Primary school education in Ireland aims to do this (DES, 1999).

The Irish curriculum is presented in seven areas, some of which are further subdivided into subjects.

Table 1. Division of subjects in the Irish Primary School Curriculum. *Source: Primary School Curriculum Introduction (DES, 1999)*



Formal education in Ireland is compulsory from the age of six to age sixteen, or until pupils have completed three years of post-primary education, whichever is the later (Darmody et al., 2012). In practice, the majority of children begin primary schooling at age four (42%) and all children are in primary school by age five. The first two years of primary school (infant classes) are classified as early childhood education. Pupils normally attend primary school for eight years and then transfer to the post-primary sector at age twelve (E. S. E. P. European Commission, 2023).

The current official primary curriculum documents of the Department of Education (DE) were developed by National Council for Curriculum and Assessment (NCCA) and published in the 1999 Primary Curriculum. A curriculum review was undertaken in recent years and the Primary Curriculum Framework (PCF) was welcomed and published in 2023 with the development of curriculum specifications due to take place in the coming years (DE, 2023). The new Primary Mathematics Curriculum (PMC) was launched in September 2023 and full implementation is due to take place by

2025. A comprehensive professional development programme to support schools with the introduction and implementation of the PMC has been put in place and is currently being implemented by the teachers support service, Oide (DE, 2023).

The curriculum for the primary schools is determined by the NCCA. The curriculum sets out, not only what is to be taught, but how learning in the particular subject area is to be assessed. The NCCA leads developments in curriculum and assessment and supports the implementation of changes resulting from this work. The DE supports the development of overall policy relating to assessment, curricula, Gaeltacht and Irish-medium education. Schools and teachers take on the responsibility of delivering the curriculum as set out be the NCCA and Oide, the teachers' support service assists in advising and supporting schools in relation to this.

The primary curriculum aims to provide a broad learning experience and encourages a rich variety of approaches to teaching and learning that cater for the different needs of individual children.

2.2.1. Teaching Methods and Materials used in Irish Primary Education

All late and recent primary curricular specifications Primary School Curriculum (1999), the Primary Language Curriculum (PLC) (2019), and the new PMC (2023) advocate that teachers use a wide range of approaches and methodologies in their implementation of the Irish primary curriculum. In particular, they are expected to attain a balance between the development of pupils' knowledge, concepts and skills, and place particular emphasis on enabling children to learn how to learn (Wyse & Manyukhina, 2018). The methods advocated in the primary curriculum include the use of the child's immediate environment as the context for learning, guided activity and discovery methods, collaborative learning approaches and differentiation, (DE, 2023).

Integration is also a key approach in the primary curriculum. All primary school teachers are trained in the use of these methodologies during and receive ongoing support in their use in the continuous professional development (CPD) provided by Oide, (Volante, 2018). They all emphasise that children should experience a variety of classroom organisational frameworks. While these include individual learning and whole-class teaching, the curriculum particularly encourages collaborative learning through pair work and group work as appropriate to the specific learning contexts and goals (Amalia,
2017).

2.2.2. Assessment in Irish Primary Education

Assessment in Irish primary schools is viewed as building a picture over time of a child's learning progress across the curriculum and is posited as an integral part of teaching and learning, (Lysaght et al., 2019). Each classroom teacher is responsible for the ongoing assessment of his/her own pupils' progress and achievement. Teachers use a variety of assessment methods to support them in assessing pupils' learning and in making decisions about their future learning. Data from assessment can be used by teachers and schools to identify priorities for development including changes they may wish to make in teaching approaches, priorities for staff development and for the acquisition of resources. Assessment information can also be used as part of the monitoring of the effectiveness or otherwise of the initiatives put in place to improve pupils' learning (NCCA, 2007). Another form of assessment in all primary schools in Ireland is standardised testing. Literacy and numeracy testing is mandated by the DE in Ireland for 2nd, 4th and 6th class pupils. It is government policy that all primary schools report their results to the DE in the autumn of every year (DE, 2024a). However, it is

common practice that all classes from 1st to 6th are tested annually and their results are shared with their parents at the end of each academic year. In this study, the standardised testing results for literacy and numeracy were used to determine the outcome of the implementation of a QPE programme on 5th and 6th class pupils' AA.

2.2.3. Support Services in Irish Primary Education

Oide is a new support service for teachers and school leaders since September 2023, funded by the DE, formed from the integration of four existing support services (Centre for School Leadership, Junior Cycle for Teachers (JCT), National Induction Programme for Teachers, and the PDST. The organisation provides ongoing support and development opportunities for teachers. The work of Oide contributes to school improvement by providing high quality CPD on curricular and educational issues, fostering reflective practice and ongoing development among teachers and school leaders. Amongst the priorities for the DE for the coming years is the implementation of proposals to improve literacy and numeracy in both primary and post-primary schools. Other key priorities include support for implementing the PLC (2016) and the PMC (2023). It is important to note however that, during the main time frame of the data collection for this research, the relevant support body for primary teachers was mainly the PDST.

2.2.4. Irish National Policy Supporting Primary Education

2.2.4.1. Wellbeing Policy

As already stated, WB is a well-established goal for primary education and up to now was mainly assigned to the PE and SPHE curriculum (DES, 1999). It was also

present in the Aistear programme (NCCA, 2009) in the junior classes in primary schools and JC WB (NCCA, 2021) in post-primary schools for some years. However, it was generally missing in the Irish primary education system as a specific subject area, and this created a gap that has been addressed with the welcomed formalisation of WB in the Draft WB Specification 2024 (NCCA, 2024).

The National Educational Psychological Service (NEPS) is an applied psychological service for school staff to help build their capability to respond to the WB, academic, social and emotional needs of all pupils, and particularly those who are experiencing barriers to their WB, learning, inclusion and participation. One of the key policy documents to support WB in primary schools is the *Wellbeing Policy Statement and Framework for Practice 2023* (DES, 2018). The policy statement provides an overarching structure encompassing existing, ongoing and developing work in this area including Aistear: The Early Childhood Curriculum
Framework (NCCA, 2009) the SPHE curriculum at the primary level (DES, 1999) and the JC WB Framework at the post-primary level (NCCA, 2021). One of the main aims of this policy document is to ensure that the experience of children and young people from the early years and throughout their primary and post-primary education will be one that enhances, promotes, values and nurtures their WB.

The curriculum document that connects closely with the area of WB and which will bridge the gap between Aistear and JC WB in this area, is the Draft WB Specification (NCCA, 2024). This encompasses two important subjects: PE and SPHE. These subjects focus on learning and teaching about different dimensions of our WB, including our physical, social, emotional, and spiritual development. Through PE, children actively participate in educational experiences that foster the development of movement competency; an understanding of the benefits of movement in their lives; the building

of a supportive community of movement; and the establishment of positive behaviours and attitudes towards movement that will enable the adoption of an active and healthy lifestyle (NCCA, 2024). SPHE provides children with valuable knowledge, skills, dispositions, attitudes, and values related to their social interactions, personal WB, and health education. By integrating PE and SPHE within the WB curriculum, children have the opportunity to develop a holistic understanding of their WB and acquire the necessary tools to lead healthy and fulfilling lives (NCCA, 2024). Eight overarching principles underpin and guide schools in pursuing the vision of the DE. These principles convey what is valued in primary and special education in Ireland and what lies at the heart of high-quality learning, teaching, and assessment in the primary curriculum. They are broad in nature to reflect varied school contexts and children's different circumstances, experiences, and abilities. Table 2 presents a set of examples of the principles in action within the WB curriculum in its current draft version (NCCA, 2024).

Table 2. Principles of learning, teaching and assessment in the Wellbeing Curriculum. *Source: Draft Wellbeing Specification (NCCA, 2024)*

Principles of learning, teaching, and assessment	Examples within Wellbeing
Partnerships	• Working collaboratively with schools and parents[4] to support children's wellbeing • Collaborating with the local community to further and enhance school-based learning and providing children opportunities to develop a sense of community and belonging
Learning environments	• Using both the indoor and outdoor environment to support children's learning • Creating safe and inclusive learning environments, where children feel physically and emotionally safe
Inclusive education and diversity	• Fostering a culture based on human rights, democracy, equity, equality, and social justice • Challenging stereotypes and misconceptions, and promoting empathy, respect, and multi-perspectivity • Recognising and celebrating the diversity present within the classroom and in wider society
Engagement and participation	• Providing opportunities, where appropriate, to empower child voice and involvement through choice of how and what to learn • Acknowledging and supporting the rights of children outlined in the United Nations Convention on the Rights of the Child
Assessment and progression	• Drawing on a wide range of assessment data to inform, shape, and guide future learning experiences • Enabling children to set goals and monitor progress through peer and self-assessment
Transitions and continuity	• Building on children's prior learning, self-worth and identity as they engage in rich learning experiences in Wellbeing • Building foundational knowledge, skills, dispositions, attitudes, and values to support children's transition to post-primary school
Relationships	• Supporting the development of emotional and relational skills to enable healthy relationships • Fostering respectful and caring relationships towards children and their families
Pedagogy	• Promoting the use of a diverse range of pedagogies to enable every child to have a positive learning experience and develop their wellbeing.

2.2.4.2. Digital Strategy for Schools

Digital technologies have increasingly become part of everyday life in our modern society (DE, 2022). In 2022, the DE launched the *Digital Strategy for Schools 2027* which aimed at embedding digital technologies in primary schools. It envisioned a future

where every learner would have ample opportunity to benefit from technology in their learning and would develop key skills for the digital world. It builds on the achievements and ambition of the previous strategy (NSW Department of Education, 2019) and aims to further support the school system to ensure that all learners can gain the knowledge and skills they need to successfully navigate an ever-evolving digital world. As advocated by UNICEF (UNICEF, n.d.), digital learning has a big part to play in pupils' learning experiences and outcomes while attending primary school. The Digital Strategy for Schools 2027 (2022) highlights three pillars. These include, (1) embedding digital technologies in teaching, learning and assessment; (2) digital technology infrastructure; and (3) policy, research and digital leadership. Each of these pillars is essential to the success of the Strategy, they equip children with the skills and capacity they need to be effective as global citizens in a digital world (UNESCO, 2024). Over the lifetime of this Strategy (2022-2027), progressing the use of digital technology and innovation will be a key enabler to assist the NCCA with curriculum reform. Empowering school communities and building capacity will support progression of both primary curriculum reform, including the

Modern Foreign Language initiative, and Senior Cycle reform. Similar to the Irish context, the EU Digital Education Action Plan (2023) aims to develop a 'digital education ecosystem'. To this end the Strategy will enable governments to continue to support school leaders and teachers through effective ITE and CPD for teachers. It will support pupils to develop essential skills and empower them to gain the maximum advantage from digital technology in the classroom (DE, 2022).

2.2.4.3. School Self-Evaluation

In addition to the above, all schools are required to undertake School Self Evaluation (SSE) in accordance with guidelines developed by the DE (DES, 2012) and report the results to the board of management. The Inspectorate of the DE undertakes evaluations including whole-school evaluations and subject inspections on the performance of schools in all subject areas. The subject inspections include, literacy, numeracy, Irish, History, Geography and Science, Visual Arts, Music, Social and Personal Health Education and PE. The whole-school inspections involve the evaluation of all subject as well as leadership and management and the WB of pupils. PE evaluations do not take place as frequent as literacy and numeracy inspections but it can often be chosen the focus area for school as part of their SSE process under the umbrella of WB (DES, 2012).

2.3. International Perspectives on Physical Education in Primary Education

PE in primary education is an essential component of the educational curriculum for young children (Lynch, 2017). PE plays a crucial role in primary school curricula worldwide. It is described "as the only curriculum subject whose focus combines the body and physical competence with values-based learning and communication, [which] provides a learning gateway to grow the skills required for success in the 21st Century" (Mc Lennon & Thompson, 2015). PE holds immense importance in supporting the general aim of primary education in schools for several compelling reasons as QPE has a key role to play in delivering overall quality primary education for young people. The reasons for this are multi-faceted as argued by Gualdi-Russo & Zaccagni (2021): a) PE promotes physical WB by promoting physical fitness and overall health; b) regular PA (through PE) reduces the risk of lifestyle- related diseases as well as releasing

endorphins which reduces stress and anxiety and c) PE provides an opportunity for children to develop essential motor skills such as coordination, balance and agility. These skills are foundational for overall physical competence. QPE as part of a quality primary education has other features such as cognitive benefits, social skills, emotional WB, lifelong habits, inclusion and investment (Marron et al., 2023). Active participation in PE enhances cognitive functions, concentration and memory and it can contribute to better academic performance (Kingston et al., 2022). PE fosters teamwork, cooperation and communication and children learn to collaborate and interact positively with peers when taking part (Morgan & Hansen, 2008).

2.3.1. International Approaches to Teaching Physical Education in Primary Education

It can be argued that PE is a significant subject within primary schools and offers powerful connections for other curriculum areas (Dockerty & Pritchard, 2023). The physical dimension often increases children's interest in learning through "play", an essential form of learning in the early years of primary school (Lynch, 2017). According to the Australian Curriculum, Assessment and Reporting Authority (ACARA) (2016), play is an activity that is positively valued by the player, self-motivated, freely chosen, and engaging. Children actively involved in play may be engaged in a variety of activities, independently, with a partner, or in a group. Play can occur indoors or outdoors. It is closely tied to the cognitive, socio-emotional, and motor development of young children, and is an important part of developmentally appropriate early years learning (Bento & Dias, 2017). Hence, play is embedded within the physical dimension and is closely related to the values-based learning and communication of PE (Arthur et al., 2015). Arthur et al. (2015) refers to play types for children as; physical play; play with objects; symbolic play; pretend play; socio-dramatic play; and games with rules.

While all play types occur during PE enabling “the development of imagination and intelligence, language, social skills, and perceptual-motor abilities” (Lynch & Soukup, 2017), it is games with rules which are predominant in the PE curriculum (Ofsted, 2022). The Australian curriculum for Health and PE (HPE) lists “Active play and minor games” as a focus area taught from Foundation to Year 10. Also, within the sub-strand of the Australian curriculum “Moving our body”, it states “the content lays the important foundations of play and fundamental movement skills” (Australian Curriculum, 2016).

Another international teaching practice related to the teaching of PE is known as the models-based practice. This is a pedagogical approach that focuses on a theoretical understanding and implementation of a range of models in teaching (Metzler, 2011). Research in this area suggests that, traditionally, PE teachers tend to deliver using a single model that is taught in isolation (Volshøj & Jensen, 2022). According to Casey and Kirk (2021), models based practice offers a more versatile approach to PE that can overcome some of the challenges of teaching through traditional styles. Metzler (2011) suggests that there are a number of models for teaching PE that are commonly recognised, these include traditional, teaching games for understanding, game sense, cooperative learning and sport education. Adopting a models-based practice approach to teaching PE would see teachers practice all of these models, aiming to provide a deeper and wider scope of learning than what one model can offer (Lund & Tannehill, 2015). Previous studies have already sought to investigate the effects of integrating one or more of these models in a hybrid-approach to teaching PE (Casey & Dyson, 2009), but few have aimed to connect and purposely integrate all of them into a school curriculum.

Similarly, the Irish curriculum for PE (DES, 1999) meets the physical needs of the child and the need for movement experiences, challenges and play. This curriculum develops a desire for daily PA and encourages constructive use of free time and

participation in PAs in adult life. To fulfil these needs, PE is built on the principles of variety and diversity, not of specialisation, following on from the Aistear guidelines (NCCA, 2009). It provides a wide variety of movement activities appropriate to the level of development of the child. Through PE the child can experience the joy of physical exertion and the satisfaction of achievement while developing skills and positive attitudes that enhance self-esteem. In the Irish curriculum, PE provides opportunities to develop desirable, personal and social attributes: the concept of fair play, the acceptance of success and failure, and the ability to co-operate in group situations.

These opportunities contribute to the understanding and promotion of a healthy lifestyle. The PE curriculum (DES, 1999) encourages schools to provide a broad and balanced PE programme. This can be created by meeting the needs of all pupils, by including all strands of the curriculum where possible. Assessment in PE is emphasised in this curriculum and should include, teacher observation, teacher-designed tasks and curriculum profiles. Strategic planning for PE is outlined as an integral part of a successful PE curriculum and should create a common understanding of PE, aim to utilise fully the interests and expertise of the teaching staff. An examination of the facilities and resources available to the school should contribute to the overall school plan which should be reviewed by the board of management regularly. The whole-school plan for PE should be continually reviewed and evaluated as well as providing regular communication between teachers, parents and the board of management (DE, 1999).

In summary PE, as an integral part of the total curriculums, in the UK, Australia and Irish provides vital opportunities for the physical, social, emotional and intellectual development of the child (MacPhail et al., 2008).

2.3.2. Current status of Physical Education in Schools Internationally

For many children and adolescents, particularly those from disadvantaged backgrounds, PE may be the only setting where they engage in good-quality and meaningful PA experiences guided by a qualified specialist in the PE curriculum who provides pedagogically aligned lessons (Howells, 2018). Additionally, there is evidence suggesting that PE can be an effective means to promote PA inside and outside of school (Bassett et al., 2013; Chen et al., 2014).

Adolescent physical inactivity likely contributes to key global health problems, including cardio-metabolic and mental health disorders. Evidence-based solutions focus on three key components of the adolescent PA system: (i) supportive schools, (ii) the social and digital environment, and (iii) multi-utility urban environments (Van Sluijs et al., 2021). Thus, participation in PE classes can be considered an important context for the promotion of PA in youth and have a role in reducing access to PA opportunities.

Globally, 80% of adolescents are insufficiently active, and many engage in ≥2hrs of daily recreational screen time (Van Sluijs et al., 2021). Sport Ireland, the authority responsible for the development of sport in Ireland, released similar research findings on PA among children and adults (Woods et al, 2022). The research, through the Children's Sport Participation and Physical Activity Study (CSPPA) and the Irish Sports Monitor (ISM), provided valuable insights into post-pandemic sport participation and PA levels in Ireland. Among children, 15% reported meeting the recommended PA guidelines of one hour of moderate-to-vigorous physical activity (MVPA) per day, marking a 2% increase since 2018, however remaining below the global figures cited above which indicate 20% of children and adolescents being sufficiently active (Van Sluijs et al., 2021). Primary students reported an average of 85 minutes of PE per week, almost double the reported minutes in 2010. Children's sports participation rates have

increased since 2018, with 96% of primary and 84% of post-primary students participating in some form of sport at least once a week. Additionally, there is a gap in monitoring systems of PE and PA at schools, which would contribute to tracking progress and inform decision-making to drive PE and PA policy, action, and research in this area (WHO, 2022). PA policies have to be regularly monitored and systematically analysed, to know when and which of their aspects need to be improved. Continued monitoring of PE policies and their actual implementation is needed worldwide (Martins et al., 2020).

The findings from these studies suggest that national, regional and worldwide data highlight the importance of improving participation in PE and the monitored implementation of PE policy. It reminds us that we are a global community as well as a national regional and local community of PA promoters. Perhaps in this context we should remind ourselves that working together can only improve our current situation (Ramirez et al. 2021).

In most countries there are either legal requirements for PE or it is a matter of general practice for both boys and girls at least at some age of compulsory schooling years (Hardman, 2008). PE provision during compulsory schooling years differs across regions and countries according to age or year stage of attendance with variations in number of lessons per week and weeks taught per year. Despite official commitment to PE either through legislation or as a matter of general practice, such provision is far from assured (Mc Lennon & Thompson, 2015) Non-compliance with regulations is particularly evident in countries where curriculum responsibility lies with education districts or individual schools, i.e., in contexts of localised implementation of curricula (Hardman et al., 2013). Research indicates a perceived decline or marginalisation of PE in schools, particularly marked in the 1990s (Chaput et al., 2020; Hardman, 2008a).

Hardman draws from the Second Worldwide Survey (2013) to discuss the situation of PE in schools. The Survey was in response to inter-governmental agencies' calls for regular monitoring of developments in school PE in the form of a 'reality check'. The overall purpose of the Survey was to assess the worldwide situation of school PE as well as developments since the PE World Summit held in November 1999 in Berlin. The 'reality check' showed that positive developments and policy rhetoric are juxtaposed with adverse practice shortcomings. Thus, the overall situation is one of 'mixed messages' with evidence that national and regional governments have committed themselves through legislation to making provision for PE but some have been either slow or reticent in translating this into action. As a result, there is unease over the falling fitness standards of young people, rising levels of obesity amongst children of school age and high youth dropout rates from PA engagement (Kunešová et al., 2007; WHO, 2016). Whilst some improvements in inclusion policy and practice can be identified since the Berlin PE World Summit, barriers to equal provision and access opportunities for all still remain. Central to the situation is the gap between promise and the reality. There is a need to develop strategies to convert "promises" into "reality" and so secure a safer future for PE in schools (Hardman et al., 2013; Mc Lennon & Thompson, 2015). Encouragingly, intergovernmental initiatives at the European Parliament's 2007 Resolution on the Role of Sport in Education and UNESCO advocacy action place PE on the political agenda (European Commission, 2007). With such commitments to government policy and advocacy action, a sustainable future for PE appears to be realisable.

2.3.3. Access to Physical Education Globally

Within education systems, the majority of countries (89% primary schools; 87% post- primary schools) have legal requirements for PE in schools. The collective surveys' data show consistency between Worldwide Surveys I and II (Hardman et al., 2013), that PE is a compulsory subject in a large majority of educational systems globally and, where it is not compulsory, it is generally taught as a matter of general practice. Data from the 2013 UNESCO global survey of school PE (Hardman et al., 2013) showed that 97% of countries have legal requirements for PE at some point during compulsory schooling years. Despite official commitment to PE, noncompliance with regulations is evident, with about 29% of countries not actually implementing PE in accordance with legal and mandatory obligations. The start end years' range and general access to PE are significant for individual development and sustained participation in PA (Hardman et al., 2013). The early years are important in developing fundamental movement skills and providing opportunities for optimal development of physical capacities during the crucial years of growth and maturation (Duncan et al., 2022). For later age school start, it is recognised that pre-school experiences might offer similar opportunities but often they are neither compulsory nor accessible to every child. The significance of school finishing age is dependent on tracking PA engagement from adolescence to adulthood. When access to PE programmes ends at an earlier age, pupils are vulnerable to disengaging from PA with a consequence that they do not continue with it in later life (Hardman, 2008).

2.4. High Level Recommendations for Physical Education

There are no easy answers or single solutions to the question of how to reform the PE curriculum so that it is fit for purpose in the 21st century. Alongside the global trends

that are rapidly changing the world, countries and jurisdictions must adapt and respond to nuanced local circumstances, as well as priorities and expectations rooted in social, cultural and historical contexts (Australian Curriculum, 2016). Recent and ongoing reforms from countries and jurisdictions provide useful insights into policy-making decision processes, priorities, and strategies (DE, 2023). Future pointers are suggested by the Organisation for Economic Cooperation and Development (OECD) (Howells, 2018) to develop and deliver dynamic and inclusive PE curriculum for children and adolescents today, and to ensure an effective implementation entrusted with agency models. These pointers are supported by the design principles accumulated in the knowledge base on curriculum design and implementation of the OECD Future of Education and Skills 2030 project (Howells, 2018). Table 3 explains the international organisations that have informed PE and Health Education (HE) policy development and curriculum in recent times.

Table 3. International organisations that have informed PE/HE policy development and curriculum. *Source: Future of Education and Skills 2030, OECD*

Who	Responsibility
OECD	The OECD puts an emphasis on international comparative educational research to inform education policies. Broad initiatives in this line include the Programme for International Student Assessment (PISA), the Definition and Selection of Competencies Framework, and the Well-being Framework. Targeted initiatives for PE/HE also exist: the OECD Future of Education and Skills 2030 is channelling efforts from countries like Korea to conduct subject-specific analysis of pathways for forward-looking reforms, including PE/HE.
World Health Organization (WHO)	Reporting global public health trends and information on children and youth health outcomes, the WHO informs country and jurisdiction reform processes and both public and political discourse on the issue.
United Nations Educational, Scientific and Cultural Organization (UNESCO)	UNESCO provides guidance for policies in PE/HE, via, for instance the *Quality Physical Education* (UNESCO, 2015); sexuality education guidelines (UNESCO, 2009); and the *International Charter of Physical Education, Physical Activity and Sport* (UNESCO, 1978).
International Olympic Committee (IOC)	The International Olympic Committee provides impetus for PE/HE when Olympic Games are celebrated in a given country. Both **England (United Kingdom)** and **Japan** report increased interest in the subject as a result of the Olympic Games.
European Union	Provides evidence and policy for the effective inclusion of PE/HE in school curricula within Europe. A key contribution in this line includes the *Physical Education and Sport at School in Europe* report (European Union, 2013).
European Physical Education Association (EPEA); Europeactive	EPEA provides research on the impacts of physical activity as well as advocacy for the inclusion of physical activity and PE/HE within education policy circles at the European level.

In the following sections the recommendations from UNESCO, WHO and OECD are summarised with a view to establish key elements of QPE from the perspective of these leading international policy makers.

2.4.1. Recommendations for Quality Physical Education from UNESCO

In a report from UNESCO (2015), QPE, Guidelines for Policy Makers, the organisation urges call on governments to reverse the decline in PE investment that has been observed in recent years in many parts of the world, including some of the wealthiest countries. According to UNESCO QPE (Mc Lennon & Thompson, 2015) funding and time allocation for PE in schools has been declining progressively over more than half of the continent, and conditions are not better in North America. These guidelines were produced in partnership with several international organisations, and

advocate QPE and training for PE teachers. It highlights the benefits of investing in PE versus the cost of not investing. UNESCO director-general Irina Bokova states, "*Public investment in PE is far outweighed by high dividends in health savings and educational objectives. Participation in QPE has been shown to instil a positive attitude towards PA, to decrease the chances of young people engaging in risky behaviour and to impact positively on academic performance, while providing a platform for wider social inclusion*.", (Mc Lennon & Thompson, 2015, pg4).

QPE includes the learning of a variety of motor skills that are designed to enhance the physical, mental, social and emotional development of every child (NASPE & AHPERD, 2012). Participation in PE should support the development of physical literacy and contribute to global citizenship through the promotion of life skills and values. In response, the outcome is to develop physical literacy in young people as part of their lifelong journey. As such, PE should be recognised as the basis for an inclusive civic participation continuum over the full life-span (Mc Lennon & Thompson, 2015). UNESCO recommend five dimensions so that improvements can take place in the provision of QPE in schools worldwide.

Table 4. National Strategy for QPE. *Source: Quality Physical Education Guidelines for Policy Makers (Mc Lennon & Thompson, 2015)*

National Strategy for QPE				
Curriculum flexibility	Community Partnerships	Monitoring and quality assurance	Teacher Education, development	Facilities, equipment and resources

2.4.1.1. Curriculum Flexibility

To make PE curricula meaningful for 21st century children and youth, innovative learning theories and new perceptions of the subject need to be considered, evaluated and implemented (European Commission/Eurydice, 2013). Much contemporary data indicates a perceived deterioration in the attitudes of pupils towards PE due to the domination of competitive sports and performance-based activities. Given the wide range of educational and other outcomes often claimed for PE, it is argued that traditional programmes take a "one size fits all" approach and, in doing so, fail to achieve any of these outcomes (Metzler, 2011). A more balanced approach to PE enables all learners, whatever their particular gifts or abilities, to develop their potential and enhance their physical competence, dramatically expanding the skills that each participant gains. Access to a well-balanced curriculum enables development across social, cooperative and problem-solving competencies. It also facilitates hands-on experience in making self-assessments, planning personal programmes, setting goals, self-monitoring and decision-making (Le Masurier and Corbin, 2006). In order to maximise the contribution of PE to the development of positive lifelong habits, curricula should be flexible, and open to adaptation, so teachers are empowered to tailor provision to suit the diverse needs of the young people they are working with. This should be done through consultations with young people to ensure their interests and needs are reflected, and to strengthen broader civic engagement through PA (Jones, 2006).

2.4.1.2. Community Partnerships

When considering the role of PE in promoting engagement in healthy, active lifestyles through the life course, the development of partnerships, between schools and community- based sports organisations and clubs is essential to accommodate broader

life-long educational outcomes, including health and WB, as well as personal and social development (Mc Lennon & Thompson, 2015). Research has confirmed that pupils are more likely to be physically active in schools with well-established school-community partnerships (Ngobeni, 2024). This includes partnering with community-based recreation clubs and organisations, and providing staff with ongoing support and training about the establishment of effective school initiatives. In this regard, there should be a clear consensus and shared understanding between policymakers and practitioners regarding the purpose and priorities of PE, in terms of meeting wider societal and educational development objectives (Leatherdale et al., 2010).

Only around a quarter of countries have formally arranged school-community partnership 'pathways' in place (Center for Higher Education Policy Analysis, 2005; Intercultural Center for Research in Education, 2005). Reasons for shortfalls in such agency partnerships include: lack of teacher-outside school agency communication, infrastructural deficiencies, non-implementation of mandated requirements and financial cut-backs. Where school-wider community agencies' provision exists, there are pervasive links between schools' competitive sport activity programmes, tournaments and development of talented young athletes from local, through to international level agencies. Some countries also have either informal and/or formal school community pathways that variously encourage participation in PA after, or outside of, school and, which embrace a broader 'sport for all' philosophy, (Harvard Family Research Project, 2010; ICEE, 2013).

2.4.1.3. Monitoring and Quality Assurance

There are mixed practices in all aspects of monitoring processes in school PE programmes. Monitoring assessment or evaluation of PE is legally required in many countries (Hardman, 2006). However, it may be irregularly, infrequently or rarely carried out or there may be either no administrative system in place, or there is a shortage of appropriately qualified personnel to facilitate the process. The scope and frequency of monitoring differ across the world (Mc Lennon & Thompson, 2015; UNESCO, 2020). Monitoring inspections are variously undertaken by school/head teachers, local or regional or national inspectors or most commonly by combinations of two or more of these groups. Where monitoring occurs, globally and regionally the reasons predominantly comprise quality assurance (QA) and guidance. Implementation, and the delivery of QPE, should be supported by clear systems for monitoring and QA, accompanied by support systems that assist teachers and schools in developing strengths and addressing weaknesses (Mc Lennon & Thompson, 2015). QA can be enhanced through the establishment of an autonomous coordinating body that promotes and fosters good practice in provision and delivery. A key element of the monitoring and QA process is adherence to the benchmarks of QPE and Quality Physical Education and Teacher Education (QPETE) (UNESCO, 2014).

2.4.1.4. Teacher Education, Supply and Development

As the provision of QPE depends on well qualified educators, responsible authorities should undertake punctual reviews of systems of QPETE as a policy priority (Ní Chróinín et al., 2018). Both specialist and generalist teachers should be trained to deliver QPE in accordance with national/region qualification standards. Training should

be facilitated by physical education teacher education (PETE) institutions (Lynch, 2017). Government, or a well-established coordinating body, should take responsibility for the coordination and provision of a CPD framework which aims to raise and protect professional standards. The responsible agency should play a significant role in providing leadership for QPE and its practitioners; particularly in the improvement and safeguarding of standards, and in the development of accreditation systems to ensure appropriate preparation, experience and qualification as well as safe and ethical delivery (Lynch, 2017). CPD opportunities should involve internal and external experts, and should deepen and extend teacher knowledge and skills. Moreover, international collaboration between physical education professionals is essential to the development of QPE and should be promoted through exchange programmes for physical education professionals (EUPEA, 2011).

2.4.1.5. Facilities, Equipment and Resources

The provision of QPE requires material resources, and appropriate technical support, to ensure access to PE for all pupils, including those with disabilities, and those with specific religious requirements (McLennon & Thompson, 2015). The learning environment is fundamental to good-quality education, and should include safe, healthy, and protective physical and social environments for pupils and teachers to learn and work in (UNESCO & UNICEF, 2013). In order to secure the place of PE within the school curriculum, provision should not be marginalized in favour of other subjects and events which require resourcing (NCCA, 2021). Where this is unavoidable, efforts must be made to provide PE using alternative, appropriate facilities. In this regard, partnerships with community sports organisations should extend to use of community

facilities to reduce costs and encourage young people to engage in extracurricular sport and PA, beyond the school day (Sport Ireland, 2022).

2.4.2. Recommendations for Quality Physical Education from WHO

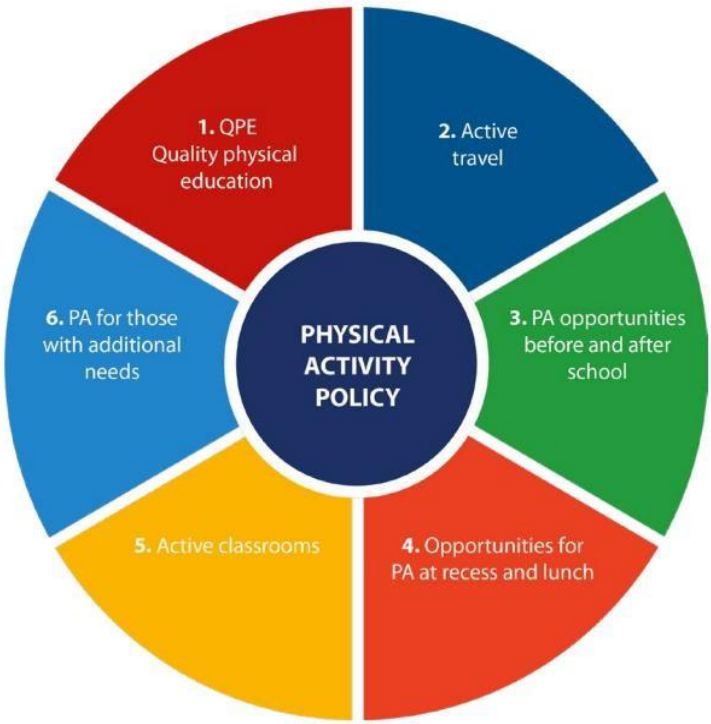
PA is good for hearts, bodies and minds. Regular PA can improve physical fitness; improve heart, vascular and metabolic health, and bone health; and reduce adiposity in children and adolescents (Chaput et al., 2020). Being active can also improve cognitive function, including AA and WB, and can reduce symptoms of depression and anxiety (Mandolesi et al., 2018). In contrast, too much sedentary behaviour can be unhealthy; it increases the risk of obesity and poorer fitness and cardio metabolic health, and can affect sleep duration (Chaput et al., 2020).

The WHO emphasises the importance of integrating PA into primary school so that all children can be physically active on a regular basis, which will contribute to preventing the increasing public health problem of childhood obesity. It highlights six evidence-based domains for promoting PA in schools:

1. QPE
2. Active travel to and from school
3. Active before- and after-school programmes
4. Opportunities during recess to encourage PA
5. Active classrooms
6. Inclusive approaches to PA

It describes how the school environment can be used to develop, implement and evaluate strategies that promote PA and reduce sedentary behaviour among children and young people, (WHO & UNESCO, 20

Table 5. The six domains that are effective as part of a whole-of-school approach to promoting PA. *Source: WHO, 2021*



The first domain, Provide PA through QPE, is of particular interest to this study. QPE should focus on teaching physical competence and confidence (WHO, 2016), sport and movement skills, and knowledge about the health behaviours needed to establish and sustain lifelong PA and health. PE provides an opportunity to increase PA during the school day, and has the potential to reach most children, ensuring access to and appreciation of health enhancing PA. It can provide children with opportunities to gain competence in a broad, balanced range of PA so that they can enjoy being active. Developing confidence and competence in PA will increase the likelihood that children will choose to be active in their own time.

As already mentioned, PE provision differs across regions and countries according to age or stage of attendance, with variations in the number of lessons per week and weeks taught per year (Hardman et al., 2013; WHO & UNESCO, 2021).

With that in mind the following key considerations are recommended by the WHO, (2016)

- PE should be valued within the school and should not be replaced by other subjects, courses or activities; also, it should be provided to all children, irrespective of age, gender or ability.
- All schools should provide QPE as a core part of formal curricula, led by appropriately trained teachers.
- Pupils' performance should be evaluated in terms of personal improvement and effort and not by comparison to others.

2.4.3. Recommendations for Quality Physical Education from OECD

Active lifestyles are key to ensuring both individual WB and sustainable, social development. QPE plays a key role in achieving this by fostering lifelong PA, improving young people's mental and emotional WB, and developing critical life skills (UNESCO & Loughborough University, 2024). It has been shown time and again that engaging in regular values-based sport and PE decreases the chances of engaging in risky behaviours, contributes to enjoyment of education, promotes equality, and enhances employability. Every young person has the right to access education worldwide. QPE is an integral part of students' education, as it helps them develop essential skills to lead healthy, active, and fulfilling lives (EUPEA, 2011).

Research has also demonstrated that QPE is a driver of inclusion, particularly for girls and students with disabilities, and can foster intercultural exchange. Students who participate in QPE programmes grow in confidence and in terms of their physical literacy. This, in turn, makes them more likely to lead active lives and participate in community sport outside of the school setting (Martins et al., 2020). As such, QPE provides a springboard to wider patterns of lifelong activity, health, and inclusivity (Mc Lennon & Thompson, 2015). UNESCO works to define, promote, and expand the reach of QPE in policy frameworks and schools around the world. They believe, investing in QPE is investing in the physical and mental wellbeing (MWB) of our future generations.

With a global majority of countries investing less than 2% of their education budgets in PE, we need to act quickly and decisively to ensure that this fundamental right to movement and play, encoded in UNESCO's International Charter of Physical Education, Physical Activity and Sport, is accessible to all. QPE provision does not happen by itself: it requires systemic change that is underpinned by evidence-based policy. UNESCO's Global State of Play Report, and recommendations on QPE, present unique insights and concrete actions to support public policy makers address challenges from policy to practice, and to maximise the return on investments in doing so. Informed by the evidence provided, now is the time to act, to ensure equality of access to QPE, to enhance teacher capacities, and to frame the value of QPE as a core curricula subject contributing to key learning domains (UNESCO & Loughborough University, 2024).

2.4.3.1. Wellbeing

One of the key recommendations from OECD in redefining PE involves placing student WB at the centre, with a wider and long-term perspective, reflecting increasing interest in not just pupils' AA, but their overall health and WB. These curriculum

reforms emphasise pupils' social and emotional skills and experiences, alongside cognitive development and academic outcomes (Donnelly et al., 2016; Woods et al., 2023). Such reforms often recognise the complex pathways for these outcomes to be developed in inter-dependent and ecological contexts. Education policies may, therefore, aim to promote regular PA to reduce the negative effects on WB of not engaging in any kind of MVPA, especially during early adolescence, to counter this trend and its consequences for student WB as well as possible lifelong implications

(OECD, 2019).

2.4.3.2. Make Physical Education/Health Education Work for All

Another recommendation is to highlight "inclusiveness" as an explicit design principle for PE curriculum. For many disadvantaged pupils, curricular PE is likely to be the only opportunity to engage in supervised, structured PA (OECD, 2017). Well-designed PE curricula, that include access to extra-curricular activities, can help to reduce inequalities in engagement with PA as well as inequalities in knowledge around eating and lifestyle habits (Buckley & Lee, 2021). Beyond this, PE/HE curricula could also include activities that foster autonomy and self-control, important domains for the empowerment of disadvantaged pupils that PE/HE can impact (Bailey, 2006; Laker, 2002). If PE/HE wants to be a driver of inclusivity, it is important that the implementation of the PE/HE curricula ensures participation opportunities and access for the diverse range of pupils. This way, PE/HE could become a more attractive learning area for those pupils who are currently less engaged in the subject. Similarly, it is important that PE/HE includes gender and disability guidelines together with a relevant choice of activities that facilitates student participation and avoids the reinforcement of gender stereotypes and gender biases (Marron et al., 2023).

2.4.3.3. Move Towards Knowledge-Rich, Competency-Based Curricula

It is of critical importance to highlight that the OECD Future of Education and Skills 2030 working group has identified that countries usually perceive a false dichotomy between "content-based curriculum" and "competency-based curriculum". A content-based curriculum focuses on teaching specific subject matter (Brooks, 2014) as opposed to a competency-based curriculum which can be defined as an approach that focuses on pupils acquiring specific competencies rather than simply spending a set amount of time in a classroom (Levine et al, 2019). The effective development of competencies requires nurturing knowledge (i.e., content, concepts), skills, and attitudes and values (O' Sullivan & Bruce, 2014). As was reported by British Columbia, Canada, at the OECD Education 2030 project's meeting, in May 2019, an integrated model of a "concept-driven, competency-based curriculum" is starting to emerge. One of the most common challenges faced by countries in today's curriculum reforms is how to incorporate emerging key competencies or new themes in curricula that are already overloaded. As such it is important to incorporate cross-curricular themes and competencies into key concepts of PE/HE.

2.4.4.4. Address Curriculum Gaps

It is crucial to align goals, pedagogies and assessments, in particular using information and communication technologies (ICT) as an opportunity for enhanced pedagogies and innovative assessments. This is especially important for countries embarking on forward-looking PE/HE curricular reforms, incorporating competency-based design concepts or diverse leaning outcomes in their curricula (Howells, 2018). Learning outcomes are increasingly defined with a wider scope of target goals as

formulated in the curriculum; however, pedagogy and instruction and assessment are still to be redesigned (Erwin et al., 2012). In the same fashion, assessment in PE/HE has traditionally focused on what is easy to observe, rather than on what is expected in terms of student individual, social and affective outcomes (López-Pastor et al., 2013). While new approaches to assessments in PE/HE are emerging, with the introduction of forward-looking curricula increasing use of technology and devices is cited as part of the broader social trends that are contributing to risk factors such as sedentary lifestyles and inadequate PA among children and young people. However, there are promising signs that technology and ICT can be part of the solution in improving PE/HE in schools (Dumont et al., 2010).

2.4.4. Other Recommendations for Quality Physical Education

It is important to note that in many contexts the burden on teachers seems to increase as an unintended consequence of the teacher agency model (Li & Ruppar, 2021; Xin & BrionMeisels, 2024) For example, countries like Japan report that teacher burnout is an increasing concern, with PE/HE teachers responsible for conceptualising the translation of new curriculum designs into class practices, as well as being responsible in many cases for extracurricular activities (Hascher & Waber, 2021). Articulating the concept of "shared responsibilities" involves not only the whole school but also communities beyond school can be an important lever for ensuring teacher WB, while enabling teacher agency to interact with the educational ecosystem. In this line, teachers can be granted the opportunity to tap into external resources like community facilities or community members to support curriculum implementation. This approach is especially relevant in rural areas where decreasing rates of fertility make it difficult to hire PE/HE teachers or to provide PE-related facilities at each school, accordingly

(Sibley & Etnier, 2003). In recent years, teacher WB has received increasing attention that has led to a plethora of empirical studies from various disciplines (Hascher & Waber, 2021; Madigan et al., 2023; Mijakoski et al., 2022). Hascher et al. (2021) showed that social relationships seem to play a pivotal role in determining teacher WB and although empirical evidence regarding its outcomes is scarce, results suggest that teacher WB influences teaching quality.

Similar to the UNESCO recommendation mentioned above, monitoring PE needs to be addressed (Cale et al., 2014). Focus in particular should be given to student WB, and piloting of new curriculum contents, pedagogies and assessments. Countries and jurisdictions usually report new curriculum content, pedagogies and assessments are not always effectively aligned when taken to class settings, or they are difficult to scale up. In this sense, piloting and monitoring mechanisms are useful tools for the effective implementation of new curricular reforms (OECD, 2019). Monitoring mechanisms can also lever indicators on key areas for student WB, like student safety or gender markers. This would allow countries and jurisdictions to obtain granular data on how in-class practices contribute to student WB to inform future reform through learning, (Aston, 2018).

While the evidence base on PE, PA and child/youth outcomes is expanding, it nonetheless remains an under-developed area of research within comparative curriculum studies (Erwin et al., 2012). Table 6 highlights some key gaps in the evidence, and priority areas for development and further research. Further research in these areas will contribute to making PE/HE curriculum development process more systematic and evidence-based, valuing student agency and student WB, rather than focusing on continuous political and ideological debates (McConnell, 2018). More evidence-based policy and curriculum in PE/HE is required as well as research on the relationships and

factor analysis in the same area. Inclusion strategies for PE and PA at school needs to be addressed and the effects of innovative pedagogies and assessment would all benefit the provision of QPE in schools.

Table 6. GAPs in the evidence and areas for further development. *Source: OECD Future of Education 2030, (2019)*

Areas for further research	Topics/direction within areas for further research
Evidence-based policy and curriculum in health and physical education	• More research, especially longitudinal studies and more comprehensive meta-analyses, are needed to answer the impacts of PE curriculum to inform the development of evidence-based policies, in particular sub-groups of interest ((Cook and Kohl, 2013 , Alvarez-Bueno et al., 2017b; Fedewa and Ahn, 2011; Sibley and Etnier, 2003). • Research on causal relationships between identified mediators, physical health and developmental outcomes in later childhood and adulthood (Aston, 2018).
Research on the relationships and factor analysis in physical and health education	• Research on the relationship / developmental pathways among physical, lifestyle, social, health, and cognitive outcomes. • Research on the relationships between physical activity, fitness and academic performance, and socio-economic status (Biddle and Asare, 2011, Efrat, 2011) ; and, in particular, in subject areas other than mathematics, reading and other language-related skills (Alvarez-Bueno et al., 2017a). • Research on the impact of physical activity on specific groups of students, e.g. students from minority backgrounds, hard-to-reach families, LGBT children, etc. who face a disproportionate risk of experiencing mental health issues (McConnell, 2018).
Inclusion strategies for physical education and physical activities at school	• Research on inclusive physical education curriculum and instructional strategies, and school level interventions to increase participation of less representative groups in physical education, physical activities and extra-curricular sports, identifying specific barriers and incentives.
Effects of innovative pedagogies and assessments in physical and health education	• Impact of technology on interventions, particularly for increasing levels of physical activity among children and youth, and promoting positive behavioural change (Aston, 2018).

In summary there are many high-level recommendations made by international organisations worldwide, including UNESCO, WHO and the OECD. Interestingly, there are overlaps with some recommendations but collectively they all need to be prioritised by countries respective governments, policymakers, and researchers. PE needs to propel itself from a state of marginalisation with the assistance of a multi-agency effort to a state of prioritisation. Altogether, these high-level recommendations

allow to start identifying key dimensions of QPE and how they might be conceptualised and operationalised from a research perspective.

2.5. Irish Context of Primary Physical Education

Following the discussion of the Primary Education aims and implementation internationally and nationally, and the discussion of QPE internationally, it is now important to look at the intersection between PE and Primary Education in the Irish context. The Irish Primary PE Association (IPPEA) is dedicated to heightening awareness of PE issues in primary schools in Ireland and aims to promote PA in an educational context. It promotes PE at primary level and liaises with other organisations involved in the promotion of PE, PA and Sport.

2.5.1. Aim of Physical Education in Irish Schools

PE is the planned, progressive, inclusive learning experience that forms part of the curriculum in early years, primary and post-primary education. In addition to contributing towards PA levels, PE can also aim to help children acquire the competencies, motivation, confidence, knowledge and understanding associated with physically literacy and supports them in developing active lifestyles (Belton et al., 2022).

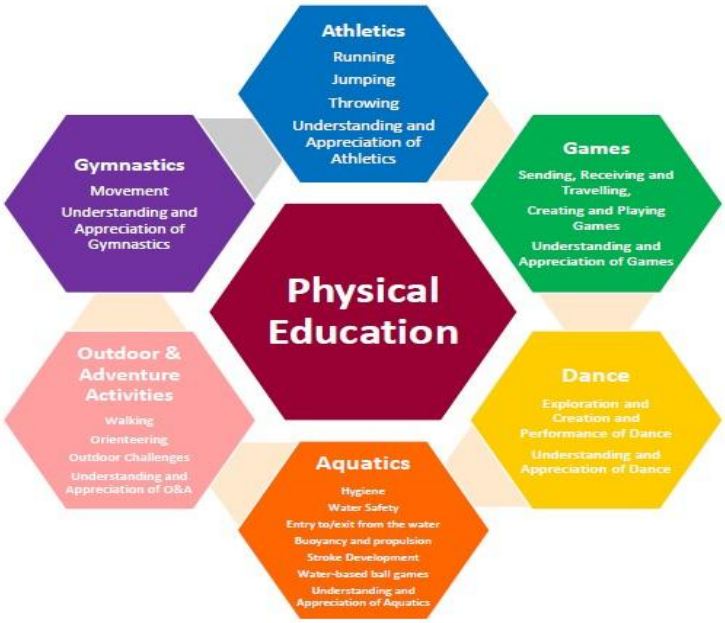
In addition, PE plays a vital role in a child's overall development, including their WB. With its focus on the body and physical experiences, PE holds a unique position within the school curriculum, aiming to promote active and fulfilling lifestyles amongst children now and into the future. PE prioritises learning, participation, enjoyment, self-referenced progress, and the creation of a supportive environment for all children, over high-level performance emphasised in sport or isolated PA (NCCA, 2024). The Draft WB Specification (2024) encompasses PE and focuses on learning and teaching

different dimensions of our WB, including our physical, social, emotional, and spiritual development. Through PE, children actively participate in educational experiences that foster the development of movement competency; an understanding of the benefits of movement in their lives; the building of a supportive community of movement; and the establishment of positive behaviours and attitudes towards movement that will enable the adoption of an active and healthy lifestyle. The overall aim of this most recent PE curriculum in Ireland is to incorporate a WB curriculum in primary education and provide children with a comprehensive foundation for leading fulfilling lives and navigating the intricate and ever-changing challenges of the contemporary world.

2.5.2. Content of Physical Education Curriculum in Irish Primary Schools

The curriculum is divided into six strands: Athletics, Dance, Gymnastics, Games, Outdoor and Adventure Activities and Aquatics. Each strand is broken down in strand units as outlined in Table 7 below. The strand units give a clear indication of what content needs to be covered under each of the six strands (DES, 1999).

Table 7. Breakdown of strands and strand units for PE Curriculum in the Irish Primary Schools. *Source: https:// pdst.ie*



The PE curriculum places a large emphasis on the development of the child's understanding and appreciation of PAs through the strand units 'Understanding and Appreciation'. This concept refers to the child's development in relation to being a spectator and as a participant and aims for the child to have an appreciation for both. The content of this strand unit is designed to be developed as the pupils explore the six strands rather than forming discrete lessons.

The Irish PE curriculum (1999) states that the focus in the PE curriculum is on the holistic development of the child, which includes social and motor development, as well as physical growth. This involves individual improvement as opposed to winning or being the best. The curriculum emphasises a balanced approach to competition and making a significant contribution to the child's development while at the same time enjoying the experience of participating (NCCA, 2020).

In the Irish school system, extracurricular activities play a role in children's participation in sport. Such activities, when managed properly so that they reflect the

aims and objectives of the PE curriculum, add value to the social and physical development of children (O'Brien et al., 2024). The curriculum also has due consideration for gender equity and aims to build positive attitudes towards all activities. Children with special needs are carefully considered and priority is given for each child to experience enjoyment of participation according to their own ability and benefitting from a broad and balanced PE programme (DE,

2020).

2.5.3. Time allocation for Physical Education in Irish Primary Schools

The allocation of time for each subject is outlined in Table 8. Interestingly, PE is allocated just one hour per week as opposed to the Arts subjects which are allocated three hours. One hour is very little in comparison to other jurisdictions. For example, in the United Kingdom (UK) there is an allocation of two hours per week (Ofsted, 2022), in Australia it is recommended for pupils in the senior end of primary school to have a minimum of one hundred minutes per week (Australian Curriculum, 2021), while in the US it is recommended that PE should be allocated at least ninety minutes per week (Landi et al., 2021).

Table 8. Allocation of time for the Irish Primary Curriculum. *Source: Primary School Curriculum Introduction NCCA, (1999)*

	Full day		Short day [*infant classes*]	
Curriculum areas	**One week**		**One week**	
	Hours	Minutes	Hours	Minutes
Secular instruction				
Language				
L^1	4	00	3	00
L^2	3	30	2	30
Mathematics	3	00	2	15
SESE	3	00	2	15
SPHE	0	30	0	30
PE	1	00	1	00
Arts education	3	00	2	30
Discretionary curriculum time	2	00	1	00
Total secular instruction	**20**	**00**	**15**	**00**
Religious education (typically)	2	30	2	30
Assembly time	1	40	1	40
Roll call	0	50	0	50
Breaks	0	50	0	50
Recreation (typically)	2	30	2	30
Total	**28**	**20**	**23**	**20**

Note: Some modification of this framework may be necessary in the context of the outcome of the pilot project on modern languages.

2.5.4. Teaching Practices for Physical Education in Irish Primary Schools

It is believed PE 'plays a foundational role in developing pathways for PA participation on a day-to-day basis and in the future' (NCCA, 2003). Although there has been no systematic study of PE teaching practices in Irish schools, most reports speak of the prevalence of direct teaching styles among many PE teachers (MacPhail et al., 2018). Teaching Games for Understanding has been a popular approach to games teaching over the last decade (Morales Belando et al., 2022). A national 'Digital Video Project in PE' which was developed by the PDST sought to establish a place for the applied use of ICT in PE looking at its potential role as a teaching and learning tool across a range of PE activities. Recent developments have seen explicit efforts to see a greater range of instructional and assessment approaches to ensure greater student

engagement in, and responsibility for, their own learning (DE, 2020). Ni Chróinín (2018) stresses the value of making the prioritisation of meaningful experience explicit through modelling and discussion, engaging with meaningful experiences as both a teacher and learner as well as reflecting on those experiences (Ní Chróinín et al., 2018). Coulter et al., found in her study (2013) that some pupils reported negative experiences of PE. This evidence highlights the importance of teachers recognising each individual perspective in PE and to ensure that they challenge the individualisation of PE practices in ways that promote lifelong physical PA for those who do not enjoy team games (Coulter & Ní Chróinín, 2013).

Coulter also suggests that wider physical culture continues to shape PE practices in Irish schools, and raises questions around how school PE can move outside the influence of the dominant aspects of wider physical culture to recreate itself in a way that embraces all aspects of wider physical culture and reposition itself as a valued educational practice. Kretchmar (2008) suggests that 'the challenge is to find ways to prioritise a life-enhancing brand of PE over its utilitarian counterpart' (p. 169).

2.5.5. The Physical Education Subject in Irish Primary Schools

PE has been a compulsory subject in the Northern Ireland Curriculum since 1989 and has a well-established programme of examinable PE courses at GCSE and A level (Northern Ireland Curriculum, 2007). In Ireland however, PE is not provided in all primary schools and the quality and breadth of provision varies (MacPhail et al, 2008). Primary teachers are responsible for the teaching of PE within the primary school and are encouraged to pursue the revised primary school curriculum in PE (DES, 1999) and the corresponding teacher guidelines (DES, 1999). There is no compulsory level of PE provision, although the suggested minimum weekly time framework includes one hour

per week for the subject. The Irish National Teachers Organisation (INTO) policy is that primary class teachers deliver all curriculum areas and consequently there is limited scope for the employment of primary PE specialists (INTO, 2007). There is an increasing trend of national governing bodies (NGBs) providing coaches for particular sports within the school day and also providing resources and training to teachers (MacPhail et al, 2008). In Irish schools, the principal stakeholder for PE is the DE. It has ultimate responsibility for the entire education system and for the principle elements that influence the quality of PE as it is experienced by pupils in schools. The DE makes decisions centrally for schools which it controls through (a) the operation of a statutory curriculum development agency called the NCCA, (b) status of the subject (compulsory or not), (c) education (preservice and in-service) of teachers and (d) provision of learning/teaching facilities. A significant educational strategy document from the DE is the White Paper on Education (DES, 1995) where PE scarcely merits a mention. Policy in relation to PE would appear to be confined to the statements and provisions contained in curriculum documents. In this predominately centralised system, schools ironically retain a significant degree of freedom in deciding on the structure of the curriculum. Schools make decisions as to the amount of curricular time and funding made available to PE. Decisions made on these issues and others like the recruitment of specialist teachers for PE are informed, mostly by the school's culture and policy relating to the subject. In a process of allocation that frequently sees subject areas in competition with each other PE is sometimes does not get adequate allocations (MacPhail et al, 2008).

2.5.6. Wellbeing in the Irish Primary Schools

The importance of PA and pupils WB is supported within the wider context of Irish schools. This is evident from the NCCA introduction of the 'JC WB Guidelines' in 2021.

This initiative outlined the eight overarching principles for JC Education, the most relevant principle for this study being the eighth principle, 'WB', where it states; 'The student experience contributes directly to their physical, mental, emotional and social WB and resilience. Learning takes place in a climate focused on collective WB of school, community and society' (NCCA, 2021). Alongside this the introduction of compulsory, non-compulsory PE as a Senior Cycle subject (NCCA, 2017b) in the Irish school system, directly following up from the JC WB principle and framework, is also a positive development and leads the way for more emphasis to be placed on PE in the primary school system to equip pupils for both aspects of their post- primary experience. The Draft WB Specification (NCCA, 2024) which was referenced earlier is another influential document that will affect WB in Irish primary schools in the near future.

2.5.7. Evolving Physical Education in the Irish Primary Schools

The three main barriers to provision of QPE in Irish primary schools are reported by principals as, inadequate facilities/equipment (59%), shortage of time on the curriculum (19%), and inadequate training (14%) (Deenihan, 2005). A recent Environmental Systems Research Institute (ESRI) report concluded that 'sport facilities in schools, and perhaps especially in primary schools, needs to be improved, particularly in regard to facilities needed for indoor activities' (Fahey et al., 2005). All of these factors interact and research has shown that improving the situation of PE is a complex process, and addressing one constraint in isolation will not suffice (MacPhail & Halbert, 2005). Bearing this in mind, thankfully, the landscape of the Irish Primary Curriculum is changing. Since the existing curriculum was launched in 1999, the world has seen many changes and the needs of the pupils in primary schools have altered. Hence the NCCA found it necessary to review the current Primary Curriculum and adjust it

accordingly. This review resulted in the PCF and was launched by the NCCA in 2023 (Figure 1). The main features include, the principles of learning, teaching, and assessment, and the key competencies. The curricular areas and subjects are presented in five broad curriculum areas, one of which is WB. WB is a single subject area for Stage 1 and 2 of the curriculum framework (Junior Infants to 2nd class) but is subdivided into SPHE and PE in Stage 3 and 4 (3rd to 6th class). This is in stark contrast to the earlier curriculum, (1999), where PE was a standalone subject. From Stage 1.

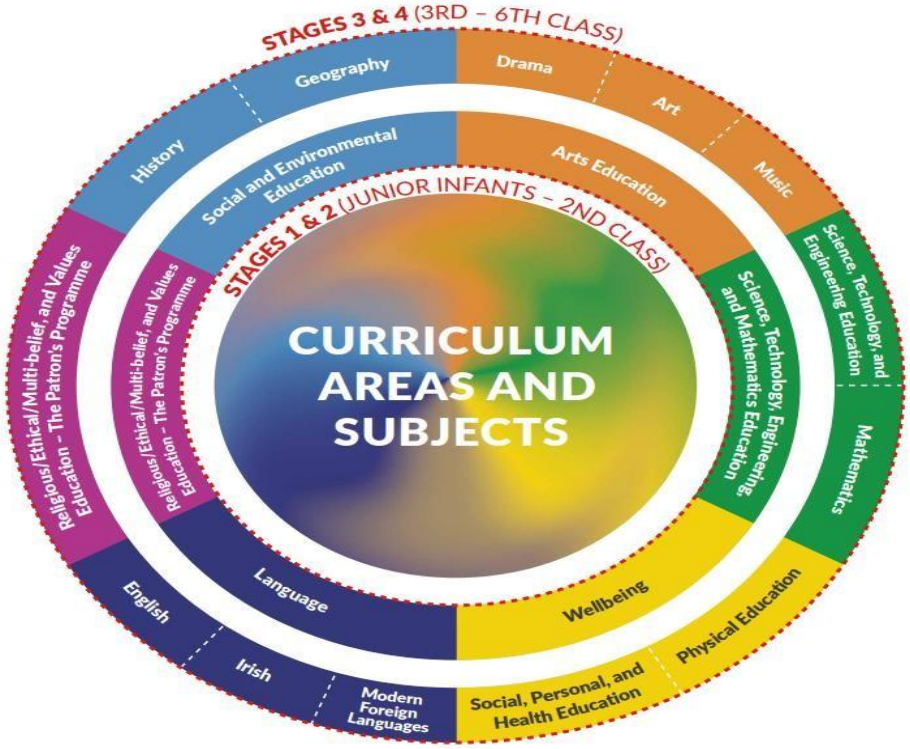


Figure 1. Curriculum areas and subjects in the Primary Curriculum Framework.
Source: The Primary Curriculum Framework, NCCA (2023)

"WB supports children's social, emotional, and physical development now and into the future. It enables children to develop self-awareness and knowledge, build life skills, and develop a strong sense of connectedness to their school, their community, and wider society" (NCCA, 2023, pg.18). This PCF makes provision for structured

opportunities where children can be physically active as well as emotionally well. The WB programme in the PCF aims to build their motivation and commitment to PA and to inform healthy lifestyle choices. Supporting these new developments, some changes have been made since 2017 to the framework at JC (first three years of post-primary) where 'WB' as a programme of study and PE as a compulsory area of study was introduced (NCCA, 2020). Within JC, at least 400 hours of timetabled engagement must be provided by schools for the WB programme, with a minimum of 135 hours within this dedicated to PE. This programme has to be taught by a qualified PE teacher. In addition, Ireland saw the introduction of PE in schools as an examinable subject at Leaving Certificate for the first time in 2018 (Woods et al., 2018). Hence primary PE in the Irish context has evolved and is beginning to play a central role in the holistic development of the child during its foundation years.

2.6. Problematising Quality Physical Education in Primary Education

This final section of the literature review is aimed at problematising the key aspects that provide rationale and structure to this thesis in terms of the QPE definition, its features, and the outcomes it intends to achieve generally in education, and especially for PE. It concludes with the problem statement that sets up each of the three studies that made up the research process.

2.6.1. Operationalisation of Quality Physical Education Definitions

QPE has become a widely used term but its nature and scope has been defined in very few countries. Conceptually, it needs to be viewed in the context of inter-related strategies to embrace the formulation and development of inclusive curricula, which

provide personally meaningful and socially and culturally relevant experiences and, which attract young people to the joy and pleasure of PA so as to foster an active healthy lifestyle philosophy over the full life-span (Mc Lennon & Thompson, 2015). QPE can also be explained as the planned, progressive, inclusive learning experience that forms part of the curriculum in early years, primary and post-primary education (Johnson & Turner, 2016).

As reported by Story (2006), the quality of PE is critical to improving the health status of children and adolescents (Story et al., 2006). Currently, only one third of adolescents are physically active in their PE class for more than 20 minutes 3 to 5 days per week. To address this issue, several organisations including the Center for Disease Control and Prevention (CDC), the Society of Health and Physical Educators (SHAPE) America and UNESCO have published reports that define a QPE programme and provide guidelines for schools to follow for developing a QPE programme (Mc Lennon & Thompson, 2015). As early as nearly three decades ago, the CDC's report *Guidelines for School and Community Programs to Promote Lifelong PA among Young People* (1997), had identified the PE curriculum and instruction as a key component to a school health programme. The CDC recommends that pupils should be participating in daily PE, as well as a quality programme that provides an opportunity for all pupils to develop knowledge and skills needed to establish and maintain a physically active lifestyle (Stirrup, 2020). As a consequence of the CDC's report, SHAPE America formally known as the National Association for Sport and Physical Education (NASPE) has developed its own definitions for PE and QPE programme, (NASPE, 2016). SHAPE America (2015) defines PE as a curricular component within the structure of a school that focuses on pupils learning about PA and gaining motor skills and health-related fitness (SHAPE America, 2015). They suggest that today's PE programmes are

important because they should be providing pupils with learning experiences that meet individual developmental needs, which help to improve mental alertness, AA, readiness to learn and enthusiasm for learning. SHAPE America
(2014) provides guidelines to help schools develop and implement QPE programmes. According to these guidelines, a QPE programme includes the following features: i) instruction time, ii) teacher qualifications and professional development and iii) adequate facilities. The Report further defines each of these critical elements and recommends that to have a QPE programme schools should offer i) instructional periods totalling 150 minutes of PE per week for elementary school, ii) employ qualified PE specialists to provide a developmentally appropriate programme, iii) and ensure that PE classes have access to adequate facilities.

Linked to the definitions and guidelines shared in the reports from the CDC and the SHAPE America is the comprehensive American school PA programme, Comprehensive School Physical Activity Programme (CSPAP) (2013). See Figure 2 for details.



Figure 2. Comprehensive School Physical Activity Programme. *Source: CDC, (2013)*

CSPAP has been recognised as the new national framework for PE and PA for young people (CDC, 2013). A CSPAP is a multi-component approach in which school districts and schools use opportunities for students to be physically active throughout the school day, at all grade levels, in order to meet the national PA recommendation. A CSPAP reflects strong coordination and synergy across all of its five components: i) PE as the foundation, ii) PA during school (such as active recess and classroom PA breaks), iii) PA before and after school, iv) involvement, and v) family and community engagement. At the heart of a CSPAP a required PE period assures a consistent and accessible way for all students to get at least a portion of the recommended daily PA. Figure 3 outlines effective PE with its essential components (SHAPE America, 2015). It outlines how PE involves more than just getting kids moving once a day, it helps children and adolescents develop and demonstrate the knowledge and skills to achieve and maintain a health-enhancing level of PA and fitness, while exhibiting personal

responsibility and social behaviour that respects self and others (SHAPE America, 2015).

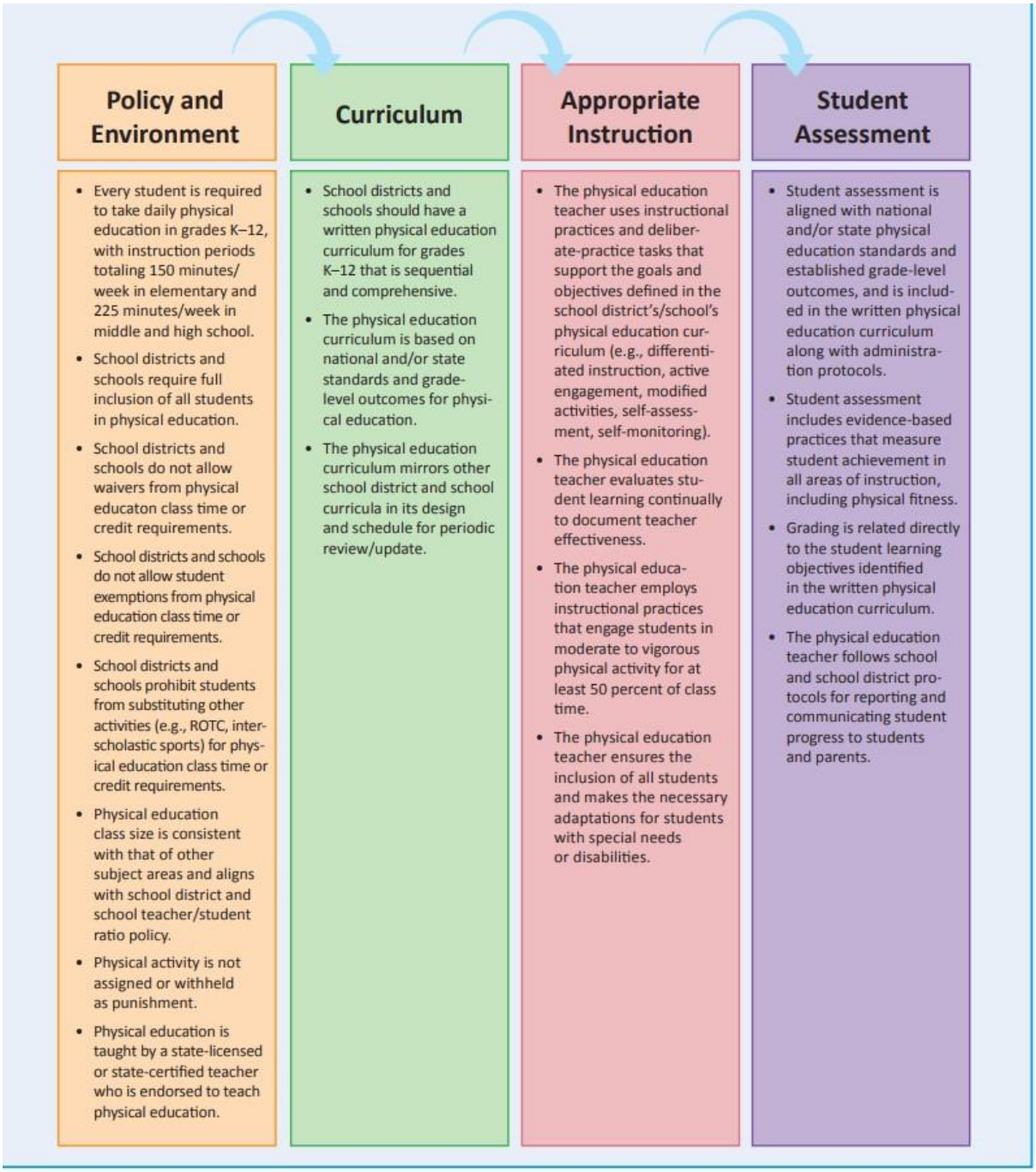


Figure 3. Essential Components of Physical Education. *Source: SHAPE America, (2015)* Under the CSPAP model, PE teachers possess two primary responsibilities: (1) to provide QPE and (2) to serve the school as a PA leader or champion by planning and administering multiple opportunities for PA throughout the school day. These two

responsibilities have been labelled PE and PA respectively. The PE responsibility includes teaching pupils a structured curriculum to help them acquire the skills, knowledge and dispositions necessary to be "wise consumers" of PA (SHAPE America, 2015). PE emphasises "education" and "learning." The PA responsibility includes providing opportunities for pupils to accumulate moderate physical activity (MPA), moderate to vigorous physical activity (MVPA), or vigorous-intensity physical activity, while on school premises. The CSPAP has found some challenges however. While participation in PE class can contribute toward student PA accumulation, other opportunities for PA are needed to help pupils achieve 60 minutes or more of MPA each day.

Johnson & Turner, (2016) offer two separate understandings of QPE. Firstly, they describe PE as a class or series of classes specifically designed to guide pupils toward becoming physically educated. This is the most common term used in everyday communications with professionals, pupils and the general public. The second understanding identifies PE not as a class but as a process or an occurrence. QPE occurs as learning, growth or development, as specified for example in each of the America National Standards for K–12 PE. These standards include skills, knowledge, physical fitness, character and appreciation (Blankenship, 2013; Lund, 2013; SHAPE America, 2014a).

Thus, as identified above, the definitions of QPE vary amongst researchers and practitioners, even within the same national context. While it makes sense for the profession to continue to define PE in a consistent way to the general public by using a simpler definition, it seems appropriate for PE professionals to consider and use this fuller definition of PE in professional dialogue and discussions. As already stated, PE is a process or occurrence that happens in many places. When we adopt this definition, it

supports the idea that providing a large quantity of PA experiences before, during and after school is a legitimate way to help more pupils develop skill and ultimately become physically active. This understanding of PE challenges teachers to assume greater responsibility for being PA leaders or champions in the school setting and to establish CSPAPs in their schools (Johnson & Turner, 2016). For some pupils, learning may be achieved more readily in a traditional PE class taught by a certified teacher. For other pupils it may happen in an after-school activity club or intramural programme. For most pupils, however, a combination of many types of opportunities for PA will be needed. The message is that PE can and does occur in many ways (Beni et al., 2021; Fletcher et al., 2021). The first definition of PE suggests that PE ends when the school closes or when a student graduates. According to the second definition, PE does not end with a formal class. It is an ongoing process, a lifelong journey, a continuous process that deserves and demands attention throughout life (Johnson & Turner, 2016).

In addition to contributing towards PA levels, PE can also contribute to helping children acquire the competencies, motivation, confidence, knowledge and understanding associated with physically literacy (Belton et al., 2022; Rudd et al., 2020), and help them develop active lifestyles. According to the UNESCO (2015). QPE is about peer-led learning and rounded skill development which can enhance educational and employability outcomes. It is also about whole body health which includes physical and psycho-social WB. QPE supports pupils to develop the physical, social and emotional skills which define healthy, resilient and socially responsible citizens (Collie, 2020).

In summary, considering the many benefits and central role that QPE has to play in the primary school curriculum and the life of a young child it is imperative that we elevate it on the educational agenda as well as promote its importance to school leaders and educational researchers. To have a better understanding of QPE it needs to be clearly

conceptualised for effective research and policy design and implementation. To do so, we need to consider the particular features and educational outcomes that relate to it. Both aspects are documented by researchers and explained in more detail below, adding to the problematisation that sustains this research.

2.6.2. Common Quality Physical Education Features

To guide the development of QPE programmes, in the US, SHAPE America has identified specific criteria or key features that progress this concept. The key features include, i) instruction time, ii) teacher qualifications and professional development and iii) adequate facilities (NASPE, 2016). There is evidence to support that each of these components can affect the quality of PE delivered in school settings. For example, the results from a study conducted by (Veugelers & Fitzgerald, 2005) revealed that participation in PE classes two or more times per week was associated with a decreased risk of overweight and obesity. In addition, enhanced training of PE teachers has been shown to be effective for improving PA time within PE class (Christodoulakis et al., 2024). The results from the Sports, Play, and Active Recreation for Kids (SPARK) study (Mostafavi et al., 2013) demonstrate that PA time was increased when certified PE teachers received additional training when compared to PE teachers who received no additional training and non-PE classroom teachers assigned to teach PE. There is also evidence of a positive relationship between PA levels in pupils and the number of facilities, such as gymnasiums and outdoor spaces, available within the school to support PA (Haug et al., 2008b). Thus, there is evidence to support that these key features, sufficient instruction time, PE teacher qualifications and professional development, and adequate PE facilities qualify as QPE features that improve the overall quality of PE provision in schools (Kulik, 2001).

As already stated, SPARK originally conducted by (Sallis, 1997) investigated the differences in the amount of PA offered per week and instructor training on PA levels and selected fitness measures in fourth and fifth grade elementary school pupils. Seven schools were assigned to three different conditions: health related PE classes taught by a certified PE specialist, health related PE classes taught by a classroom teacher who received additional training to implement the specific curriculum, or a control condition where the standard curriculum was taught by a classroom teacher who received no additional training. Results of this study revealed that pupils spent more time per week being physically active in specialist-led classes (40 minutes) and teacher-led classes (33 minutes) when compared to control classes (18 minutes: $p<0.001$). After completion of the two-year study, girls in the specialist-led classes were superior to the girls in the control classes on abdominal strength and endurance ($p<0.001$) and cardiorespiratory endurance ($p<0.001$). There were no significant results between the boys in the different classes.

As suggested in SPARK (Sallis, 1997) teacher training and professional development tend to add time for PA and practice within the same instruction time and it should be considered a key feature in developing a QPE programme. McKenzie. et al., (2004) conducted the Middle School PE Intervention study, whose purpose was to develop, implement and assess a health-related PE intervention in middle school aged pupils. Twenty-four middle schools (approximately 25,000 pupils) were recruited to participate in the study with 12 intervention and 12 control schools. The intervention consisted of the implementation of an enhanced PE curriculum that focused on health-related activities and teacher training. At the conclusion of the two-year period, it was noted that the intervention significantly ($p=0.02$) improved student MVPA in PE, by approximately 3 minutes per lesson. It was also noted that these effects were cumulative;

by year 2 the pupils in the intervention schools increased MVPA by 18%. To support the results of these studies, the CDC (1997) had suggested that the planning, implementation and evaluation of PE programmes requires specially trained personnel. PE specialists teach longer lessons, spend more time on developing skills, impart more knowledge and provide more MVPA than do classroom teachers. Based on data collected from the 2016 Shape of the Nation Report, the majority of schools (80.6%) require newly hired PE teachers to have an undergraduate or graduate training in PE or related field, and 73.2% of schools require new teachers to be state certified, licensed or endorsed. In addition, funding for professional development was offered in 66% of the states and 80.7% of the districts. In 89.3% of the schools, physical educators received staff development on at least one PE topic within the last two years. Thus, supporting the notion that teacher qualifications and professional development is a key feature of QPE in schools.

MacKen et al., (2020) strengthens the argument that teacher ITE is also a key factor in ensuring delivery of QPE programmes. MacKen and her colleagues argue that teacher educators' have a role to play in modelling and mentoring pre-service teachers (PSTs). Based on the findings of this study, opportunities for PSTs to practice Assessment for Learning (AfL) with primary school students during the PE module developed higher levels of assessment literacy for PSTs during school placement than was facilitated through theoretical discussion and content. This evidence highlights the difficulties in developing PST critical engagement with assessment data and the rationale for PST reluctance around enacting self- and peer-assessment. While student relational dynamics could have impacted on this, it could be concluded that such AfL strategies require time to practice and develop.

As recommended by SHAPE America, another critical feature of a QPE programme is the access to appropriate instructional facilities for all PE classes (SHAPE

America, 2014). SHAPE America (2014) along with the Joint Commission for National Health Education Standards note that adequate facilities and equipment are necessary for PE programmes to be successful in offering all pupils opportunities for increased PA. To support this, the newly revised National PE Standards (SHAPE America, 2024) recommendations are made that school districts adopt policies to ensure that PE spaces are strictly for the use of PE classes during their assigned class times and that classes are not cancelled due to the use of the space by another programme (Monti., 2004). Aligning to the recommendations issued by SHAPE America and the Joint Commission for National Health Education Standards (2024), the results of the 2006 School Health and Policies and Programmes Study (Kann et al., 2007) suggest that the availability of indoor and outdoor PE facilities may determine the quality of PE. Nationwide, more than three fourths of all high schools had access to a gymnasium, weight room, baseball or softball field, general use field, and soccer or football field for PE (Lee et al., 2006). Several studies have been conducted to examine the relationship between the availability of instructional facilities for PE and PA (Duyar, 2010). The study conducted by Haug et al (2008) investigated this relationship in 1347 8th grade pupils in 68 post-primary schools in Norway. The results of this study revealed that pupils who attended schools with many facilities had 4.49 times higher odds of being physically active compared to pupils in schools with fewer facilities. It was also reported that facilities such as open fields, outdoor obstacle course, playground equipment, and room with cardio and weightlifting equipment, were associated with increased participation in PA (Haug et al., 2008).

The results of these studies demonstrate that access to instructional facilities is a key feature to enhancing the provision of QPE as stated as one of the specific components in the SHAPE America Guidelines (SHAPE America., 2016). Although it is important to understand that the presence of multiple components or features carries

greatest impact on improving QPE, it is also important to determine what factors may affect schools' ability to improve these specific components. One of these factors is the role of the school leaders, typically the principal (Kulik, 2009).

The New South Wales (NSW) Department of Education state that the health of pupils is relevant to their learning and is important to schools and explicitly named principals [headteachers] as having a role to play in the effective support of pupils' health needs (Department of Education and Communities, 2012). Hence, primary school principals are acknowledged as key participants for representing school communities. This is supported by the findings of Rainer et al., 2012, whose UK research outlined the significance of the role of the head teacher in ensuring a specific policy is developed for PE. They have the capacity to consider the wider targets of government PE initiatives and encourage the development of effective, high-quality PE. Similarly, other studies have found school-level leadership has an important role and is a key feature of successful implementation of PE programmes (Lynch, 2015; Morgan & Hansen, 2007). A survey collected in the state of Victoria indicated strong principal support for PE in the context of Australia (Lynch, 2015), while alternative literature implies that a low level of principal support exists in several countries (Barroso et al., 2005; Hardman & Marshall, 2005).

2.6.3. Core Quality Physical Education Outcomes

As well as identifying key features that contribute to QPE programmes in primary schools we should also consider the educational outcomes that it seeks to attain. As an educational subject, PE has inherent subject specific outcomes of QPE that typically include, PA and PE levels, while aiming at contributing to general outcomes, mainly WB and AA. Both sets of outcomes are explained in more detail below.

2.6.3.1. Subject Specific Outcomes of Quality Physical Education-Physical Activity Behaviour

PE has been widely acknowledged as a key vehicle for promoting PA among children (Biddle & Mutrie, 2001). The physical, social and emotional benefits of PA during childhood are well established (Papadopoulos et al., 2022) and it is claimed that PE provides the opportunity for children to develop the knowledge and skills to lead a physically active lifestyle (Cale, 2023; Cornish et al., 2020; Kinder et al., 2020).

The health benefits of PA to children and youth are widely reported (Chaput et al., 2020; Janssen & Le Blanc, 2010). Yet, the prevalence of physical inactivity in the youth population is high, (Barnes et al., 2016; Guthold et al., 2020) and suggesting most children and youth are not able to realise these benefits. Efforts to increase PA have focused on the school setting, given the fact that the majority of children and youth are in this setting for large periods of the day and week. While this makes practical sense, the objective of increasing PA is often at odds with the learning objectives of education settings. As such, there has been a push from academic researchers and others to emphasise not only the health benefits of PA and exercise, but also its effects on learning (Betard & Best, 2010).

Basic movement skills, like those developed in PE form the foundation of almost all later sporting and physical activities. There is evidence that those who have developed a strong foundation in fundamental movement skills are more likely to be active, both during childhood and later in life (Okely et al., 2001).

The mechanisms by which active young people become active adults are unclear. However, research suggests that a number of factors contribute to the establishment of PA as part of a healthy lifestyle (Tay et al., 2021). There is some evidence that health-related behaviours learned in childhood are often maintained into adulthood. In a

systematic review carried out by Peterson et al., (2020) it was reported that fathers and mother's modelling of PA behaviour is similar to that of their sons, and daughters respectively. They also reported, despite a weak relationship, parents may still play important roles in influencing their children's PA by encouragement and support. Another study carried out by Helme et al., (2022) assessed the impact of a Creating Active School's programme on organisational changes to PA provision. There were large positive effects on the organisational PA culture of schools. Large effects were observed for whole-school culture and ethos, a measure of the schools' policies, strategies, monitoring and evaluation, and evidence based practice around PA. A review of retrospective and longitudinal studies reported that PA and sports participation in childhood and youth represents a significant predictor of later activity (Sabo et al., 2004). Interestingly, studies also show how strongly inactivity in youth tracks to adulthood, so exclusion from PE can be associated with a legacy of inactivity and associated ill-health in the years to come (Chaput et al., 2020; Salud, 2018). There have been frequent claims that school PE create important contexts in which PA levels are influenced. Studies have found that school-based programmes can contribute to PA levels, both during youth and later in life (Vaquero-Solís et al., 2020). Alvarez-Bueno et al (2017), suggested that PA benefits several domains of cognition and metacognition in children and adolescents. The same authors demonstrated that PA improves classroom behaviour and benefits several aspects of AA in youth, especially mathematics related skills (Cöster et al., 2018).

2.6.3.2. Subject Specific Outcome of Quality Physical Education- Attitudes Towards Physical Education

Attitude is an elusive construct and yet has a profound impact on human behaviour through behavioural intentions (Subramaniam & Mercier, 2017). Attitudes formed during childhood can impact the choices we make in our daily lives to be active or to lead sedentary lives (Ajzen, 1991). Considering that attitudes are decided by our own evaluative responses, it is surprising that the impact of attitudes does not get due recognition in PE. Subramaniam (2017) advocates that attitudes matter in PE and that fostering positive attitudes should be deliberately planned in the learning environment (Chaiklin, 2011; Subramaniam & Mercier, 2017).

Several researchers have supported the claim that students' attitudes could influence participation in future PA and that students who develop positive ATPE are more likely to adopt healthy lifestyles (Cameron et al., 2006; Rady & Schmidt, 2013; Silverman et al., 2008; Zeng, 2011). Results indicated from a study carried out by Subramaniam et al., (2017) that attitudes play an important role in teaching and student learning. Understanding attitude formation and change teachers can deliberately plan to foster the development of positive attitudes in the learning environment. PE programmes should focus on helping students enjoy being active in class while learning about the usefulness and importance of PE in order to promote the development of positive attitudes (Subramaniam & Mercier, 2017).

Schools are ideal settings for the promotion of healthy lifestyles in children and adolescents, and PE is the primary vehicle to achieve these objectives (Fisher et al., 2011). As young people's learning is entrusted to the educational system, instructional time for core academic subjects is preserved and protected in the pursuit of AA (Rasberry et al., 2011). Unfortunately, this often happens at the expense of time spent in PE (Howie

& Pate, 2017), despite that no evidence indicates that time allocated to PE has an adverse effect on AA and cognition (Dudley & Burden, 2020) and, in fact, the reverse is may be the case (Álvarez-Bueno et al., 2017; Zach et al., 2017).

Children are more likely to engage in PA if they adopt positive ATPE and parents play a large role in their development (Coulter et al., 2019). Coulter advocates that parents and children had positive attitudes towards their school's PE programme and they value the fun and enjoyment it brings. Coulter (2019) found that health and fitness as well as team sport discourses were felt important by parents, but they had little knowledge of the content of their child's PE programme. The school community must explore ways to inform parents about, and support their child's learning in, PE ensuring positive attitudes are fostered and encouraged towards influencing positive physically active behaviours (Coulter et al., 2020).

Chedzoy et al., (2009) aimed to seek suggestions from the students of ways in which PE lessons could be improved and consequently referred these to the attention of teachers. The study found striking differences in the attitudes and attributions of girls and boys, with the latter more likely than the former to identify success in terms of some form of physical demonstration of ability. Whilst both sexes identified a positive attitude as associated with success, boys were more likely to look for signs of health or physical fitness, whereas girls were more impressed by effort and evidence of a learning orientation. These attributions held also for perceived lack of success. Although lesson enjoyment was seen by a significant number of children as a key factor leading to success, the pupils, on the whole, tended to attribute both success and failure to internal, changeable, controllable factors. It is very apparent from these findings that certainly by the age of 10 years pupils have developed clear perceptions of their own as to what constitutes success or failure in PE lessons. As these may not necessarily match

expectations of their teachers, it is suggested that teachers would discuss this aspect of PE as part of the lessons and as an important element of the self-assessment process (AfPE, 2008; Chedzoy & Burden, 2009).

2.6.3.3. General Outcome of Quality Physical Education - Wellbeing

It is well established that WB for children and young people is an outcome of QPE (Piñeiro-Cossio et al., 2021). The QPE Indicators and the associated Core Principles from the UNESCO World Wide Report 2013 highlight positive outcomes of QPE curricula. Exemplars of the outcomes mentioned include: i) holistic personal development, ii) student commitment to, and willing participation in, different types of physical and sporting activity, iii) understanding of essential role of PE in contributing to personal WB and to a balanced healthy, active lifestyle, iv) confidence to engage in PA in a variety of activities and settings as well as take initiative. Increased PA during school hours is associated with better physical, psychological and social health and WB (Ekeland et al., 2005). Unfortunately, many children and young people exercise insufficiently to benefit from positive factors like WB (Søren Smedegaard et al., 2016).

Regular PA can help build social skills and self-esteem, the latter commonly viewed as a key indicator of positive WB as well as an overall positive effect on WB (Biddle & Asare, 2011). A comprehensive review of reviews, by Biddle (2015), substantiates the claim that PA has an overall positive effect on WB. Bailey and colleagues feel there is compelling evidence that regular PA can have a positive effect on emotional WB, especially for children and young people' (Bailey et al., 2013). At the same time, Bailey and colleagues underlined that there is no "automatism" regarding the connection. PA's contribution to WB is conditional to the context and especially the

social climate generated by e.g., educators (Bailey et al., 2013; Brunelle et al., 2007; Holland, 2012).

Focus on the mental benefits of PA at school has been a rather neglected theme in health promotion research during recent decades. This is unfortunate as mental health has been proclaimed as one of the most important health concerns of the 21st century as stated early on by WHO in their 2004 summary report, Promoting Mental Health. On top of this, the mutually dependent relationship between PA and mental health has not yet been fully uncovered (Biddle & Asare, 2011). Advocates of PE and sport have listed numerous benefits associated with participation in PA (Kumar & Kuloor, 2020). Talbot, (2001) claims that PE helps children to develop respect for the body and contributes toward the integrated development of mind and body. He also states that physical education and sport (PES) develops an understanding of the role of aerobic and anaerobic PA in health, positively enhances self-confidence and self-esteem, and enhances social and cognitive development and AA. Writing specifically about sport, a Council of Europe, (1994) suggests that it provides opportunities to meet and communicate with other people, to take different social roles, to learn particular social skills and to adjust to collective objectives such as cooperation and cohesion. This Council of Europe Report goes on to stress the important contribution of sport to personality development and psychological WB, stating that there is strong evidence on the positive effects of PA on self-concept, self-esteem, anxiety, depression, tension and stress, self-confidence, energy, mood, efficiency and WB.

The learning experience offered to children and young people through PE lessons results in a selection of learner outcomes including enhancing the WB of children and young people. These quality learning outcomes occur when PE is developmentally appropriate to help children acquire the psychomotor skills, cognitive understanding,

and social and emotional skills they need to lead a physically active life, (AfPE, 2015). A QPE curriculum promotes movement competence to structure thinking, express feelings, and enrich understanding. Through competition and cooperation, learners appreciate the role of rule structures, conventions, values, performance criteria and fair play. They celebrate each other's varying contributions, as well as appreciating the demands and benefits of teamwork. Additionally, the learner understands how to recognize and manage risk, to fulfil assigned tasks, and to accept responsibility for their own behaviour. They learn how to cope with both success and failure, and how to evaluate performance against their own and other's previous achievements. Quality learning experiences provides exposure to clear, consistent values that reinforces pro-social behaviour through participation and performance (Hillman et al., 2009; Hollar et al., 2010; Trudeau & Shephard, 2005). It is through these learning experiences that quality learner outcomes occur.

An associated general outcome for QPE is physical competence and increase in school attendance. One especially relevant set of findings from Kumar et al, 2020, relates to the development of perceived physical competence. This study suggests that self-esteem is influenced by an individual's perceptions of competence or adequacy to achieve. They find there is a growing interest in the relationship between PES and pupils' general attitudes toward school. The evidence supporting such claims is limited and is mostly based on small-scale studies or anecdotal evidence. However, some studies report generally positive outcomes in terms of pupil attendance following the introduction of PE and sports schemes. Additionally, there is evidence from studies of pupils at risk of exclusion from school that an increase in the availability of PE and sports programmes would make the school experience more attractive (Kumar & Kuloor, 2020).

Adding to the research, WB is now a core common element of Irish education, from pre-school to post-primary education (NCCA, 2009, 2024; NCCA, 2017b, 2017a). WB is valued for its intrinsic and central value of the human experience, and as a key element for all students to achieve academically. WB in the three main cycles of Irish education stands as a broad educational outcome that the whole school is responsible for, including all subjects (DE, 2023). PE is also placed as a lead subject for WB as a curricular area and as a broad educational outcome. Hence, it is crucial that research provides evidence on how schools are supporting this important educational outcome, and what is the role and impact of PE in it (Pulimeno et al., 2020).

Much of the research referenced and discussed above, details the positive effects that PE has on WB. We can see the associated outcome such as the development of physical competence and the increase in school attendance. Such is the importance of the provision of QPE in schools so that positive outcomes for pupil's WB can occur.

In summary, PE has the potential to make significant contributions to both the subject specific and the general outcomes and development of children and young people in many ways, although further research and evaluation will help us better understand the nature of these contributions. As stated above, there is evidence that PE can have a positive and profound effect at the general AA and WB of pupils and more specifically on PA and PE levels. In some respects, such an effect is unique, owing to the distinctive contexts in which PE takes place. Consequently, there is a duty for those who teach and acknowledge the value of PE to act as advocates for its place as a necessary feature of the general education of all children. They need to argue not just for the inclusion of PE within the curriculum, and for the provision of sufficient time, but also to stress the importance of the quality of the programme and share information on the benefits of PE among administrators, parents, and policy makers. Contexts that

emphasise positive PE experiences, characterised by enjoyment, diversity, and the engagement of all, and that are managed by committed and trained teachers and coaches, and supportive and informed parents, are fundamental (Kumar & Kuloor, 2020).

2.6.3.4. General Outcome of Quality Physical Education- Academic Achievement

There is a growing body of research focused on the connection between PA, including PE, and AA among school children (Castelli et al., 2007; Sibley & Etnier, 2003; Strong et al., 2005; Tomporowski et al., 2008; Trudeau & Shephard, 2010). The literature suggests no indication that increases in PA negatively affect cognition or AA and PA is important for growth and development and general health (Donnelly et al., 2016). On the basis of the evidence available in Donnelly's study, he concluded that PA has a positive influence on cognition as well as brain structure and function; however, more research is necessary to determine mechanisms and long-term effect as well as strategies to translate laboratory findings to the school environment.

Regular participation in QPE and other forms of PA can improve a child's attention span, enhance their cognitive control and speed up their cognitive processing (Mc Lennon & Thompson, 2015). AA is influenced by other factors, but, nevertheless, the evidence supports the presupposition that if young people achieve at least the recommended daily amount of PA there are potentially broad social and academic gains. For many children, especially those from less advantaged backgrounds, PE provides their only regular sessions of PA (AfPE, 2019). This further emphasises the need for children to receive their entitlement of QPE within school curricula so that the general outcome of AA can be achieved.

The Trois-Rivieres regional project by Lavallee et al., (2003) is one of the most robust and renowned longitudinal studies in its field. It is unique in its quasi-experimental design and the scale of its participants. It investigated the merits of introducing an hour of daily, specialist-taught PE into two different schools with varying socio-economic backgrounds in Quebec, Canada. From a policymaker's perspective, the most significant finding in this study was, despite the reduction of 14% academic teaching and the introduction of one-hour daily PE, it had a positive effect on academic performance in grade 2 and grade 6 of the experimental group.

As already mentioned above, another well-known PA intervention programme is, SPARK, (Sallis et al., 1999). This investigated the effect of a two-year PE programme on AA on a sample of 759 children. They were assessed with the Metropolitan Achievement Tests before and after the programme. Schools were randomly assigned to a particular condition. The three conditions included; a) Specialists Condition where experts delivered the programme, b) the Trained Teacher Condition where classroom teachers were trained to deliver the programme and c) the Control Condition where teachers continued to teach their usual PE programme. The results showed the Specialist Condition was superior to the Control Condition for Reading and inferior for Language. The Trained Teacher condition was superior to the Control Condition for Language, Reading and Basic Battery. Despite doubling the amount of time per week on PE in comparison to the Control Condition, the SPARK programme did not interfere with the student's AA and leads to the question can PA programmes enhance pupils AA while at the same time provide health related benefits such as improved WB.

In contrast to the Trois Rivieres project (Shephard, 1997), SPARK study did not have the benefit of such a lengthy period of time to draw data from. Nor did it have the comparative sample of two differing socio groups. However, the results for both

favoured the positive impact extra time spent on PE can have on pupil's AA (Sallis et al., 1999; Trudeau & Shephard, 2008).

Further contemporary studies have found similar results. A review was done to synthesise the scientific literature that examined the association between PA in schools and AA (Rasberry et al., 2011). Following this review, it was evident that PA 'is either positively related to AA or that there is not a demonstrated relationship between PA and AA. The pattern of having positive relationships or no relationships, along with the lack of negative relationships, is consistent throughout and suggests that adding PA to the school day may enhance and does not detract from AA' (Rasberry et al., 2011, pg.5).

Notably, these research studies show some similarities. For example, with the Trois-Rivieres Regional Project, the PA intervention did have an effect on the pupils' AA. Even though the teaching time was reduced, the Trios-Rivieres Regional Project found a positive effect on AA in certain grades in the school. Likewise, the SPARK project had a reduction in teaching time and still showed positive findings for Reading and in some cases Language.

Research from Kingston et al. (2018) examined the implementation of a PA policy in a primary school setting and what effect it had on the executive functions of a particular sample and indirectly how this may have affected their AA. The results found that PE and structured play (SP) had a stronger effect on the EF of the pupils in comparison to unstructured play (UP). This may be due to the lack of cognitive engagement for the PA component UP. The teacher's observations found that the pupils' WB had improved as a result of the PA intervention. The findings suggest that PE and SP should be prioritised when developing PA policy in school and that AA may be influenced as a result of a PA intervention.

Singh (2012) reviewed both observational and intervention studies and found a positive effect of PA on measures of AA. (Lees & Hopkins, 2013) conducted a systematic review of randomized trials examining the cognitive effect of aerobic exercise and found either small benefits to cognition or no effects on measures of cognition and AA. Finally, these results align with those reported in the review examining classroom-based PA interventions in general, showing positive results on academic-related outcomes (Watson et al., 2017).

School-based PA intervention studies have largely focused on extending or enhancing existing PA opportunities (including PE class) and have been marginally successful, (Rasberry et al, 2011), however, many barriers to implementation remain problematic. Teachers still feel pressure from parents, schools, and school-administrators, to prioritise time spent learning core academic content rather than devoting time to PA (Mahar et al., 2006; McKenzie & Lounsbery, 2009; Sallis et al., 2012). Naylor and colleagues (2015) reviewed 29 studies of school-based PA interventions and found that factors relating to time, such as preparation time, teacher overload, and competing demands for other curricular priorities were consistently reported as barriers to successful implementation. This is particularly concerning given the positive relationship between implementation effectiveness and positive academic and health outcomes (Durlak & DuPre, 2008; Naylor et al., 2015).

In summary, regular participation in QPE and other forms of PA can improve a child's attention span, enhance their cognitive control and speed up their cognitive processing (Mc Lennon & Thompson, 2015). AA is influenced by other factors, but, nevertheless, the evidence supports the presupposition that if young people achieve at least the recommended daily amount of PA there are potentially broad social and academic gains (Belton et al., 2014). Collectively, these are significant findings and

confirm that engagement in a PE programme in schools can have a positive effect on the AA. Considering the ill effects of the lack of emphasis on PE in schools and the barriers to implementation, it is imperative that immediate action should be taken to counteract this.

2.6.4. Problem Statement

There are obvious gaps in policy and practice in relation to the provision and delivery of QPE across the globe (OECD, 2012; Rainer et al., 2012). Primary school principals are increasingly under more pressure and closer scrutiny to ensure young children are developed appropriately in core subject areas, such as numeracy and literacy (Green, 2008). However, research would suggest that the experience of PE in primary school can help form our views of sport and PA in later life (Laker, 2002). Furthermore, the underlying purpose of PE is to facilitate and promote lifelong participation in PA (Green, 2008), and specifically in Ireland it is set as a curricular subject that offers valuable opportunities for physical learning, alongside social, affective, and cognitive learning. PE plays a vital role in a child's overall development, including their WB. With its focus on the body and physical experiences, it holds a unique position within the school curriculum, aiming to promote active and fulfilling lifestyles amongst children now and into the future (DE, 2024). Hence, it would appear imperative that primary school pupils are given exposure to QPE in order to influence their participation and enjoyment in sport in later life, which would potentially have a positive impact on their health and WB (Powell et al., 2018). Research also indicates that there is a large variation in the quality of children's experiences of PE within primary schools (Bailey & McFadyen, 2000; Coulter & Ní Chróinín, 2013; Kirk, 2004; Macken et al., 2020; Ní Chróinín et al., 2018). Traditionally, primary school PE has been delivered through a

multi-activity approach involving short blocks of often-unrelated PA with the result that learning experiences are often compartmentalized and fragmented (Jess et al., 2017). With increasing pressures on the primary school curriculum and on the generalist teacher it seems unlikely that primary schools can offer the kind of quality experience that young people deserve and that can significantly impact on lifelong habits (Bailey & McFadyen, 2000; Kirk, 2005). In an effort to address these systemic weaknesses and to promote QPE in primary schools, this study will attempt to address some of these gaps, adding to the discourse on QPE and potentially assist with improvements in this area. With the gaps and barriers presented above and the current status of PE in Irish primary schools, this research will also attempt to address the issue of QPE implementation within literature, and in addition investigate the outcomes of the QPE programmes both specific as PE Attitudes and PAB, and general as WB and AA. More specifically, the aim of this research is to investigate the impact of QPE and the fidelity of its implementation on four targeted outcomes, ATPE, PAB WB and AA. Based on a QPE evaluation protocol classification, the following hypothesis can be advanced:

H1: Schools with higher quality and higher fidelity of their PE programme have significantly higher pupil outcomes on ATPE, PAB, WB and AA;

H2: The differences of quality and fidelity of the QPE programme reflect differences of pupil outcomes on ATPE, PAB, WB and AA.

Chapter 3 - A Scoping Review on Quality Physical Education Programmes and its Outcomes on Primary-Level Pupils

Manuscript published as: Kingston Ú, Adamakis M, Lester D, Costa J. A Scoping Review on Quality Physical Education Programmes and Their Outcomes on Primary-Level Pupils.

Int J Environ Res Public Health. 2023 Feb 17; 20(4):3575. doi: 10.3390/ijerph20043575.

PMID: 36834274; PMCID: PMC9965463.

- ✓ I wrote the first draft of this paper and contributed significantly to the subsequent redrafts until publication.
- ✓ Alongside my supervisors, Dr. Joao Costa, Dr. Emmanouil Adamakis and Dr. Diarmuid Lester, I was the principal investigator responsible for all data collected (Sept. to June, 2022) in this chapter.
- ✓ I planned and organised the data collection. This included contacting the six primary schools (i.e., principals and teachers) involved in this phase of the study, timetabling of observational visits, carrying out observations of PE lessons in each of the schools, data storage, data cleaning and data inputting.
- ✓ A significant component of this cross-sectional study was the completion of the pupil survey which was carried out at three time points during the year. This was administered by the class teachers and submitted by the pupils on Google Forms. Another component was the three observation visits in each school which was

carried out by myself and a Critical Friend on one occasion and by myself only on three occasions. Data was gathered from each of these visits.

- ✓ Both the Critical friend and I, conducted interrater reliability together and I then scored and analysed the data before compiling the results presented in this chapter.

3.1. Abstract

A scoping review was carried out on the literature relating to the evaluation of the implementation of quality physical education (QPE) programmes and related outcomes on final-stage primary-level pupils' attitudes towards physical education (ATPE), physical activity behaviour (PAB), wellbeing (WB) and academic achievement (AA). The scoping review included studies published between 2000 and 2020 in the PubMed, Elsevier, SCOPUS and CINAHL databases and was completed in accordance with the PRISMA extension for scoping reviews' guidelines (Tricco et al., 2018). Based on the inclusion criteria, 15 out of 2869 studies were included in the review. A thematic analysis was used to inductively and deductively analyse the studies for common themes of features of QPE programmes in primary schools, arising from nine different countries, considering the four outcome dimensions (ATPE, PAB, MWB and AA). The common themes identified as features of QPE across all four dimensions were as follows: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships. Based on these findings, recommendations were made for an evaluation framework on QPE in primary education.

Keywords: quality physical education; programmes; primary education; academic achievement; attitudes; wellbeing; physical activity; fidelity

3.2. Introduction

QPE can be explained as a group of interrelated strategies to embrace the formulation and development of inclusive and equitable curricula. It provides personally meaningful as well as socially and culturally relevant experiences. These attract young people to the joy and pleasure of physical activity (PA) to foster an active healthy lifestyle over their full lifespan (McLennon & Thompson, 2015). Children have the right to quality physical activity (QPE) and should have equal access to qualified professionals, appropriate resources and supportive structures regardless of their background. Schools are the medium to provide QPE and represent an attractive and important setting for health promotion initiatives (WHO, 2017). Based on the significant amount of time children spend at school, this sector has a great influence on promoting and improving PA in youth (Hills et al., 2015). Worldwide, physical education (PE) is by far the most common method of promoting PA during the school day, and the majority of countries have legal requirements for school PE for at least some part of the compulsory schooling years. Even in countries where PE may not be mandated by law, the subject is still offered (Hills et al., 2015).

QPE consistently receives positive acclaim as a contributor to young learners' holistic development, including academic achievement (AA), wellbeing (WB) and PA, especially in their formative years (Jess et al., 2017). Research on children's and adolescents' PA levels shows that their overall PA levels tend to be low and decline with age (Marques et al., 2020; Sallis et al., 2016). Physical inactivity is recognised as a public health issue across all ages. PA in children is associated with improvements in skeletal health, central venous catheter (CVD) risk factors, adiposity, self-esteem and mental wellbeing (MWB) (Biddle & Mutrie, 2001). As such, it is essential to continue the research on the factors that contribute to or inhibit children from engaging with PA in its

different forms, including PE, to minimise their sedentary lifestyle and reap all the PA benefits that will contribute to a fuller, longer, better and happier life (Martins et al., 2021). Consistent with the notion of a link between early life experiences and later health outcomes, greater attention is being given to the importance of exposure to QPE opportunities during early years and childhood. If health behaviours established during early life are more likely to persist or 'track' from childhood to adulthood, greater efforts should be made to capitalise on key opportunities, including in the school setting (Hills et al., 2015). PE is a fundamental cornerstone for childhood development as it promotes lifelong PA participation for holistic health. School educators play a key role in creating school environments that lead to developmentally appropriate and high-quality PE lessons (Donnelly et al., 2016). QPE opportunities should be carefully considered so that children will develop lifelong habits of being active, as well as create positive attitudes towards physical education (ATPE). It is imperative that school leaders identify the key features of QPE programmes that help promote all the outcomes on ATPE, physical activity behaviour (PAB), AA and WB. This study aims to scope out these key features.

Systematic reviews have identified over 100 randomised trials of school-based interventions targeting PA among other health-related factors. They have demonstrated that such interventions can be effective in reducing associated health risks (Demetriou & Höner, 2012). Based on this evidence, national and international best-practice guidelines have been established acknowledging the potential for school-based settings to influence the development of children's PAB. These evidence-based guidelines recommend schools adopt a range of policies, practices and programmes, such as the scheduling and provision of QPE programmes, and active play opportunities (Government of Canada., 2019).

In Barnes's systematic review, the findings provide some evidence to support the effectiveness of strategies in enhancing the nutritional quality of foods served at schools, the implementation of canteen policies and the time scheduled for PE (Barnes et al., 2021). Advocacy needs to be directed toward the school officials and community members. There are approximately 25 million obese children in the United States of America (USA) today, and that number continues to grow. Schools that are reducing or cutting their PE programmes are limiting the students' access to healthy eating and fitness (Government of Canada., 2019; Chng et al., 2015).

Other reviews have found that enhancing the quality of policy dissemination and implementation research through high-quality pragmatic measures will mark a key step in bridging the policy-to-practice gap (Glasgow & Riley, 2013). Policy research over the last 20 years was focused on the regulatory mandate of time. Policy research did not directly address disciplinary process variables of learning activities or outcomes of PE. The effects of policy exemptions and class size were underrepresented. Further research is needed to examine the downstream effects of PE policy and determine whether well-written policies increase the number of individuals that are more physically competent (Burson et al., 2021).

The interest in the connection between PE programmes and AA during development has recently increased, with evidence suggesting a positive association (Corredor, 2015). This is very encouraging, as part of this study will attempt to examine the impact of QPE programmes on pupils' AA as well as on ATPE, PAB and WB. To assess this impact, the implementation fidelity of QPE programmes will be initially investigated. To ensure the integrity of scientifically based research, curriculum intervention researchers conducting efficacy and effectiveness studies are now being asked to describe how fidelity is defined, conceptualised and measured. Fidelity measures are needed to explain the

degree of variation in implementation and how this might affect moderate outcomes. This means that fidelity measures must capture the critical features of the intervention's programme theory (Education et al., 2006). Such measures should also indicate how the intervention is maintained consistently across multiple groups over time or describe the parameters under which variations in the implementation may occur. The statistical power of a study relies on the use of reliable, valid measures; appropriate design and sampling; and careful assessment of fidelity. Each of these three decreases as research moves from the laboratory (efficacy studies) and toward the field (effectiveness studies) (Mowbray et al., 2003). Therefore, measuring the fidelity of implementation is critical to determine not only if the QPE programme is sufficiently implemented, but also if there are critical differences between what the experimental and comparison groups receive, so that one might expect a difference in outcomes.

While the reviews mentioned above have presented many findings, there are still gaps in the research. Therefore, this review aims to scope out the common themes of features of QPE programmes in primary schools, while considering the four outcome dimensions (i.e., ATPE, PAB, WB and AA). The aim of the review is to formulate an evaluation framework on QPE in primary education.

3.3. Materials and Methods

A scoping review of the available qualitative and quantitative literature relating to the evaluation of implementation fidelity of quality QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, MWB and AA, was conducted according to the PRISMA extension for scoping reviews guidelines (Tricco et al., 2018). Using the PRISMA ScR guidelines of identification, screening, determining eligibility and inclusion, studies were extracted from four different

databases, using search terms related to the essential PE component of policy and environment.

3.3.1. Inclusion and Exclusion Criteria

The inclusion criteria were as follows: (1) studies that explored the attitudes of pupils on PE, as well as outcomes on AA, PAB and MWB (outcome criteria); (2) studies that used qualitative and quantitative methods to collect data (design criteria); (3) pupils aged between
8 and 12 years, from urban and non-urban areas living in developed or developing countries (population criteria); (4) studies published in English (language criteria); (5) studies published after 2000 (time criteria); (6) studies published in scientific journals (publish criteria).

Studies were excluded if they (1) were not focused on PAB outcomes, ATPE outcomes, MWB outcomes and AA outcomes; (2) focused on out-of-school PA; (3) were a systematic review themselves; (4) involved participants over 12 years; (5) were not published in English; (6) were published before 2000; and (7) were not articles published in scientific journals with peer review (e.g., conference papers, book chapters, etc.).

3.3.2. Search Strategy

Regarding the search strategy, PubMed, Elsevier, SCOPUS and CINAHL databases were used to ensure, from an early stage, the scientific quality of the studies ranging the areas of social science and health sciences that were core to this research. The search strategy was based on the following fields: ‘title’, ‘abstract’ and ‘keywords/subject’. The language of publication was restricted to English. The terms

used in the search were: ‘quality physical education*’ AND ‘physical education programme’ AND ‘primary*’ AND ‘education’. Additional records were identified through reference lists. In those cases where the scientific article or data needed were not available (e.g., no access to pdf, no mean age, etc.), the authors of the study were contacted via email and/or professional media platforms.

3.3.3. Studies’ Screening, Selection and Quality

After performing the search in the databases, the data were imported into a reference manager software (Gotschall, 2021). One hundred fifty-two duplicate studies were eliminated automatically. The first author screened titles and abstracts of the remaining records. Each full-text article was carefully examined to decide whether the article met the inclusion criteria and, if so, to assess its quality. Where there were doubts, these were discussed with the research team and an agreement was reached upon inclusion or exclusion of the reference.

The initial search identified 2869 records in the described databases, and an additional 5 records were identified through the reference list. These data were then exported to the reference manager software EndNote (Clarivate Analytics, 2013) and all duplicates (152 records) were excluded. The remaining 2722 studies were then screened according to the title and abstract for relevance, resulting in another 2677 studies being eliminated from the database. The full texts of the remaining 46 studies were read in full and another 30 were further excluded due to lack of relevance for the specific purpose of the current review. The main reasons for exclusion were related to the following: (1) PA-related rather than PE (n = 12); (2) related to post-primary pupils (n = 5); (3) based on PE policy (n = 9); (4) book was no longer available (n = 1); and (5) systematic review

research papers (n = 4). At the end of the screening procedure, 15 studies were included. See Figure 4 below.

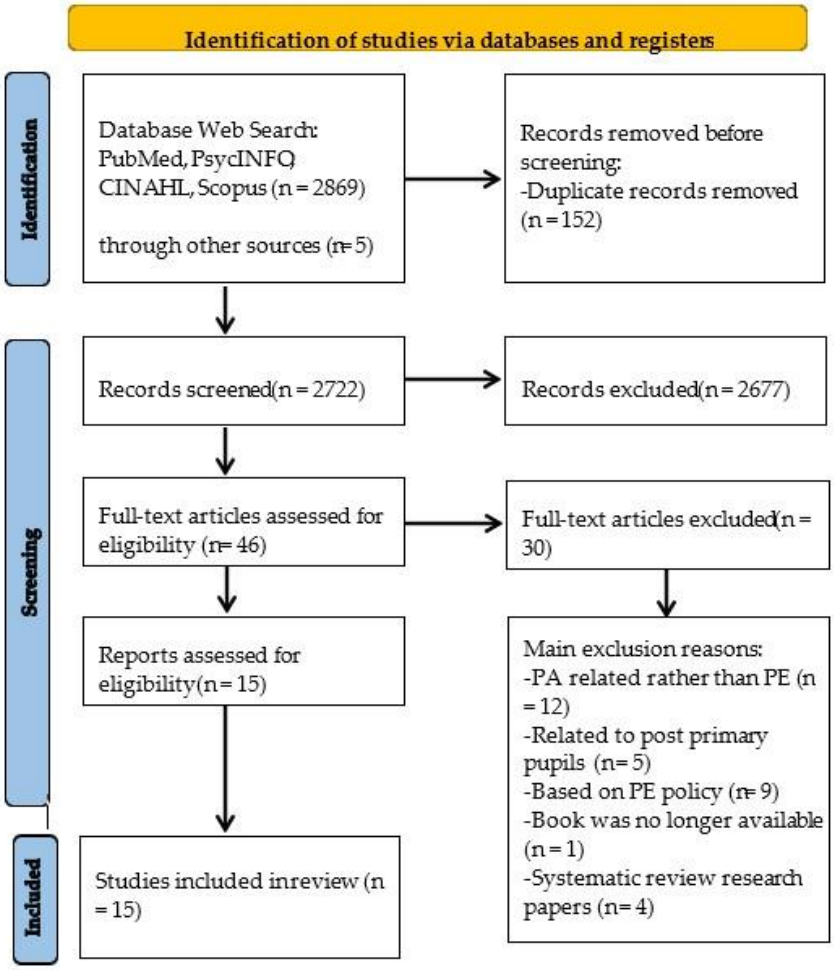


***Figure* 4. PRISMA-ScR flow diagram for study selection.** *Source: Kingston et al., (2023)*

3.3.4. Data Extraction, Analysis and Synthesis

Initially, each article was read, and the following characteristics were extracted independently by the first author of the scoping review: (1) author's name and publication year; (2) country; (3) sample; (4) methods; (5) quality feature of PE programme; (6) dimension of outcome; (7) physical measurement for each outcome; and (8) main findings. Data extracted by the researcher were re-examined, readjusted and confirmed with three other authors. The four outcome dimensions were considered as

deductive categories: ATPE, PAB, MWB and AA. Following this, a thematic synthesis approach was adopted to analyse and synthesise the data concerning the research topic. In this inductive/deductive process, each article was read several times and analysed line by line by the first author. The features were constantly compared, and then coded according to the thematic emphasis in the seven selected themes. The full coding was reviewed between the four members of the research theme involved in the process and confirmed after reviewing and refining the coding scheme.

3.4. Results

3.4.1. Study Characteristics

For this review, the perspectives of researchers from nine countries were taken into account. Three of the included studies were carried out in Australia, three in Malaysia, two in Ireland, two in the USA and one in each one of the following countries: UK, Greece, Italy, Spain and South Africa. Studies were cross-sectional: five were qualitative, seven used a mixed-methods approach and three studies were quantitative in nature. In relation to the dimension outcomes, fourteen studies reported on the dimension ATPE, four on the dimension PAB, one on the dimension MWB and one on the dimension AA. As for the implementation fidelity of a QPE programme and its outcomes on ATPE, PAB, MWB and AA, 12 out of 15 studies did not directly relate to this; however, all studies were related to the topic of implementation fidelity indirectly. Details were provided on the sample of each study. The specific method was outlined, and several quality features were inductively and deductively identified across all four dimensions of the study. The physical measurement for each dimension was also outlined along with the main findings.

3.4.2. Domains of Quality Physical Education in Primary Education

Following further analysis, all studies were categorised into seven themes summarising the domains of QPE programmes in primary education that have shown to positively affect one or more of the outcome dimensions targeted by this study (ATPE, PAB, MWB and AA). The following themes were generated: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships. Each theme was composed of the specific features of quality (Table 9). Teachers (Theme 5) were by far the most heavily weighted theme with the largest number of associated quality features.

Table 9. Themes and Quality Features Identified Across All Four Dimensions in the Systematic Review

Themes and Quality Features Identified	Details
Government leadership	Facilities, equipment, and resources; Human resources; Availability of PE facilities: facilities such as open fields, outdoor obstacle course, playground equipment; Quality physical resources through building new facilities and upgrading existing ones; Train educators on the use and maintenance of facilities; Class size; Level of departmental assistance
PE curriculum	Fundamental movement skills; Curriculum flexibility; Structured curriculum to help acquire skills, knowledge; Reflection on the nature and content of programmes of PE; Time—60 min or more of moderate-intensity physical activity each day; Instruction time—45 min per day × 5 days per week = 225 min per week
School principal and leaders	Adequate funding allocated to the PE department; Administrators discussing PE teaching assignments with teachers; Academic and professional qualifications of the principal; Personal school experiences in PE of the principal; PE classes assigned to teachers based on their professional qualification; Adequate library PE books; Equipment availability; Quality of facilities; School executive attitudes towards PE; Leadership and vision: status of PE as a subject

Organisational management from leadership in school	Needs of the staff, readiness factors such as equipment and sports facilities; Resources and materials; Multiple PE opportunities—recess, intramurals, interscholastic sports, classroom PA breaks and walk and bicycle to school initiatives; Promote extracurricular physical activity; PA during the school day, PA before and after school; Multiple opportunities for physical activity throughout the school day
Teachers	PE content knowledge; Personal school experiences in PE for teachers; Years of teaching experience; Teacher's confidence teaching PE; Teacher's interest/enthusiasm for PE; Willingness to teach new elements of PE content; Attitudes to meeting the individual needs of children in PE; Teachers serving as the school physical activity leader; Planning and implementation; Cooperative learning opportunities; Goal-oriented activities; Quality preparation of tutors; Teachers' attitudes; Communities of practice and collaborative learning; Specialist-led teachers; Teacher competency; Teacher education; Observations of other teachers' PE classes; Providing students with learning experiences that meet individual developmental needs, which help to improve mental alertness, academic performance, readiness to learn and enthusiasm for learning; Teacher to be knowledgeable about the school curriculum, unpack its specialised content, use available resources appropriately and design suitable learning programmes
Parental involvement	Support for the PE programme; Positive attitude towards PE; Support for school transport initiatives; Assisting school to deliver the PE programme; Fundraising and helping to advance the PE facilities and resources in the school; Homework assignments with family activities; Sending educational material home; Providing physical activity and nutritional guidelines; Asking parents to send healthy snacks to school
Community partnerships	Promoting extracurricular physical activity and disseminating information about community-based sports programmes; Family and community involvement in PA and PE programmes in schools; Community partnerships so that quality physical resources can be provided through building new facilities and upgrading existing ones

Theme 1: Government Leadership

Through the scoping review, five studies were linked to the theme government leadership. These included five studies (Coulter & Woods, 2012; Hills et al., 2015; Kulik, 2001; Morgan & Hansen, 2008; Roux, 2020). The selected studies positively affected two of the dimensions: ATPE and AA. It is imperative that governments display leadership by enabling schools to establish health-promoting environments that support

PA (Hills et al., 2015). It was found that adequate government leadership was associated with the provision of the adequate availability of PE facilities such as open fields, outdoor obstacle courses and playgrounds (Kulik, 2001). Leaders could provide this by building new facilities or upgrading existing ones. Training educators on the use and maintenance of facilities were also important (Roux, 2020). Teachers reported that a good level of resources provided were invaluable in supporting and enabling their PE teaching (Coulter & Woods, 2012). Equipment availability, quality of facilities, level of departmental assistance, class size and access to professional development were key features linked to good government leadership (Morgan et al., 2008).

Theme 2: Physical Education Curriculum

The theme PE curriculum aligned with five of the studies from the scoping review (Lucertini et al., 2013), (Lynch, 2017); (Tyler et al., 2016), (Wee, 2019) and (Mohamed et al., 2017). They were found to affect only one of the outcome dimensions, namely ATPE. Lucertini et al. (2017) reported a number of features that enhanced the PE curriculum. The study reported the following: (1) specialist-led lessons benefitted pupils' more than generalist-led peers. Specialist-led pupils demonstrated greater increases in some motor and health-related abilities tests compared to generalist-led peers; (2) 60-minute PE lessons were more beneficial than shorter lessons; and finally, (3) structured programmes were more effective than unstructured. Other features that were reported to be beneficial were fundamental movement skills and curriculum flexibility (Lynch, 2017). Similar to Lucertini et al. (2013), it was suggested that a structured curriculum to help acquire skills, knowledge and dispositions was necessary to be 'wise consumers' of PA (Tyler et al., 2016). The positioning of PE in the curriculum

(Coulter et al., 2012) and curriculum management-planning and implementation (Mohamed et al., 2017) were also noted in the scoping review as key features of this theme.

Theme 3: School Principal and Leaders

Both Wee (2019) and Fonyi and Soon (2021) are closely linked with this theme. The studies affected only one outcome dimension: ATPE. There were a number of quality features observed in this study which were associated with school principals and leaders. Features worth noting were principals' positioning of PE in the curriculum; adequate funding for the PE department from school administrators; administrators discussing PE teaching assignment with teachers; PE classes assigned to teachers based on their professional qualification, leadership and vision (status of PE as a subject); and adequate library PE books (Wee, 2019).

The academic and professional qualifications of the principal were also important. When principals believed in personal development, they would also support the welfare of teachers to ensure QPE learning and teaching experiences. The school context and years of teaching experience were relevant. Promoting a positive and quality school learning climate was directly influenced by what a principal had gone through in their lifetime as a teacher. The PA level of school principals was influential, and principals who were involved in organised PA were more likely to possess a higher favourable attitude towards administering QPE programmes as compared to less-active principals (Fonyi & Soon, 2021). This study also stated that both female and male principals favoured PE and believed in the importance of it. All of the above features

were closely connected to the successful implementation of QPE programmes in schools.

Theme 4: Organisational Management from Leadership in School

Quality features for this theme can be seen in the study by Kulik, 2009. The only associated outcome dimension was ATPE. The following quality features were identified under the theme organisational management from leadership in school: meeting the needs of the staff; providing readiness factors such as equipment and sports facilities, re-sources and materials; provision of multiple PE opportunities (recess, intramurals, interscholastic sports, classroom PA breaks and walk and bicycle to school initiatives); and promoting extracurricular PA. PA before, during and after the school day, and multiple opportunities for PA throughout the school day were also important (Kulik, 2001).

Theme 5: Teachers

There was a wide selection of quality features identified under this theme. It is worth noting that many of these features overlapped in the 15 studies reviewed. The quality features for this theme were found in the following studies (Atencio et al., 2012; Christodoulos et al., 2006; Coulter & Woods, 2012; Hills et al., 2015; Johnson & Turner, 2016; Kulik, 2001; Lynch, 2017; Mohamed et al., 2017; Morgan & Hansen, 2007; Murphy & O'Leary, 2012; López-Rivera et al., 2020; Roux, 2020; Wee, 2019). Of all seven themes, teachers were by far the most heavily weighted theme. It is interesting to note that this was the only theme that affected all four outcome dimensions: ATPE, PAB, MWB and AA.

The key features included personal school experiences in PE for teachers, years of teaching experience, teachers' confidence and competence for teaching PE, teachers' interest/enthusiasm for PE, willingness to teach new elements of PE content and attitudes to meeting the individual needs of children in PE. Additionally relevant were teachers serving as the school PA leader, planning and implementing and cooperative learning opportunities, providing goal-oriented activities, quality preparation of tutors, communities of practice and collaborative learning. Specialist-led teachers, teacher education, observations of other teachers' PE classes, providing students with learning experiences that meet individual developmental needs, being knowledgeable about the PE curriculum, unpacking its specialised content, using available resources appropriately and designing suitable learning programmes were also identified as quality features.

Theme 6: Parental Involvement

Features included in this theme were identified mainly in the Christodoulos et al. (2006) study. This theme affected just one outcome dimension: PAB. The features included parental support for the PE programme, positive ATPE, support for school transport initiatives, assisting the school to deliver the PE programme and fundraising and helping to advance the PE facilities and resources in the school. Parental involvement was encouraged through homework assignments with family activities, by sending educational material home, providing physical activity and nutritional guidelines and by asking parents to send healthy snacks to school.

Theme 7: Community Partnerships

The final theme can be associated with three studies from the scoping review (Christodoulos et al., 2024; Hills et al., 2015; Lynch, 2017). By promoting extracurricular PA and disseminating information about community-based sports programmes, QPE in schools can be strengthened (Christodoulos et al., 2006). Family and community involvement in PA and PE programmes in schools was worthwhile (Hills et al., 2015). There were also opportunities for community partnerships so that quality PA resources could be provided through building new facilities and upgrading existing ones (Lynch, 2017). All features listed above were important so that QPE programmes could be delivered successfully in schools.

3.5. Discussion

This scoping review updates the existing knowledge from quantitative and qualitative research relating to the evaluation of the implementation fidelity of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, MWB and AA. In this section, the quality features are organised and discussed around the four outcome dimensions. At the end, strengths, recommendations and limitations are further developed.

3.5.1. Attitude Towards Physical Education

School PE provides a context for regular and structured PA participation. To this end, a common justification for PE's place in the school curriculum is that it contributes to children's health and fitness (PEA UK, 2004). Christodoulos et al. (2006) reported that the higher scores of the intervention classes on attitudinal measures, compared with

the typical classes, can be attributed to the health-related lectures and frequent health-related reminders included in the teaching material. For example, when students were doing sit ups, the teacher could remark ‘our abdominals help in good posture’; when they were running, the teacher could remark that ‘now we are improving aerobic endurance’. There were reminders for the PE teacher to give as many such messages as possible. This approach may be beneficial in attitude change. The Christodoulos et al. (2006) study also focused on children’s enjoyment and willingness to participate in PE classes. Christodoulos et al. (2006) suggested that emphasis should be placed on total class participation in enjoyable, non-competitive exercise forms. PAs matched to the child’s ability are more likely to produce a feeling of success than those that are at too high a skill level. Another perspective is that students believe their peers play a major role in impacting their ATPE, but research has demonstrated that the influences of the PE teacher and curriculum are more powerful in this regard (Figley, 1985; Luke & Sinclair, 1991). Previous studies have shown that the involvement of parents remains a necessary part of school-based PE programmes, because their attitude has a great influence on the lifestyle and habits of health behaviour in children (Dobbins et al., 2013). There is an obvious link between the dimension ATPE and the quality features of the PE curriculum, teachers and parental involvement. As a result, it is suggested to include health-related information as part of the PE curriculum content, and that teachers be properly trained so that adequate and well-structured content is delivered. It is also important for parents to be involved in some aspects of the delivery of the PE programme in what concerns the promotion of positive attitudes.

It was reported that specialised teachers are more impactful in the classroom as opposed to generalised teachers (Lucertini et al., 2013), and that PE specialists provide more effective PE than non-specialists (Starc & Strel, 2012). Another experiment

showed that the planning and delivery of PE lessons by PE-specialist teachers in comparison to generalist teachers resulted in a relative improvement of physical fitness in the quasi-test group in comparison to the quasi-control group (Kriemler et al., 2010).

A major barrier to delivering QPE programmes is the poor qualifications and preparation of teachers. It is recommended that opportunities for developmentally appropriate primary education PE specialism be provided within degrees, allowing every primary school over time to have a sustainable infrastructure of PE expertise and advocacy (Lynch, 2017). Similar to the point made by Lucertini et al. (2013) and supporting the point made by Lynch et al. (2017), there is a need to have specialist PE teachers, as the majority of the current teachers taught less than five PE periods per week and only 6.2% were PE majors (Wee, 2019). The above results make evident the connection between ATPE and the domains government leadership and teachers regarding teacher preparation, qualification and professional development. The government should consider the impact of the academic and professional background of those who are in charge of delivering successful PE programmes in schools, and should prioritise the contribution, or collaboration, of specialist PE teachers in primary education systems where the delivery of the PE subject is the responsibility of generalist teachers.

Time allocation is another relevant indicator of QPE programmes for ATPE. There is evidence to support the effectiveness of PE policy strategies in enhancing the time scheduled for PE (Nathan et al., 2019). It is reported that schools in the USA do not offer PE daily and also do not offer the recommended 225 min (45 min per day × 5 days per week) of PE per week (Nathan et al., 2019). It does not appear that the factors recommended by SHAPE America influence the amount of time that is allocated for PE instruction (Kulik, 2001).

Administrators also play a major role in ensuring high-quality PE implementation, which highlights the strong links between ATPE and the domains of school leaders and organisational management from leaders in school. In a systematic review carried out by (McLoughlin et al., 2021) one of the higher implementation determinants assessed was leadership (n = 42, 49%) (McLoughlin et al., 2021). The teachers need to emphasise the importance of PE and value it similar to other subjects. The administrators should strive to ensure that the PE curriculum is properly pursued by assigning it its due budget and allocating proper resources so that activities can be carried out in accordance with the syllabus. The lack of resources for PE activities results in a general lack of enthusiasm among students for PE (Mohamed et al., 2017). Good administrators organise in-house training, discuss PE teaching assignments and factors affecting PE teaching and observe PE teaching. As regards class distribution, administrators should have discussions with teachers before assignment to ensure PE teaching is based on interest and qualification (Wee, 2019).

It is evident that certain features are prerequisites for QPE programmes. The information gathered from this scoping review highlights that the key features that positively affect ATPE are health-related reminders, foci on children's enjoyment and willingness to participate in PE classes, specialised teachers, adequate time allocation and administrators working to ensure that the PE curriculum is properly pursued. The effectiveness of these key features depends on the success of the following domains: government leadership, PE curriculum, school principal and leaders, organisational management from leadership and teachers. All these messages along with their obvious links to the domains listed above should be taken into account in the design of future QPE interventions aimed at improving ATPE in children.

3.5.2. Physical Activity Behaviour

The foundations of PAB are set early in life, and schools have an important role to play in shaping young people's activity behaviours. PE is meant to teach students the benefits of health and exercise not only for the duration that they are in school, but for their lifetime. Schools without a quality health or PE programme are inevitably pushing young students toward a sedentary adult lifestyle (Chng et al., 2015). A CSPAP should consist of PE and other PA opportunities such as recess, intramurals, interscholastic sports, classroom PA breaks as well as walking and cycling to school initiatives (Wechsler et al., 2004). The crowded school curriculum with an intense focus on AA; lack of school leadership support, funding and resources; along with poor-quality teaching are barriers to QPE and PA promotion in schools (Hills et al., 2015). Due to the relationship schools have with their communities, both local and national governing bodies need to be involved in developing CSPAPs. This supports the connection between PAB and government leadership. Governments are able to support leadership by requiring schools to provide PE and other PA opportunities before, during and after school and by enabling schools to establish health-promoting environments that support PA (SHAPE America., 2017).

Data shows that school health education programmes, including PE programmes, have the potential to slow the age-related decline in PA and help pupils establish lifelong, healthy PA patterns. Promoting healthy habits and PA behaviours during childhood may prevent some of the leading causes of morbidity and mortality, while also decreasing direct healthcare costs and improving quality of life (Christodoulos et al., 2006), thus highlighting the link between PAB with the domains of school principal and leaders, and teachers. It is imperative that school leaders and PE teachers address this deficit and ensure that the minimum requirement of allocated time for PE is met.

A final connection became evident between the dimension PAB and the domains of teachers and parental involvement. Physical educators must be key drivers of physical and health literacy as well as behaviour changes to optimise the QPE of children and adolescents. For parents, physical educators need to provide information regarding the benefits of PA via messages sent home and different school activities. In addition, physical educators need to encourage families to become involved in school-based PA and events. Since non-specialist classroom teachers and staff often serve as role models for children, physical educators need to encourage school staff to be more physically active (Hills et al., 2015).

3.5.3. Wellbeing

Cooperative learning as a pedagogical model that can contribute to the students' social and emotional learning involves building quality relationships, learning to manage stressors and evolving as individuals and as a group. The domain 'teacher' link closely to this dimension (i.e., MWB) as teachers can plan and provide cooperative learning opportunities for children in school. The cooperative learning framework helps to increase students' self-approach goals and their emotional control and regulation, and empathy. It can guide students to more adaptive motivational patterns and to develop their emotional intelligence (López-Rivera et al., 2020). QPE programmes are well-positioned to include cooperative learning activities and are therefore significant factors in determining positive outcomes for pupils' WB.

3.5.4. Academic Achievement

International research in this field has repeatedly reported that increasing PA can be positively related to AA. It has been proven that when students are active for a portion of their day, they are able to focus and be more productive in school (U.S. Department of Health and Human Services; 2010). Physical educators now have data showing that PA can help students learn better and releases endorphins that improve mood (Chng et al., 2015). Higher cardiorespiratory fitness may be important to enhance children's and adolescents' health, and, additionally, AA (Marques et al., 2018). Due to a lack of consensus across studies, methodological issues associated with the assessment of QPE and PA should be considered when investigating the links between PE/PA and AA. QPE and PA seem not to be detrimental to school-age children and adolescents' AA, and may, in fact, be beneficial (Barbosa et al., 2020). The Department of Education in America explicitly lists the personal development, health and PE (PDHPE) key learning area as how schools support and develop students' health, emphasising physical and mental health, as well as academic benefits (Lynch, 2017). Further research shows that participating in PE is positively related to outcomes including AA; academic behaviours; and indicators of cognitive skills and attitudes, such as concentration, memory, self-esteem and verbal skills (CDC, 2010). All studies reviewed emphasise the link between the AA dimension and government leadership. It is crucial that governments continue to invest in researching the links between AA, PAB and ATPE as interconnected variables that contribute to the pupils' overall WB (NCCA, 2017).

3.6. Conclusions

A key strength of this scoping review is that it is the first to evaluate the literature on the implementation fidelity of QPE programmes and their outcomes on final-stage

primary-level pupils' ATPE, PAB, WB and AA. Furthermore, the concurrent examination of research on features of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, WB and AA enabled a comprehensive investigation of the most up-to-date evidence. The focus on peer-reviewed research enhanced the overall integrity and rigor of this scoping review and strengthened the review's methodological quality. Reliance on empirical studies that analyse primary data, complemented with additional sources of evidence (e.g., different types of reviews, scientific statements, position papers), is another clear strength of our review because we are able to provide a holistic and more nuanced view of the existing evidence for the evaluation of the implementation fidelity of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, WB and AA. This is one of a few scoping reviews that is used to identify quality features of PE programmes and to use these to develop a conceptual framework. Furthermore, the key features of QPE programmes that have been identified can be used to inform future researchers, PE policy makers and PE educators. There is an obvious link between the four outcome dimensions and the seven identified domains displayed in Table 9. The findings indicate that domain 5 (teachers) has far more quality features than any of the other six. This gives us evidence that teachers are a highly significant and a very valuable resource when discussing the topic of QPE programmes in primary schools. More emphasis should be placed on researching this body of people and considering the subsequent findings.

However, there were some limitations, with the main one being the quality of analysed research was not examined because the primary aim of this review was to identify the existing features of QPE programmes that promote one or more of the four outcome variables. However, we acknowledge that a quality evaluation is needed for similar studies which primarily focus on the analysis of the outcomes. Another limitation

is that this review did not aim to analyse the outcomes themselves; therefore, an analysis of the impact of the features of QPE programmes on the outcome variables is needed.

An important conclusion from this scoping review lies in the volume of available studies. There is limited and disperse research completed in this area; therefore, the number of relevant studies selected to be analysed in relation to each outcome variable was reduced. Another conclusion from this review is that there were no longitudinal studies as none were found during the database search. This compromises the existing knowledge based on the long-term effects of QPE programmes and their outcomes on pupils' ATPE, PAB, WB and AA in primary school settings. This study recommends that further research is needed, and particularly longitudinal studies towards a more concentrated effort in researching in this area. It was consistent throughout this study that studies relating to the effect of QPE programmes on the WB and AA of pupils in primary schools were less available than the effects on any of the ATPE and PAB outcome dimensions. Only one paper was selected for the topic WB and one for AA as part of this scoping review. Policy makers and researchers alike should consider a broad and balanced approach to monitoring the longitudinal impact of the fidelity of implementation of QPE programmes on the four outcome variables that were addressed in this study for a holistic picture of children's development at the end of their primary education.

3.7. Link Section

The first study (chapters 3) presented in this thesis refers to a scoping review which was carried out on the literature relating to the evaluation of the implementation of QPE programmes and related outcomes on final-stage primary-level pupils' ATPE, PAB, WB

and AA. The overall objective of the chapter was to identify quality features of PE programmes and to use these to develop a conceptual framework.

The principles for examining the quality of the PE programme and the fidelity of its implementation were research-informed, underpinned by O'Donnell (2008) and CDC (2019) to assist with designing the evaluative protocol, while attending to ecological validity. A thematic analysis was used to inductively and deductively analyse the studies for common themes of features of QPE programmes in primary schools, arising from nine different countries, considering the four outcome dimensions (ATPE, PAB, WB and AA). The common themes identified as features of QPE across all four dimensions were as follows: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships. Based on these findings, recommendations were made for an evaluation framework on QPE in primary education.

Essentially, the scoping review, including the analysis of the studies for common features of QPE programmes, provided a more robust evidence base for the potential development of an evaluative framework which could support the promotion of a holistic picture of children's development at the end of their primary education. The evaluative framework was subsequently used to support the second study of this paper (chapter 4). The aim of the second study was to validate an evaluative framework to examine QPE and fidelity of implementation in primary schools. This study (chapter 4) contributes significantly to the aim of the overall study which is to evaluate the extent to which the quality of PE programmes and their fidelity of implementation sustain pupils' outcomes on ATPE, PAB, WB and AA. The information gathered in chapter 4 will result in the validation of an evaluative tool that will be used in follow-on study to assess the effects of a QPE programme on the four targeted outcomes of pupils in 5th

and 6th class of primary school. It also contributes to answering the two hypothesis which are part of the wider questions to be addresses as part of the overall study. As a reminder, the main research question investigates the fidelity of the implementation of a QPE programme and its outcomes on final-stage primary-level pupil's ATPE, PAB, WB and AA. The two hypotheses are:

H1: Schools with higher quality and higher fidelity of their PE programme have significantly higher pupil outcomes on ATPE, PAB, WB and AA;

H2: The differences of quality and fidelity of the QPE programme reflect differences of pupil outcomes on ATPE, PAB, WB and AA.

In the next chapter, evidence is presented that supports the comprehensive development of an evaluation protocol that examines QPE and fidelity of implementation in primary schools.

Chapter 4 - Development of an Evaluation Protocol to examine Quality Physical Education and Fidelity of Implementation in Primary Schools

4.1. Abstract

Previous research in Ireland has shown that it is important for primary pupils to be exposed to a rich physical education (PE) curriculum to develop holistically. However, until now there is no validated instrument that measures the quality physical education (QPE) provision in primary schools and the fidelity of its implementation. One of the aims of this study was to validate an evaluative protocol to examine QPE and fidelity of implementation in primary schools. The design of the protocol followed a systematic literature research process to consider elements of context, process, and outcomes on attitudes towards physical education (ATPE), physical activity behaviour (PAB), wellbeing (WB) and academic achievement (AA). The evaluative framework is made up of a physical education-school self-assessment survey (PE-SSAS) and a physical education-external qualitative observational tool (PE-EQOT). These are two aspects of the same tool. The validation of the protocol included 179 PE leaders and teachers from sixty-eight primary schools in the Munster province of Ireland. Following a two-phase procedure, the PE-SSAS was developed as a fifty-six-item scale-type instrument with seven factors and a forty-four-item instrument with seven factors in the PE-EQOT was generated, both of which were subject to validation. The statistical fit of the PE-SSAS was tested with the use of exploratory factor analysis (EFA) and content, face and

construct validity tests, as well as Cronbach's alpha coefficients and inter-construct correlations. The PE-EQOT was subject to validation through a pilot run in six primary schools and peer debriefing with an expert panel and critical friend. Taken together, our analyses supported the overall validity and reliability of this instrument for assessing QPE programmes and fidelity of implementation in primary schools. It is suggested that future studies should expand on the validity and factorial structure of this instrument, particularly with regards to external validity in different contexts. Notwithstanding considerable heterogeneity in the data paralleled with methodological limitations, the presented evidence supports a comprehensive development of an evaluation protocol that examines QPE and fidelity of implementation in primary schools.

Keywords: primary education; academic achievement; attitudes; wellbeing; physical activity; programme evaluation;

4.2. Introduction

Although PA plays a fundamental role in overall child health and development, rates of compliance with worldwide PA guidelines such as, children and adolescents engaging in an average of 60 minutes per day of PA and incorporating MVPA at least 3 days a week, are decidedly lacking (WHO 2020; Guthold et al., 2018). This is particularly noted in Ireland in the CSPPA, 2022, as the context of this research. Increased childhood physical inactivity and sedentary behaviour is a growing public health concern in many countries across the globe (WHO & UNESCO, 2021) and during the COVID-19 pandemic, conditions for regular PA became even more unfavourable, with the declaration of a state of emergency and pandemic control measures leading to the closure of sports grounds and sporting competitions (Adamakis, 2021; Jalongo, 2021).

Evaluating the extent of implementation and variation of typical school provision of PE,

PA, and sports in the Republic of Ireland is a public health priority (Rocliffe, et al., 2023). When children and adolescents participate in the recommended level of PA, multiple health benefits accrue encompassing physiological, physical, mental, and cognitive benefits (Dudley & Burden, 2020). Most youths, including those residing in Ireland, however, do not reach the recommended levels of PA. PE stands as a subject with diverse levels of quality and implementation in the Irish educational context (Woods et al., 2023).

Policies that support PA in schools may be promising, but their impact on PAB is poorly understood. Recent research supports the positive impact of typical school provision of PE, PA, and sports on adolescent PAB (Rocliffe et al, 2023). Research also supports the effectiveness of PA policy actions within the school setting but cautions against a "one-size fits-all" approach and emphasises the need to examine policy implementation to maximise translation into practice. Greater clarity regarding terminology, measurement, and methods for evaluation of policy interventions is needed (Woods et al., 2021). A recent systematic literature review by, (Rocliffe, et al., 2023) synthesised the evidence on typical school provision of PE, PA, and sports as a strategy to impact adolescent PAB and that the relationship between typical school provision of PE, PA, and sports on adolescent PAB to be multifaceted. PAB was the most frequently reported outcome and evidence was also found to support an impact on meeting PA guidelines and in reducing sedentary behaviour, particularly in girls. In the context of typical school provision of PE, this study illuminated that the provision of regular PE class, extension of minutes dedicated to PE (>90 min), maximising opportunities for MVPA, and minimising opportunities for sedentary behaviour should be considered when strategising to impact adolescent PAB (Rocliffe et al,, 2023).

According to Periˇc and Bˇrezina (2019) exercise and sport are a fundamental part of every individual's life, an essential manifestation of a healthy lifestyle that is indispensable for the proper development of every individual. Other benefits of increasing children's engagement in PA are substantial developmental, and social benefits for children including reducing stress (Lambiase et al., 2010), and depression and anxiety symptoms and AA, (Ontario Active School Travel, 2020), as well as improving WB, (Participation, 2018; Yang et al., 2014). Findings from the PA and WB study (PAWS), (Murphy et al., 2020), reported a minority of the sample were found to meet the WHO's PA guidelines (60 minutes or more each day). Also in this study, frequency of activity were found to decline with age and frequency of activity was positively associated with WB and negatively associated with symptoms of anxiety and depression. Males had higher levels of WB and lower levels of anxiety and depressive symptoms across all sub-groups. Adolescents who engaged in sports were found to have higher levels of WB and lower symptoms of anxiety and depression with team sport conferring an additional benefit, (Murphy et al., 2020). Other evidence supported the impact of PE on adolescent WB (Rocliffe et al, 2023). Results showed significantly positive effects were linked to interventions with minor modifications to typical provision such as the integration of teacher workshops and/or implementation of curriculum models. This suggests the importance of supplementing typical school provision of PE to positively influence future impact. The Ireland North and South Report Card on PA for Children and Adolescents, (Furuya, 2022) has shown progress in relation to children's PA across the island of Ireland. Positive trends were observed across a number of indicators, despite the results for PE being less encouraging. This information combined emphasises the importance of this particular research and its subsequent outcomes.

Woods et al (2021) states that PE is a strong area in school-focused PA policy that can directly impact PA. Schools, when planning for whole-school PA (WHO, 2022) have the potential to influence the habitual PA of children by encouraging increased participation in extracurricular sports activities, by favouring active commuting to school (Trudeau et al., 2005; Tudor-Locke et al., 2001), and by creating close links with sporting clubs and associations in the local community (Tremblay et al., 2011). Furthermore, Dudley et al (2020) concluded that research interventions in PE can significantly impact a range of learning domains. It can be suggested that a QPE programme provided by the school, while supported by a positive policy environment, can contribute significantly to the overall amount of PA and MVPA of the school-age child while meeting a range of significant socio-educational outcomes (Dudley et al., 2021; Woods et al., 2021).

Pfledderer & Brusseau, (2021) provide a summary of contemporary empirical evidence supporting the need for the Essential Components of PE as the minimum threshold of quality. The collective findings demonstrate the feasibility and necessity of policy, curriculum, instruction, and assessment guidelines. Given the paucity of empirical research representing positive, neutral, or adverse health outcomes, the analysis revealed small to moderate evidence supporting the inclusion of essential components. This conclusion is heavily weighted on the findings that policy has the potential for impact and fitness education curricular models do improve PA and fitness (Pfledderer & Brusseau, 2021). The paucity of research on assessment as measures of student learning, instruction effectiveness, and national surveillance, as well as the lack of experimental research, limits our understanding of this essential component. PE still needs a redesign with national organisations and rigorous, empirical research playing pivotal roles in this reform (White et al., 2021).

PE policies provide guidance and accountability to develop quality programmes that support the development of physical literacy. Policy research over the last 20 years was focused on the regulatory mandate of time. Policy research did not directly address disciplinary process variables of learning activities or outcomes of PE. The effects of policy exemptions and class size were underrepresented. PE policy requires further research. Investigations are needed to examine the downstream effects of PE policy and determine whether well-written policies increase the number of physically literate individuals (Burson et al., 2021).

PE classes in schools are considered relevant to implement interventions, especially focused on PA. However, evidence overviews on how PE classes contribute to general health (physical, social, affective, and cognitive domains) are still needed. A scoping review by Ramires et al., (2023), summarised the evidence that reinforces the importance of PE classes for the health of children and adolescents. The evidence suggests that PE lessons positively affect several physical, affective, social, and cognitive outcomes. In addition, it supports those programmes and policies with a "more and better PE classes" approach (i.e., PE strategies increasing the time allocated to PE lessons, improving the lessons' quality, and providing certified PE teachers) are the most effective components for reaching health benefits. This evidence forms the basis for building policies and practices related to the PE classes.

There is a consensus that schools represent an ideal setting for the promotion of PA and that policy changes are needed to address the current issues of inactivity that affect children and adolescents around the world (U.S. Department of Health and Human Services, 2010; WHO, 2022). Although work in this area is incipient and the evidence remains largely scattered, Kingston et al. (2023) has identified policy areas, with specific policy actions within each area, that add to the emerging body of knowledge regarding

the impact of school-based policies on PA-related outcomes. The policy areas and specific policy actions provide a template to guide upstream PA promotion practice in the school setting. Policy areas with stronger evidence of PA impact were: (1) PE; (2) school sport; (3) classroom-based PA; and (4) active school breaks. However, the range of policy options implemented and evaluated in the school setting remains limited, and more attention needs to be paid to how policies are implemented and the consequent impact on the PA outcomes investigated.

4.2.1. Evaluating Quality Physical Education in Primary Schools

QPE consistently receives positive acclaim as a contributor to young learners' holistic development, including ATPE, PAB, WB and AA (Dudley et al., 2022), especially in their formative years (Jess et al., 2017). Consistent with the notion of a link between early-life experiences and later health outcomes, greater attention is being given to the importance of exposure to QPE opportunities during early years and childhood. If health behaviours established during early life are more likely to persist or 'track' from childhood to adulthood, greater efforts should be made to capitalise on key opportunities, including in the school setting (Hills et al., 2015). PE is a fundamental cornerstone for childhood development as it promotes lifelong PA participation for holistic health (Martins et al., 2016). School educators play a key role in creating school environments that lead to developmentally appropriate and high-quality PE lessons (Donnelly et al., 2016). QPE opportunities should be carefully considered so that children will develop lifelong habits of being active, as well as developing well-rounded learning, to include ATPE, PA, WB, and AA. It is imperative that school leaders identify the key features of QPE programmes that help promote a well-rounded educational development.

This requires a protocol that evaluates QPE programmes and fidelity of implementation in primary schools, considering a well-rounded range of learning domains and outcomes, here represented by ATPE, PA, WB and AA.

With a view to developing an evaluation protocol with the features described above, a scoping review was carried out on the literature relating to the evaluation of the implementation of QPE programmes and related outcomes on final-stage primary-level pupils' ATPE, PAB, WB and AA (Kingston et al., 2023). A thematic analysis was used to identify common themes of features of QPE programmes in primary schools, arising from nine different countries, considering the four outcome dimensions (ATPE, PAB, WB and AA). The common themes identified as features of QPE across all four dimensions were as follows: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships. Based on these findings, recommendations were made for an evaluation framework on QPE in primary education.

However, despite the relative importance of pupil participation in PE programmes, repeated studies have noted methodological concerns regarding the validity of implementation of QPE programmes (Oliver et al., 2014; Wilson et al., 2018).

The PE interventions with the greatest effects on student learning and development are dependent on the learning domains (Dudley et al., 2022). Some PE interventions with a pedagogical focus such as games-based approaches, TARGET/Mastery Teaching, and QPE Meta-Analysis Sport Education were found to be strong investments across multiple domains. The evidence is limited however by consistency in intervention dosage, study design, and data collection instruments, (Dudley et al, 2022). The rise of the UNESCO QPE agenda has important educational implications for student learning

and development across four domains: cognitive, social, affective, and psychomotor. To date, however, no research has considered the impact of specific PE interventions within these domains. Such analysis is critical for determining how best to allocate the limited resources that are directed to PE globally, nationally, and locally, and for ensuring that our structural and pedagogical interventions yield the greatest potential benefits for students. Importantly, almost all interventions in PE can stake a claim to making a positive difference to student learning and development. Moreover, these benefits extend across four domains: cognitive, affective, psychomotor, and social. If we continue to set the "efficacy" bar at zero, therefore, it is of little surprise that so many PE interventions claim victory in improving student outcomes. By instead considering interventions with greater than average effect within each domain and highlighting the intervention approaches that are likely to enhance learning and development to the greatest extent (Dudley et al., 2022).

4.2.2. Aim of the Study

The aim of this study was to develop a PE-SSAS and a PE-EQOT to evaluate QPE programmes and the fidelity of its' implementation in primary public schools. The aim of the overall study from which this paper derives is to evaluate the extent to which the quality of PE programmes and the fidelity of their implementation sustain pupils' outcomes on ATPE, PAB, WB and AA. It is designed to gain knowledge on a broad variety of implementation issues and give detailed information on PE programme delivery and outcomes at the primary school level. This specific paper aims to validate an evaluative protocol to examine QPE and fidelity of implementation in primary schools. The protocol is made up of a PE-SSAS and a PE-EQOT, two aspects of the

same tool. The study has the potential to influence government policy and future practice.

4.3. Methods

The study was approved by the Social Research Ethics Committee (SREC) in University College Cork (log no. 2022-096). The validation of the evaluation method entailed the development of the PE-SSAS and the PE-EQOT. The principles for examining the QPE programmes and the fidelity of its implementation was research-informed, underpinned by a previous review paper (Kingston et al., 2023). The research by O'Donnell (2008) and CDC (2019) was adopted to assist with designing the evaluative protocol, while attending to ecological validity.

Before an evaluation method can be used to assess QPE programmes and its fidelity of implementation in primary schools, its validity must be subjected to rigorous verification (McDougall et al., 2006; Zhang et al., 2008). Validity is defined as the extent to which a concept is accurately measured in a quantitative study (Heale & Twycross, 2015). This study focuses on three basic and valuable types of validity: content validity, face validity, and construct validity. Content validity requires the use of recognised subject matter experts to evaluate whether test items assess defined content and more rigorous statistical tests than does the assessment of face validity (Pennington, 2003). Content validity, also known as logical validity, refers to the extent to which a measure represents all facets of a given construct. Face validity refers to the relative realism of the evaluation protocol (McDougall et al., 2006). Face validity assesses whether the test "looks valid" to the examinees who take it, the administrative personnel who decide on its use, and other technically untrained observers. Construct validity indicates the extent

to which the evaluation tool method can distinguish between different levels of fidelity of implementation based on PE-SSAS responses and data from the PE-EQOT protocol.

4.3.1. Overview of Physical Education-School Self-Assessment Survey

4.3.1.1. Sampling and Participants

A total of 71 primary schools were invited to participate in the study. They were from a range of schools in the province of Munster, Ireland. The range consisted of one junior school (junior infants -1st class), two senior schools (2nd-6th class), four Gaelscoileanna (all Irish speaking schools), 18 large urban, 23 small to medium and 20 Delivering Equality of Opportunity in School (DEIS), co-ed vertical schools (DE, 2017). Co-ed vertical schools were schools that enrolled both boys and girls and offered all classes from junior infants to 6th class. DEIS refers to the action plan of the DE for educational inclusion (Department of Education, 2017). Sixty-eight schools replied positively (~96% response rate) and in total 179 non-specialist teachers responded., The sample included 37 principals, 2 middle management members who were not teaching, 50 middle management members who were teaching and 90 teachers. 22.3% respondents had less than 10 years teaching experience, 38% had between 11 and 19 years, 27.4% had between 20 and 29 years, 9.5% had between 30 and 39 years and 2.8% had between 40 and 45 years of teaching experience. From all the respondents only two (1.1%) were substitute teachers and all the others were either permanent or temporary teachers. One other area of enquiry in the survey was related to either positive or negative influence of previous experience on teachers' current ATPE provision. The results showed that 4.5% of participants strongly disagreed that their past experience positively influenced their current ATPE provision, 11.2% disagreed with this statement, 21.2% were neutral, 40.2% agreed and 22.9% strongly agreed. In the responses to their

past experience negatively influencing their current ATPE provision, the results showed that 36.9% strongly disagreed with this statement, 31.8% disagreed, 18.4% were neutral, 10.1% agreed and 2.8% strongly agreed. For more detailed information see Table 10.

Table 10. Summary of Demographic Information Gathered from the PE-SSAS

Category	Subcategory	Percentage	Frequency
Role occupied in school	Principal	20.7%	37 2
	Middle Management	1.1%	
	Teacher and Middle Management	27.9%	50
	Teacher	50.3%	90
Years teaching experience	Less than 10 11-	22.3%	40
	19	38.0%	68
	20-29	27.4%	49
	30-39	9.5%	17
	40-45	2.8%	5
Employment status	Permanent	89.9%	161
	Temporary	8.9%	16
	Substitute	1.1%	2
Past experience influence your current ATPE	Positive influence		
	Strongly disagree	4.5%	8
	Disagree	11.2%	20
	Neutral	21.2%	38
	Agree	40.2%	72
	Strongly Agree	22.9%	41
	Negative influence		
	Strongly disagree	36.9%	66
	Disagree	31.8%	57
	Neutral	18.4%	33
	Agree	10.1%	18
	Strongly Agree	2.8%	5

4.3.1.2. Instrument

The PE-SSAS generated data to assist in evaluating the quality of PE implementation. The data reported on the seven themes that were identified through the underpinning review (Kingston et al., 2023). Each theme reported on how well the school was engaged with the PE curriculum and PE school programme. This data was analysed electronically via online questionnaires on Google Forms. The purpose of the PE-EQOT was to represent the level of fidelity of implementation of QPE according to the scores from the PE-SSAS by bringing an external perspective from an independent observer. By collecting the qualitative data on the themes aligned to the PE-SSAS constructs, the extent of fidelity of implementation can be summarised from a fully aligned perspective when all PE-EQOT data supports the school's self-reported data from the PE-SSAS. This paper describes the validation of the data PE-EQOT implementation up to the point of data collection.

4.3.1.3. Research Protocol and Procedures

For the PE-SSAS tool, a pilot version was developed with the relevant themes suggested by Kingston et al (2023), initially framed as construct scales, and its indicators framed as items, resulting in an initial pole of seven construct scales and 56 items. The survey was developed by an expert panel with a background and expertise in PE. This ensured content and face validity. These were then set in an online form (i.e., Google Forms). The decision to use Google Forms as a platform was due to the easy access for school users, user friendly experience and post submission easy data analysis. Furthermore, it was supported by the hosting institution, availing of its ICT security services and approved by SREC.

To address face validity, a pilot study was run. The pilot participants included two principals, a member of middle management and two classroom teachers, all from different primary school settings in the province of Munster, Ireland. The participants were asked to check the instrument structure, identify potential wording problems and to record the time it took them to complete the survey. The feedback from the sample participants for the pilot survey was taken into account to adapt it and to establish face validity. As a result, minor structural improvements were made. These included, deleting the abbreviations of phrases throughout the survey as one sample participant found this confusing to interpret. Additionally, the estimated time of completion was extended; it was originally suggested as being 15 minutes and following the pilot studied it was extended to 20 minutes.

Following the pilot, the refined PE-SSAS version was divided into eight construct scales and 56 items. The additional construct was 'Demographic information'. For most sections a five-point Likert-type scale was used, ranging from strongly disagree (1) to strongly agree (5), and a 'Do not know' answer was also available. The eight sections are outlined below:

- **Demographic information**: Respondents were required to provide a unique identifier for their school, the role that they occupied in the school, how many years teaching experience they had, the status of their employment, how their past PE experiences influence their current attitude towards PE and finally to supply a unique identifier code.
- **Satisfaction with Government Leadership of PE Support**: Five items that measured participant's satisfaction with government leadership of PE support were included. Examples of the instrument's questions in this section were: 'The government provides sufficient human resources for PE teaching' and 'The

mainstream primary school class size is adequate for the successful delivery of a PE lesson'.

- **NCCA PE curriculum and School Programme**: Referring to NCCA mandated PE curriculum strands that were covered in the PE programme in their school. Eight items were included. An example of the statements used was: 'The PE curriculum Aquatics Strand is covered in our PE programme'. The third and second last questions in this section participants were asked to choose from a selection of possible times allocated to PE and PA and the final question asked them to select from a selection of physical activities listed, the activities that are provided in their school.

- **School Leadership in relation to PE in our School**: Seven items, referring to how school leadership responds to PE provision and programme in their school. Examples of the statements used were: 'School leadership allocates adequate funding to the PE department in our school' and 'School leadership ensures adequate provision of PE literacy resources in our school'.
- **Middle Management in relation to PE in our School**: Five items referring to any post holder who holds the responsibility for leading the PE programme in the school. Examples of the instrument's questions in this section were: 'Middle management responds to the needs of the staff in relation to PE' and 'Middle management responds to the needs of the pupils in our school in relation to PE'.
- **Teachers in relation to the PE programme in your school**: Fifteen items referring to the team of teaching staff in your school. Examples of the statements included were: 'Teachers have knowledge of the PE curriculum' and 'Teachers have the ability to unpack the PE curriculum's content'.

- **Parental Involvement in the PE programme in your school**: Five items referring to the extent that parents are involved in the PE programme. Examples of the statement used were: 'The parent body holds a positive attitude towards the school's PE programme' and 'The parent body assists my school to deliver the PE programme'.
- **Community involvement in the PE programme in your school**: Four items that measured participants' perceptions on the extent of community partnerships are part of the PE programme in the school. Examples of the statements used in this section were" 'Our school has links with the local sport clubs' and 'Our local community has sponsored the school to enhance the provision of PE resources'.

4.3.2. Data Analysis

Initially, an EFA (principal components method, varimax rotation, 25 maximum iterations for convergence) were conducted to investigate the factor structure of the QPE evaluative instrument. To determine the number of factors to retain, the parallel analysis Monte Carlo simulation method was selected over the eigenvalue >1 rule and the Cattell's scree test (Gaskin & Happell, 2014; Hayton et al., 2004). An extension package for SPSS available to download for free was used, which enabled the research team to perform parallel analysis with polychoric correlations (Basto & Pereira, 2012). Items were assigned to a factor based on the following criteria: (a) they had a loading of .32 or greater, (b) they did not have cross-loadings, (c) they demonstrated a difference of .15 between their primary and alternative factor loadings, and (d) they demonstrated single communalities over .30 (Tabachnick & Fidell, 2013; Worthington & Whittaker, 2006).

Additionally, Cronbach α coefficients were examined. A Cronbach α reliability coefficient above .70 was considered acceptable (Houser, 2008).

4.3.3. Overview of the Physical Education-External Qualitative Observation Tool

4.3.3.1. Sampling and participants

A total of six schools were invited to participate in the validation study for the PE-EQOT. They were from a range of schools in the province of Munster, Ireland. The means for all PE-SSAS seven single factors was computed. The means from the principals' responses was used for the following analysis. Estimation of the quartiles (25%, 50%, and 75%) for the principals' sample took place, as well as 10% and 90% percentiles. Initially, the below 10% and over 90% percentiles were used for choosing the schools that would fall in these categories, however no clear pattern emerged. There was more clarity when the below 25% and over 75% quartiles were used for choosing the schools. Selection of schools was based on the following criteria: a. for a school to be included in the low category (<25%), at least 4 out of 7 factors for that school should be in the low category (<25%), and none of the factors should falling the high category (>75%). b. for a school to be included in the high category (>75%), at least 4 out of 7 factors for that school should be in the high category (>75%), and none of the factors should fall in the low category (<25%). Based on these criteria, six schools in each of the high and low categories emerged. The range consisted of two small schools (c. 50 pupils), three middle size rural schools (c.180 pupils), and one urban large school (c.600 pupils) which had DEIS status. They were all co-educational vertical schools. Thirteen teachers engaged in the PEEQOT when the researcher asked them questions during the three school visits. One teacher from each of

the small rural schools, five from the middle size rural schools and six from the large urban DEIS school participated.

4.3.3.2. Instrument

There were seven sections in the PE-EQOT: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships. The sections were derived from the scoping review previously carried out by the researcher (Kingston et al., 2023). A set of indicators or items were selected for each theme and the items were aligned with the questions in the PE-SSAS. 44 items were included in total. All of the items were not included in the PE-EQOT as some were not observable. The 12 items that were excluded were:

- **Teachers' Physical Education Delivery:**
    1. Teachers regularly review their PE planning and implementation of the PE curriculum and PE programme in their classroom
    2. Teachers use digital technology to promote pupils' interaction and entertainment when teaching PE
- **Satisfaction with Government Leadership for PE Support**:
    3. I am satisfied with the current NCCA PE curriculum
- **Senior Leadership and PE Professional Learning:**
    4. School leadership allocated adequate funding to the PE department
    5. The Board of Management employs external provision for elements of the PE programme to the pupils (e.g., sports, coaches, PA instructors)
- **NCCA PE Curriculum and School PE Programme:**

6. The PE programme meets the needs of children in our school
7. The PE programme is an important part of our school culture
8. The PE programme is clearly structured under the aim of providing our pupils competencies for lifelong learning
9. The PE programme aims at providing all pupils the opportunities to meet the recommended daily 60 minutes of PA
10. How many minutes are allocated to PE instruction each week? (Multiple choice answer)
11. How many minutes are allocated to any other school-based PA, excluding PE instruction time, each week?
12. Choose which of the following physical activities are provided for as part of the PE programme in your school. Choose all that apply.

The following items were moved from the section, Teachers' PE Delivery to the section on

'Senior Leadership and PE Professional Learning' but not excluded from the PE-EQOT.

- Teachers reflect regularly on the nature and content of the PE programme and PE curriculum in our school
- Teachers are provided with opportunities to engage in PE communities of practise. The community can be made up of teachers from outside your own school
- Provision is made for teachers to develop their teaching knowledge of PE collaboratively within the school
- Teachers have opportunities to observe other teachers' PE lessons

- Teachers engage in PE CPD

All items from the three sections outlined below remained the same for the PE-SSAS and the PE-EQOT:

- **Middle management in relation to PE in our School**
- **Parental Involvement in the PE programme in our School**
- **Community Partnerships with our School in relation to our PE programme**

4.3.3.3. Research protocol and procedures

The refined PE-EQOT was divided into seven sections and 44 items. For all sections observation notes were recorded and analysed later by the researcher. The seven sections are outlined below:

- **Teachers' PE delivery:** respondents were required to acknowledge their engagement with the PE programme in their school and the quality of provision for their pupils. Examples of the instruments' questions on this section were: 'Teachers have the ability to unpack the PE curriculum content', and 'Teachers design suitable PE learning opportunities for the pupils in their school'.
- **Satisfaction with Government Leadership for PE Support:** four items that measured participants' perceptions on the possible satisfaction with government leadership in relation to PE support. Examples of the statements used were: 'The government provides sufficient human resources for PE teaching', and 'The mainstream primary school class size is adequate for the successful delivery of PE lesson'.

- **Senior Leadership and PE Professional Learning:** ten items in total. Examples of statements used were: 'School leadership provides opportunities for management to discuss PE teaching and learning with class teachers.
- **NCCA PE Curriculum and School PE Programme:** eight items were included in this section. Examples of statements included: 'The PE curriculum Gymnastics Strand is covered in our PE Programme' and 'The PE curriculum Dance Strand is covered in our PE Programme'.
- **Middle management in relation to PE in our School:** five items, referring to their observations on support provided by middle management in relation to the PE programme and provision in their school. Examples of statements used were: 'Middle management responds to the needs of the pupils in our school in relation to PE', and Middle Management manages the maintenance and upkeep of resources and materials for PE in our school'.
- **Parental Involvement in the PE programme in our School:** five items were examined. Examples of questions asked were, 'The parent body supports the school's PE programme' and 'The parent body assists my school to deliver the PE Programme'.
- **Community Partnerships with our School in relation to our PE programme:** four items in total and examples of statements were, 'Our school has links with local sport clubs' and 'Our local community has sponsored the school to enhance the provision of PE facilities, e.g., school hall, school field etc.'.

A section was also included to record any general remarks and any documentation gathered from the school.

A critical friend accompanied the researcher on two school visits during the academic year of observation. The visits took place during January and May. The research engaged in three school visits in total throughout the year, September, January, and May. When the critical friend accompanied the researcher, constructive criticism was shared by the project's critical friend. The critical friend offered external validity to the data collection process, thus reducing the importance of individual opinions in conducting the research study (McNiff, 2017). In the action research literature, a critical friend is widely defined as a trusted person who is invited to join an action research project based on the qualities of knowledge, experience, and skills (Balthasar, 2011). In this context, the role of the critical friend was to ask critical questions to understand the issues and the context of the specific situations. Other than being expected to ask provocative questions, act as another lens to the situation, and critique the researchers' work based on a friend's capacity (Clarke & Dawson, 1999), the critical friend also acted as participant-observer in the process of PE class observations.

Observations were made on any challenges or gaps that might have been present in the PEEQOT during the school visit. The critical friend found that some questions in the PE-EQOT overlapped slightly. As a result of this, certain questions were merged or deleted from the tool altogether. For example, in section two of the PE-EQOT entitled, Senior Leadership and PE Professional Learning, the teachers were asked: 'Does school leadership ensure that staff have regular opportunities to update and upskill the quality of PE provision in our school?'. In the same section, teachers were asked 'Do teachers engage in PE CPD?'. As a result of this observation the latter question was deleted. In other questions the wording was difficult to comprehend and needed rewording, suggested amendments were carried out. For example, in section two the question stated, "Teachers are provided with opportunities to engage in PE communities of practice?"

Some participants did not fully comprehend the meaning of 'communities of practice' so an explanation was added to the question. The explanation stated in brackets (A community of practice refers to groups of people who share a common interest and learn how to improve practice as they interact regularly). This gave clarity to the participants. The critical friend also recommended that the questions in the PE-EQOT would be emailed to the class teachers one day in advance of the visit. This would make more efficient use of time during the school visit and the teacher would have had an opportunity to reflect on the questions before answering them on the day.

For all seven sections the researcher recorded field notes on a grid sheet. Any additional comments were added to the 'general remarks' section at the end of the PE-EQOT grid and any documents gathered were stored according to college protocol.

4.3.4. Data Analysis

The data gathered was analysed by categorising and coding the results manually (see Table 11 below). The categories were itemised as, one, two and three. Category one presented strong evidence to suggest that there was a low level of QPE provision in the school. The results showed that zero to three dimensions aligned. Category two presented strong evidence for moderate level of QPE provision in the school with four to five dimensions aligning. And finally, category three presented strong evidence to support a high level of QPE provision in the school where six to seven dimensions aligned with the PE-EQOT.

4.4. Results

The unique identifiers were used to identify the individual schools. School number 1 and 4 were both categorised at lower fidelity (grade 1). There was a low level of QPE

provision in both schools as only three out of the seven dimensions aligned. The dimensions that aligned included Teachers' PE Delivery (1), NCCA PE Curriculum and School PE Programme (4), and Parental Involvement in the PE programme in our school (6). The four dimensions that did not align included, Satisfaction with Government Leadership for PE Support (2), Senior Leadership and PE Professional Learning (3), Middle Management in relation to PE in our
School (5) and Community Partnership with our school in relation to our PE Programme (7). Interestingly, the two schools that were categorised in the low level of QPE provision (grade 1), aligned with the same dimensions.

The school numbers 5 and 6 were both categorised at grade 2 which shows there is a moderate provision of QPE in the school. The results from school number 5 showed five of the seven dimensions were aligned. These included: Teacher' PE Delivery (1); Senior Leadership and PE Professional Learning (3); NCCA PE Curriculum and School PE Programme (4); Middle Management in relation to PE in our school (5); and Community Partnerships with our School in relation to our PE Programme (7). The results for this school were not aligned with dimensions, Satisfaction with Government Leadership for PE Support (2) and Parental Involvement in the PE Programme in our school (6). School number 6 was also categorised at level two. The results aligned with four of the dimensions: (1); (4); (6); and (7) and did not align with three of them: (2); (3); and (5). There was alignment for different dimensions between the two schools. The two remaining schools, school 3 and school 2 were categorised in Grade 3 and showed strong evidence that the schools were providing a high level of QPE. Both schools aligned with six of the seven dimensions: (1); (3); (4); (5); (6); and (7). The only dimension that both schools did not align with was Satisfaction with Government Leadership for PE Support (2). Interestingly, all six schools that were involved in the

study did not align with dimension, Satisfaction with Government Leadership for PE Support (2).

It is worth noting that the results from the PE-SSAS showed that schools 4 and 1 were in the low-quality category and the results from the PE-EQOT showed that schools 1 and 4 were in the low fidelity category. In contrast, such alignment did not take place for the grade 2 schools, Schools 5 and 6. The PE-SSAS results reported that school 5 had low quality but the results of the PE-EQOT reported that it had moderate fidelity. There was also a difference in quality and fidelity in School 6, where the PE-SSAS reported high quality and the PE-EQOT report moderate fidelity. Schools 3 and 2 were in the same high category for both quality and fidelity. Table 11 below shows a summary of the school's grading results.

Table 11. Summary of the School's Grading Results

School	Dimensions Aligned	Dimensions Not Aligned	Grade	School's Quality Result based on PE-SSAS	School's Fidelity Result based on PE-EQOT
4	3	4	1	Low Quality	Low Fidelity
1	3	4	1	Low Quality	Low Fidelity
5	5	2	2	Low Quality (increased to Moderate Quality in PE-EQOT in comparison to results in PE-SSAS)	Moderate Fidelity
6	4	3	2	High Quality (Decreased to Moderate Quality in	Moderate Fidelity

				PE-EQOT in comparison to results in PE-SSAS)	
3	6	1	3	High Quality	High Fidelity
2	6	1	3	High Quality	High Fidelity

4.4.1. Physical Education-School Self-Assessment Survey: Exploratory Factor Analysis

The EFA extracted seven factors that accounted for 57.65% of the total variance (Table 12). Based on the results of the parallel analysis, these factors had an eigenvalue of 1.64. Bartlett's test of sphericity (χ^2=4739.23, do=1378, p<0.001) and Kaiser-Meyer-Olkin (KMO=0.847) indices were satisfactory. Factor one accounted for the largest proportion of the total variance (27.57%) as most of the items loaded on this factor, and included items related to *Leaders and Teachers in relation to PE* (e.g., 'School leadership ensures that staff have regular opportunities to update and upskill the quality of PE provision in our school'. The second factor accounted for 7.14% of the total variance, including items referring to *Teachers in relation to the PE programme in the school* (e.g., 'Teachers have the ability to unpack the PE curriculum's content'. Factor three accounted for 5.94% of the total variance, including items referring to *PE curriculum and school PE programme* (e.g., 'The PE curriculum Games strand is covered in our PE programme'. The fourth factor accounted for another 5.61% of the total variance, including items referring to *Middle management in relation to PE in the school* (e.g., 'Middle management responds to the needs of the staff in relation to PE'. Factor five accounted for 4.97% of the total variance, including items referring

to *Parental involvement in the PE programme in the school* (e.g., 'The parent body supports the school's PE programme'. The sixth factor accounted for 3.32% of the total variance, including items referring to *Satisfaction with government leadership for PE Support* (e.g., 'The government provides sufficient human resources for PE teaching'. Finally, factor seven accounted for the remaining 3.10% of the total variance, including items referring to *Community partnerships with the school in relation to the PE programme* (e.g., 'Our school has links with local sport clubs'. Seven items (highlighted with '*' in Table 12) did not meet the inclusion criteria. Following the removal of these items, 10 items were included in the first factor labelled as *School leaders in relation to PE*, eight items were included in the second factor labelled as *Teachers in relation to the PE programme in the school,* 10 items were included in the third factor labelled as *NCCA PE curriculum and school PE programme;* five items were included in the fourth factor labelled as *Middle management in relation to PE in the school,* five items were included in the fifth factor labelled as *Parental involvement in the PE programme in the school,* four_items were included in the sixth factor labelled as *Satisfaction with government leadership for PE Support,* and four -items were included in the seventh factor labelled as *Community partnerships with the school in relation to the PE programme*. The loadings of all items were above .32, indicating that the observed variables had adequate convergent validity.

4.4.2. Physical Education-School Self-Assessment Survey: Reliability

Cronbach α coefficients of the seven factors were all above the recommended criterion of .70, providing evidence that the measures were reliable and internally consistent. More specifically, Cronbach α coefficients for the seven factors were the following: (a) School leadership and teachers in relation to PE in the school α=.92; (b)

Teachers in relation to the PE programme in the school α=.92; (c) NCCA PE curriculum and school PE programme α=.86; (d) Middle management in relation to PE in the school α=.90; (e) Parental involvement in the PE programme in the school α=.82; (f) Satisfaction with government leadership for PE α=.72; (g) Community partnerships with the school in relation to the PE programme α=.75. The overall Cronbach α coefficient for the entire instrument was α=.95.

Table 12. EFA with Rotated Factor Loadings of the QPE Evaluative Instrument

Items	Factors						
	1	**2**	**3**	**4**	**5**	**6**	**7**
School leadership ensures that staff have regular opportunities to update and upskill the quality of PE provision in our school	**.770**	.181	.117	.145	.137	.055	.168
Provision is made for teachers to develop their teaching knowledge of PE collaboratively within the school	**.753**	.196	.042	.021	.130	.168	.091
School leadership regularly reflects on the nature and content of our PE programme and the PE curriculum in our school	**.725**	.124	.303	.176	.047	.098	.031
School leadership provides opportunities for management to discuss PE teaching and learning with class teachers	**.707**	.182	.209	.263	.139	.099	.026
The school leadership vision for PE in our school is clearly disseminated to staff and pupils	**.658**	.204	.326	.163	.088	.093	.058
School leadership ensures adequate provision of PE literacy resources in our school (e.g., "Move Well Move Often" PDST resource, etc.)	**.655**	.061	.254	.302	.184	.056	-.045
Teachers engage in PE CPD	**.617**	.245	-.008	.012	.278	.038	-.007
Teachers reflect regularly on the nature and							

content of the PE programme and PE curriculum in our school	**.613**	.465	.109	-.068	.071	.127	.198
Teachers have opportunities to observe other teachers' PE lessons	**.583**	.157	.040	.126	.129	-.021	.169
There is provision for teachers to participate in PE communities of practice	**.544**	.192	.047	.135	.051	.200	.236
School leadership allocates adequate funding to the PE department in our school *	.477	.153	.219	.428	.189	.099	-.030
Teachers use digital technology to promote pupils' interaction and entertainment when teaching PE *	.433	.302	.024	.096	.200	.029	.316
Teachers design suitable PE learning opportunities for the pupils in our school	.166	**.826**	.237	.076	-.041	.000	-.020
Teachers are enthusiastic about teaching PE	.206	**.761**	.089	.190	.160	.109	-.056
Teachers have the ability to unpack the PE curriculum's content	.182	**.740**	.256	.036	.006	-.070	-.036
Teachers have a positive attitude towards teaching PE	.290	**.736**	.054	.195	.204	.004	-.084
Teachers feel confident when teaching the PE curriculum	.242	**.718**	.187	.119	.100	.264	.061
Teachers have knowledge of the PE curriculum	.034	**.688**	.335	.169	.103	-.135	.000
Teachers use available PE resources appropriately	.145	**.676**	.133	.242	.087	-.079	.086
During PE lessons teachers provide pupils with appropriate learning experiences that meet their developmental needs	.370	**.662**	.109	-.076	.074	.078	.198
Teachers regularly review their PE planning and implementation of the PE curriculum and programme in their classroom *	.438	.516	.278	-.073	.119	.161	.127
The PE programme meets the needs of children in our school	.164	.149	**.714**	.084	.044	.175	.124
The PE curriculum Dance strand is covered in our PE programme	.109	.083	**.684**	-.053	.166	.053	-.043
The PE curriculum Athletics strand is covered in our PE programme	.055	.059	**.682**	.043	.208	-.057	.045

I am satisfied with our PE programme	.166	.184	**.680**	.151	.045	.221	.066
The PE curriculum Outdoor and Adventure Activities strand is covered in our PE programme	.285	.139	**.613**	-.052	.204	.036	.075
The PE programme is clearly structured under the aim of providing our pupils competencies for lifelong learning	.311	.186	**.588**	.201	-.089	.252	.059
Fundamental movement skills are covered in our PE programme	.242	.212	**.576**	.113	-.015	.083	.003
The PE programme is an important part of our school culture	.222	.147	**.519**	.224	-.020	-.021	.265
The PE curriculum Games strand is covered in our PE programme	-.071	-.003	**.512**	.219	.075	-.258	.075
The PE curriculum Gymnastics Strand is covered in our PE programme	-.140	.185	**.447**	-.048	.178	.216	-.089
I am satisfied with the current NCCA PE curriculum *	.028	.189	.409	-.093	.042	.353	.101
The PE programme aims at providing all pupils the opportunities to meet the recommended daily 60 minutes of PA *	.099	.231	.374	-.055	.044	.153	.013
Middle management makes provision for the required PE equipment and sports resources in our school	.138	.131	-.008	**.868**	.029	.060	.066
Middle management manages the maintenance and upkeep of resources and materials for PE in our school	.101	.157	.046	**.839**	.044	.010	.078
Middle management responds to the needs of the staff in relation to PE	.318	.057	.059	**.805**	.044	.039	.043
Middle management responds to the needs of the pupils in our school in relation to PE	.210	.187	.062	**.767**	-.042	-.003	.044
There is an obvious presence of middle management for PE in our school	.076	.026	.151	**.740**	.023	.109	.139
The Board of Management employs external provision for elements of the PE programme to the pupils (e.g., sports coaches, PA instructors) *	-.019	.065	.006	.415	.348	.016	.135
The parent body fundraises to help advance the PE facilities and resources in my school	.241	.038	.025	.104	**.709**	.023	.026

The parent body holds a positive attitude towards the school's PE programme	.232	.180	.316	.077	**.701**	-.054	-.010
The parent body supports the school's PE programme	.315	.124	.319	.034	**.654**	-.018	.088
The parent body assists my school to deliver the PE programme	.266	.144	.020	.048	**.632**	-.019	.169
The parent body supports school transport initiatives such as walk/cycle to school	.161	.092	.242	-.010	**.579**	.054	.208
The PE curriculum Aquatics Strand is covered in our PE programme *	-.103	.097	.285	-.031	.394	.169	.314
I am satisfied with the provision of funding from the Department of Education for quality physical facilities such as suitable PE buildings, open fields, outdoor obstacle courses	.019	-.018	.083	.064	.001	**.795**	-.054
I am satisfied with the provision of funding from the Department of Education for physical resources for PE such as PE equipment, playground equipment is adequate	.181	.037	.069	.161	.029	**.759**	-.025
The government provides sufficient human resources for PE teaching	.195	-.044	.164	-.002	.150	**.653**	.010
The mainstream primary school class size is adequate for the successful delivery of a PE lesson	.147	.084	.193	.046	-.285	**.454**	.056
Our school has links with local sport clubs	.082	-.024	.210	.076	.021	-.185	**.796**
Our school celebrates local PA achievements	.221	.090	.062	.115	.170	-.047	**.781**
Our local community has sponsored the school to enhance the provision of PE facilities (e.g., school hall, school field, etc.)	.191	-.054	-.075	.183	.332	.265	**.541**
Our local community has sponsored the school to enhance the provision of PE resources	.370	-.030	.098	.272	.198	.102	**.531**
Eigenvalue	14.61	3.79	3.15	2.98	2.63	1.76	1.64
Factor variance (%)	27.57	7.14	5.94	5.61	4.97	3.32	3.10
Total variance (5)	27.57	34.71	40.65	46.26	51.23	54.55	57.65

* Excluded items.

4.4.3. Physical Education-External Qualitative Observation Tool: Reliability

Table 11 above shows a summary of the data analysed from the PE-EQOT. Each school is represented by a number (1-6) and the number of dimensions that were aligned and not aligned for each school are outlined in the table. The results include the grade assigned to each school which was based on a selected grading system. The grading system comprised of three grades, 1, 2, and 3. Grade 1 shows low fidelity in the school because zero to three dimensions were aligned. Grade 2 shows moderate fidelity in the school where four to five dimensions were aligned and grade 3 shows high fidelity in the school because six to seven of the dimensions aligned. One column outlines the original results from the PE-SSAS which were used to select the six participating schools initially for this study. It is noted that four out of the six schools selected, remained at the same level of performance as was already established from the PE-SSAS and from the two remaining schools, one moved up a level from low to moderate and another moved down a level from high to moderate as explained in the fifth column.

4.5. Discussion

The aim of this study was to suggest and provide initial validity evidence for the PE-SSAS and for the PE-EQOT, two aspects of the same tool used for evaluating the factors influencing the PE quality and fidelity of implementation in primary schools. This paper also presents the development of an evaluation protocol that examines PE programmes' quality and fidelity of implementation in primary schools, towards supporting the achievement of four fundamental educational outcomes of primary school PE, ATPE, PAB, WB, and AA (Dudley et al., 2022; Kingston et al., 2023; WHO, 2022). The protocol consists of a PE-SSAS (quantitative, self-reported) and a PE-EQOT (qualitative, externally observed) tool. Constructs of QPE were first qualitatively

investigated and tested for their face and construct validity via a pilot survey and feedback from a critical friend, and then subsequently statistically assessed for their reliability and consistency. The protocol was used as a concept to investigate the seven themes (government leadership, PE curriculum, school principal and leaders, organisational management from leadership in school, teachers, parental involvement and community partnerships), (Kingston et al., 2023) that have shown evidence of supporting the achievement of the four dimensions (ATPE, PAB, WB and AA) of educational outcomes in primary PE. Following a two-phase procedure, a fifty-six-item instrument with seven factors, the PE-SSAS was generated and a forty-four-item instrument with seven factors in the PE-EQOT was generated. Taken together, our PE-SSAS and PE-EQOT analyses supported the overall validity and reliability of this instrument for assessing PE programmes' quality and fidelity of implementation in primary schools. It is suggested that future studies should re-examine the validity and factorial structure of this instrument, to provide further evidence of validity and reliability in different contexts.

The evaluation protocol results in a bivariate stratification based on the PE programme quality and fidelity with the following quadrants: high-quality/high-fidelity; high-quality/low- fidelity; low quality/high-fidelity; low-quality/low fidelity. Furthermore, the data garnered from both the PE-SSAS and the PE-EQOT can assist when classifying schools into relevant quadrants where outcomes can be monitored and measured. The ensuing discussion focuses on the methodological implications, potential research applications, implications for practitioners as well as strengths and limitations of the PE-SSAS and the PE-EQOT for PE educators.

4.5.1. Methodological Implications

Overall, the PE-SSAS was shown to have generally high test-retest reliability and internal consistency regarding seven of the developed themes (i.e., government leadership, PE curriculum, school principal and leaders, organisational management from leadership in school, teachers, parental involvement and community partnerships), further resulting in an overall score of PE quality of implementation, and response rate agreements for the individual measures across all themes. The scope of the perceptual constructs validated in the PE-SSAS and the PE-EQOT represent a significant step toward developing the protocol that is designed to support evaluating QPE programmes and research. To ensure the suitability of the PE-SSAS and the PE-EQOT as two aspects of the same measuring tool, we employed a mixed-methods data collection and analysis approach that was guided by the themes identified in the scoping review, (Kingston et al., 2023). When paired with the socio-ecological underpinnings of the relevant literature (CDC, 2019; O'Donnell, 2008) that was used to inform the validated constructs contained within the PE-SSAS and the PE-EQOT reflect authentic teacher, school leaders, middle management, parental and community considerations.

4.5.2. Potential Research Applications

Research focusing on QPE programmes and the fidelity of implementation may use the seven themes (i.e., government leadership, PE curriculum, school principal and leaders, organisational management from leadership in school, teachers, parental involvement; and community partnerships) to pursue a variety of future relevant research and intervention topics pertaining to the four dimensions, (ATPE, PAB, WB and AA) and relevant indicators of the PE-EQOT. For instance, the PE-SSAS could be used to support research related to identifying and addressing challenging areas in the

delivery of the PE programme in schools as well as implementing and evaluating effectual areas of the programme. The PE-SSAS could be employed to study the potential associations between the school leaders and middle management perceptions of the QPE programme against the teachers' perceptions.

In summary, it could be utilised to explore the potential discrepancies between both perceptions and subsequently why these discrepancies might exist.

4.5.3. Implications for Practitioners

These new perceptual measures included in the PE-SSAS and the PE-EQOT represent a new tool for practitioners involved in delivery of QPE programme to use in their programme development of evaluation processes. Additionally, this tool can be used to provide further insights into parental and community links that will help inform the DEIS action planning for disadvantaged schools.

4.5.4. Strengths and Limitations

A key strength of this study is that it is the first to evaluate the literature on the implementation fidelity of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, WB and AA. Furthermore, this is one of a few studies that utilises the already identified quality features of PE programmes to develop a conceptual framework. These key features of QPE programmes can be used to inform future researchers, PE policy makers and PE educators.

While this study significantly contributes to the international literature, there are some limitations however. Although recent literature advocate for a whole school approach to promoting PAB (ISPAH, 2021), few studies investigated the impact of QPE

programmes on WB and other outcomes, such as ATPE and AA. Initially, participants were recruited from only one province in Ireland, with a convenience sampling procedure, leaving other provinces unexamined. While we anticipate that the protocol will be relevant in other PE contexts, future work is needed to this direction. Furthermore, due to the fact that the researcher was the school inspector and may have influenced the response rate and the number of responses submitted and due to the much-anticipated change in the Irish PE curriculum, future implementations of this protocol are needed to ascertain the temporal stability of the current findings. Another limitation is that this review did not aim to analyse the outcomes themselves; therefore, an analysis of the impact of the features of QPE programmes on the outcome variables is needed. An integrated view of relevant literature published during the pandemic, could offer fruitful lines of enquiry to shape emerging research in the field of primary PE teaching and learning. The factors reported in this study can serve as appropriate points of reference towards this direction.

4.6. Conclusion

The full implementation of this evaluation protocol will allow to stratify the schools' PE provision based on the self-assessed quality and the externally observed fidelity of its implementation along four quadrants: high-quality/high-fidelity; high-quality/low-fidelity; low quality/high-fidelity; low-quality/low fidelity. These can then be mapped and analysed in relation to the four target educational outcomes (ATPE, PAB, WB, AA) to identify causal relationships between strata of quality and fidelity of PE and the achievement of those educational outcomes as a much-needed endeavour (Dudley et al., 2022).

The factor structure, reliability, and validity of the instrument presented in this study, is an important preliminary step in the advancement of research related to the evaluation of QPE and fidelity of implementation in primary schools. Although a seven-factor solution was tenable with rotation, this structure should be considered preliminary at this point, pending further confirmatory work. However, researchers in the field of PE teaching can use it to evaluate school QPE programmes in primary schools. This work has implications for those who seek to redesign or update primary school PE programmes, based on the results of the investigative instruments, the PE-SASS and the PE-EQOT. Policy makers and researchers alike should consider a broad and balanced approach to evaluating QPE programmes and the fidelity of implementation on the four targeted outcomes that were addressed in this study, for a holistic picture of children's development at the end of their primary education. Identifying strategies that increase children's PA for health is a public health priority (Morgan et al, 2016). Therefore, this protocol is well placed to gather the evidence based on typical school provision of QPE programmes, WB and AA to impact children's PAB.

4.7. Link Section

The second study (chapter 4) presented in this thesis refers to the validation of an evaluative protocol to examine QPE and fidelity of implementation in primary schools. The design of the protocol followed a systematic literature research process to consider elements of context, process, and outcomes on ATPE, PAB, WB and AA. The evaluative framework is made up of a PE-SSAS and a PE-EQOT which are two aspects of the same tool. Taken together, our analyses supported the overall validity and reliability of this instrument for assessing QPE programmes and fidelity of implementation in primary schools.

Essentially, the validation of this unique evaluation protocol provided a more robust instrument that could be used to investigate the impact of QPE and the fidelity of its implementation on four targeted outcomes, ATPE, PAB, WB, and AA. The validated evaluative framework was subsequently used as a follow-on study (chapter 5) to carry out the above investigation. A cross-sectional sample (n = 257) of pupils (age 10-12 years), enrolled at six different schools that are representative of higher (n = 2), moderate (n = 2) and lower (n = 2) levels of a QPE was included in the study and several instruments were utilised to measure the impact of a QPE programme on pupils' four targeted outcomes.

In the next chapter, details outlining the specific structure of how this evaluation took place is discussed. The findings stemming from this inquiry enable schools to optimise pupils' holistic development by favouring positive outcomes on almost all of the four targeted outcomes. This is based on the provision of QPE and the fidelity of its' implementation.

Chapter 5 - Effect of Quality Physical Education provision in Primary School settings and fidelity of its implementation on four target educational outcomes ATPE, PAB, WB, AA

5.1. Abstract

The aim of this study was to investigate the impact of quality physical education (QPE) and the fidelity of its implementation on four targeted outcomes, attitudes towards physical education (ATPE), physical activity behaviour (PAB), wellbeing (WB), and academic achievement (AA). The study was carried out on 5th and 6th class primary school pupils (10–12 years) in the province of Munster, Ireland. A cross-sectional sample (n = 257) of pupils enrolled at six different schools that are representative of high (n = 2), moderate (n = 2) and low (n = 2) levels of a QPE was included. Data analysis indicated a significant variation in the levels of ATPE, PAB, WB and AA across different levels of QPE. The results show that the implementation of the QPE had positive effects on pupils' ATPE. It had positive effects on only certain pupils' PAB but for the most part pupils' PAB stayed the same or did not negatively affect pupils PAB. There were no differences on WB scores between pupils at the different grades, and all pupils decreased almost equally their WB scores over time, between the two timepoints. In relation to effects on AA, pupils at grade 3 (higher QPE) slightly increased their literacy scores over the two time points and the numeracy levels of the pupils showed statistically significant differences in all 3 grades. The findings stemming from this inquiry enable schools to optimise pupils' holistic development by favouring positive outcomes on some elements of the outcomes ATPE, PAB, WB and AA.

This is based on the provision of QPE programmes and the fidelity of its' implementation.

Keywords: quality physical education; fidelity of implementation; outcomes; physical activity behaviours; wellbeing; academic achievement.

5.2. Introduction

QPE can be explained as a group of inter-related strategies to embrace the formulation and development of inclusive and equitable curricula. It provides personally meaningful as well as socially and culturally relevant experiences. These attract young people to the joy and pleasure of PA to foster an active healthy lifestyle over the full lifespan (McLennon & Thompson, 2015). Children have the right to QPE and should have equal access to qualified professionals, appropriate resources, and supportive structures regardless of their background. Schools are the medium to provide QPE and represent an attractive and important setting for health promotion initiatives (WHO, 2017). Based on the significant amount of time children spend at school, this subject has a great influence on promoting and improving PA in youth (Hills et al., 2015). Worldwide, PE is by far the most common method of promoting PA during the school day and the majority of countries have legal requirements for school PE for at least some part of the compulsory schooling years. Even in countries where PE may not be mandated by law, the subject is still offered (Hills et al., 2015).

QPE consistently receives positive acclaim as a contributor to young learners' holistic development, including AA, WB, and PAB especially in their formative years (Jess et al., 2017). This study relates in particular to pupils at a primary school level so it is consistent with the notion of a link between early life experiences and later health outcomes, greater attention is being given to the importance of exposure to QPE

opportunities during early years and childhood. If health behaviours established during early life are more likely to persist or 'track' from childhood to adulthood, greater efforts should be made to capitalize on key opportunities, included in the school setting, especially at primary school level (Hills et al., 2015; Peterson et al., 2020; Abarca-Gómez et al., 2017; Engel et al., 2018). PE is a fundamental cornerstone for childhood development as it promotes lifelong PA participation for holistic health. School educators play a key role in creating school environments that lead to developmentally appropriate and high-quality PE lessons (Guthold et al., 2020). QPE opportunities at primary school level should be carefully considered so that children will develop lifelong habits of being active, as well as creating positive ATPE. Following a systematic review carried out by Kingston et al. (2023) a selection of key features for QPE programmes in primary education were identified that contribute to positive outcomes for the four dimensions, ATPE, PAB, WB and AA. Previous research has focused on aspects of PE and targeted outcomes but it has yet to be shown what happens to those outcomes when full QPE is adopted with fidelity or otherwise. This study investigates what happens to each of the four outcomes when a QPE programme is in place with varying levels of fidelity. The key features for each of the four dimensions are described in more detail below.

5.2.1. Attitudes Towards Physical Education

Primary school PE provides a context for regular and structured PA participation. To this end, a common justification for PE's place in the school curriculum is that it contributes to children's health and fitness (PEA UK, 2004). It is evident that certain features are prerequisites for successful QPE programmes and that certain contributing factors affect this. In the evidence gathered from the scoping review (Kingston et al.,

2023) the key factors that positively affect ATPE are in summary, health-related reminders, foci on children's enjoyment and willingness to participate in PE classes, specialised teachers, administrators working to ensure that the PE curriculum is properly pursued and adequate time allocation (Kingston et al., 2023). Parental involvement in some aspects of the delivery of the PE programme is another factor that concerns the promotion of positive attitudes towards lifestyle and healthy habits (Schmid & Garrels, 2021). The influence of the PE teacher and a quality curriculum can also impact pupils' ATPE (Figley, 1985; Luke & Sinclair, 1991). Christodoulos et al. (2006) made a strong connection between the teaching of health-related lectures and health reminders and the positive affect on attitudinal measures. He also associated pupils' enjoyment and access to appropriate levels of PE instruction with feelings of success and satisfaction as opposed to the negative feelings that might occur in competitive PE. Parents play a key role in shaping the lifestyle and creating healthy habits for young people, which in turn has a long-lasting effect on their lifelong ATPE (Dobbins et al., 2013). Access to specialised PE teachers can provide more effective PE provision (Lucertini et al, 2013). Lynch (2017) strengthens this argument by reporting that the largest barrier for QPE in primary schools is the qualifications and preparation of teachers. He recommends that opportunities for developmentally appropriate primary education PE specialisms be provided within degrees, allowing every primary school over time to have a sustainable infrastructure of PE expertise and advocacy. This recommendation will in time provide QPE experiences for all children; offering global direction for learning in the physical dimension and consequently, optimise holistic education and by association a positive ATPE. The influence of the school leader is also significant (McLoughlin et al, 2021). It is apparent that the value the school leader places on PE often determines the value that teachers place on it similar to other subjects. Success in this area depends on leaders

striving to ensure that the PE curriculum is properly resourced, teachers have access to quality CPD, professional conversation around the PE syllabus and observing other teachers practice (McLoughlin et al., 2021). Leaders should also ensure that teachers are assigned to appropriate roles so that pupils receive that best possible provision (Wee et al., 2019).

5.2.2. Physical Activity Behaviour

Similar to ATPE the foundations of PAB are set early in life, and schools have an important role to play in shaping young people's activity behaviours (Chng et al., 2015). Research has proven that health related programmes which include PE programmes, supports pupils to establish lifelong healthy habits, can slow down age-related decline in PA (Christodoulos et al., 2006) and reduce associated health risks (Marques et al., 2020). Based on systematic review evidence, national and international best-practice guidelines have been established acknowledging the potential for school-based settings to influence the development of children's PAB (Barnes et al., 2021). The systematic reviews highlight the importance of active play and quality provision of PE (Sallis et al., 2016). Many factors can influence poor PAB. These include the overcrowded curriculum, inept school leadership, lack of funding as well as poor quality teaching (Hills et al., 2015). This evidence highlights the importance of a CSPAP with elements of QPE and other PA opportunities during the school day (Webster, 2023). SHAPE America (2017) has rightly made the valid connection between governments and school communities. Governments support school leaders by requiring them to develop CSPAPs where PE and PA opportunities exist before, during and after the school day and establishing health-promoting environments that support PA. Another stakeholder in determining positive PAB for pupils are teachers. Ensuring the minimum requirement

of time for PE is provided, teaching quality physical and health literacy and managing behaviour changes to optimise the QPE are responsibilities that need to be taken seriously by PE educators. Teachers also need to be inspiring role models for their pupils as well as sending clear messages to parents to encourage them to get involved in the QPE programme (Hills et al., 2015). Considering all influencing factors mentioned above PAB has many dependants. It is timely that governments, school leaders, teachers, parents and the wider school community prioritise aligning their efforts to ensure pupils are provided with QPE programmes that lead to positive PAB. This will inevitably support lifelong healthy PA patterns and prevent some of the leading causes of morbidity and mortality, while also decreasing direct healthcare costs and improving quality of life (Christodoulos et al., 2006).

5.2.3. Wellbeing

Building quality relationships, learning to manage stressors and evolving as individuals and as a group are all proven elements that contribute to the positive WB of pupils (Coulombe et al., 2020; López-Rivera et al., 2020). These elements combined come in the guise of cooperative learning in schools. This pedagogical model contributes to pupils emotional WB and helps them to empathise with others while also developing their emotional intelligence (López-Rivera et al., 2020). QPE programmes are well-positioned to include cooperative learning activities and are therefore significant factors in determining positive outcomes for pupils' WB. Several positive education intervention programmes have been found to be effective in promoting student WB (Seligman et al., 2009; White, 2016a). Positive education interventions have been developed in many forms, including but not limited to mindfulness, character strength development, and whole school approaches (Coulombe et al., 2020). Positive education is defined as education for both traditional skills and for happiness. The high prevalence

worldwide of depression among young people, the small rise in life satisfaction, and the synergy between learning and positive emotion all argue that the skills for happiness should be taught in school. There is substantial evidence from well controlled studies that skills that increase resilience, positive emotion, engagement and meaning can be taught to schoolchildren (Seligman et al, 2009). As reported by McDaid & Park (2011), prosperity-as- usual has been equated with wealth. The time has come for a new prosperity, a prosperity that combines WB with wealth. Learning to value and to attain this new prosperity must start early—in the formative years of schooling— and it is this new prosperity, kindled by positive education as described above, that the world can now choose (Seligman et al., 2009). As McDaid (2011) and O'Donnell (2014) note, until economists, school leaders, and researchers collaborate to create a consistent theoretical framework to guide policymakers to appreciate WB's pivotal role in educational accomplishment, I believe the positive education movement is at risk of either not being taken seriously, being dismissed or being limited to a handful of extraordinary examples in schools acting as centres of excellence across the world (White, 2016b).

5.2.4. Academic Achievement

According to Periˇc and Bˇrezina (2019), exercise and sport are a fundamental part of every individual's life, an essential manifestation of a healthy lifestyle that is indispensable for the proper development of every individual. One of the recognised benefits of increasing children's engagement in PA is the positive effect on pupils' AA (Ontario Active School Travel, 2019). International research in this field has reports that increasing PA is either positively related to AA or that there is an inconclusive relationship between PA and AA (Rasberry et al., 2011). On both accounts, the impact will always have a positive effect on the pupil's physical fitness and WB as well as

possibly benefitting their AA. The provision of QPE in schools therefore has the loaded potential of enhancing the pupils' AA as a consequence of a positive effect on the pupils' PAB, ATPE and WB. Research tells us that when pupils are active for a portion of their day, they are able to focus and be more productive in school (CDC, 2010) as well as release endorphins that improve their mood and enable them to learn better (Chng et al., 2015). In addition to the research referenced above there is evidence to suggest that higher cardiorespiratory fitness may contribute to children's and adolescents AA (Corredor, 2015) Considering the many differences associated with research carried out by Barbosa (2020), Marques (2018) and Lynch (2017), all the findings concur that QPE and PA have the potential to influence AA.

5.2.5. Purpose of the Study

The overall aim of this study is to assess the impact of QPE provision and the fidelity of implementation on four targeted outcomes, ATPE, PAB, WB and AA at the final stage (5th and 6th class) of the pupils' primary education. This specific paper presents the results of a pupil survey which investigates the impact of a QPE programme on the four selected outcomes, ATPE, PAB, WB and AA.

5.3. Methods

Considering the evaluation protocol classification, which was decided on in a previous study (Kingston et al., 2023), the following hypothesis were advanced and were investigated as part of this study:

- Schools with higher quality and higher fidelity of their PE programme have significantly higher pupil outcomes on ATPE, PAB, WB and AA;

- The differences of quality and fidelity of the PE programme reflect differences of pupil outcomes on ATPE, PAB, WB and AA;

The study attempts to find answers to the above hypothesis by comparing the outcome variables (AA, PAB, WB, ATPE) between summer 2022 (pre) and summer 2023 (post) for

  - Overall sample;
  - By school QPE category;

Ethical approval for this study was provided by the SREC in University College Cork (protocol code 2022-096). The principles for examining the QPE programmes and the fidelity of its implementation is research-informed, underpinned by the findings of a review paper (Kingston et al. 2023), and the research by O'Donnell (2008) and CDC (2019) to assist with designing the evaluative protocol, while attending to ecological validity. The validation of the evaluation method entailed the development of PE-SSAS and an external independent observation tool, PE-EQOT. The gathering of data to determine the impact of a QPE programme on the four targeted outcomes (ATPE, PAB, WB and AA) took place through the pupil survey. Research design and observational research design took place through a mixed methods approach. The quantitative method was the PE-SSAS and the pupil survey while the qualitative method occurred through the PE-EQOT. This was a correlation study as it compared the results of the levels of quality of the PE programme to the levels of the fidelity of the PE programme in the schools. The criteria were based on: a. for a school to be included in the low category (<25%), at least 4 out of 7 factors for that school should be in the low category (<25%), and none of the factors should falling in the high category (>75%). b. for a school to be included in the high category (>75%), at least 4 out of 7 factors for that school should

be in the high category (>75%), and none of the factors should fall in the low category (<25%). Based on these criteria, six schools in each of the high and low categories emerged.

Six primary schools were selected for this particular study on the basis of a previous study (chapter 4). In the previous study participants completed the PE-SSAS which allowed to stratify the sample of schools. The six schools that were selected had a variety of PE quality levels. Two had high quality, two had moderate levels and two had low. The participants for the study in this paper consisted of the pupils in 5th and 6th class from the six selected schools.

5.3.1. Development of Physical Education-External Qualitative Observation Tool

The objective of the PE-EQOT was to add to the PE-SSAS for a full classification of QPE. The PE-EQOT added the fidelity element from the perspective of an external observer. This allowed for more robust evidence gathering which supported the authenticity of the evaluative framework.

There were seven sections in the PE-EQOT: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships and a total of 44 items. The sections were derived from the scoping review previously carried out by the researcher (Kingston et al., 2023). All of the items from the PE-SSAS (56) were not included in the PE-EQOT as some were not observable. Five items were moved from the section, Teachers' PE Delivery to the section on 'Senior Leadership and PE Professional Learning' but not excluded from the PE-EQOT. All items from the three sections "Middle management in relation to PE in our School",

"Parental Involvement in the PE programme in our School", "Community Partnerships with our School in relation to our PE programme", remained the same for the PE-SSAS and the PE-EQOT. Observations were made on any challenges or gaps that might have been present in the PE-EQOT during the school visits. For all seven sections the researcher recorded field notes on a grid sheet. Any additional comments were added to the 'general remarks' section at the end of the PE-EQOT grid and any documents gathered were stored according to college protocol.

5.3.1.1. Participants

The selected six schools participated in the PE-EQOT, 33% (2) of the schools were small schools (>100), 66% (3) were medium sized rural schools (>300), and 16.6% (1) was an urban large school (<300). 16.6% (1) had DEIS status and 83% (5) was non-DEIS. They were all coeducational vertical schools. Thirteen teachers engaged in the PE-EQOT when the researcher asked them questions during the three school visits. One teacher from each of the small schools, five from the middle size rural schools and six from the large DEIS school participated.

5.3.1.2. Procedures

The researcher engaged in three school visits in total throughout the academic year (2022/2023). The visits took place during September, January, and May. A critical friend accompanied the researcher on one of the three school visits. The critical friend offered external validity to the data collection process, thus reducing the importance of individual opinions in conducting the research study (McNiff, 2017). The data gathered was analysed by categorising and coding the results manually. The evaluation protocol results in a bivariate stratification based on the PE programme quality and fidelity with

the following quadrants: high-quality/high-fidelity; high-quality/low-fidelity; low quality/high-fidelity; low-quality/low fidelity. The categories were itemised as, grade 1, 2 and 3. Category one presented strong evidence to suggest that there was a low level of fidelity of QPE provision in the school. Category two presented strong evidence for moderate level of fidelity for QPE provision in the school with four to five dimensions aligning and finally, category three presented strong evidence to support a high level of fidelity for QPE provision in the school where six to seven dimensions aligned with the PE-EQOT. See Table 11 in chapter 4 for details.

5.3.2. Development of the Pupil Survey

The pupil survey was developed to determine the impact of the QPE programme on the four outcomes, ATPE, PAB, WB and AA. The survey was made up of an information sheet for pupils which explained the research project. All pupils in the relevant classes were invited to complete the pupil survey. The survey was made up of four sections and 57 items. Section 1 was Demographic Information. Examples of this information included, the participants name, gender, age, height and weight (optional), nationality, do you attend PE lessons, are you currently taking part in any sport outside of school and in the past twelve months have you had an injury. This section had 15 items. Section 2 was the Stirling Children's Wellbeing Scale (SCWS) with 15 items. Section 3 was the International Physical Activity Questionnaire (IPAQ), short form which had 7 items and finally Section 4 was the ATPE Scale which had 20 items. Section 2 to 4 gathered data on the pupils' ATPE, PAB and WB. The results of the pupils' AA were garnered from the pupils' standardised test results for literacy and numeracy which was administered by the class teacher during June 2022 and again in June 2023. There was a variety of standardised tests utilised which might question the validity of the

results. However, to contradict this thinking, research has found that there is a strong correlation to the same tests both for literacy and numeracy (Westwood, 1999). The testing instruments for literacy were the Mary Immaculate College Reading Attainment Test (MICRA-T) or the New-Drumcondra Primary Reading Test (N-DPRT) and the instruments for numeracy the Standardised Irish Graded Mathematics Attainment-Tests (SIGMA-T) and the Drumcondra Primary Mathematics Test—Revised (DPMT-R). School leaders had consented to share these results at the outset of the research project. These results were added to the excel spreadsheet of data collection which also included the results from the pupil survey. All the results combined would inform the study of the impact of the QPE programme and its fidelity on these four targeted outcomes.

5.3.2.1. Participants

A total of 257 participants from the six selected schools participated in the pupil survey. 15% of the pupils represented school 1, 13% school 2, 1.9% school 3, 3.4% school 4, 10.3% school 5 and 55.3% school 6. 44.4% were male and 55.6% were female. The pupils ranged from the age of 10 to 13, 11% were age 10, 42% were age 11, 42% were age 12 and 5% were age 13. There was no single sex school, all schools were mixed (both boys and girls). 86% of the pupils that participated were Irish nationality and 14% were other nationalities. 16.6% were from urban school and 83% were from rural schools. Table 13 outlines these details.

Table 13. Characteristics of schools and participants from the Pupil Survey

Characteristic	Full Sample (n=257) *
School Identifier	School 1=15%
	School 2=13.8%
	School 3=1.9%
	School 4=3.4%
	School 5=10.3%
	School 6=55.3%
Gender	Male 44.4%
	Female 55.6%
Age	10=11%
	11=42%
	12=42%
	13=5%
Level of Fidelity	Lower (Grade 1): School 1, School 4
	Moderate (Grade 2): School 5, School 6
	Higher (Grade 3): School 3, School 2
School Type	Single Sex 0%
	Mixed 100%
School Size	Small (<100) 33%
	Medium (<300) 66%
	Large (>300) 16.6%
Socioeconomic Status	DEIS 16.6%

	Non-DEIS 83%
Nationality	Irish 86% Others 14%
Jurisdiction	Urban 16.6%
	Rural 83%

**Out of the 257 students within this composition part in the pupil survey, this refers to the max no. of students. The actual number of pupils that took part was 171 therefore, the attrition rate was 33%. The breakdown is presented in the Results.*

5.3.2.2. Procedures

The pupil survey link which consisted of an online questionnaire on Google Forms was distributed to all 5th and 6th class teachers in the six selected schools. As explained earlier, the decision to use Google Forms as a platform was due to the easy access for school users, user friendly experience and post submission easy data analysis. Furthermore, it was supported by the hosting institution, availing of its ICT security services and approved by SREC.

All consented participants were given opportunities to engage with the lead researcher on the project regarding any clarifications that were needed. Similar to the PE-SSAS, participants were permitted to exit the pupil survey web link at any point, should they have wished to depart the study. Nonresponse bias was minimised where possible, utilising both a reminder email to the principal and the participating teachers and a detailed standard operating procedure to the participants on two occasions in advance of the closing date of the pupil survey. The survey was administered by the class teacher to the pupils during the school day. They were invited to complete the pupil survey during a certain timeframe at three time points in the academic year. Point one

was in December 2022, timepoint two was in March 2023 and timepoint three was in June 2023. Participants were systematically encouraged and reminded to respond to every item within the pupil survey (approx. 40 min duration) to mitigate the occurrence of unanswered questions and presence of missing values. Following the completion of the pupil survey at two different timepoints, the data was converted into an excel spreadsheet and coded appropriately in preparation for SPSS software.

5.3.2.3. Instruments and Testing for Pupil Survey

The following instruments were utilised to assess the impact of the QPE programme on the four outcomes, ATPE, PAB, WB and AA.

ATPE*: Students Attitudes toward PE scale*

PAB: *International Physical Activity Questionnaire* (IPAQ) short form

WB: *Stirling Children's Wellbeing Scale*

AA: *N-DPRT or MICRA-T for literacy* and *DPMT-R or SIGMA-T* for numeracy

- ATPE: *Students Attitudes toward PE scale*

This was used to assess ATPE of primary pupils in 5th and 6th class. The Students' Attitudes toward Physical Education Scale is a two-component instrument grounded in attitude theory was developed and validated (Subramaniam & Silverman, 2000) (Subramaniam & Silverman, 2007). It measures students' enjoyment (affect) and perceived usefulness (cognition) of PE in their present school with their current PE teachers (Subramaniam & Silverman, 2000).

- PA: *International Physical Activity Questionnaire* (IPAQ) short form.

Health education and promotion professionals were anxious to develop interventions to address the steady decline in PA among students. It was imperative that valid and

reliable instruments were used to assess PA in this population as a part of the needs assessment and/or intervention evaluation process. Health education and promotion professionals can now confidently use the IPAQ to assess students' participation in PA, (Dinger et al., 2006). The results of this study indicate that the self-administered IPAQ short-form has acceptable stability, reliability and criterion validity indices similar to other self-report PA questionnaires.

- *The Stirling Children's Wellbeing Scale (SCWBS)*

The SCWBS was used to assess pupils WB. The scale proved to be both reliable and valid, meeting the benchmark criteria set for standardising measures. The 12-item scale meets the statistical requirements for standardisation, is robust, reliable and a valid measurement for emotional and psychological WB. Each item is rated on a Likert scale of 5 levels with the minimum score being 12 and the maximum score being 60. The scale covers areas of WB including: optimism, cheerfulness and relaxation; satisfying Interpersonal relationships; clear thinking and competence. Overall, this forms a single dimensioned scale with two subcomponents described as Positive Outlook and Positive Emotional State. The mean score is 43.95 with a standard deviation of 7.29 and an inter-quartile range of 9. The scale is suitable for educational professionals looking to measure the effectiveness of projects and interventions with children aged from 8 to 15 years. The scale is founded on a positive psychological perspective measuring positive aspects of WB as opposed to a deficit-based mental health model.

- *Academic Achievement Testing for Literacy*

Pupils in 5th and 6th class completed the 40-item Reading Vocabulary test from the N-DPRT, (ERC, 2007). The N-DPRT is a revised version of a long-standing reading attainment scale developed for Irish school children and linked to the national curriculum. Scores on the N-DPRT have been shown to correlate well with measures of

cognitive ability (McNamara & Knoch, 2019) and other ability measures such as digit span and letter/number sequencing tasks (Hayes et al., 2016). All pupils who completed the test were administered the grade- appropriate version of the N-DPRT. "Level 5" and "Level 6" which corresponded to 5th and 6th class respectively in the Irish primary school system. The 40-item vocabulary measure took 20 minutes to complete and involved reading a sentence and selecting the meaning of an underlined word from four alternatives (McNamara & Knoch, 2019). The MICRA-T was administered to assess the pupils' literacy attainment. Level 4 of this test was administered to both 5th and 6th class participating pupils. The raw score was used for analysis in this study. Either the N-DPRT or the MICRA-T was administered by the classroom teachers during the month of May in 2022 and again in May 2023. Across the six participating schools, 257 pupils in total completed the tests. The same number of pupils completed one of the literacy tests at both testing points, May 2022 and May 2023.

- *Academic Achievement Testing for Numeracy*

The two standardised assessment instruments that were administered to assess pupils' attainment in mathematics, are the DPMTR and the SIGMA-T. Level 5 of the test was used for pupils in 5th class and Level 6 for pupils in 6th class. The raw score was used for analysis in this study. SIGMA-T contains 119 items to assess student achievement in the following five areas: number, measurement, geometry, elementary algebra and data and statistics. These questions are mostly based on the mathematics curriculum from the last two years of primary school and require students to perform several mathematical procedures and solve word problems relating to the content studied (CDU Mary Immaculate College, 2018). The purpose of administering the tests was to assess student progress in mathematics during the end of 5th class and the end of 6th class following a full year implementation of a QPE programme. Either the DPMT-R or the

SIGMA-T was administered by the classroom teacher during the month of May in 2022 and again in May 2023. Across the six participating schools,

257 pupils in total completed one of these tests.

5.3.3. Analysis

The statistical analysis was conducted with the use of the statistical package SPSS 23.0 (Mehta & Patel, 2011). Before analysis, variables were screened for accuracy of data entry, missing values, distribution (skewness and kurtosis), and potential outliers through descriptive statistics and Mahalanobis distance values. Some missing values were observed. The full sample was 257 and you will see from the Results section that data from 171 participants was analysed. There was an attrition rate of 33%. The scales were then computed and screened for univariate and multivariate outliers using the suggestions proposed by Tabachnick and Fidell (2018). No univariate and multivariate outliers were observed. Data were analysed using descriptive (mean, SD, standard error) and inferential statistics (multivariate analysis of variance) (MANOVA). The between subjects' factors for the two performed repeated measures MANOVAs were (a) Enjoyment (2 levels, PE teacher and Curriculum) and (b) Perceived Usefulness (2 levels, PE teacher and Curriculum), on the various factors of the questionnaires at two time points. In order to control whether the design was unbalanced, the equality of covariance matrices using Box's M test was used. Furthermore, the n2 was presented as a measure of effect size for F-tests. A n2 value between .01 and .06 was associated with a small effect, between .06 and .14 with a medium effect, and .14 or greater with a large effect (Warner, 2012). For purposes of interpretation, significant multivariate effects were followed by univariate F-ratios (analysis of variance) and t-tests for correlated means, along with the Bonferroni correction, to explore which sub-groups experienced

significant changes between the two moments throughout the research project, while ensuring an overall $p < .05$. Finally, the internal consistency of the various constructs was assessed by Cronbach's alpha coefficient.

5.4. Results

5.4.1. Pre-Post Data Analysis

A description of the sample demographics, PA profile and PE profile is outlined in Table 14. Out of 257 pupils 171 were considered as valid for the study. There was an attrition rate of

33%. 171 were for both data points for outcome variables, with age M= 11.20, SD=.69.

Table 14. Sample Demographics, PA Profile and PE Profile

	N (%)	Min-Max	Mean (SD)
Sample Demographic Profile			
Age	171	[10-12]	11.20 (±0.69)
Boy	73 (42.7%)		
Girl	98 (57.3%)		
Ireland	137 (80.1%)		
Poland	10 (5.8%)		

Ukraine	7 (4.1%)
South Africa, Togo	3 (1.8%)
Syria, Brazil, Italy	2 (1.2%)
USA, Zimbabwe, Hungary, Moldavia, Nigeria	1 (0.6%)
Sample PA Profile	
Practices sports outside of school	116 (67.8%)
Ball games and team sports	69 (59.5%)
Other	18 (15.5%)
Technique-coordinative sports	15 (12.9%)
Condition orientated sports	14 (12.1%)
Feeling after partaking in sports	
Very unhappy	1 (0.9%)
Unhappy	1 (0.9%)
Neither happy nor unhappy	4 (3.4%)
Happy	58 (50.0%)
Very happy	52 (44.8%)

Sample PE Profile	
Attends PE in school	170 (99.4%)

Table 15 shows the school sample breakdown. Thirty-one pupils or 18.1% were in grade 1. The largest portion of pupils were categorised in grade 2 which has moderate QPE with 110 or 64.3% of the sample population. The smallest number of pupils, thirty or 17.5% were placed in grade 3 which has high QPE.

Table 15. School Sample Breakdown

	Frequency (%)
Grade 1 (Lower QPE)	31 (18.1%)
Grade 2 (Moderate QPE)	110 (64.3%)
Grade 3 (Higher QPE)	30 (17.5%)
Total	171

Table 16 demonstrates Pre-Post PAB which was collected with the use of IPAQ. We performed a Wilcoxon signed-rank test to check for possible differences between the pre- and post- percentages of PA categories. A total of 50 students (29.59%) moved to a higher PA category, 25 students (14.80%) moved to a lower PA category, while the remaining 96 students (55.61%) remained in the same PA category during the two data collection timepoints. In general, a significant increase was observed in the high PA category between the two timepoints of 14.8% (62.1-47.3), and a similar decrease in the moderate PA category of 13.1% (45.6-32.5). The results revealed that there were no statistically significant differences in the number of students in each category ($p>0.05$).

Table 16. Pre-Post PA Behaviour (IPAQ)

PA Level	Pre Frequency (%)	Post Frequency (%)
Low PA	12 (7.1%)	9 (5.3%)
Moderate PA	77 (45.6%)	55 (32.5%)
High PA	80 (47.3%)	105 (62.1%)
Total	169	169

Table 17 shows the overall pre-post results for the four outcomes AA, PAB, MWB and ATPE. 171 students completed all instruments/questionnaires, apart from 2 students that did not complete the IPAQ. In table 17 the inferential statistical analysis was recorded and no statistically significant differences were reported for any of the four outcome variables. Under the outcomes AA, the pre- and post- mean results for literacy increased from 49.45 to 50.576 and for numeracy the mean results increased from 52.91 to 63.16. It was similar for the outcome with PAB. Vigorous PA pre- and post- mean results showed there was an increase from 1152.43 to 1683.08 and for moderate PA there was an increase from 774.41 to 804.02. Walking activity showed an increase from 953.25 to 1025.40. Interestingly the results for the outcome MWB showed a slight decrease for the pre- and post- mean results, reducing from 56.58 to 55.44. The final outcome ATPE again showed increased pre- and post - mean results for both Enjoyment (2.72 increases to 3.56) and Perceived Usefulness (3.11 increased to 3.40).

Table 17. Overall Pre-Post Results for AA, PAB, MWB, ATPE

	Pre		Post	
	N	Mean (±SD)	N	Mean (±SD)

Academic				
Achievement	171	49.45 (±20.66)	171	50.57 (±19.00)
Literacy				
Numeracy	171	52.91 (±21.85)	171	63.16 (±24.67)
PA Behaviour				
Vigorous_PA	169	1152.43 (±1148.44)	169	1683.08 (±1734.57)
Moderate_PA	169	774.41 (±989.97)	169	804.02 (±806.99)
Walk	169	953.25 (±1096.58)	169	1025.40 (±994.58)
Total_PA	169	2880.14 (±2188.40)	169	3512.56 (±2563.28)
Mental Wellbeing				
MWB_Sterling	171	56.58 (±4.56)	171	55.44 (±5.65)
PE Attitudes				
PE Enjoyment	171	2.72 (±0.29)	171	3.56 (±0.78)
PE Perceived Usefulness	171	3.11 (±0.40)	170	3.40 (±0.76)

Table 18 shows the literacy outcomes by school QPE grade. This was collected from the results of the repeated measures (MANOVA) data. No statistically significant differences were observed for both the interaction of Time x School ($F=2.181$, $p<.116$, $\eta^2=.025$), and the main effect of Time ($F=.004$, $p<.950$, $\eta^2=.000$). There were 171 participants for this analysis. No statistically significant differences were observed in literacy in pre-post measurements between the 3 different grade schools ($p>0.05$). No interaction (Time x School) or main effect (Time) were observed (from the descriptive

statistics table it can be observed that the students at grade 3 schools slightly increased their literacy scores).

Table 18. Literacy outcomes by School QPE grade (repeated measures MANOVA)

Descriptive Statistics

	School	Mean	Std. Deviation	N
Literacy Pre	Grade 1 (Lower QPE)	51.52	27.76	31
	Grade 2 (Moderate QPE)	48.40	20.05	110
	Grade 3 (Higher QPE)	51.17	13.52	30
	Total	49.45	20.66	171
Literacy Post	Grade 1 (Lower QPE)	47.97	24.97	31
	Grade 2 (Moderate QPE)	50.75	18.46	110
	Grade 3 (Higher QPE)	52.60	13.34	30
	Total	50.57	19.00	171

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Time	Greenhouse -Geisser	.384	1.000	.384	.004	.950	.000	.004	.050
Time* School	Greenhouse -Geisser	423.102	2.000	211.551	2.181	.116	.025	4.362	.441

a. Computed using alpha = .05

* Statistically significant values

Table 19 shows the numeracy outcomes by school QPE grade. This was collected from the results of the repeated measures (MANOVA) data. Statistically significant differences were observed for both the interaction of Time x School ($F=13.488$, $p<0.001$, $\eta^2=0.138$), and the main effect of Time ($F=34.166$, $p<0.001$, $\eta^2=0.169$), on numeracy in the 3 different grade schools. More specifically, in the first timepoint, students at grade 3 schools had significantly higher numeracy scores than the students in grade 2 schools ($p=0.024$). In the second timepoint, students at grade 3 schools had significantly higher numeracy scores than both students at grade 1 ($p<0.001$) and grade 2 ($p=0.013$) schools. In the interaction between grade and time, it can be observed that students at grade 2 ($p<0.001$) and grade 3 ($p<0.001$) schools significantly increased their numeracy scores between the two timepoints. No significant differences were observed for students in grade 1 ($p>0.05$).

Table 19. Numeracy outcomes by School QPE grade (repeated measures MANOVA)

Descriptive Statistics

	School	Mean	Std. Deviation	N
Numeracy Pre	Grade 1 (Lower QPE)	55.58	29.04	31
	Grade 2 (Moderate QPE)	49.77	20.27	110
	Grade 3 (Higher QPE)	61.67	16.06	30
	Total	52.91	21.85	171
Numeracy Post	Grade 1 (Lower QPE)	52.84	26.58	31
	Grade 2 (Moderate QPE)	62.40	23.81	110
	Grade 3 (Higher QPE)	76.60*	20.07	30
	Total	63.16	24.67	171

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Time	Greenhouse-Geisser	4123.911	1.000	4123.911	34.166	<.001*	.169	34.166	1.000
Time* School	Greenhouse-Geisser	3256.082	2.000	1628.041	13.488	<.001*	.138	26.976	.998

Pairwise Comparisons

Measure: MEASURE_1

Time	(I) School	(J) School	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
1*	Grade 1 (Lower QPE)	Grade 2	5.808	4.370	.557	-4.759	16.375
		Grade 3	-6.086	5.504	.811	-19.395	7.223
	Grade 2 (Moderate QPE)	Grade 1	-5.808	4.370	.557	-16.375	4.759
		Grade 3	-11.894*	4.426	.024	-22.597	-1.191
	Grade 3* (Higher QPE)	Grade 1	6.086	5.504	.811	-7.223	19.395
		Grade 2*	11.894*	4.426	.024	1.191	22.597
2*	Grade 1 (Lower QPE)	Grade 2	-9.561	4.828	.148	-21.235	2.113
		Grade 3	-23.761*	6.080	<.001	-38.465	-9.058
	Grade 2 (Moderate QPE)	Grade 1	9.561	4.828	.148	-2.113	21.235
		Grade 3	-14.200*	4.890	.013	-26.025	-2.375
	Grade 3 (Higher QPE)	Grade 1*	23.761*	6.080	<.001	9.058	38.465
		Grade 2	14.200*	4.890	.013	2.375	26.025

a. Computed using alpha = .05

* *Statistically significant values*

Table 20 shows the results for MWB outcome as per Sterling Test by school QPE grade. This was collected from the results of the repeated measures (MANOVA) data. No interaction effect between Time and School was observed (F=1.046, p=0.354, η^2=0.012). However, the main effect of Time was statistically significant (F=10.833, p=0.001, η^2=0.061). This means that no differences on MWB scores were observed between students at the different grades, and all students decreased almost equally their MWB scores over time, between the two timepoints. A separate (only School) analysis revealed that students at grade 1 schools had significantly lower MWB scores than both students at grade 2 (p=0.018) and grade 3 (p=0.005) schools.

Table 20. Mental Wellbeing outcomes as per Sterling Test by School QPE grade (repeated measures MANOVA)

Descriptive Statistics

	School	Mean	Std. Deviation	N
Sterling Pre	Grade 1 (Lower QPE)	54.71	4.48	31
	Grade 2 (Moderate QPE)	56.63	4.32	110
	Grade 3 (Higher QPE)	58.37	4.92	30
	Total	56.59*	4.56	171
Sterling Post	Grade 1 (Lower QPE)	52.94	5.11	31
	Grade 2 (Moderate QPE)	55.89	5.41	110
	Grade 3 (Higher QPE)	56.37	6.47	30
	Total	55.44*	5.65	171

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]

Time	Greenhouse -Geisser	136.211	1.000	136.211	10.838	.001*	.061	10.838	.905
Time* School	Greenhouse -Geisser	26.286	2.000	13.143	1.046	.354	.012	2.092	.231

a. Computed using alpha = .05
* *Statistically significant values*

Table 21 shows PE Attitudes: Enjoyment outcomes by school QPE grade. This was collected from the results of the repeated measures (MANOVA) data. No interaction effect between Time and School was observed (F=2.120, p=0.123, η^2=0.025). However, the main effect of Time was statistically significant (F=107.275, p<0.001, η^2=0.390). This means that no differences in PE Enjoyment were observed between the students at the different grade schools, and all students, independently of which grade school they attended, increased almost equally their PE Enjoyment scores over time, between the two timepoints.

Table 21. PE Attitudes: Enjoyment outcomes by School QPE grade (repeated measures MANOVA)

Descriptive Statistics

	School	Mean	Std. Deviation	N
Enjoyment Pre	Grade 1 (Lower QPE)	2.91	.42	31
	Grade 2 (Moderate QPE)	2.68	.25	110
	Grade 3 (Higher QPE)	2.67	.160	30
	Total	2.72*	.29	171
Enjoyment Post	Grade 1 (Lower QPE)	3.64	.54	31
	Grade 2 (Moderate QPE)	3.61	.87	110
	Grade 3 (Higher QPE)	3.29	.54	30
	Total	3.56*	.78	171

Tests of Within-Subjects Effects

Measure: MEASURE_1									
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Time	Greenhouse-Geisser	34.433	1.000	34.433	107.275	.001*	0.390	107.275	1.000
Time* School	Greenhouse-Geisser	1.361	2.000	.681	2.120	.123	.025	4.241	.431

a. Computed using alpha = .05

**Statistically significant values*

Table 22 shows the results for ATPE: Perceived Usefulness outcomes by school QPE grade. This was collected from the results of the repeated measures (MANOVA) data. No interaction effect between Time and School was observed (F=1.358, p=0.260, η^2=0.016). However, the main effect of Time was statistically significant (F=14.759, p<0.001, η^2=0.081). This means that no differences in PE Perceived Usefulness were observed between the students at the different grade schools, and all students, independently of which grade school they attended, increased almost equally their PE Perceived Usefulness scores over time, between the two timepoints.

Table 22. PE Attitudes: Perceived Usefulness outcomes by School QPE grade (repeated measures MANOVA)

Descriptive Statistics

	School	Mean	Std. Deviation	N
Perceived_Usefulness Pre	Grade 1 (Lower QPE)	3.38	.37	30
	Grade 2 (Moderate QPE)	3.04	.40	110
	Grade 3 (Higher QPE)	3.08	.34	30
	Total	3.11*	.40	170
Perceived_Usefulness Post	Grade 1 (Lower QPE)	3.57	.57	30
	Grade 2 (Moderate QPE)	3.40	.85	110
	Grade 3 (Higher QPE)	3.25	.54	30

		Total				3.40*	.76		170

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Time	Greenhouse -Geisser	3.413	1.000	3.413	14.759	.001*	.081	14.759	.969
Time* School	Greenhouse -Geisser	.628	2.000	.314	1.358	.260	.016	2.716	.290

a. Computed using alpha = .05

* *Statistically significant values*

Table 23 shows the results for Vigorous PA outcomes by School QPE grade. This was collected from the results of the repeated measures (MANOVA) data. No interaction effect between Time and School was observed (F=0.871, p=0.420, η^2=0.011). However, the main effect of Time was statistically significant (F=7.653, p=0.006, η^2=0.045). This means that no differences on Vigorous PA was observed between the students at the different grades, and all students, independently of which grade school they attended, increased almost equally their Vigorous PA over time, between the two timepoints.

Table 23. Vigorous PA outcomes by School QPE grade (repeated measures MANOVA)

	School	Mean	Std. Deviation	N
Vigorous PA Pre	Grade 1	1660.00	1445.69 884.06	28
	Grade 2	885.50	1422.53	109
	Grade 3	1634.67		30
	Total	1149.94*	1155.08	167
Vigorous PA Post	Grade 1	1795.71	1483.99	28
	Grade 2	1511.19	1597.80	109
	Grade 3	2258.67	2314.30	30
	Total	1693.17*	1742.46	167

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Time	Greenhouse -Geisser	1226855 2.264	1.000	122685 52.264	7.653	.006 *	.045	7.653	.785
Time * School	Greenhouse -Geisser	2793387 .392	2.000	139669 3.696	.871	.420	.011	1.743	.198

a. Computed using alpha = .05

** Statistically significant values*

Table 24 shows the results for Total PA outcomes by school QPE grade. This was collected from the results of the repeated measures (MANOVA) data. No interaction effect between Time and School was observed (F=1.376, p=0.255, η^2=0.017). Also, the main effect of Time was not statistically significant this time (F=3.069, p=0.082, η^2=0.018). This means that no differences on Total PA was observed between the students at the different grades, and all students, independently of which grade school they attended, did not statistically significantly increase their Total PA over time,

between the two timepoints (even though from the descriptive results it seems that there was an increase in grade 2 and grade 3 school students).

Table 24. Total PA outcomes by school QPE grade (repeated measures MANOVA)

	School	Mean	Std. Deviation	N
Total PA Pre	Grade 1 (Lower QPE)	3270.07	1990.35	28
	Grade 2 (Moderate QPE)	2611.24	2181.09	109
	Grade 3 (Higher QPE)	3474.13	2354.86	30
	Total	2876.71	2201.13	167
Total PA Post	Grade 1 (Lower QPE)	3252.25	2151.30	28
	Grade 2 (Moderate QPE)	3477.34	2628.79	109
	Grade 3 (Higher QPE)	3910.77	2770.49	30
	Total	3517.46	2574.99	167

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Time	Greenhouse-Geisser	10553312.479	1.000	10553312.479	3.069	.082	.018	3.069	.414
Time * School	Greenhouse-Geisser	9464658.237	2.000	4732329.118	1.376	.255	.017	2.752	.293
Error (Time)	Greenhouse-Geisser	563976482.482	164.000	3438880.991					

a. Computed using alpha = .05

* Statistically significant values

This information summarises the results for this study. The discussion will explore the findings and identify the strengths and gaps of the research question.

5.5. Discussion

The aim of this study was to investigate the impact of QPE and the fidelity of its implementation on four targeted outcomes, ATPE, PAB, WB, and AA. The study was carried out on 5th and 6th class primary school pupils (10–12 years) in the province of Munster, Ireland. More specifically, the study looked for possible differences in pre- and post- results on a number of factors, as these would occur over time as a result of their participation in a QPE programme over one academic year. Overall, some values align and others are at odds with what would be expected. This may be due to actual occurrences in the sample, (n=171 pupils) as literature does not always report benefits (or negative impact) in each of the outcomes. Another reason for conflicting results may be the sample size. The sample comprised of 171, 5th and 6th class pupils. This is a limited sample size and results may have been more consistent if there was a larger number of participants in the study. The final reason for misalignment within the results is the scoring system itself. There is potential for development of the scoring system during the observation part of the evaluation protocol, notwithstanding the rigour that was inherent to the study with a critical friend and having the protocol aligned with themes of the PE-SSAS and focused on observational aspects through clear prompts.

This study found that a QPE programme had a positive outcome on pupils' ATPE. This was similar to Christodoulas (2006) where he found that school health education programmes have the potential to slow the age-related decline in PA and help pupils establish lifelong, healthy PA patterns. Fonyi (2021) confirmed that principals play their role in creating a positive PE environment which in turn can influence the attitudes of students towards PE. Although it is not proven in this current research if principals/school leaders played a part in impacting on the students' ATPE, it may have been an influential factor.

The results of this study showed that the QPE programme had positive effects on only certain aspects of a particular group of participants' PAB, but for the most part pupils' PAB stayed the same or did not negatively affect pupils' PAB. Hills et al, (2015) advocates that the school setting must embrace their role in public health by adopting a comprehensive school PA programme. PE should remain a priority and school leaders and teachers need to overcome the many barriers they encounter such as an overcrowded curriculum, lack of funding and resources and poor quality teaching as a result of minimum opportunities provided for PE CPD (Hills et al., 2015: Howells, 2018). If this was case the implementation of a QPE could have a positive outcome on pupils' PAB as opposed to a partial one. Johnson et al., 2016 states that PE is a process or that happens in many different places and in the company of many different people. When we adopt this understanding of PE, it supports the idea that providing a large quality of PA experiences before, during and after school is a legitimate way to help more students develop skill and ultimately positive PAB (Johnson et al., 2016).

Surprisingly, there were no differences on MWB scores between pupils at the different grades in this study. López-Rivera (2020) encourages cooperative learning as a pedagogical model in PE and believes this can contribute to students' social and emotional learning. In this particular study the cooperative learning framework helped increase students' self-approach goals and their emotional control and regulation, and empathy. The study reinforced the use of this framework as it can guide students to more adaptive motivational patterns and to develop their emotional intelligence. Advocating this pedagogical model during PE lessons could benefit their MWB.

In relation to effects on AA, pupils at grade 3 (higher QPE) schools slightly increased their literacy scores over the two time points and the numeracy levels of the pupils showed statistically significant differences in all 3 different grades. This result is

very encouraging and concurs with a study carried out by Donnelly (2016). Donnelly concludes that PA has a positive effect on AA but premises this with the fact that more research needs to be carried out to determine mechanisms and long-term effect. McLennon (2015) confirms that regular participation in QPE can improve pupils' attention span, improve their cognitive control and speed up their cognitive processing. AA can be influenced by many factors but evidence from this study and others as mentioned above, supports the presupposition that if pupils achieve at least the recommended daily amount of PA, there is potential for broad social and academic gains (AfPE, 2019).

The findings stemming from this inquiry enable schools to optimise pupils' holistic development by favouring positive outcomes on some elements of the outcomes ATPE, PAB, WB and AA. This is based on the provision of QPE programmes and the fidelity of its implementation.

The study has implications for research, practice and policy, with an eye on the JC WB programme (NCCA, 2019) and the PCF (2023) and Draft WB Specification (DE, 2024).

The results have provided some answers to the overarching research question of this study, which is to investigate the fidelity of the implementation of a quality PE programme and its outcomes on final-stage primary-level pupils' ATPE, PAB, WB and AA. The results also inform other research questions which are based on the evaluation protocol classification. These questions refer to two separate hypothesis which were advanced as part of the evaluation protocol.

H1: Schools with higher quality and higher fidelity of their PE programme have significantly higher pupil outcomes on ATPE, PAB, WB and AA;

H2: The differences of quality and fidelity of the PE programme reflect differences of pupil outcomes on ATPE, PAB, WB and AA. We will now discuss the results in relation to the four targeted outcomes and the research questions raised above.

5.5.1. Attitude Towards Physical Education

The study considered two aspects of pupils' ATPE. They included pupils PE Enjoyment and PE Perceived Usefulness. Encouragingly, the results showed that all pupils PE Enjoyment increased between the first time point and the second by almost the same amount in each of the schools. Interestingly, the overall level of PE Enjoyment for pupils in grade 1 schools (low QPE) had significantly higher levels in comparison to pupils in schools at grade 3 (high QPE). The results of the second aspect of ATPE showed similar results. The scores for pupils Perceived Usefulness of PE increased almost equally over time between the two timepoints of the research study. Similar to pupils PE Enjoyment as mentioned earlier, pupils at grade 1 schools had significantly higher overall PE Perceived Usefulness scores compared to those of students at grade 2. The fact that pupils from grade 1 schools displayed higher scores for PE Enjoyment and Perceived Usefulness in comparison to pupils' levels in grade 2 schools contradicts what we would have expected, however the results show that the implementation of a QPE programme over the course of one academic year whether it is high (grade 3) moderate (grade 2) or low (grade 1) QPE improves pupils' levels of both PE Enjoyment pupils Perceived Usefulness.

5.5.2. Physical Activity Behaviour

In relation to PAB, the results revealed that 50 pupils (29.59%) moved to a high PA category, 25 pupils (14.80%) moved to lower PA and the remaining 96 (55.61%) remained in the same PA category across the two timepoints. While the results show that the implementation of the QPE had some positive effects with a certain group improving their PAB, for the most part pupils PAB stays the same or does not negatively affect pupils PAB. There are some parallels between these results and the results of Raspberry et al., (2011). Raspberry et al. states that increasing PAB is either positively related to AA or that there is not a demonstrated relationship between PA and AA. On both accounts, the impact will always have a positive effect on the pupil's physical fitness and WB as well as possibly benefitting their AA.

All grades increased almost equally their vigorous PA over time, between the two timepoints. Pupils in grade 2 had the highest increase. These results clearly demonstrated the QPE programme benefits all schools. Even though there was no statistically significant increase in the pupils Total PAB, from the descriptive results it seems that there was an increase in grade 2 and grade 3. Again, this finding shows a positive effect of the QPE programme on pupils Total PAB.

5.5.3. Wellbeing

Contrary to other research findings in this field (Donnelly et al., 2016; OECD, 2019; Wood, 2022), there were no differences on MWB scores between pupils at the different grades, and all pupils decreased almost equally their MWB scores over time, between the two timepoints. A separate (only School) analysis revealed that students at grade 1 had significantly lower MWB scores than both pupils at grades 2 and grade 3.

5.5.4. Academic Achievement

While no statistically significant differences were observed in literacy in pre-post measurements between the 3 different grades, from the descriptive statistics table we can state that the pupils at grade 3 slightly increased their literacy scores over the two time points. This still demonstrated a positive effect of the QPE programme and is in line with other research in this field (Bedard et al., 2019; Best, 2010; Diamond & Ling, 2016; Kingston et al., 2020; Norris et al., 2015) notwithstanding there was no statistical significance. More encouraging were the results of the QPE programme on the numeracy levels of the pupils. Statistically significant differences were observed for both the interaction of Time x School and the main effect of Time on numeracy in the 3 different grades. Interestingly, in the first timepoint, pupils at grade 3 had significantly higher numeracy scores than the students in grade 2 and in the second timepoint, pupils at grade 3 had significantly higher numeracy scores than both students at grade 1 and grade 2. In the interaction between grade and time, it can be observed that pupils at grade 2 and grade 3 significantly increased their numeracy scores between the two timepoints. These results are very encouraging and support other researchers, already mentioned above and their findings.

5.5.5. Strengths and Limitations

A key strength of this study is that it the first of its kind to conduct an examination on the impact of QPE provision and the fidelity of implementation on four targeted outcomes, ATPE, PAB, WB and AA at the final stage (5th and 6th class) of the pupils' primary education. Furthermore, this is one of a few studies that utilises already identified quality features of PE programmes (Kingston et al., 2023) to develop a conceptual framework. These key features of QPE programmes can be used to inform

future researchers, PE policy makers and PE educators. Another strength of this study is that the protocol can be used as a tool and adopted by Education validation bodies, for example the NCCA in Ireland, Ofsted in the UK and curricular education organisations in other jurisdictions.

While this study significantly contributes to the international literature, there are some limitations however. Initially, participants were recruited from only one province in Munster, with a convenience sampling procedure, leaving other provinces unexamined. While we anticipate that the protocol will be relevant in other PE contexts, future work is needed to this direction. To support the relevance of the protocol outside the national context of PE in Ireland it would also need external validity so that it would be valid in other contexts and other jurisdictions. We must also consider there may have been a possible loss of data when the class teacher administrated the tests and the percentage of the number of participants that started the study is less than what finished, 171 in comparison to 257 participants. The sample size is small and if this were to be increased to a larger scale it would result in more robust results for the study. Due to the fact that the researcher was the school inspector may have influenced the response rate to the study. As mentioned already in the Discussion, there is potential for development of the scoring system during the observation part of the evaluation protocol while using the PE-EQOT there was great rigour within the study itself by having a critical friend to assist throughout and the protocol was aligned with the themes of the PE-SSAS. One other point to consider is the methodological issue of using the SCWBS. WB is such a broad concept it is very difficult to analyse it in its totality. Using this particular instrument tested the pupils' MWB only. Using an instrument that tested more broadly for pupils' WB could have presented different results. This methodological issue may have been a limitation. Considering much anticipated change in the Irish PE curriculum,

future implementations of this protocol are needed to ascertain the temporal stability of the current findings. The factors reported in this study can serve as appropriate points of reference towards this future work. Generally, there may have been some issues with how the pupils interrupted the open ended questions. For example, the IPAQ revealed some issues in terms of how the pupils interrupted and addressed the response. Not all students provided days of the week and time per day. This is one of the limitations not having the researcher on cite. Where questions arose the teachers may not have had the expertise or time to explain the questions clearly.

5.6. Conclusion

The PE-SSAS, and the PE-EQOT were used as a concept to investigate the seven themes (government leadership, PE curriculum, school principal and leaders, organisational management from leadership in school, teachers, parental involvement and community partnerships) that have shown evidence of supporting the achievement of some of the four educational outcomes in primary PE; ATPE, PAB, WB and AA, (Kingston et al., 2023). Collectively, the PE-SSAS, and the PE-EQOT supported the overall validity and reliability of this instrument for assessing the quality and fidelity of the implementation of PE programmes in primary schools.

In summary, over the course of one academic year, whether the school is in the high (grade 3), moderate (grade 2) or low (grade 1) category, the implementation of a QPE programme improves pupils' ATPE. In addition, the implementation of the QPE had positive effects on certain pupils' PAB but for the most part pupils' PAB stayed the same or did not negatively affect pupils PAB. Surprisingly, there were no differences on WB scores between pupils at the different grades, and all pupils decreased almost equally their WB scores over time, between the two timepoints. A separate (only School)

analysis revealed that students at grade 1 schools had significantly lower WB scores than both pupils at grade 2 and grade 3. From the descriptive statistics table we can state that the pupils at grade 3 schools slightly increased their literacy scores over the two time points and the results of the effect of a QPE programme on the numeracy levels of the pupils showed statistically significant differences in the 3 different grades.

Chapter 6 - Future Directions of QPE Research, Practice and Policy

6.1. Overview of Thesis

This PhD research study is unique as it is the first of its kind to conduct an examination on the impact of quality physical education (QPE) provision and the fidelity of implementation on four outcomes, attitudes towards physical education (ATPE), physical activity behaviour (PAB), wellbeing (WB) and academic achievement (AA) at the final stage (5th and 6th class) of the pupils' primary education. There has been much debate worldwide surrounding the future of QPE (Laker, 2003) and within this uncertain environment the importance of QPE in primary schools in particular has been advocated (Beni et al., 2019; Pickup, 2012). Notwithstanding this strong advocacy of QPE in primary schools, there is a limited guidance and research available to primary school leaders and teachers, particularly in an Irish context on the impact of QPE provision and the fidelity of its implementation (Mangione et al., 2020; Murphy & McEvoy, 2020). This thesis contributes to our understanding of the implementation and fidelity of QPE programmes in primary schools and its effect on pupils' ATPE, PAB, WB and AA in an Irish context for the first time and considers the potential use of the conceptual framework for future directions in this field. This was achieved by carrying out a scoping review on the literature relating to the evaluation of the implementation of QPE programmes and related outcomes on final-stage primary-level pupils, and by validating an evaluating a protocol to examine the above and finally, by investigating the impact of the QPE on the four targeted outcomes.

This chapter, will begin by considering the strengths and then limitations of this research. This will be followed by directions for future research. The chapter will conclude with some final thoughts on the conclusion of this PhD journey.

6.2. Strengths of the Study

A key strength of this study is that it is the first to evaluate the literature on the implementation fidelity of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, MB and AA. Furthermore, this study utilises the already identified quality features of QPE programmes (Kingston et al., 2023) to develop a conceptual framework. These key features of QPE programmes can be used to future inform researchers, PE policy makers and PE educators. Another strength of this study is that the protocol derived from the conceptual framework can be used as a tool and adopted by reputable and established educational bodies, for example the NCCA in Ireland, Ofsted in the UK and curricular education organisations worldwide.

Another strength was the design of the evaluation tool with a self-reported component (PE-SSAS) and an externally observed component (PE-EQOT) that can be triangulated to determine the quality and fidelity of PE in primary schools. This was achieved through a considerable range of schools and staff represented in the validation study for the PE-SSAS component and the critical friend for the PE-EQOT.

This research adds to the limited studies carried out on pupils in primary schools in relation to PE in the Irish context. This curricular area needs more attention than others as pupils' WB, PE and their holistic development is a high priority for all (Hardman et al., 2008). Another strength to consider is the identification of the quality features from Kingston et al, 2023. The list of key features are very valuable when considering the limitations and barriers in education for school leaders, teachers and leads of WB, PE

and PA. This information could be very useful for policy makers to assist in improving the provision of PE in primary schools.

A further strength was the combined use of validated tools and ecologically valid tools relative to the different outcomes assessed in this study, with minimal participant attrition between both data points, over the course of a full academic year. This longitudinal design model, combining elements of process, context and outcomes is highly rare in research and policy evaluation.

Finally, there is strong evidence presented that the design, development, and implementation of the evaluation protocol was based on meticulous and systematic research considerations, evident throughout this PhD journey. The aim of researching the links between QPE levels with specific and general educational outcomes places this research among the few that have attempted to do so, standing as a main strength that steered the design and major decisions for this study.

6.3. Limitations of the Study

Despite the important strengths identified in the current study, it is important for future research to consider the limitations of the same, albeit some of which were outside the control of the researcher. The limitations of this study are outlined below.

We must consider there may have been a possible loss of data when the class teacher administrated the tests and the percentage of the number of participants that started the study is less than what finished, 171 in comparison to 257 participants, representing an attrition rate of 33% for the outcomes data. Data collection was conducted on participants in their class groups. This may have been a limitation as the researcher had no control over the environment or conditions in which the questionnaires were

completed. Furthermore, due to the fact that the researcher was the school inspector may have influenced the response rate to the study. There is a limited sample size, particularly in the last study, and the quality of the results could have been more robust if there was a larger number of participants and more than six schools involved. As mentioned already in chapter 5, there is potential for development of the scoring system during the observation part of the evaluation protocol while using the PE-EQOT, notwithstanding there was great rigour within the study itself by having a critical friend to assist throughout and the protocol was aligned with the themes of the PE-SSAS. We also need to consider the methodological issue of using the SCWS. WB is such a broad concept it is very difficult to analyse it in its totality. Using this particular instrument only allowed us to evaluate MWB in the main. Other aspects of pupils' WB may have been overlooked in this study. This methodological issue may have been a limitation.

A further limitation is that this review did not aim to analyse the outcomes themselves; therefore, an analysis of the impact of the features of QPE programmes on the outcome variables is needed. The lack of any follow-up tests beyond one year, particularly any long-term retention testing like testing for literacy and numeracy is a limitation within the study.

And finally, there was a limitation in the fact that the researcher was not onsite to explain the questions clearly to the pupils and to answer any queries that arose about the interpretation of the open ended questions. There may have been some issues with the IPAQ in terms of how the pupils interrupted and addressed the response. Not all students provided days of the week and time per day.

6.4. Recommendations and Future Directions of QPE Research, Practice and Policy

Based on the results of the study it is possible to provide several recommendations relating to future research carried out in this field as well as recommendations for the relevant practitioners and policy makers.

6.4.1. Research

Future research should use a larger sample, and potentially a larger longitudinal research design to track the same group of participants over time (5-year follow-up, for example), specifically to provide more insight into how and why the evaluative tool is useful and what is the impact on pupils' targeted outcomes over a longer length of time and what patterns are emerging.

Further studies, including larger cross-sectional studies and controlled trials, are also required to extend the evidence base and determine whether the QPE programme impacts on pupils' targeted outcomes. This will help to maximize the quality and robustness of the study design, while providing further integrity to the findings and conclusions.

Further research questions should be considered to allow for more robust findings and consequently more comprehensive information for all interested stakeholders to contemplate a fuller perspective of the student's sociodemographic profile. Two additional questions worth considering should be:

Q1: Schools with higher quality and higher fidelity of their PE programme have lower sociodemographic gaps of pupil outcomes on ATPE, PAB, WB and AA;

Q2: The differences of quality and fidelity of the PE programme reflect differences of sociodemographic gaps of pupil outcomes on ATPE, PAB, WB and AA.

As already mentioned in the limitations, there is a limited sample size. To ensure richer quality results it is recommended that a larger sample size be used.

Even though there was great rigour within the study itself by having a critical friend to assist throughout and the protocol was aligned with the themes of the PE-SSAS, the scoring system during this observation part of the evaluation protocol could be redeveloped.

A future direction for this study is to analyse the four targeted outcomes themselves, therefore, an analysis of the impact of the features of QPE programmes on the outcome variables is suggested. Particular attention should be given to the choice of the tools relative to the outcomes, aiming for a balance between research-informed tools and ecologically valid tools, realising that both might not be equally strong in the same chosen tool.

In this current study, the lead researcher served as the external contact person with the participating schools and was available to answer any questions as they arose. For the QPE protocol and analysing its impact to be disseminated on a wider scale, it would need sufficient personnel, as well as financial backing to provide this level of support in order to ensure that the evaluation of the QPE programme was monitored, and therefore implemented and analysed as intended.

Initially, participants were recruited from only the Munster province in Munster in Ireland, with a convenience sampling procedure, leaving other provinces unexamined. While we anticipate that the protocol will be relevant in other PE contexts, future work is needed to this direction to extend its external validity. However, to support the

relevance of the protocol outside the national context of PE in Ireland it would also need international replication so that its external validity can be established more broadly in other contexts and other jurisdictions.

It would enhance the study if the researcher was be onsite for the first time point of the data collection. There were issues for pupils in interpreting some of the open ended questions, in particular the questions from the IPAQ. Not all students provided days of the week and time per day. If the researcher was onsite for the first time point this problem could be avoided for the following two timepoints as the pupils would have a clearer direction.

6.4.2. Practice

As already outlined in this study, the common themes identified as features of QPE were: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships. Based on these findings, along with evidence presented by Kulik, (2001), Wee (2019), and SHAPE America (2016) throughout the study the following key recommendations can be made.

The collaboration between expert academics (i.e., academics with expertise in QPE research, peer-reviewed publications, PETE programmes etc.) and expert practitioners (i.e., primary teachers, specialist PE teachers with significant experience of teaching the PE curriculum in primary schools, primary school leaders and policy makers), (Morley et al., 2019), as well as pupil input (i.e., participant voice) (Demetriou & Wilson, 2010), where possible, will play an important role in refining the evaluative protocol used in future studies. The development of an evaluative protocol for use by teachers needs to consider the multidimensional complexities of evaluating QPE in relation to the specific

context in which the evaluation will be conducted (Morley et al., 2019). It is necessary to provide teachers with an evaluative framework that is easy to use, and is ultimately embraced by the teachers who are going to use it in schools (Morley et al., 2019).

Structures should be put in place, to facilitate and support teachers to become involved in the work of PE leadership, as well as ensuring that the work of lead teachers is valued (Duncombe, 2005). Approaches such as collaborative work practices and class swapping, can provide examples of useful starting points in the process of developing PE leadership within primary schools. Utilising these insights to tap into the potential of informal PE leadership could be hugely beneficial to primary PE, as it has been clearly shown that when teachers are provided with leadership opportunities, they can positively influence the quality of PE provision.

School leaders and staff are also encouraged to embrace the opportunity of the Draft WB Specification (NCCA, 2024) to place it at the heart of the school experience for all pupils, and consider the importance of QPE in the school context. Pupil voice in shaping whole-school WB approaches, and a meaningful QPE programme cannot be ignored, as well as staff as PE champions in the school to lead QPE planning, provision, assessment and reporting for all their pupils.

It is recommended that the average time allocation for PE as identified by (UNESCO, 2014) is secured worldwide. The NCCA in Ireland have already responded to this by ensuring greater flexibility and increased time for PE and SPHE in the recent PCF (2023). This presents a monthly block of flexible time and an increase of the weekly time allocation for WB (PE and SPHE) from 1.5 hours to 3 hours (NCCA, 2023). Other countries need to follow suit so that QPE is made available to all pupils in all jurisdictions.

Another recommendation in relation to the practice of PE is that a basic standard of adequate facilities should be available to all and this should not be determined by school context or availability of funding from affluent parents. This is the responsibility of governments and a basic entitlement for pupils (Kirket al., 2006; Hardman, 2008a).

Finally, governments should continue to support school leaders, teachers and leads for PE/WB through effective ITE and CPD for teachers (Lynch, 2017). Regular access to quality CPD would ensure that a uniformed and research-informed approach to teaching PE. In Ireland, the work of Oide provides high quality CPD, fostering reflective practice and ongoing development among teachers and school leaders. Not all schools can easily access this service however and waiting lists exist. Enhanced resources are required so that all schools, teachers and leaders are provided with this training in a timely manner.

6.4.3. Policy

From September 2020, for the first time in the history of formal state examinations in Ireland, post-primary schools in Ireland and in particular, PE teachers, will have been required to record student achievements and report on PE within WB in JC (NCCA, 2017), as part of each individual student's JC Profile of Achievement (NCCA, 2018). Robust assessment and reporting practices within schools are one way to advocate for PE as a subject. These developments provide a useful framework for policymakers and educators and pupils in the development of a similar movement culture within primary schools.

As part of the Draft WB Specification (NCCA, 2024) framing PE under the WB perspective as a holistic concept is very much welcomed. This holistic approach

highlights the potential for the pupils' holistic development as well as AA as a result of experiencing a QPE programme in school (Lynch, 2017). It is recommended that this concept and approach should be considered on a wider scale and in other jurisdictions.

The PCF (NCCA, 2023) is encouraging in the fact that the subject PE is due to be combined with the curricular area SPHE under the umbrella of WB with an element of flexibility and teacher autonomy incorporated into this innovative approach. Again this new development in the Irish curriculum displays a holistic approach to the development of the child. It is recommended that teachers and school leaders embrace this development and use their autonomy along with the flexible approach to ensure a positive learning experience for the child that involves fulfilment and enjoyment. This would help to shape proactive lifestyles and create healthy habits for young people, which in turn would have a long-lasting effect on their lifelong ATPE (Dobbins et al., 2013; Lucertini et al., 2013).

In Ireland, it is current practice that PE is rarely evaluated by the Department Inspectorate. Thus, little priority is often given to the subject area by school leaders and teachers to make continual improvements and to view it as a high priority subject area. Unlike the Literacy and Numeracy Learning for Life document (DES, 2011), PE is not formally assessed at any level within the primary school system and no results are submitted to the DE on an annual basis. In order to raise the profile of PE and to gain more traction for it within the teaching staff, it is recommended that governments would issue policy to ensure that an annual formal assessment was carried out for some or all levels within the system and that the compulsory submission of results would follow. To support this, policy should also include that the subject PE would be evaluated and a published report open to the public would be issued. This evaluation should take place at least once every four years.

In the past, Irish governments have allocated ring fenced financing to primary schools for PE resources. This was issued annually but there is no guarantee for school leaders that this funding would be reissued each year, therefore leaving PE funding in an unstable position. Often funding for equipment and facilities falls to parents and the wider community. To counteract this vulnerability for schools and its dependency on the good will of others, governments should allocate an annual allocation of funding to all schools based on the number of children enrolled. This would secure and maintain an acceptable standard of resources for all so that quality provision could take place.

As highlighted by Kulik (2001) and SHAPE (2016) teacher qualifications are a key issue related to poor quality provision of PE in schools. To improve this situation, it is recommended that compulsory CPD in PE on a biannual basis would be a pre-requisite for teachers when renewing their Teaching Council membership. This would ensure the upskilling of teachers and provide a more streamlined standard of training in this subject area. It would also support a more balanced approach to the QPE in schools.

Pupils are more likely to be physically active in schools where community partnerships have been established (Ngobeni, 2024). Leatherdale et al., (2010) argues that partnering with community-based recreation clubs and organisations, and providing staff with ongoing support and training about the establishment of effective school initiatives would put schools in a much stronger position to deliver QPE programmes. In this regard, policy-makers and practitioners should set out a clear plan and prioritise PE, in terms of meeting wider societal and educational development objectives. Ample opportunities should be provided by educational policy makers for schools to establish strong community links with their local sporting organisations. The practice of creating and nurturing these links should be embedded in the PE curriculum and when schools

are being evaluated by the Inspectorate this relational should be either encouraged or acknowledged.

The provision of QPE requires material resources, and appropriate technical support, to ensure access to PE for all pupils, including those with disabilities, and those with specific religious requirements (McLennon & Thompson, 2015). Governments and policy makers alike have a responsibility to ensure that sufficient physical resources are made available so that inclusivity is evident in schools. This argument is also supported by UNESCO and UNICEF, 2013, when they state that the learning environment is fundamental to good-quality education, and should include safe, healthy, and protective physical and social environments for pupils and teachers to learn and work in.

6.5. Closure – The Conclusion of this PhD Journey

The overall aim of this thesis was to evaluate the fidelity of the implementation of QPE programmes and its outcomes on the final-stage primary-level pupils' ATPE, PAB, WB and AA. It is the first of its kind in Ireland seeking to critically design, develop and implement an evaluative protocol to examine this. The reported study offers a feasible, targeted whole-school approach to evaluate the fidelity of the implementation of their QPE programme and its outcomes on pupils' four targeted outcomes. The findings have important implications for the future evaluation of QPE in primary schools at local, national and international level. This investigation also has the potential to extend the evidence-base for programmes aiming to improve health, WB, ATPE and the overall holistic development in young people.

Acknowledging the study design strengths and limitations, the evaluation of the fidelity of the implementation for QPE programmes in primary schools and its impact

on four outcomes for senior level primary pupils, highlights that it is a promising approach for enabling young children to improve their ATPE, certain aspects of particular groups of pupils' PAB, their AA, in particular numeracy and possibly their WB. Further analysis must be conducted on the observational aspect of the evaluation with a focus on the scoring system. A methodological issue needs to be addressed in relation to the selection of the instrument to examine pupils' WB and consideration should be taken to determine whether the evaluation of the QPE programme can be delivered on a larger scale in primary schools as well as other jurisdictions. This PhD research study has successfully ensured that the design of an evaluative framework that can be used to assess the impact of a QPE programme. Following this research, we can now move to the next stage of advancing and extending the use of the protocol and maximising its potential.

The research process for designing, developing, implementing and evaluating this study has refined my thinking and practice, while writing this PhD thesis has helped clarify my thinking. This journey has been challenging, relentless, but above all else, a fruitful learning experience. Although I have now learned how to conduct research as an independent researcher, it is the collaborative approach that defines this research.

Chapter 7 - References

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Appendices

A1

Journal of Physical Education and Sport ® (JPES), Vol 20 (Supplement issue 6), Art 442 pp 3260 – 3266, 2020 online
ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Acute effects of physical education, structured play, and unstructured play in children's executive functions in primary school

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Published online: November 30, 2020
(Accepted for publication: November 22, 2020)

DOI:10.7752/jpes.2020.s6442

Abstract:
Purpose: Research continuously reports a close connection between Physical Activity (PA) and its effect on pupils' Executive Functions (EF). Thus, the purpose of the present study was to expand previous knowledge and examine the acute effects on the EF – working memory and inhibition – in two primary level class cohorts (4th class: n = 20 students, mean age 9.95 ± .39 years; 6th class: n = 23 students, mean age 12.00 ± .30 years; 22 boys, 21 girls) of a school-based PA policy in a four-week design intervention programme. **Methods:** The PA policy included Physical Education (PE),
Structured Play (SP) and Unstructured Play (UP). Testing of EF was carried out with a Working Memory Test and an Animal Stroop Test, before and after each session of each PA policy component. To determine whether each component of the PA intervention had an effect on working memory and inhibition, two separate repeated measures multivariate analysis of variance, controlling for gender and class as between-subject factors. **Results:** Results showed that the PE intervention improved more students' working memory (3.49% increase), comparing to SP ($p = .002$, $\eta^2 = .057$) and UP ($p < .001$, $\eta^2 = .077$) interventions. Furthermore, the PE intervention improved more students' inhibition (3.57% increase), comparing to SP ($p = .001$, $\eta^2 = .074$) and UP ($p < .001$, $\eta^2 = .105$) interventions. No gender and class differences were observed. **Discussion:** While whole school PA policies need to focus on all PA components and provide school based opportunities to meet PA recommendations to benefit health in general, PE appears to be more beneficial for improving most students' EF. Based on this finding, it is suggested that structured PE to be prioritised when developing PA policy in schools. Potential causes on the differences direct the conclusion towards school-based PA policy recommendations.
Keywords: Working Memory, Inhibition, Whole-School Physical Activity, Exercise, Cognition, Intervention.

Introduction

Research continuously reports a close connection between Physical Activity (PA) and its effect on pupils' Executive Functions (EF) (Ludyga, Gerber, Pühse, Looser, & Kamijo, 2020; Nazlieva,Mavilidi, Baars, & Paas, 2020). Despite this research, many schools are attempting to increase instructional time for mathematics, English, and science in an effort to improve standards-based test scores (Wilkins et al., 2003) neglecting the importance of EF for those purposes and how it can benefit from PA. Furthermore, schools across the world face increasing challenges in allocating time for physical education and other physical activity opportunities during the school day (Hardman, 2006, 2008; Morgan & Hansen, 2008). Also, break time has been reduced to allow for increased instructional time so that schools can meet the ongoing demands of raising their standard-based scores for literacy and numeracy (Blatchford & Sumpner, 1998; Dills, Morgan, & Rotthoff, 2011). Pellegrini and colleagues (2005) rebate such decisions, arguing that school

policy should be based on theory and the best empirical evidence available that supports the significance of play and PA. Those authors stress that break times are beneficial and have the potential to influence the child's social and emotional development.

Increased regular PA has been associated with small and measurable improvements in neuropsychological tests of EF (Jackson, Davis, Sands, Whittington, & Sun, 2016), although Singh et al. (2019) conclude on inconclusive evidence on the effects from PA on cognitive and overall academic performance and strong evidence for beneficial effects of PA on maths performance in children. Specifically, the inhibitory control and working memory enhancement seems more responsive to cognitively-engaging activities (Jackson et al., 2016). Vazou and colleagues (2019), in a review of school-PA interventions, concluded that curricular PE lessons seem to be the most appropriate framework for promoting the development of children's cognitive functions, likely for providing a medium for cognitively-engaging PA.

Effects of physical activity on executive functions

According to Salimpoor and Desrocher (2006) 'EF are a group of interrelated complex mental abilities that are involved in planning and initiating goals and carrying them through despite interruptions' (p. 15). The

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most prominent theoretical framework suggests that EF has three basic components: inhibition, working memory and shifting (Diamond, 2006). The component of inhibition refers to the deliberate, controlled suppression of pre-potent responses (Miyake et al., 2000) and is usually tested with children aged 13-16 years old with the Animal Stroop test (Wright, Waterman, Prescott, & Murdoch-Eaton, 2003). Working memory is referred to as a system for temporarily holding and manipulating information as part of a wide range of essential cognitive tasks such as learning, reasoning and comprehending (Baddeley, 1997). This can be assessed by using the Working Memory Test Battery for Children (WMTB-C) which includes the Listening Recall test which is suitable for children in an age range of 5-15 years (Gathercole & Pickering, 2001). The third component, shifting, while not explored in this study, is often defined as the ability to adapt mental set when required, including the ability to change a strategy in a responsive manner, or abandon a strategy in response to negative feedback (Henry & Bettenay, 2010).

PA programmes and their effects on EF can be divided into two fields of research. One being the evidence resulting from experiments using chronic aerobic exercise (exercise over a long period of time showing long term effects) and the other using acute bouts of aerobic exercise (once off periods of exercise and showing immediate effect on EF). We will predominantly focus on the effects of acute aerobic exercise as this empirical research is based on an acute PA programme in a school.

Using an experimental design, Pesce and colleagues (2009) compared two forms of acute aerobic exercise of equivalent aerobic intensity. A group of preadolescent children aged eleven to twelve completed one hour of individual circuit training and in another session completed an hour of aerobic group games. To test the effect on EF, after each session the group completed a list-learning procedure to assess the immediate and delayed word recall. The findings showed that the acute bout of group aerobic games enhanced their immediate word recall and for delayed recall both groups enhanced their memory performance. In both situations the samples' EF were positively affected. Caterino and Polak's (1999) study investigated the effect of an acute bout of stretching and aerobic walking, which was grade appropriate. It was assessed by the Woodcock-Johnson Test of Concentration and it found that the EF selective attention had improved for 4th graders but not with 2nd and 3rd graders. The development time point of the sample is significant here. During late childhood, inhibition (Hillman et al., 2009) may be more sensitive than shifting (Tomporowski, Davis, Miller, & Naglieri, 2007) to the effects of acute exercise. The acute aerobic study by Caterino and Polak (1999) addressed this issue but gave little explanation as to why 4th graders scored differently to 2nd and 3rd.

Ludyga and colleagues (2020) findings from a meta-analysis investigating moderators of long-term effects of exercise on cognition suggested a general effect of exercise on cognition, which was influenced by sex, exercise type and reciprocal relationships between dose parameters. Regarding sex, Quan and colleagues (2018) found that specific cognitive functions (i.e. Verbal Intelligence Quotient, Performance Intelligence Quotient, and Full Intelligence Quotient) were associated with light PA, only in boys. Furthermore, the combination of high physical exertion and high cognitive engagement in a classroom-based PA setting (i.e. inclusion of cognitively engaging PA breaks) was mostly beneficial for students' enhanced shifting and mathematic performance (Egger, Benzing, Conzelmann, & Schmidt, 2019).

Few studies have addressed a related question regarding the potential influence of the pubertal status of participants. It may be possible that the hormone levels could alter the effect of PA on EF. Chu et al. (2015) argues that acute exercise has a selective effect on cognitive function, specifically effecting the motor response inhibition aspect of EF. Furthermore, the same authors have stated that acute exercise predominately impacts later stages of information processing during motor response inhibition, which may lead to an increase in attentional resource allocation and confer the ability to successfully withhold a response to achieve motor response inhibition.

For the most part, these findings are concurrent with the thesis that acute aerobic exercise in schools has a positive effect on children's EF, however the effects of numerous elements of PA on cognition remain to be explored (e.g. type, amount, frequency, timing), and many questions remain regarding how to best incorporate PA within schools, such as activity breaks versus active lessons (Donnelly et al., 2016). Also, most research approaches are externally driven and less has been documented "real-world settings" (Jäger, Schmidt, Conzelmann, & Roebers, 2015) on internally designed and driven approaches from the school staff, which is the focus of this study to address the following research question: What are the acute effects of three different components of a Whole-School PE Policy (PE sessions, Unstructured Recess, Structured Recess) in the Executive Functions of Inhibition and Working Memory (verbal and visual) of Primary level children?

Material & methods

This research employed a quasi-experimental approach. A pilot-study was initially conducted with a 5th class students' cohort (n = 17) for reliability purposes. Considering Diamond's (2006) EF framework, the choice of EF testing for this study was essentially sourced from Henry and Bettenay's (2010) design.

Sample and procedures

The study cohort consisted of two classes from an Irish primary school (4th class: n = 20 students, mean age 9.95 ± .39 years; 6th class: n = 23 students, mean age 12.00 ± .30 years), with an overall split of 22 boys and 21 girls. The multi-component PA intervention included three distinct components: PE, Structured Play (SP), and Unstructured Play (UP). After a one-week baseline assessment of the students' EF, the programme was implemented during official school-time for four weeks (12 sessions in total). All sessions occurred at the same time and day of each week, in the same sequence, testing the EF 10 mins before and 10 mins after each session. Children's working memory was measured with a verbal visual memory test using curriculum-based vocabulary, while their inhibition was assessed through the Animal Stroop-like test. *Ethics*

The host institution provided ethical consent to the study and the research team guaranteed to follow all ethical requirements. Prior to participation, all students, as well as their parents or guardians, got the opportunity to read the information sheet and agreed to participate in the study. The informed consent ensured confidentiality and anonymity with the appropriate use of coding to track each student with the results of their testing in the database.

It is important to acknowledge that the main researcher was the school principal where the study was conducted. This element was not used to place pressure on the participation from teachers and students and any concerns with the first researcher's school role were thoughtfully considered and supported by the rest of the research team. The main advantage was the facilitated access to the setting and enhanced engagement from the teachers as an element of protocol fidelity. It was made clear to the school community that the researcher was playing a facilitating role and there was no leveraging undertaken on their behalf as manager. This was made explicit for teachers, students and guardians in the sense that no prejudice on educational and relational aspects were implied for any unwillingness or withdrawal of participation from the study, without negative implications on the participation in the whole-school PA policy.

Protocol Implementation

During the four-weeks of the study, the working memory and inhibition testing were administered immediately before and after each separate component (i.e. PE, SP and UP), without changes to weekdays, time of day and sequence in the week. This was part of the whole-school PA policy as a structured timetable for different PA opportunities. As such, pre and post testing of EF was carried out for PE lesson each Monday, for UP each Wednesday at lunch break, and for SP each Friday at lunch break.

Independent Variables - Whole-School Physical Activity Policy as Intervention

The three PA policy components, framed as independent variables, contributed to an overall commitment of 60 minutes of daily school-based PA following international PA guidelines (Organisation, 2010). **Physical Education Lesson:** The PE lessons were based on the Games strand as per the Primary School Curriculum (Assessment, 1999) and the lessons were sourced from the Primary Schools Sports Initiative PE lesson pack (Teachers, 2002). It was agreed that the class teacher would carry out the formal PE lesson to allow for minimum disruption during the normal classes' timetable on Mondays. As part of the lesson, Fundamental Movement Skills were also taught based on the 'Move Well, Move Often' resource pack (Teachers, 2016), differentiated by class level. The duration of the PE lesson was a 30minute session and it took place at 11.30am until 12.00 for a four-week period.

Unstructured Play: In line with Pellegrini and Bohn (2005), UP involved students participating in more leisurely PA such as 'tip the can', 'basketball shoots', 'catch' and 'den to den' during break-time from formal instruction. Students

had to choose in which PA they would participate. These activities took place four days a week, twice a day, although for research purposes only one day per week was considered for EF testing for the duration of four weeks. This activity took place as a 20-minute recess session at lunch break, each Wednesday between 12.40pm and 1.00pm.

Structured Play: As part of the PA policy, SP was introduced as a 20-minute recess session, every Friday between 12.40pm and 1.00pm, labelled 'Fun Friday'. A plan for eight PA stations was drawn up by the PE coordination team which included students from the Active School Committee. A team of students would participate at a particular PA station each Friday during the lunchtime break for a 20-minute session, for the duration of four weeks. The groups rotated each Friday so that the activities varied. The students were fully engaged for the duration of the activity and the stations included activities such as ladders and hurdles, soccer, basketball, hula-hoops, skipping, handball, game of the week and beanbag toss.

Dependent Variables - Testing of Working Memory and Inhibition

It was intended to test all three main components of EF, i.e. inhibition, working memory and shifting (Diamond, 2006). However, after careful consideration, the Modified Wisconsin Card Sorting Test by Nelson (1976) that tested the EF shifting was not carried out as it had to be administered individually by student and there was insufficient time and personnel. The two remaining components of EF testing - inhibition and working memory - were considered as dependent variables. Both tests were randomized with a different sequence for each pre and post-test procedure aiming at ensuring enhanced internal validity and reliability by reducing learning and memory effects from previous trials over the intervention period.

Inhibition Test: The new Stroop-like measure, Animal Stroop task assesses young children's inhibition (Wright et al., 2003). In the present study, children were initially asked to identify pictures of familiar animals, e.g. congruent images of a cow, pig, duck and sheep. In the Animal-Stroop task children were asked to look at pictures where the head of the animal had been swapped with the head of another animal, i.e. non-congruent images. The students were then asked to identify the 'body' of the animal for both the congruent and the non-congruent images. With the face of the animal pictures so prominent, the students were challenged to ignore it. Each test was marked out of 36 (three sequences of 12 pictures) and the number of correct answers was aggregated and used for the statistical analysis.

Working Memory Test: A verbal memory test is often used by researchers to test subjects to memorise spoken or written lists of words or phrases, as prescribed in the Working Memory Test for Children (Gathercole & Pickering, 2001). The lists of words for the test were selected from the curriculum spelling lists for the students' relevant classes, which ensured that these were appropriate to their age and language development level. The test was introduced on each occasion with a list of 12 new words presented visually. Both cohorts attempted to memorise these words and continued the following three trials to record whether each word was 'new' or 'repeated'. Each test was marked out of 36 (three sequences of 12 words) and the number of correct answers was aggregated and used for the statistical analysis.

Statistical analysis

All students were assessed in both tests (i.e. Inhibition and Working memory) twice (pre- and post-PA lesson) for every single session (4 weeks x 3 sessions per week), throughout the 4-week programme. The everyday accumulated data for every PA component (pre-PE, post-PE; pre-SP, post-SP; pre-UP, post-UP) were included in the statistical analysis, as evidence of the programmes' acute effects.

Data analysis was conducted with the use of the statistical package SPSS Version 23.0 (IBM Corp., Armonk, NY, USA). Before analysis, variables were screened for accuracy of data entry, missing values, distribution (skewness and kurtosis), and potential outliers. No missing values and univariate outliers were observed. Descriptive data were initially presented [means (*M*), standard deviations (*SD*) and percentages (%)]. To determine whether each component of the PA intervention had an effect on working memory and inhibition, two separate repeated measures multivariate analysis of variance (MANOVA) were employed [2 times (pre- and post-intervention) x 3 components (PE, SP, UP)], controlling for gender and class as between-subject factors. When significant differences across conditions or time were identified based on the statistical significance of MANOVA, univariate follow-up pairwise comparisons with Bonferroni adjustments were conducted. For all analyses, a *p*-value below 0.05 ($p < 0.05$) was considered statistically significant. Lastly, the partial η^2 was presented as a measure of effect size for *F*-tests. A partial η^2 value between 0.01 and 0.06 was associated with a small effect, between 0.06 and 0.14 with a medium effect, and 0.14 or greater with a large effect (Warner, 2012).

Results

Descriptive results from working memory and inhibition pre- and post-testing, per gender and class, are presented in Tables 1 and 2.

Table 1. Descriptive statistics (M, SD) for working memory and inhibition by gender

Intervention	Boys (n=22) Pre-test Post-test *M (SD)*		Girls (n=21)		Total (n=43)	
			Pre-test *M (SD)*	Post-test *M (SD)*	Pre-test *M (SD)*	Post-test *M (SD)*
Working memory (max score = 36)						
PE	30.98 (4.80)	32.01 (2.62)	30.97 (4.73)	32.11 (3.01)	30.98 (4.75)	32.06 (2.81)
SP	31.42 (3.25)	31.34 (3.80)	31.95 (3.09)	31.25 (3.77)	31.67 (3.18)	31.30 (3.78)
UP	32.96 (2.59)	32.15 (3.07)	33.01 (2.70)	32.61 (2.45)	32.99 (2.63)	32.37 (2.79)
Inhibition (max core = 36)						
s PE	33.93 (3.40)	35.48 (1.54)	34.50 (3.61)	35.34 (2.56)	34.20 (3.05)	35.42 (2.08)
SP	35.00 (3.02)	35.11 (3.28)	35.74 (.92)	35.83 (1.16)	35.35 (2.30)	35.45 (2.54)
UP	35.46 (1.96)	35.48 (1.74)	35.78 (1.12)	35.68 (1.30)	35.61 (1.62)	35.58 (1.55)

Note. *PE* = Physical Education; *SP* = Structured Play; *UP* = Unstructured Play.

Table 2. Descriptive statistics (*M, SD*) for working memory and inhibition by class

Intervention	4th class (n=20) Pre-test *M (SD)*	Post-test *M (SD)*	6th class (n=23)		Total (n=43)	
			Pre-test *M (SD)*	Post-test *M (SD)*	Pre-test *M (SD)*	Post-test *M (SD)*
	(max score = 36)					
PE	30.76 (5.67)	31.93 (2.62)	31.16 (3.80)	32.16 (2.97)	30.98 (4.75)	32.06 (2.81)
SP	32.17 (2.93)	31.56 (3.62)	31.23 (3.34)	31.07 (3.91)	31.67 (3.18)	31.30 (3.78)
UP	33.37 (2.03)	32.93 (2.52)	32.65 (3.04)	31.87 (2.94)	32.99 (2.63)	32.37 (2.79)
Inhibition (max score = 36)						
PE	34.37 (3.36)	35.01 (2.90)	34.06 (3.62)	35.75 (.85)	34.20 (3.05)	35.42 (2.08)
SP	35.74 (.76)	35.79 (.94)	35.02 (3.01)	35.16 (3.30)	35.35 (2.30)	35.45 (2.54)
UP	35.70 (1.16)	35.51 (1.52)	35.53 (1.92)	35.64 (1.58)	35.61 (1.62)	35.58 (1.55)

Note. *PE* = Physical Education; *SP* = Structured Play; *UP* = Unstructured Play.

For working memory, the repeated measures MANOVA analysis, with Greenhouse-Geisser correction due to violations of sphericity (Mauchly's $W = .81$, $p < .001$), revealed non-significant interaction effect for both Intervention x Time x Gender [$F(2,265) = .823$, $p = .422$, $\eta^2 = .005$], and Intervention x Time x Class [$F(2,265) = 0.584$, $p = .530$, $\eta^2 = .004$] with small effect sizes. The interaction effect for Intervention x Time was statistically significant [$F(2,265) = 9.211$, $p < .001$, $\eta^2 = .055$], with a small effect size. All remaining interaction effects were not statistically significant ($p > .05$). The main effect of Time was not statistically significant [$F(1,157) = .010$, $p = .919$, $\eta^2 < .001$], however the main effect of Intervention was statistically significant [$F(2,305) = 15.530$, $p < .001$, $\eta^2 = .090$], with a medium effect size.

The univariate follow-up pairwise comparisons with Bonferroni adjustments indicated that, for all children, the PE intervention improved more students' working memory, comparing to SP [$F(1,157) = 9.539$, $p = .002$, $\eta^2 = .057$] and UP [$F(1,157) = 13.187$, $p < .001$, $\eta^2 = .077$] interventions. PE intervention improved all students' working memory by 3.49% (pre-test $M = 30.98$, $SD = 4.75$; post-test $M = 32.06$, $SD = 2.81$), while during SP (pre-test $M = 31.67$, $SD = 3.18$; post-test $M = 31.30$, $SD = 3.78$) and UP (pre-test $M = 32.99$, $SD = 2.63$; post-test $M = 32.37$, $SD = 2.79$) working memory levels declined by 1.17% and 1.88% respectively. No gender or class differences were observed ($p > .05$).

For inhibition, the repeated measures MANOVA analysis, with Greenhouse-Geisser correction due to violations of sphericity (Mauchly's $W = .83$, $p < .001$), revealed non-significant interaction effects for both Intervention x Time x Gender [$F(2,269) = 1.190$, $p = .301$, $\eta^2 = .008$] and Intervention x Time x Class [$F(2,269) = 2.017$, $p = .142$, $\eta^2 = .013$]. The interaction effect for Intervention x Time [$F(2,269) = 12.332$, $p < .001$, $\eta^2 = .073$] was statistically significant, with medium effect size. All remaining interaction effects were not statistically significant ($p > .05$). The main effects of Time [$F(1,157) = 12.180$, $p = .001$, $\eta^2 = .072$] and Intervention [$F(2,295) = 9.978$, $p < .001$, $\eta^2 = .060$] were also statistically significant, with medium effect sizes.

The univariate follow-up pairwise comparisons with Bonferroni adjustments indicated that, for all children, the PE intervention improved more students' inhibition, comparing to SP [$F(1,157) = 12.633$, $p = .001$, $\eta^2 = .074$] and UP [$F(1,157) = 18.349$, $p < .001$, $\eta^2 = .105$] interventions. PE intervention improved all students' inhibition by 3.57% (pretest $M = 34.20$, $SD = 3.05$; post-test $M = 35.42$, $SD = 2.08$), while UP improved it by .28% (pre-test $M = 35.35$, $SD = 2.30$; post-test $M = 35.45$, $SD = 2.54$), and during SP inhibition levels declined by .08% (pre-test $M = 35.61$, $SD = 1.62$; post-test $M = 35.58$, $SD = 1.55$). No gender or class differences were observed ($p > .05$).

Discussion

The aim of the present study was to investigate the acute effects on students' EF (working memory and inhibition) from the PE lesson, UP recess session and SP recess session as multiple components of a whole-school PA policy. The findings suggest that students' EF benefited more from PE sessions comparing to SP and UP recess sessions. Regarding both components of EF measured, no gender and class differences were observed.

Our findings further reinforce the cognitive value of PE for both dimensions of EF here assessed, compared to less cognitively demanding PA, currently provided through SP and UP (Jackson et al., 2016; Vazou et al., 2019). PE higher effect sizes might be explained by the fact that it intentionally addresses the cognitive dimension (among others) that might benefit children's EF more than the other components. Nonetheless, from a PA recommendation perspective (WHO, 2010), all PA components are worthwhile (Jäger et al., 2015; Tomporowski et al., 2011).

The combined effects have not been explored in this study and the timeframe was short, thus it was not possible to extrapolate an overall effect of the whole-school policy. Still, the fact that EF came out benefited following each session (despite the slight and non-significant decreases from UP), supports the research on the positive outcomes and advances the conclusions from Jäger et al. (2015) on the unexpected missing differences from different PA components on EF. As the findings refer to the effects immediately before and after the intervention, PA, and particularly PE, might create a window of opportunity where children's academic performance can benefit of enhanced EF and can be considered particularly beneficial for primary classroom related learning (Cortés Pascual, Moyano Muñoz, & Quílez Robres, 2019). This is a valuable argument against the increase of instructional time for different subjects by sacrificing diverse PA opportunities (Wilkins et al., 2003).

Despite the regular findings on differences between boys and girls in their movement skills (Junaid & Fellowes, 2006), our findings suggest that whole-school PA programmes benefit both boys and girls in their EF. No differences between gender and class means that, at least at the middle and end stages of Primary education, every child might benefit from PA with regards to EF and, by extension, academic performance and achievement.

In presenting these results, it is important to consider key limitations. As the sample size refers to a single school the generalisation power is limited. Moreover, the results may not fully reflect the effect the PA policy has on all classes within the school or indeed on other classes in other schools. Also, it would be interesting to explore the differences and effect sizes in the EF if more time was available to carry out the research, and to include shifting for a fuller view on EF. While the focus of the research was on the acute effects in EF, with a longer timeframe it would have been possible to analyse the relationship with the pupils' academic achievement.

A core strength of this study is that it was carried out in "real-world settings" (Jäger et al., 2015), building evidence on a whole-school PA policy incorporating multiple PA components as a needed research design, especially given the inconclusiveness of findings in this topic (Singh et al., 2019). By integrating previous reviews' recommendations (Jackson et al., 2016; Singh et al., 2019; Tomporowski, Lambourne, & Okumura, 2011; Vazou et al., 2019) into natural settings, and working with school stakeholders to develop intentional PA policies that contribute to PA and EF (Pellegrini & Bohn, 2005), the research-base on this relation can be renovated for more robust and ecologically valid conclusions and interventions.

Whole school PA policies need to focus on all PA components and provide school-based opportunities to meet PA recommendations to benefit health in general (Tomporowski et al., 2011), and focus on structured PA (namely PE) when EF and academic achievement are a priority for the school/children (Vazou et al., 2019).

Conclusions

Our findings suggest PA has a significant and positive association with cognitive function, especially PE. As such, the programme shows potential to support the children academic performance considering the importance of EF (Hinkle et al., 1993; Tuckman and Hinkle, 1986) but also the potential to enhance their wellbeing through PA adding to the recommended 60 min/day of PA (WHO, 2010). Moreover, it cannot be disregarded the importance of SP and UP in whole-school PA programmes by providing opportunities for developing other brain functions through exploration and self-regulated and self-directed behaviour (Pellegrini and Bohn, 2005).

Our findings have implications for future intervention strategies. A longitudinal study on the impact of the PA intervention could be conducted over the length of the Irish primary school cycle (eight years in total) considering both academic performance (EF) and achievement (scores). This would provide more definitive evidence in relation to the long-term impact of the PA intervention on academic performance and its links with academic achievement as chronic and combined effects in other developmental outcomes. The outcomes of that research could support the content of the Junior Cycle Wellbeing programme and the Leaving Certificate PE Programme to inform a progressive spiral curriculum providing the best possible learning opportunities for the students. In summary, we suggest structured PE should be prioritised when developing PA policy in school towards the specific aim of promoting EF and the developmental stage of the pupils may be relevant when considering the effects of a PA intervention in EF as mediators of academic performance. Further research is warranted on longitudinal studies towards the chronic and combined effects, in different

EF and in other developmental outcomes. Additionally, policy level implications are drawn from the research considering the current national curriculum developments in PE. **Conflicts of interest -** The authors have no conflict of interest to declare.

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Revista de Psicología del Deporte/Journal of Sport Psychology Vol.29. 2020 Suppl 2, pp. 117-123
Universidad de Almería / Universitat Autónoma de Barcelona. ISSN 1132–239X ISSNe 1988–5636

The Acute Effects of Multiple Components in a Whole-School Physical Activity Policy on Executive Functions of Primary Level Students

Úna Kingston[1], Manolis Adamakis[2], João Costa[3]

Resumen

Un creciente cuerpo de literatura examina la relación entre la actividad física (AF) con las funciones ejecutivas (FE) y el rendimiento académico en niños y adolescentes. El presente estudio tuvo como objetivo examinar cómo componentes múltiplos de una intervención de política de AF en un entorno de escuela primaria afectó el FE (i.e. la memoria de trabajo y la inhibición) de los estudiantes. La política de AF tenía tres componentes, Educación física (EF), Juego estructurado (JE) y Juego no estructurado (JNE). Las pruebas de FE para la memoria de trabajo y la inhibición se llevaron a cabo con una muestra de 43 estudiantes de las clases 4 y 6 antes y después de cada componente de la política de AF, una vez a la semana durante cuatro semanas, después de una semana piloto. La memoria de trabajo de los niños se midió con una prueba de memoria visual verbal utilizando vocabulario basado en el currículo, mientras que su inhibición se evaluó mediante la prueba similar a Animal Stroop. El efecto de cada componente de la intervención de AF en la memoria de trabajo y la inhibición se analizó con dos MANOVA de medidas repetidas separadas, controlando el género y la clase como factores entre sujetos. Tanto para la memoria de trabajo como para la inhibición, la EF fue más beneficiosa para todos los estudiantes en comparación con JE y JNE ($p < .001$). Respecto a la inhibición, no se observaron diferencias de género y clase. Sin embargo, para la memoria de trabajo, hubo mejoras más altas para la 4ta clase en comparación con los estudiantes de 6ta clase ($p < .05$). La EF parece ser más beneficiosa para mejorar el FE de los estudiantes y se sugiere que se le dé prioridad al desarrollar políticas de AF en las escuelas. Se requiere investigación adicional con estudios longitudinales.

Palabras clave: rendimiento académico, funciones ejecutivas, inhibición, memoria de trabajo, actividad física, política de toda la escuela.

Introduction

In the Irish post-primary education context, the students' wellbeing was recently established as core to the Junior Cycle Profile of Achievement (NCCA, 2017), positioned within a whole-school culture, strongly supported by physical activity (PA) and Physical Education (PE) as determinant to students' academic performance and achievement. Additionally, PE is being piloted as a Leaving Certificate subject to be fully introduced from 2020. Consequently, in primary education, students are expected to benefit from a solid foundation in wellbeing.

A growing body of literature examines the relationship between PA with cognitive functions, academic performance and achievement in children and adolescents (Donnelly et al., 2016). Centrally to this study, research supports models conceiving the executive functions (EF) as mediator of the relationship between children's PA and academic performance and achievement (Schmidt et al., 2017). For clarity, we take academic performance as process-related aspects (e.g. attention and engagement), differing from academic achievement as product-related (e.g. scores and grades). Given the paucity of research on the relationship between PA and EF through whole-school PA programmes, we aimed at examining the effects of multiple components in a PA policy intervention in a primary school on students' EF.

Considering the socio-educational change in the Irish educational landscape, increasing research provides significant evidence on the connection between PA and academic performance and academic achievement among schoolchildren (Donnelly et al., 2016; Rasberry et al., 2011), notwithstanding concurrent important health-related benefits such as wellbeing. Among the Trois-Rivieres regional project's (Shephard and Trudeau, 2013) most significant findings was the positive effect on academic performance of the experimental group, despite the reduction of 14% academic teaching time and the introduction of one-hour daily PE. In the Sports, Play and Active Recreation for Kids programme (SPARK; Sallis, Mc Kenzie, Kolody, Lewis, Marshall, and Rosengard, 1999), while doubling the amount of weekly PE time in comparison to the control condition, there was no interference with the student's academic performance. Such led to the question if PA programmes can enhance the latest while providing health-related benefits such as improved wellbeing. A recent review on the association between school-based PA and academic performance (Rasberry et al., 2011) concluded that "The pattern of having positive relationships or no relationships, along with the lack of negative relationships, is consistent throughout and suggests that adding PA to the school day may

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enhance and does not detract from academic performance" (p. 19). Furthermore, Vazou, Pesce, Lakes and Smiley-Oyen (2016), in a review of school PA interventions, concluded that curricular PE seems to provide the most appropriate framework for promoting the development of children's cognitive functions, otherwise known as EF.

According to Salimpoor and Desrocher (2006) the EF 'are a group of interrelated complex mental abilities that are involved in planning and initiating goals and carrying them through despite interruptions' (p.15). Considering the focus on academic performance, EF were deemed to be essential for the students effective and sustained cognitive engagement towards higher academic achievements. The most prominent theoretical framework suggests that EF has three basic components: inhibition, working memory, and shifting (Diamond, 2006). While these components are briefly presented, inhibition and working memory were primarily targeted in this study. The component of inhibition refers to the deliberate, controlled suppression of prepotent responses (Miyake et al., 2000). The Animal Stroop test is often used when testing younger children, aged 3-16-year old (Wright, Waterman, Prescott, and Murdoch-Eaton, 2003) with the purpose of providing conflicting information in a given image and requesting the participant to correctly identify one of the requested elements. Working memory, is referred to as a system for temporarily holding and manipulating information as part of a wide range of essential cognitive tasks such as learning, reasoning and comprehending (Baddeley, 1997). This can be assessed with the Working Memory Test Battery for Children (WMTB-C) suitable for children between 5 and 15 years (Pickering and Gathercole, 2001). Shifting, not addressed in this study, is explained as the ability to adapt the mental set when required, including the ability to change a strategy in a responsive manner, or abandon a strategy in response to negative feedback (Henry and Bettenay, 2010).

The effects of PA programmes through acute bouts of aerobic exercise (i.e. once-off periods of exercise and showing immediate effect on EF) are the focus for this study. Caterino and Polak (1999), investigating the effect on concentration from an acute bout of stretching and aerobic walking, found that selective attention had improved for 4th graders but not with 2nd and 3rd graders, although with little exploring explanations. Pesce and colleagues (2009), through an experimental design, compared two forms of acute aerobic exercise of equivalent intensity regarding its effects in working memory of a group of preadolescent children (11-12 years old). The findings showed that the bout of group aerobic games enhanced their immediate word recall and for delayed recall, and both groups enhanced their memory performance. Similarly, during late childhood, inhibition may be more sensitive than shifting to the effects of acute exercise (Hillman et al., 2009; Tomporowski, Davis, Miller, and Nagkieri, 2008). However, this may alter during adolescence, when there is less effect and sensitivity (Stroth et al., 2009). Few studies have addressed a related question regarding the potential influence of the pubertal status of the participants, where it may be possible that the hormone levels could alter the effect of PA on EF.

Essentially, research findings concur in that external interventions providing acute aerobic exercise in schools have a positive effect on children's EF. As less is known on the effects from whole-school PA policies in EF this study sought to answer the following research question: What are the acute effects of multiple components in a whole-school PA policy on executive functions of primary level students, considering gender and class level?

Methods

This research employed a post-positivist perspective considering the reality and ecological validity of the research site. To ensure reliability, each test and the protocol were rehearsed through a pilot-study in the same school but with a 5th class students' cohort (n=17).

Sample and procedures

The study cohort from an Irish primary school included 20 4th class (Mage = 9.95 years, SDage = .39 years) and 23 6th class students (Mage = 12.00 years, SDage = .30 years) (22 boys - 21 girls in total). The multiple component PA intervention comprised three distinct components: PE lesson, Structured Play (SP) recess, and Unstructured Play (UP) recess. It started after a one-week baseline assessment and was conducted during official school-time for one month (adding to 12 sessions, with four PE lessons, four SP recess sessions, and four UP recess sessions) with each component ran at the same time and day of each week. Children's working memory was measured with a verbal visual memory test using curriculum-based vocabulary, while their inhibition was assessed through the Animal Stroop-like test.

Ethics

The host institution provided ethical consent to the study and the research team guaranteed to follow all ethical requirements. Prior to participation, all students, as well as their parents or guardians, read the information sheet and signed an informed consent document approved by the School of Education Research Ethics Committee, guaranteeing confidentiality and anonymity with the appropriate use of coding to track each student with the results of their testing in the database.

As the main researcher was the school principal, this facilitated access to the field and ensured maximum engagement from the teachers as an element of protocol fidelity although no pressure on teachers and students' participation was placed and any concerns with the first researcher's school role were thoughtfully considered. It was made clear to the school community that the researcher was playing a facilitating role and there was no leveraging undertaken on their behalf as manager. This was made explicit for teachers, students and

guardians in the sense that no prejudice on educational and relational aspects were implied for any unwillingness of participation.

Implementation of the Protocol

Over the course of the study, the working memory and inhibition testing were administered immediately before and after each separate component (i.e. PE, SP, UP), during a four-week period for the 4th and 6th class participants. The sequence and time of components was stable for the entire duration of the protocol, reflecting the current school policy in place, i.e. pre and post testing was carried out for PE lesson each Monday, for UP recess each Wednesday at lunch break, and for SP recess each Friday at lunch break.

Independent Variables: Whole-School Physical Activity Policy as Intervention

According to national and international guidelines (e.g. WHO, 2010), the school PA policy included at least 60 minutes of daily-PA with the three mentioned components as independent variables described below.

Physical Education Lesson.

The PE lessons were based on the Games strand as per the Primary School Curriculum (NCCA, 1999) and the lessons were sourced from the Primary Schools Sports Initiative PE lesson pack (PDST, 2002). It was agreed that the class teacher would carry out the formal PE lesson to allow for minimum disruption during the normal classes' timetable on Mondays. As part of the lesson, Fundamental Movement Skills were also taught based on the 'Move Well, Move Often' resource pack (PDST, 2016), differentiated by class level. The duration of the PE lesson was a 30-minute session and it took place at 11.30am until 12.00 for a four-week period.

Unstructured Play.

In line with Pellegrini and Bohn (2005), UP involved students participating in more leisurely PA such as 'tip the can', 'basketball shoots', 'catch' and 'den to den' during break-time from formal instruction. Students had to choose in which PA they would participate. These activities took place four days a week, twice a day, although for research purposes only one day per week was considered for EF testing for the duration of four weeks. This activity took place as a 20-minute recess session at lunch break, each Wednesday between 12.40pm and 1.00pm.

Structured Play.

As part of the PA policy, SP was introduced as a 20-minute recess session, every Friday between 12.40pm and 1.00pm, labelled 'Fun Friday'. A plan for eight PA stations was drawn up by the PE coordination team which included students from the Active School Committee. A team of students would participate at a particular PA station each Friday during the lunchtime break for a 20-minute session, for the duration of four weeks. The groups rotated each Friday so that the activities varied. The students were fully engaged for the duration of the activity and the stations included activities such as ladders and hurdles, soccer, basketball, hula-hoops, skipping, handball, game of the week and beanbag toss (Figure 2).

Dependent Variables: Testing of Working Memory and Inhibition

It was intended to test all three main components of EF, i.e. inhibition, working memory and shifting (Diamond 2006). However, after careful consideration, the Modified Wisconsin Card Sorting Test by Nelson (1976) that tested the EF shifting was not carried out as it had to be administered individually by student and there was insufficient time and personnel. The two remaining components of EF testing - inhibition and working memory - were considered as dependent variables. Both tests were randomized with a different sequence for each pre and post-test procedure aiming at ensuring enhanced reliability by reducing learning and memory effects from previous trials over the intervention period.

Inhibition Test.

The new Stroop-like measure, Animal Stroop task assesses young children's inhibition (Wright et al., 2003). In the present study, children were initially asked to identify pictures of familiar animals, e.g. congruent images of a cow, pig, duck and sheep. In the Animal-Stroop task children were asked to look at pictures where the head of the animal had been swapped with the head of another animal, i.e. non-congruent images. The students were then asked to identify the 'body' of the animal for both the congruent and the non-congruent images. With the face of the animal pictures so prominent, the students were challenged to ignore it. Each test was marked out of 36 (three sequences of 12 pictures) and the number of correct answers was aggregated and used for the statistical analysis.

Working Memory Test.

A verbal memory test is often used by researchers to test subjects to memorise spoken or written lists of words or phrases, as prescribed in the Working Memory Test for Children (Pickering and Gathercole, 2001). The lists of words for the test were selected from the curriculum spelling lists for the students' relevant classes, which ensured that these were appropriate to their age and language development level. The test was introduced on each occasion with a list of 12 new words presented visually. Both cohorts attempted to memorise these words and continued the following three trials to record whether each word was 'new' or 'repeated'. Each test was marked out of 36 (three sequences of 12 words) and the number of correct answers was aggregated and used for the statistical analysis.

Statistical analysis

All data analyses were completed using SPSS Version 23.0 (IBM Corp., Armonk, NY, USA). Descriptive data were initially presented [means (M) and standard deviations (SD)]. For the inferential statistical analysis, in order to test for possible differences between means, M, standard errors (SE) and percentages (%) were preferred. SE was preferred in this

occasion over SD because we were interested in the precision, rather than the variability, of the M. To determine whether each component of the PA intervention had an effect on working memory and inhibition, two separate repeated measures MANOVA were employed [2 times (pre- and post-intervention) x 3 components (PE, SP, UP)], controlling for gender and class as between-subject factors. When significant differences across conditions or time were identified based on the statistical significance of the multivariate analysis of variance test, univariate follow-up pairwise comparisons with Bonferroni adjustments were conducted. For all analyses, a p-value below .05 ($p < .05$) was considered statistically significant. Lastly, the partial η2 was presented as a measure of effect size for F-tests. A partial η2 value between .01 and .06 was associated with a small effect, between .06 and .14 with a medium effect, and .14 or greater with a large effect (Warner, 2012).

Results

Descriptive results from working memory and inhibition pre- and post-testing, by gender and class, are presented in Tables 1 and 2.

Table 1

Descriptive statistics for working memory and inhibition by gender

	Boys (n = 22)		Girls (n = 21)	
	Pre-test	Post-test	Pre-test	Post-test
Intervention	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Working memory (max score = 36)				
PE	26.19 (6.13)	31.62 (3.28)	25.28 (5.73)	31.33 (3.71)
SP	29.29 (2.92)	31.90 (3.82)	29.89 (3.10)	33.78 (1.73)
UP	33.10 (2.34)	32.29 (3.29)	32.94 (2.58)	33.50 (2.26)
Inhibition (max score = 36)				
PE	32.86 (3.18)	35.32 (1.91)	33.12 (5.61)	35.65 (1.00)
SP	35.68 (1.29)	33.32 (5.94)	35.35 (1.62)	35.41 (2.43)
UP	35.73 (.77)	35.36 (2.13)	35.41(2.19)	35.76 (.75)

Note. *PE* = Physical Education; *SP* = Structured Play; *UP* = Unstructured Play.

Table 2

Descriptive statistics for working memory and inhibition by class

	4th class (n = 20)		6th class (n = 23)	
	Pre-test	Post-test	Pre-test	Post-test
Intervention	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Working memory (max score = 36)				
PE	23.06 (6.15)	31.72 (2.95)	28.10 (4.66)	31.29 (3.88)
SP	29.61 (3.03)	33.44 (1.85)	29.52 (3.01)	32.19 (3.89)
UP	33.17 (1.92)	32.56 (3.19)	32.90 (2.83)	33.10 (2.66)
Inhibition (max score = 36)				
PE	30.44 (5.32)	35.19 (1.94)	34.74 (2.03)	35.65 (1.27)
SP	35.75 (.78)	35.31 (1.89)	35.39 (1.75)	33.48 (6.00)
UP	35.38 (2.25)	35.56 (.81)	35.74 (.75)	35.52 (2.09)

Note. *PE* = Physical Education; *SP* = Structured Play; *UP* = Unstructured Play.

For working memory, the repeated measures MANOVA analysis, with Greenhouse-Geisser correction due to violations of sphericity (Mauchly's $W = .66$, $p = .001$), revealed a non-significant interaction effect for Intervention x Time x Gender [$F(2,52) = .013$, $p = .987$, $\eta^2 < .001$]. A statistically significant interaction effect was observed for Intervention x Time x Class [$F(2,52) = 5.045$, $p = .017$, $\eta^2 = .126$] with a medium effect size, and for Intervention x Time [$F(2,52) = 18.035$, $p < .001$, $\eta^2 = .340$] with a large effect size. All remaining interaction effects were not statistically significant ($p > .05$). The main effects of Time [$F(1,52) = 45.051$, $p < .001$, $\eta^2 = .563$] and Intervention [$F(2,52) = 43.173$, $p < .001$, $\eta^2 = .555$] were also statistically significant with large effect sizes.

The univariate follow-up pairwise comparisons with Bonferroni adjustments indicated that PE improved more students' working memory, comparing to SP [$F(1,35) = 6.903$, $p = .013$, $\eta^2 = .165$] and UP [$F(1,35) = 24.338$, $p < .001$, $\eta^2 = .410$]. PE improved students' working memory by 24.05% (pre-test $M = 25.41$, $SE = .88$; post-test $M = 31.52$, $SE = .58$), while SP improved it by 11.15% (pre-test $M = 29.50$, $SE = .49$; post-test $M = 32.79$, $SE = .47$) and, during UP, working memory levels declined by .58% (pre-test $M = 33.02$, $SE = .41$; post-test $M = 32.83$, $SE = .48$). The working memory improvements were higher for 4th class students comparing to 6th class students [$F(1,35) = 5.585$, $p = .024$, $\eta^2 = .138$], with an overall increase of 14.58% for 4th year students (pre-test $M = 28.46$, $SE = .65$; post-test $M = 32.61$, $SE = .53$), in comparison to an overall increase

of 6.60% for 6th year ones (pre-test M = 30.16, SE = .59; post-test M = 32.15, SE = .48).

For inhibition, the repeated measures MANOVA analysis, with Greenhouse-Geisser correction due to violations of sphericity (Mauchly's W = .66, p = .001), revealed a non-significant interaction effects for both Intervention x Time x Gender [F(2,57) = .551, p = .543, η2 = .015] and Intervention x Time x Class [F(2,57) = 3.286, p = .054, η2 = .086]. The interaction effect for Intervention x Time was statistically significant with a large effect size [F(2,57) = 15.675, p < .001, η 2= .309]. All remaining interaction effects were not statistically significant (p > .05). The main effects of Time [F(1,52) = 4.310, p = .045, η2 = .110] and Intervention [F(2,52) = 6.979, p = .004, η2 = .166] were also statistically significant with medium effect sizes.

The univariate follow-up pairwise comparisons with Bonferroni adjustments indicated that PE improved more students' inhibition, comparing to SP [F(1,35) = 20.891, p < .001, η^2 = .374] and UP [F(1,35) = 27.859, p < .001, η^2 = .443] interventions. PE intervention improved students' inhibition by 10.15% (pre-test M = 32.13, SE = .59; post-test M = 35.39, SE = .27), while UP improved it by .25% (pre-test M = 35.39, SE = .25; post-test M = 35.48, SE = .29), and, during SP, inhibition levels declined by 3.01% (pre-test M = 35.52, SE = .25; post-test M = 34.35, SE = .80). No gender or class differences were observed (p > .05).

Discussion

The aim of the present study was to investigate the acute effects on students' EF (working memory and inhibition) from the PE lesson, one UP recess session and one SP recess session as multiple components of a whole-school PA policy. The findings suggest that students' EF benefited more from PE sessions comparing to SP and UP recess sessions. Regarding inhibition, no gender and class differences were observed. However, for working memory, there were statistically significant higher improvements for 4th class than 6th class students. Considering regularly reported differences between boys and girls in their movement skills (Junaid and Fellowes, 2006), our findings suggest that this specific whole-school PA programme benefited both boys and girls in their EF.

Hillman et al. (2009) suggested that age differences in the PA effects on EF may be associated with developmental stages. This seems present in our study specifically for working memory, implying higher sensitivity to the developmental stages than inhibition. Furthermore, it has been stated that inhibition is less sensitive to the effects of acute exercise during adolescence than it is in childhood (Stroth et al., 2009). The findings in this study confirm varying sensitivities to particular EFs (Stroth et al., 2009) at different development stages considering outcomes that are more positive for the 4th class pupils, possibly due to a greater age-related intervention sensitivity.

Our findings aligned with the reported divergence of outcomes from Rasberry et al. (2011) as minimal isolated declines were noted for UP/working memory and SP/inhibition for all students, and particularly for 6th class. Still, the current findings further reinforced the cognitive value of PE for both dimensions of the assessed EF as more responsive to cognitively engaging activities (Jackson, Davis, Sands, Whittington, and Sun, 2016), compared to a less cognitively demanding PA through SP and UP (Vazou et al., 2016). This research illustrates positive acute effects of a whole-school PA policy on the pupils' EF. As such, the programme shows potential to support the children academic performance considering the importance of EF (Hinkle et al., 1993; Tuckman and Hinkle, 1986) but also the potential to enhance their wellbeing through PA adding to the recommended 60 min/day of PA (WHO, 2010). Moreover, it cannot be disregarded the importance of SP and UP in whole-school PA programmes by providing opportunities for developing other brain functions through exploration and self-regulated and self-directed behaviour (Pellegrini and Bohn, 2005).

Some limitations need to be considered. As the sample size referred to a single school setting, the generalisation power is limited. Moreover, the results may not fully reflect the PA policy effect on all classes within the school as this research was conducted under the context of a whole-school PA policy, and it was not possible to consider a concomitant non-exercise control group. Lastly, while random versions of the EF tests were carried out to minimise a learning effect, day-to-day effects cannot be discarded.

Our findings have implications for future intervention strategies. A longitudinal study on the impact of the PA intervention could be conducted over the length of the Irish primary school cycle (eight years in total) considering both academic performance (EF) and achievement (scores). This would provide more definitive evidence in relation to the long-term impact of the PA intervention on academic performance and its links with academic achievement as chronic and combined effects in other developmental outcomes. The outcomes of that research could support the content of the Junior Cycle Wellbeing programme and the Leaving Certificate PE programme recently introduced in Ireland to inform a progressive spiral curriculum providing the best possible learning opportunities for the students. With a higher priority weighting on the education agenda, PA planning could be streamlined nationally and maximise time for PA in schools. Specifically, PE should be prioritised when developing whole-school PA policy but always combining other forms of PA for holistic effects in students' development.

The Acute Effects of Multiple Components in a Whole-School Physical Activity Policy on Executive Functions of Primary Level Students

Abstract

A growing body of literature examines the relationship between physical activity (PA) with executive functions (EF) and academic achievement in children and adolescents. The present study aimed at examining how multiple components in a whole-school PA policy intervention in a primary school setting affected the EF (i.e. working memory and inhibition) of students. The PA policy had three components, Physical Education (PE), Structured Play (SP) and Unstructured Play (UP). Testing of EF for working memory and inhibition was carried out with a sample of 43 students from the 4th and 6th class before and after each component of the PA policy, once a week for four weeks, after a one-week pilot. Children's working memory was measured with a verbal visual memory test using curriculum-based vocabulary, while their inhibition was assessed through the Animal Stroop-like test. The effect of each component of the PA intervention on working memory and inhibition was analysed with two separate repeated measures MANOVA, controlling gender and class as between-subject factors. For both working memory and inhibition, PE was more beneficial for all students comparing to SP and UP ($p<.001$). Regarding inhibition, no gender and class differences were observed. However, for working memory there were higher improvements for 4th class comparing to 6th class students ($p<.05$). PE appeared to be more beneficial for improving students' EF and is suggested to be prioritised when developing PA policy in schools. Further research is warranted with longitudinal studies.

Keywords: Academic performance, executive functions, inhibition, working memory, physical activity, whole-school-policy.

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International Journal of Environmental Research and Public Health

MDPI

Review

A Scoping Review on Quality Physical Education Programmes and Their Outcomes on Primary-Level Pupils

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Citation: Kingston, Ú.; Adamakis, M.; Lester, D.; Costa, J. A Scoping Review on Quality Physical Education Programmes and Their Outcomes on Primary-Level Pupils. *Int. J. Environ. Res. Public Health* **2023**, *20*, 3575. https://doi.org/10.3390/ijerph20043575

Academic Editor: Paul B. Tchounwou

Received: 16 December 2022
Revised: 14 February 2023
Accepted: 15 February 2023
Published: 17 February 2023

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Abstract: A scoping review was carried out on the literature relating to the evaluation of the implementation of quality physical education (QPE) programmes and related outcomes on final-stage primary-level pupils' attitudes towards physical education (ATPE), physical activity behaviour (PAB), mental wellbeing (MWB) and academic achievement (AA). The scoping review included studies published between 2000 and 2020 in the PubMed, Elsevier, SCOPUS and CINAHL databases and was completed in accordance with the PRISMA extension for scoping reviews' guidelines. Based on the inclusion criteria, 15 out of 2869 studies were included in the review. A thematic analysis was used to inductively and deductively analyse the studies for common themes of features of QPE programmes in primary schools, arising from nine different countries, considering the four outcome dimensions (ATPE, PAB, MWB and AA). The common themes identified as features of QPE across all four dimensions were as follows: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships. Based on these findings, recommendations were made for an evaluation framework on QPE in primary education.

Keywords: quality physical education; programmes; primary education; academic achievement; attitudes; wellbeing; physical activity; fidelity

Int. J. Environ. Res. Public Health **2023**, *20*, 3575. https://doi.org/10.3390/ijerph20043575 https://www.mdpi.com/journal/ijerph

[1]. Introduction

Quality physical education (QPE) can be explained as a group of interrelated strategies to embrace the formulation and development of inclusive and equitable curricula. It provides personally meaningful as well as socially and culturally relevant experiences. These attract young people to the joy and pleasure of physical activity (PA) to foster an active healthy lifestyle over their full lifespan [1]. Children have the right to QPE and should have equal access to qualified professionals, appropriate resources and supportive structures regardless of their background. Schools are the medium to provide QPE and represent an attractive and important setting for health promotion initiatives [2]. Based on the significant amount of time children spend at school, this sector has a great influence on promoting and improving PA in youth [3]. Worldwide, PE is by far the most common method of promoting PA during the school day, and the majority of countries have legal requirements for school PE for at least some part of the compulsory schooling years. Even in countries where PE may not be mandated by law, the subject is still offered [3].

QPE consistently receives positive acclaim as a contributor to young learners' holistic development, including academic achievement (AA), mental wellbeing (MWB) and PA, especially in their formative years [4]. Research on children's and adolescents' PA levels shows that their overall PA levels tend to be low and decline with age [5–7]. Physical inactivity is recognised as a public health issue across all ages. PA in children is associated with improvements in skeletal health, CVD risk factors, adiposity, self-esteem and MWB [8]. As such, it is essential to continue the research on the factors that contribute to or inhibit children from engaging with PA in its different forms, including PE, to minimise their sedentary lifestyle and reap all the PA benefits that will contribute to a fuller, longer, better and happier life [9]. Consistent with the notion of a link between early-life experiences and later health outcomes, greater attention is being given to the importance of exposure to QPE opportunities during early years and childhood. If health behaviours established during early life are more likely to persist or 'track' from childhood to adulthood, greater efforts should be made to capitalise on key opportunities, including in the school setting [3]. PE is a fundamental cornerstone for childhood development as it promotes lifelong PA participation for holistic health. School educators play a key role in creating school environments that lead to developmentally appropriate and high-quality PE lessons [10]. QPE opportunities should be carefully considered so that children will develop lifelong habits of being active, as well as create positive attitudes towards PE (ATPE). It is imperative that school leaders identify the key features of QPE programmes that help promote all the outcomes on ATPE, PA behaviour (PAB), AA and MWB. This study aims to scope out these key features.

Systematic reviews have identified over 100 randomised trials of schoolbased interventions targeting PA among other health-related factors. They have demonstrated that such interventions can be effective in reducing associated health risks [11]. Based on this evidence, national and international bestpractice guidelines have been established acknowledging the potential for school-based settings to influence the development of children's PAB. These evidence-based guidelines recommend schools adopt a range of policies, practices and programmes, such as the scheduling and provision of QPE programmes, and active play opportunities [12].

In Barne's systematic review, the findings provide some evidence to support the effectiveness of strategies in enhancing the nutritional quality of foods served at schools, the implementation of canteen policies and the time scheduled for physical education [13]. Advocacy needs to be directed toward the school officials and community members. There are approximately 25 million obese children in the United States of America (USA) today, and that number continues to grow. Schools that are reducing or cutting their PE programmes are limiting the students' access to healthy eating and fitness [14].

Other reviews have found that enhancing the quality of policy dissemination and implementation research through high-quality pragmatic measures will mark a key step in bridging the policy-to-practice gap [15]. Policy research over the last 20 years was focused on the regulatory mandate of time. Policy research did not directly address disciplinary process variables of learning activities or outcomes of physical education. The effects of policy exemptions and class size were underrepresented. Further research is needed to examine the downstream effects of physical education policy and determine whether well written policies increase the number of individuals that are more physically competent [16].

The interest in the connection between PE programmes and AA during development has recently increased, with evidence suggesting a positive association [17]. This is very encouraging, as part of this study will attempt to examine the impact of QPE programmes on pupils' AA as well as on ATPE, PAB and MWB. To assess this impact, the implementation fidelity of QPE programmes will be initially investigated. To ensure the integrity of scientifically based research, curriculum intervention researchers conducting efficacy and effectiveness studies are now being asked to describe how fidelity is defined, conceptualised and measured. Fidelity measures are needed to explain the degree of variation in implementation and how this might affect moderate outcomes. This means that fidelity measures must

capture the critical features of the intervention's programme theory [18]. Such measures should also indicate how the intervention is maintained consistently across multiple groups over time or describe the parameters under which variations in the implementation may occur. The statistical power of a study relies on the use of reliable, valid measures; appropriate design and sampling; and careful assessment of fidelity. Each of these three decreases as research moves from the laboratory (efficacy studies) and toward the field (effectiveness studies) [19]. Therefore, measuring the fidelity of implementation is critical to determine not only if the QPE programme is sufficiently implemented, but also if there are critical differences between what the experimental and comparison groups receive, so that one might expect a difference in outcomes.

While the reviews mentioned above have presented many findings, there are still gaps in the research. Therefore, this review aims to scope out the common themes of features of QPE programmes in primary schools, while considering the four outcome dimensions (i.e., ATPE, PAB, MWB and AA). The aim of the review is to formulate an evaluation framework on QPE in primary education.

2. Materials and Methods

A scoping review of the available qualitative and quantitative literature relating to the evaluation of implementation fidelity of quality QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, MWB and AA, was conducted according to the PRISMA extension for scoping reviews guidelines (PRISMA-ScR) [20]. Using the PRISMA-ScR guidelines of identification, screening, determining eligibility and inclusion, studies were extracted from four different databases, using search terms related to the essential PE component of policy and environment.

2.1. Inclusion and Exclusion Criteria

The inclusion criteria were as follows: (1) studies that explored the attitudes of pupils on PE, as well as outcomes on AA, PAB and MWB (outcome criteria); (2) studies that used qualitative and quantitative methods to collect data (design criteria); (3) pupils aged between 8 and 12 years, from urban and non-urban areas living in developed or developing countries (population criteria); (4) studies published in English (language criteria); (5) studies published after 2000 (time criteria); (6) studies published in scientific journals (publish criteria).

Studies were excluded if they (1) were not focused on PAB outcomes, ATPE outcomes, MWB outcomes and AA outcomes; (2) focused on out-of-school PA; (3) were a systematic review themselves; (4) involved participants over 12 years; (5) were not published in English; (6) were published before 2000; and (7) were not articles published in scientific journals with peer review (e.g., conference papers, book chapters, etc.).

2.2. Search Strategy

Regarding the search strategy, PubMed, Elsevier, SCOPUS and CINAHL databases were used to ensure, from an early stage, the scientific quality of the studies ranging the areas of social science and health sciences that were core to this research. The search strategy was based on the following fields: 'title', 'abstract' and 'keywords/subject'. The language of publication was restricted to English. The terms used in the search were:
'quality physical education*' AND 'physical education programme' AND 'primary*' AND 'education'. Additional records were identified through reference lists. In those cases where the scientific article or data needed were not available (e.g., no access to pdf, no mean age, etc.), the authors of the study were contacted via email and/or professional media platforms.

2.3. Studies' Screening, Selection and Quality

After performing the search in the databases, the data were imported into a reference manager software [21]. One hundred fifty-two duplicate studies were eliminated automatically. The first author screened titles and abstracts of the remaining records. Each full-text article was carefully examined to decide whether the article met the inclusion criteria and, if so, to assess its quality. Where there were doubts, these were discussed with the research team and an agreement was reached upon inclusion or exclusion of the reference.

The initial search identified 2869 records in the described databases, and an additional 5 records were identified through the reference list. These data were then exported to the reference manager software EndNote and all duplicates (152 records) were excluded. The remaining 2722 studies were then screened according to the title and abstract for relevance, resulting in another 2677 studies being eliminated from the database. The full texts of the remaining 46

studies were read in full and another 30 were further excluded due to lack of relevance for the specific purpose of the current review. The main reasons for exclusion were related to the following: (1) PA-related rather than PE (n = 12); (2) related to post-primary pupils (n = 5); (3) based on PE policy (n = 9); (4) book was no longer available (n = 1); and (5) systematic review research papers (n = 4). At the end of the screening procedure, 15 studies were included. See Figure 1 below.

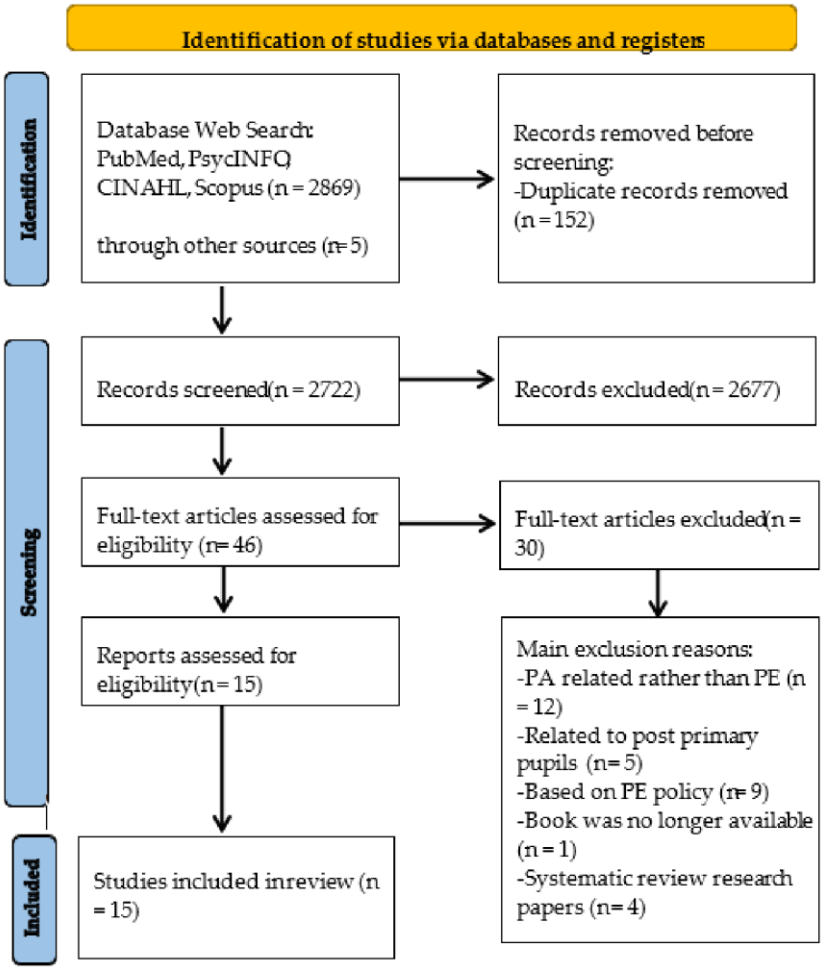


Figure 1. PRISMA-ScR flow diagram for study selection.

2.4. Data Extraction, Analysis and Synthesis

Initially, each article was read, and the following characteristics were extracted independently by the first author of the scoping review: (1) author's name and publication year; (2) country; (3) sample; (4) methods; (5) quality feature of PE programme; (6) dimension of outcome; (7) physical measurement for each outcome; and (8) main findings. Data extracted by the researcher were re-examined, readjusted and confirmed with three other authors. The four outcome dimensions were considered as deductive categories: ATPE, PAB, MWB and AA. Following this, a thematic synthesis approach was adopted to analyse and synthesise the data concerning the research topic. In this inductive/deductive process, each article was read several times and analysed line by line by the first author. The features were constantly compared, and then coded according to the thematic emphasis in the seven selected themes. The full coding was reviewed between the four members of the research theme involved in the process and confirmed after reviewing and refining the coding scheme.

3. Results

3.1. Study Characteristics

Table S1 (Supplementary File) presents the characteristics of the studies included in this systematic review between 2000 and 2020. For this review, the perspectives of researchers from nine countries were taken into account. Three of the included studies were carried out in Australia, three in Malaysia, two in Ireland, two in the USA and one in each one of the following countries: United Kingdom, Greece, Italy, Spain and South Africa. Studies were cross-sectional: five were qualitative, seven used a mixed-methods approach and three studies were quantitative in nature. In relation to the dimension outcomes, fourteen studies reported on the dimension ATPE, four on the dimension PAB, one on the dimension MWB and one on the dimension AA. As for the implementation fidelity of a QPE programme and its outcomes on ATPE, PAB, MWB and AA, 12 out of 15 studies did not directly relate to this; however, all studies were related to the topic of implementation fidelity indirectly. Details were provided on the sample of each study. The specific method was outlined, and several quality features were inductively and deductively identified across all four dimensions of the study. The physical measurement for each dimension was also outlined along with the main findings (Table S1).

3.2. Domains of QPE in Primary Education

Following further analysis, all studies were categorised into seven themes summarising the domains of QPE programmes in primary education that have shown to positively affect one or more of the outcome dimensions targeted by this study (ATPE, PAB, MWB and AA). The following themes were generated: (1) government leadership; (2) PE curriculum; (3) school principal and leaders; (4) organisational management from leadership in school; (5) teachers; (6) parental involvement; and (7) community partnerships. Each theme was composed of the specific features of quality (Table 1). Teachers (Theme 5) were by far the most heavily weighted theme with the largest number of associated quality features.

Table 1. Themes and quality features identified across all four dimensions in the systematic review.

4. Themes and Quality Features Identified	
Government leadership	
• Facilities, equipment and resources; • Human resources; • Availability of PE facilities: facilities such as open fields, outdoor obstacle course, playground equipment; • Quality physical resources through building new facilities and upgrading existing ones; • Train educators on the use and maintenance of facilities; • Class size; • Level of departmental assistance.	
PE curriculum	
• Fundamental movement skills; • Curriculum flexibility; • Structured curriculum to help acquire skills, knowledge; • Reflection on the nature and content of programmes of PE; • Time—60 min or more of moderate-intensity physical activity each day;	• Instruction time—45 min per day × [1] days per week = 225 min per week.
School principal and leaders	
• Adequate funding allocated to the PE department; • Administrators discussing PE teaching assignments with teachers; • Academic and professional qualifications of the principal; • Personal school experiences in PE of the principal; • PE classes assigned to teachers based on their professional qualification; • Adequate library PE books;	
• Equipment availability;	

- Quality of facilities;
- School executive attitudes towards PE;
- Leadership and vision: status of PE as a subject.

Organisational management from leadership in school

- Needs of the staff, readiness factors such as equipment and sports facilities;
- Resources and materials;
- Multiple PE opportunities—recess, intramurals, interscholastic sports, classroom PA breaks and walk and bicycle to school initiatives;
- Promote extracurricular physical activity;
- PA during the school day, PA before and after school;
- Multiple opportunities for physical activity throughout the school day.

Teachers

- PE content knowledge;
- Personal school experiences in PE for teachers;
- Years of teaching experience;
- Teacher's confidence teaching PE;
- Teacher's interest/enthusiasm for PE;
- Willingness to teach new elements of PE content;
- Attitudes to meeting the individual needs of children in PE;
- Teachers serving as the school physical activity leader;
- Planning and implementation;
- Cooperative learning opportunities;
- Goal-oriented activities;
- Quality preparation of tutors;
- Teachers' attitudes;
- Communities of practice and collaborative learning;
- Specialist-led teachers;
- Teacher competency;
- Teacher education;
- Observations of other teachers' PE classes;
- Providing students with learning experiences that meet individual developmental needs, which help to improve mental alertness, academic performance, readiness to learn and enthusiasm for learning;
- Teacher to be knowledgeable about the school curriculum, unpack its specialised content, use available resources appropriately and design suitable learning programmes.

Parental involvement

- Support for the PE programme;
- Positive attitude towards PE;
- Support for school transport initiatives;
- Assisting school to deliver the PE programme;
- Fundraising and helping to advance the PE facilities and resources in the school;
- Homework assignments with family activities;
- Sending educational material home;
- Providing physical activity and nutritional guidelines;
- Asking parents to send healthy snacks to school.

Community partnerships

- Promoting extracurricular physical activity and disseminating information about community-based sports programmes;
- Family and community involvement in PA and PE programmes in schools;
- Community partnerships so that quality physical resources can be provided through building new facilities and upgrading existing ones.

3.2.1. Theme 1: Government Leadership

Through the scoping review, five studies were linked to the theme government leadership. These included five studies [3,22–25]. The selected studies positively affected two of the dimensions: ATPE and AA. It is imperative that governments display leadership by enabling schools to establish health promoting environments that support PA [3]. It was found that adequate government leadership was associated with the provision of the adequate availability of PE facilities such as open fields, outdoor obstacle courses and playgrounds [22]. Leaders could provide this by building new facilities or upgrading existing ones. Training educators on the use and maintenance of facilities were also important [23]. Teachers reported that a good level of resources provided were invaluable in supporting and enabling their PE teaching [24]. Equipment availability, quality of facilities, level of departmental assistance, class size and access to professional development were key features linked to good government leadership [25].

3.2.2. Theme 2: PE Curriculum

The theme PE curriculum aligned with five of the studies from the scoping review [26–30]. They were found to affect only one of the outcome dimensions, namely ATPE. Lucertini et al. [26] reported a number of features that enhanced the PE curriculum. The study reported the following: (1) specialist-led lessons benefitted pupils more than generalist-led peers. Specialist-led pupils demonstrated greater increases in some motor and health-related abilities tests compared to generalist-led peers; (2) 60-minute PE lessons were more beneficial than shorter lessons; and finally, (3) structured programmes were more effective than unstructured. Other features that were reported to be beneficial were fundamental movement skills and curriculum flexibility [27]. Similar to Lucertini et al. [26], it was suggested that a structured curriculum to help acquire skills, knowledge and dispositions was necessary to be 'wise consumers' of PA [28]. The positioning of PE in the curriculum [24] and curriculum management planning and implementation [30] were also noted in the scoping review as key features of this theme.

3.2.3. Theme 3: School Principal and Leaders

Both Wee [24] and Fonyi and Soon [31] are closely linked with this theme. The studies affected only one outcome dimension: ATPE. There were a number of quality features observed in this study which were associated with school principals and leaders. Features worth noting were principals' positioning of PE in the curriculum; adequate funding for the PE department from school administrators; administrators discussing PE teaching assignment with teachers; PE classes assigned to teachers based on their professional qualification, leadership and vision (status of PE as a subject); and adequate library PE books [29].

The academic and professional qualifications of the principal were also important. When principals believed in personal development, they would also support the welfare of teachers to ensure quality PE learning and teaching experiences. The school context and years of teaching experience were relevant. Promoting a positive and quality school learning climate was directly influenced by what a principal had gone through in their lifetime as a teacher. The PA level of school principals was influential, and principals who were involved in organised PA were more likely to possess a higher favourable attitude towards administering QPE programmes as compared to less-active principals [31]. This study also stated that both female and male principals favoured PE and believed in the importance of it. All of the above features were closely connected to the successful implementation of QPE programmes in schools.

3.2.4. Theme 4: Organisational Management from Leadership in School

Quality features for this theme can be seen in the study by Kulik, 2009, [22]. The only associated outcome dimension was ATPE. The following quality features were identified under the theme organisational management from leadership in school: meeting the needs of the staff; providing readiness factors such as equipment and sports facilities, re-sources and materials; provision of multiple PE opportunities (recess, intramurals, interscholastic sports, classroom PA breaks and walk and bicycle to school initiatives); and promoting extracurricular physical activity. PA before, during and after the school day, and multiple opportunities for physical activity throughout the school day were also important [22].

3.2.5. Theme 5: Teachers

There was a wide selection of quality features identified under this theme. It is worth noting that many of these features overlapped in the 15 studies reviewed. The quality features for this theme were found in the following studies [3,22–25,27–30,32–35]. Of all seven themes, teachers were by far the most heavily weighted theme. It is interesting to note that this was the only theme that affected all four outcome dimensions: ATPE, PAB, MWB and AA.

The key features included personal school experiences in PE for teachers, years of teaching experience, teachers' confidence and competence for teaching PE, teachers' interest/enthusiasm for PE, willingness to teach new elements of PE content and attitudes to meeting the individual needs of children in PE. Additionally relevant were teachers serving as the school PA leader, planning and implementing and cooperative learning opportunities, providing goal oriented activities, quality preparation of tutors, communities of practice and collaborative learning. Specialist-led teachers, teacher education, observations of other teachers' PE classes, providing students with learning experiences that meet individual developmental needs, being knowledgeable about the PE curriculum, unpacking its specialised content, using available resources appropriately and designing suitable learning programmes were also identified as quality features.

3.2.6. Theme 6: Parental Involvement

Features included in this theme were identified mainly in the Christodoulos et al. [32] study. This theme affected just one outcome dimension: PAB. The features included parental support for the PE programme, positive ATPE, support for school transport initiatives, assisting the school to deliver the PE programme and fundraising and helping to advance the PE facilities and resources in the school. Parental involvement was encouraged through homework assignments with family activities, by sending educational material home, providing physical activity and nutritional guidelines and by asking parents to send healthy snacks to school.

3.2.7. Theme 7: Community Partnerships

The final theme can be associated with three studies from the scoping review (Christodoulos et al. [32], Hills et al. [3] and Lynch et al. [27]). By promoting extracurricular PA and disseminating information about community based sports programmes, QPE in schools can be strengthened [32]. Family and community involvement in PA and PE programmes in schools was worthwhile [3]. There were also opportunities for community partnerships so that quality PA resources could be provided through building new facilities and upgrading existing ones [27]. All features listed above were important so that QPE programmes could be delivered successfully in schools.

4. Discussion

This scoping review updates the existing knowledge from quantitative and qualitative research relating to the evaluation of the implementation fidelity of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, MWB and AA. In this section, the quality features are organised and discussed around the four outcome dimensions (A1). At the end, strengths, recommendations and limitations are further developed.

4.1. Attitudes towards Physical Education

School PE provides a context for regular and structured PA participation. To this end, a common justification for PE's place in the school curriculum is that it contributes to children's health and fitness [36]. Christodoulos et al. [32] reported that the higher scores of the intervention classes on attitudinal measures, compared with the typical classes, can be attributed to the health related lectures and frequent health-related reminders included in the teaching material. For example, when students were doing sit ups, the teacher could remark 'our abdominals help in good posture'; when they were running, the teacher could remark that 'now we are improving aerobic endurance'. There were reminders for the PE teacher to give as many such messages as possible. This approach may be beneficial in attitude change. The Christodoulos et al. [32] study also focused on children's enjoyment and willingness to participate in PE classes. Christodoulos et al. [32] suggested that emphasis should be placed on total class participation in enjoyable, non-competitive exercise forms. PAs matched to the child's ability are more likely to produce a feeling of success than those that are at too high a skill level. Another perspective is that students believe their peers play a major role in impacting their attitudes towards PE, but research has demonstrated that the influences of the PE teacher and curriculum are more powerful in this regard [37,38]. Previous studies have shown that the involvement of parents remains a necessary part of school-based PE programmes, because their attitude has a great influence on the lifestyle and habits of health behaviour in children [39]. There is an obvious link between the dimension ATPE and the quality features of the PE curriculum, teachers and parental involvement. As a result, it is suggested to include health-related information as part of the PE curriculum content, and that teachers be properly trained so that adequate and well-structured content is delivered. It is also important for parents to be involved in some aspects of the delivery of the PE programme in what concerns the promotion of positive attitudes.

It was reported that specialised teachers are more impactful in the classroom as opposed to generalised teachers [26], and that PE specialists provide more effective PE than non-specialists [40]. Another experiment showed that the planning and delivery of PE lessons by PE-specialist teachers in comparison to generalist teachers resulted in a relative improvement of physical fitness in the quasi-test group in comparison to the quasi-control group [41].

A major barrier to delivering QPE programmes is the poor qualifications and preparation of teachers. It is recommended that opportunities for developmentally appropriate primary education PE specialism be provided within degrees, allowing every primary school over time to have a sustainable infrastructure of PE expertise and advocacy [27]. Similar to the point made by Lucertini et al. [26] and supporting the point made by Lynch et al. [27], there is a need to have specialist PE teachers, as the majority of the current teachers taught less than five PE periods per week and only 6.2% were PE majors [29]. The above results make evident the connection between ATPE and the domains government leadership and teachers regarding teacher preparation, qualification and professional development. The government should consider the impact of the academic and professional background of those who are in charge of delivering successful PE programmes in schools, and should prioritise the contribution, or collaboration, of specialist PE teachers in primary education systems where the delivery of the PE subject is the responsibility of generalist teachers.

Time allocation is another relevant indicator of QPE programmes for ATPE. There is evidence to support the effectiveness of PE policy strategies in enhancing the time scheduled for PE [42]. It is reported that schools in the USA do not offer PE daily and also do not offer the recommended 225 min (45 min per day × 5 days per week) of PE per week [42]. It does not appear that the factors recommended by the Society of Health and Physical Educators (SHAPE) America influence the amount of time that is allocated for PE instruction [22].

Administrators also play a major role in ensuring high-quality PE implementation, which highlights the strong links between ATPE and the domains of school leaders and organisational management from leaders in school. In a systematic review carried out by McLoughlin et al. [43], one of the higher implementation determinants assessed was leadership (n = 42, 49%) [43]. The teachers need to emphasise the importance of PE and value it similar to other subjects. The administrators should strive to ensure that the PE curriculum is properly pursued by assigning it its due budget and allocating proper resources so that activities can be carried out in accordance with the syllabus. The lack of resources for PE activities results in a general lack of enthusiasm among students for PE [30]. Good administrators organise in-house training, discuss PE teaching assignments and factors affecting PE teaching and observe PE teaching. As regards class distribution, administrators should have discussions with teachers before assignment to ensure PE teaching is based on interest and qualification [29].

It is evident that certain features are prerequisites for QPE programmes. The information gathered from this scoping review highlights that the key features that positively affect ATPE are health-related reminders, foci on children's enjoyment and willingness to participate in PE classes, specialised teachers, adequate time allocation and administrators working to ensure that the PE curriculum is properly pursued. The effectiveness of these key features depends on the success of the following domains: government leadership, PE curriculum, school principal and leaders, organizational management from leadership and teachers. All these messages along with their obvious links to the domains listed above should be taken into account in the design of future QPE interventions aimed at improving ATPE in children.

4.2. Physical Activity Behaviour

The foundations of PAB are set early in life, and schools have an important role to play in shaping young people's activity behaviours. PE is meant to teach students the benefits of health and exercise not only for the duration that they are in school, but for their lifetime. Schools without a quality health or PE programme are inevitably pushing young students toward a sedentary adult lifestyle [14]. A comprehensive school physical activity programme (CSPAP) should consist of PE and other PA opportunities such as recess, intramurals, interscholastic sports, classroom PA breaks as well as walking and cycling to school initiatives [44]. The crowded school curriculum with an intense focus on AA; lack of school leadership support, funding and resources; along with poor quality teaching are barriers to QPE and PA promotion in schools [3]. Due to the relationship schools have with their communities, both local and national governing bodies need to be involved in developing CSPAPs. This supports the connection between PAB and government leadership. Governments are able to support leadership by requiring schools to provide PE and other PA opportunities before, during and after school and by enabling schools to establish health-promoting environments that support PA [45].

Data show that school health education programmes, including PE programmes, have the potential to slow the age-related decline in PA and help pupils establish lifelong, healthy PA patterns. Promoting healthy habits and PA behaviours during childhood may prevent some of the leading causes of morbidity and mortality, while also decreasing direct healthcare costs and improving quality of life [32], thus highlighting the link between PAB with the domains of school principal and leaders, and teachers. It is imperative that school leaders and PE teachers address this deficit and ensure that the minimum requirement of allocated time for PE is met.

A final connection became evident between the dimension PAB and the domains of teachers and parental involvement. Physical educators must be key drivers of physical and health literacy as well as behaviour changes to optimise the QPE of children and adolescents. For parents, physical educators need to provide information regarding the benefits of PA via messages sent home and different school activities. In addition, physical educators need to encourage

families to become involved in school-based PA and events. Since non-specialist classroom teachers and staff often serve as role models for children, physical educators need to encourage school staff to be more physically active [3].

4.3. Mental Wellbeing

Cooperative learning as a pedagogical model that can contribute to the students' social and emotional learning involves building quality relationships, learning to manage stressors and evolving as individuals and as a group. The domain teachers links closely to this dimension (i.e., MWB) as teachers can plan and provide cooperative learning opportunities for children in school. The cooperative learning framework helps to increase students' self-approach goals and their emotional control and regulation, and empathy. It can guide students to more adaptive motivational patterns and to develop their emotional intelligence [35]. QPE programmes are well-positioned to include cooperative learning activities and are therefore significant factors in determining positive outcomes for pupils' wellbeing.

4.4. Academic Achievement

International research in this field has repeatedly reported that increasing PA can be positively related to AA. It has been proven that when students are active for a portion of their day, they are able to focus and be more productive in school [46]. Physical educators now have data showing that PA can help students learn better and releases endorphins that improve mood [14]. Higher cardiorespiratory fitness may be important to enhance children's and adolescents' health, and, additionally, AA [47]. Due to a lack of consensus across studies, methodological issues associated with the assessment of QPE and PA should be considered when investigating the links between PE/PA and AA. QPE and PA seem not to be detrimental to school-age children and adolescents' AA, and may, in fact, be beneficial [48]. The Department of Education in America explicitly lists the personal development, health and PE (PDHPE) key learning area (KLA) as how schools support and develop students' health, emphasising physical and mental health, as well as academic benefits [27]. Further research shows that participating in PE is positively related to outcomes including academic achievement; academic behaviors; and indicators of cognitive skills and attitudes, such as concentration, memory, self-esteem and verbal skills [46]. All studies reviewed emphasise the link between the AA dimension and government leadership. It is crucial that governments continue to invest in researching the links between AA, PAB and ATPE as interconnected variables that contribute to the pupils' overall wellbeing [49].

5. Conclusions

A key strength of this scoping review is that it is the first to evaluate the literature on the implementation fidelity of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, MWB and AA. Furthermore, the concurrent examination of research on features of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, MWB and AA enabled a comprehensive investigation of the most up-to-date evidence. The focus on peer-reviewed research enhanced the overall integrity and rigor of this scoping review and strengthened the review's methodological quality. Reliance on empirical studies that analyse primary data, complemented with additional sources of evidence (e.g., different types of reviews, scientific statements, position papers), is another clear strength of our review because we are able to provide a holistic and more nuanced view of the existing evidence for the evaluation of the implementation fidelity of QPE programmes and their outcomes on final-stage primary-level pupils' ATPE, PAB, MWB and AA. This is one of a few scoping reviews that is used to identify quality features of PE programmes and to use these to develop a conceptual framework. Furthermore, the key features of QPE programmes that have been identified can be used to inform future researchers, PE policy makers and PE teachers. There is an obvious link between the four outcome dimensions and the seven identified domains displayed in Table 1. The findings indicate that domain 5 (teachers) has far more quality features than any of the other six. This gives us evidence that teachers are a highly significant and a very valuable resource when discussing the topic of QPE programs in primary schools. More emphasis should be placed on researching this body of people and considering the subsequent findings.

However, there were some limitations, with the main one being the quality of analysed research was not examined because the primary aim of this review was to identify the existing features of QPE programmes that promote one or more of the four outcome variables. However, we acknowledge that a quality evaluation is needed for similar studies which primarily focus on the analysis of the outcomes. Another limitation is that this review did not aim to analyse the outcomes themselves; therefore, an analysis of the impact of the features of QPE programmes on the outcome variables is needed.

An important conclusion from this scoping review lies in the volume of available studies. There is limited and disperse research completed in this area; therefore, the number of relevant studies selected to be analysed in relation to each outcome variable was reduced. Another conclusion from this review is that there were no longitudinal studies as none were found during the database search. This compromises the existing knowledge based on the long-term effects of QPE

programmes and their outcomes on pupils' ATPE, PAB, MWB and AA in primary school settings. This study recommends that further research is needed, and particularly longitudinal studies towards a more concentrated effort in researching in this area. It was consistent throughout this study that studies relating to the effect of QPE programmes on the MWB and AA of pupils in primary schools were less available than the effects on any of the ATPE and PAB outcome dimensions. Only one paper was selected for the topic MWB and one for AA as part of this scoping review. Policy makers and researchers alike should consider a broad and balanced approach to monitoring the longitudinal impact of the fidelity of implementation of QPE programmes on the four outcome variables that were addressed in this study for a holistic picture of children's development at the end of their primary education.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/ijerph20043575/s1. Table S1: Characteristics of the included studies in the scoping review.

Author Contributions: Conceptualisation, Ú.K., J.C., M.A. and D.L.; methodology, Ú.K.; investigation, Ú.K.; data curation, one year; writing—original draft preparation, Ú.K.; writing—review and editing, J.C., M.A. and D.L.; supervision, J.C., M.A. and D.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of University College Cork and approved by the Social Research Ethics Committee (SREC) of University College Cork (protocol code 2022-096, 27 May 2022 date of approval).

Informed Consent Statement: Not Applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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B1

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Dear Principal,

I hope you enjoyed the midterm break.

You may recall you and your staff were asked to complete a survey relating to the PE programme in your school before the summer break last year, June 2022. I thank you sincerely for taking the time to complete and submit this as it was a very important part of my PhD study and gave a great insight into the perspective of the PE curriculum and programmes in Irish primary schools.

You will be glad to hear, out of a large number of school who initially took part in the survey, based on the data returned, your school has been shortlisted along with five other schools in the Munster region to take on Phase two of the investigation. The next step for your school requires minimum effort on behalf of the teachers and pupils and very little disruption to teaching and learning.

One advantage for your school if you are to take part is that as a result of participating it will give you some great insights into PE, physical activity and wellbeing of pupils in the senior classes **(5th and 6th classes only)** of the school.

What is involved if I take part in the study?

- Pupils, teachers and parents complete informed consent and assent forms, provided by the researcher.
- Researcher and a critical friend observe one PE lesson in your school at three points during the academic year, (December, March and May).
- Pupils will participate in the online surveys in class and these are administered by the teacher (Attitudes towards PE, Wellbeing and Physical Activity survey.

B2

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Information Sheet for Parents/Guardians of Children & Young People Participating in Úna Kingston's Research Project for a PhD Study entitled

"An evaluation of the fidelity of the implementation of quality PE programmes and its outcomes on final-stage primary-level pupils' attitudes toward PE, physical activity, wellbeing and academic achievement" is a project funded by Department of Educatio Ireland.

Purpose of the Study: The purpose of this research is to evaluate the extent to which QPE programmes with differing levels of implementation fidelity support pupils' attitudes toward PE, PA, wellbeing, and AA at the final stage (5th-6th class) of their primary education. Designing a protocol that examines the fidelity of a quality PE programme, implementing it in various school settings over the course of one academic year and evaluating its outcomes on four specific aspects, makes this study one of a few of its kind. Through a research informed comprehensive evaluation protocol, this study is designed to gain knowledge on a broad variety of implementation issues and give detailed information on PE programme delivery and outcomes. The study's results will better inform future practice and policy both nationally and internationally.

What will the study involve? The study involves collecting data from children aged 11-13 years, on a number of questions about their attitudes towards PE, their levels of physical activity and their wellbeing. We invite your child's participation in an online survey in September 2022, December 2022 and finally June 2023 at your child's primary school in their classroom. The class teacher will conduct the online survey with children which will take approximately thirty minutes.

Once you have completed the consent form, please place it in the envelope provided, seal it, and return it to the school with your child on or before 10th September. You can keep the information sheet and the second blank copy of the consent form for your records.

Why has your child been asked to take part? Your child has been asked to take part in the research because they attend XXXX Primary School which was invited and has agreed to participate in this research project.

Do I or my child have to take part? No, participation is voluntary. You will be asked to sign a consent form for yourself and on behalf of your child. Your child will also be asked to sign an assent form. If you do not give permission, your child cannot participate. Both you and your child have to agree to proceed with participating in the study. You and your child have the option of withdrawing from the study, even if you have agreed to participate. Once your child has completed their involvement, they can still withdraw up until 6 weeks after the completion of the surveys (anticipated project completion date for this part of the project is a year).

Will you and your child's participation in the study be kept confidential? Yes, absolutely!
We are collecting data for research purposes only, so we gather only a minimum of personal data (name and email address or telephone number) to record consent, and it will be stored securely and separately from the survey data collected. Your personal data will be processed and handled in accordance with European legislation, including the General Data Protection Regulation (EU) 2016/679. Access to personal data will be highly restricted (project researchers only), and no attempt will be made to link personal data to the survey responses. Ten years after the completion of the project, your personal data and the research data will be erased. Your and your child's answers to the questions on the survey will be tagged with an anonymous identifier made up of letters and numbers.

What will happen to the information you and your child give? The responses from your child will become part of a securely stored database, along with data from other children. Because the answers that your child gives will be anonymised, there will be no way to tell who provided the information. The research team will use this data for research and policy development.

What will happen to the results? It is expected that results of this study will be published in a academic and policy-oriented articles. After the project has finished, the anonymised data may be made available to other researchers, but only once we have ensured that it is not possible to identify any individual person from it. All participants will be assigned a unique ID number, which will correspond across all testing and time points used to collect data.
Unique ID number: The first two letters of the first name and day of birth. Example: a. Christian, b. 19.03.82 = CH/19.

What are the possible disadvantages of taking part? We don't envisage any negative consequences for you or your child in taking part.

What if there is a problem? At the end of their participation, the teacher will discuss with the children how they found the experience and how they are

feeling. If you have any issues, you should contact the researcher on the email address provided below. We can provide contact information for support services.

Who has reviewed this study? Approval has been given by the UCC Social Research Ethics Committee, and all members of the research team visiting schools have been Garda vetted.

Any further queries? If you need any further information, you can contact:

Úna Kingston (Researcher): 115223192@umail.ucc.ie
Dr. Joao Costa (PhD Supervisor): joao.costa@ucc.ie
Dr. Emmanouil Adamakis (PhD Supervisor): emmanouil.adamakis@ucc.ie

If you agree to allow your child(ren) to take part in the study, please fill out the attached consent form. If you have more than one child participating, you will be able to add their names at the bottom of the consent form

B3

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Information Sheet for Class Teachers Participating in Úna Kingston's Research Project for a PhD Study entitled

"An evaluation of the fidelity of the implementation of quality PE programmes and its outcomes on final-stage primary-level pupils' attitudes toward PE, physical activity, wellbeing and academic achievement".

Purpose of the Study: The purpose of this research is to evaluate the extent to which QPE programmes with differing levels of implementation fidelity support pupils' attitudes toward PE, PA, wellbeing, and AA at the final stage (5th-6th class) of their primary education. Designing a protocol that examines the fidelity of a quality PE programme, implementing it in various school settings over the course of one academic year and evaluating its outcomes on four specific aspects, makes this study one of a few of its kind. Through a research informed comprehensive evaluation protocol, this study is designed to gain knowledge on a broad variety of implementation issues and give detailed information on PE programme delivery and outcomes. The study's results will better inform future practice and policy both nationally and internationally.

What will the study involve? The study involves collecting data from children aged 11-13 years, on a number of questions about their attitudes towards PE, their levels of physical activity and their wellbeing and gathering observation from PE lessons in the selected classes. We invite you to allow the researcher and an critical friend to visit your classroom and make observations based on your PE lessons. Observation will be gathered by the researcher who will visit your room at three intervals during the school year 22/23 and an critical friend who will visit twice. You will also be required to conduct an online survey for the pupils in your class at three intervals during the year, September 2022, December 2022 and finally June 2023. This will take approximately thirty minutes.

Once you have completed the consent form, please return it to the school principal on or before 10th September. You can keep the information sheet and the second blank copy of the consent form for your records.

Why has you been asked to take part? You have been asked to take part in the research because XXXX Primary School which was invited and has agreed to participate in this research project.

Do I have to take part? No, participation is voluntary. You will be asked to sign a consent form for yourself. If you do not give permission, you cannot participate. You have to agree to proceed with participating in the study. You have the option of withdrawing from the study, even if you have agreed to participate. Once you have completed your involvement, you can still withdraw up until 6 weeks after the completion of surveys and the observations in your school (anticipated project completion date for this part of the project is a year).

Will your participation in the study be kept confidential? Yes, absolutely! We are collecting data for research purposes only, so we gather only a minimum of personal data to record consent, and it will be stored securely and separately from the survey and observation data collected. Your personal data will be processed and handled in accordance with European legislation, including the General Data Protection Regulation (EU) 2016/679. Access to personal data will be highly restricted (project researchers only), and no attempt will be made to link personal data to the survey responses. Ten years after the completion of the project, your personal data and the research data will be erased.

What will happen to the information gathered through observations in my classroom?
The observations will become part of a securely stored database, along with data from observations in other schools.

What will happen to the information the children in my classroom give as part of the online survey? The responses from the pupils will become part of a securely stored database, along with data from other children. Because the answers that pupils give will be anonymised, there will be no way to tell who provided the information. The research team will use this data for research and policy development.

What will happen to the results? It is expected that results of this study will be published in an academic and policy-oriented articles. After the project has finished, the anonymised data may be made available to other researchers, but only once we have ensured that it is not possible to identify any individual person from it. All pupils will be assigned a unique ID number, which will correspond across all testing and time points used to collect data. Unique ID number: The first two letters of the first name and day of birth. Example: a. Christian, b. 19.03.82 = CH/19.

What are the possible disadvantages of taking part? We don’t envisage any negative consequences for you or your child in taking part.

What if there is a problem? At the end of their participation, the teacher will discuss with the children how they found the experience and how they are feeling. If you have any issues, you should contact the researcher on the email address provided below. We can provide contact information for support services.

Who has reviewed this study? Approval has been given by the UCC Social Research Ethics Committee, and all members of the research team visiting schools have been Garda vetted.

Any further queries? If you need any further information, you can contact:
Úna Kingston (Researcher): 115223192@umail.ucc.ie
Dr. Joao Costa (PhD Supervisor): joao.costa@ucc.ie
Dr. Emmanouil Adamakis (PhD Supervisor): emmanouil.adamakis@ucc.ie
If you agree to allow your child(ren) to take part in the study, please fill out the attached consent form. If you have more than one child participating, you will be able to add their names at the bottom of the consent form

B4

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Information Sheet for Children & Young People's participating in Úna Kingston's Research Project

Úna Kingston's Research Project is a research project funded by the Department of Education, Ireland.

Purpose of the Study: Úna Kingston's Research Project is looking at the quality of how well PE programmes are implemented in primary schools in Ireland and what effect the PE programme has on pupil's attitudes towards PE, physical activity, wellbeing and academic achievement.

What will the study involve? Your class teacher will conduct a survey on 10th September 2022 in your classroom with children and this will take approximately thirty minutes.

Why have you been asked to take part? You have been asked because you are a student at xxxx Primary School.

Do you have to take part? No, participation is voluntary. You will be asked to sign a form which explains what the study is about and what will happen to the information you provide. You can also stop participating in the study, even if you have already agreed, and you do not have to give a reason. After you have finished, you can still change your mind up until 6 weeks after your surveys have been completed (which will be in a year).

Will your participation in the study be kept confidential? Yes, absolutely! Your answers will be anonymised, which means that no one will know that they are yours. Your name and any other identifying information about you will not be used.

What will happen to the information you give? Your information will become part of a securely stored database with the data from your group and other children and young people! The researcher will use this data to evaluate the fidelity of the implementation of quality PE programmes and its outcomes on final-stage primary-level pupils' attitudes toward PE, physical activity, wellbeing and academic achievement.

What will happen to the results? The results will be presented in a paper as part of a PhD study. We also hope to talk about the study's findings at conferences and to publish the findings in articles, blogs, on social media and in books.

What are the possible disadvantages of taking part? We don't expect any negative consequences for you in taking part.

What if there is a problem? At the end of the process, we will talk with you to see how you found the experience and how you are feeling. If you feel upset, you should talk to your teacher or contact the researcher below.
Who has reviewed this study? Approval has been given by the UCC Social Research Ethics Committee, and all members of the research team visiting schools have been Garda vetted.

Any further queries? If you need any further information, you can contact:

Úna Kingston (Researcher): 115223192@umail.ucc.ie
Dr. Joao Costa (PhD Supervisor): joao.costa@ucc.ie
Dr. Emmanouil Adamakis (PhD Supervisor): emmanouil.adamakis@ucc.ie

B289

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Teacher Consent Form

I…… agree to participate in Úna Kingston's Research Project.

The purpose and nature of the study has been explained to me in writing.

I understand that I will be participating voluntarily.

I understand that anonymity will be ensured, because personal data is collected only to record consent and is stored separately to data collected, with no attempt made to link them.

I understand that I can withdraw from the study, without repercussions, whether before it starts or while I am participating, and I do not have to give any reasons for this.

I understand that the data and any personal details collected are for research and teaching purposes only within the scope of Úna Kingston's Research Project. My personal details will be processed and handled in accordance with European legislation including the General Data Protection Regulation (EU) 2016/679. I have the right to access these data, rectify them, limit or oppose their processing and to request deletion of my personal data.

I understand that I can withdraw permission to use the data at any time up until 6 weeks after the completion of this research work in which case the material will be deleted. If I change my mind and wish to withdraw after a report has been published, the material cannot be removed from the reports, but the research team will refrain from using it in any future work or analysis. I understand that after ten years all data associated with the study will be destroyed.

I understand that disguised extracts (e.g., name / location won't be used) and data from the research may be quoted in presentations and subsequent publications (journal article, book chapter, student thesis, newspaper article, social media publicity about the study's findings, etc.), if I give permission below (please tick):

I consent to participating in this study ☐

I do not consent to participating in this study ☐

Signature: _____ Date: _____

Name (CAPS): _____

B6

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Parent / Guardian Consent Form

I…… give permission for my child(ren) to participate in Úna Kingston's Research Project.

The purpose and nature of the study has been explained to me in writing.

I understand that my child will be participating voluntarily.

I understand that anonymity will be ensured, because personal data is collected only to record consent and is stored separately to data collected from children, with no attempt made to link them. My child's data will have an anonymous identifier made up of letters and numbers.

I understand that my child can withdraw from the study, without repercussions, whether before it starts or while they are participating, and we do not have to give any reasons for this.

I understand that the data and any personal details collected are for research and teaching purposes only within the scope of Úna Kingston's Research Project. My personal details will be processed and handled in accordance with European legislation including the General Data Protection Regulation (EU) 2016/679. I have the right to access these data, rectify them, limit or oppose their processing and to request deletion of my personal data.

I understand that my child can withdraw permission to use the data at any time up until 6 weeks after the completion of the surveys in which case the material will be deleted. If my child changes their mind and wishes to withdraw after a report has been published, their material cannot be removed from the reports, but the research team will refrain from using it in any future work or analysis. I understand that after ten years all data associated with the study will be destroyed.

I understand that disguised extracts (e.g., name / location won't be used) and data from my child's survey may be quoted in presentations and subsequent publications (journal article, book chapter, student thesis, newspaper article, social media publicity about the study's findings, etc.), if I give permission below (please tick):

I confirm that I am a legal decision-maker for the child(ren) listed below) ☐

I consent to my child(ren) participating in this study ☐

I do not consent to my child(ren) participating in this study ☐

Signature: _____ Date: _____

Name (CAPS): _____

Child 1's name (CAPS): _____

Child 2's name (CAPS): _____

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

B7

Child Assent Form

I…… [name in CAPS] agree to take part in the research study.

I understand what the study is about, and it has been clearly explained to me.

I am participating voluntarily.

I undertake to maintain the confidentiality of the online survey.

It's fine if I drop out of the study, and I do not have to give any reasons for this.

I understand that the information collected are for research and teaching purposes only for Úna Kingston's research project. I have the right to see these data, change them, or ask that they be deleted and not used.

- I can withdraw permission to use the data from the study at any time up until 6 weeks after the surveys are completed, in which case the material will be deleted.
- I understand that with anonymised survey's it will not be possible to delete my data if I change my mind.
- If I change my mind and want to withdraw after a report has been published, my material cannot be removed from the reports, but the research team will not use it in any future work or analysis.

I understand that nobody will know it's me in the results or report because my name or any other identifying information will not be linked to my survey answers. I understand that my parent(s) / legal guardian(s) must also consent before I can take part in the study.

Name: _____

Date: _____

Signature: _____

☐ **Yes, I consent** to take part in this study.

☐ **No, I do not** consent to take part in this study. ***Thank you.***

C1

Physical Education School Self-Assessment Survey (PE-SSAS)

Thank you for participating in this research project. The purpose of this study is to evaluate the extent to which Quality PE programmes with differing levels of implementation fidelity support pupils' attitudes toward physical education (PE), physical activity (PA), wellbeing, and academic achievement (AA) at the final stage (5th-6th class) of their primary education.

At this stage of the research you are being invited to complete the survey below as a self-evaluation of the Physical Education provision in your school. The survey includes 9 sections and should take approximately 15-20 minutes to complete.

There is no obligation to participate, and you can cease your participation at any time of completing the survey by simply not submitting it. All information provided will be confidential and anonymity will be protected throughout the study.

This study has obtained ethical approval from the UCC Social Research Ethics Committee (Log 2022-096).

I would be very grateful if you could submit the survey before Friday 10th June. If you have any queries about this research, you can contact me at 115223192@umail.ucc.ie.

Thank you for your time and for contributing to my research. It is very much appreciated.

Úna Kingston
PhD Student UCC

* Indicates required question

Informed Consent*

I consent to be a participant in this research under the conditions presented above.

2. Demographic Data

For coding purposes, please state your roll number here. *

Your answer

What is your role in the school? *

Principal

Middle Management

Teacher and Middle Management Teacher

How many years of teaching experience do you have?*

Your answer

Please state your employment status*

Permanent

Temporary

Substitute

Please state how your past PE experiences influence your current attitude towards PE provision.*

Strongly Disagree

Disagree

Neutral

Agree

Strongly Agree

My personal experiences of PE as a student POSITIVELY influence my general attitude towards PE provision.

My personal experiences of PE as a student NEGATIVELY influence my general attitude towards PE provision.

My personal experiences of PE as a student POSITIVELY influence my general attitude towards PE provision.

My personal experiences of PE as a student NEGATIVELY influence my general attitude towards PE provision.

For anonymity and coding purposes, please use the following coding system: The first THREE letters of your FIRST name and DAY of birth. Example- Christian, 19.03.1982=CHR19*

Your answer

3. Satisfaction with Government Leadership for PE Support

In the context of PE in primary education please answer the following statements regarding your satisfaction with Government Leadership for PE Support in your school.

Please rate each item from 1-6, 1- Strongly disagree, 2 –Disagree, 3 – Neutral, 4- Agree, 5- Strongly agree.

If there is any item that you cannot answer please use option 6 Do not know.

The government provides sufficient human resources for PE teaching.*

Strongly Disagree

Disagree

Neutral

Agree

Strongly Agree

Do not know

The mainstream primary school class size is adequate for the successful delivery of a PE lesson.*

Strongly disagree

Disagree

Neutral
Agree
Strongly Agree
Do not know

I am satisfied with the provision of funding from the Department of Education for quality physical facilities such as suitable PE buildings, open fields, outdoor obstacle courses.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree
Do not know

I am satisfied with the provision of funding from the Department of Education for physical resources for PE such as PE equipment, playground equipment is adequate*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree
Do not know

I am satisfied with the current NCCA PE curriculum.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree
Do not know

NCCA PE Curriculum and School PE Programme

In the context of PE in primary education please answer the following questions regarding the NCCA PE Curriculum and the PE Programme in your school.

Please rate each item from 1-6, 1- Strongly disagree, 2 –Disagree, 3 – Neutral, 4- Agree, 5- Strongly agree.
If there is any item that you cannot answer please use option 6 Do not know.

For the second and third last questions you are asked to choose from a selection of possible times allocated to PE and PA. Please select the number of minutes that is closest to the actual time allocated to both areas in your school and round it up.

For the final question in this section please select all the answers that apply to you. Fill in the 'Other' option if applicable.

The PE curriculum Gymnastics Strand is covered in our PE programme.*

Strongly disagree
Disagree Neutral
Agree
Strongly agree
Do not know

The PE curriculum Games Strand is covered in our PE programme.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

The PE curriculum Athletics Strand is covered in our PE programme.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

The PE curriculum Dance Strand is covered in our PE programme.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

The PE curriculum Outdoor and Adventure Strand is covered in our PE programme.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

The PE curriculum Aquatics Strand is covered in our PE programme.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

I am satisfied with our PE programme.*
Strongly disagree
Disagree

Neutral
Agree
Strongly agree
Do not know

The PE programme meets the needs of children in our school.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Fundamental movement skills are covered in our PE programme.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

The PE programme is an important part of our school culture.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

The PE programme is clearly structured under the aim of providing our pupils competencies for lifelong learning.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

The PE programme aims at providing all pupils the opportunities to meet the recommended daily 60 minutes of PA.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

How many minutes are allocated to PE instruction each week? If the exact value is not provided please chose the closest value and round it up.*

0-30 mins
31-60 mins
61 mins - 80 mins
81 mins- 120 mins
More than 120 mins

How many minutes are allocated to any other school-based PA, excluding PE instruction time, each week? If the exact value is not provided please chose the closest value and round it up.* No other PA activities

0-30 mins
31-60 mins
61 mins - 80 mins
81 mins- 120 mins
More than 120 mins

Choose which of the following physical activities are provided for as part of the PE programme in your school. Choose all that apply.*

Multiple recess opportunities (e.g., morning or lunch time Physical activity breaks Inter-school sports (e.g., school PA competitions or events)
Classroom movement breaks (e.g., short break for PA between learning tasks)
Integrated learning including PA (e.g., using PA to teach maths concepts such as jumping and measurement)
Active transport (e.g., walk/cycle to and from school.
Extracurricular PA (e.g., breakfast clubs, after-school training) Other:

School Leadership in relation to PE in our School

In the context of PE in primary education please answer the following questions regarding School Leadership your school.

Please rate each item from 1-6, 1- Strongly disagree, 2 –Disagree, 3 – Neutral, 4- Agree, 5- Strongly agree. If there is any item that you cannot answer please use option 6 Do not know.

School leadership allocates adequate funding to the PE department in our school.*

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree
Do not know

School leadership provides opportunities for management to discuss PE teaching and learning with class teachers.*

Strongly disagree

Disagree
Neutral
Agree
Strongly agree
Do not know

The Board of Management employs external provision for elements of the PE programme to the pupils (e.g., sports coaches, PA instructors).*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

School leadership ensures adequate provision of PE literacy resources in our school (e.g., "Move Well Move Often" PDST resource, etc.).*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

The School leadership vision for PE in our school is clearly disseminated to staff and pupils.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

School leadership regularly reflects on the nature and content of our PE programme and the PE curriculum in our school.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

School leadership ensures that staff have regular opportunities to update and upskill the quality of PE provision in our school.*

Strongly disagree
Disagree
Neutral

Agree
Strongly agree
Do not know

Middle Management in relation to PE in our School

In this section 'Middle Management' refers to any post holder who holds the responsibility for leading the PE programme in your school. This could be the Deputy Principal, an AP1 or an AP2 post holder.

In the context of PE in primary education please answer the following questions as to how Middle Management with the responsibility for PE manages the PE curriculum and the PE programme in your school.

Please rate each item from 1-6, 1- Strongly disagree, 2 –Disagree, 3 – Neutral, 4- Agree, 5- Strongly agree.
If there is any item that you cannot answer please use option 6 Do not know.

It is obvious that our PE programme is the responsibility of a member of our Middle Management team.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Middle management responds to the needs of the staff in relation to PE.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Middle management responds to the needs of the pupils in our school in relation to PE.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Middle management manages the maintenance and upkeep of resources and materials for PE in our school.*
Strongly disagree
Disagree
Neutral

Agree
Strongly agree
Do not know

Middle management makes provision for the required PE equipment and sports resources in our school.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers in relation to the PE programme in your school

In this section 'Teachers' refer to the team of teaching staff in your school. This includes mainstream class teacher, special education teachers and any other member of staff that holds a teaching position.

In the context of PE in primary education please answer the following questions regarding teachers and the PE programme in your school.

Please rate each item from 1-6 , 1- Strongly disagree, 2 –Disagree, 3 – Neutral, 4- Agree, 5- Strongly agree.
If there is any item that you cannot answer please use option 6 Do not know.

Teachers have knowledge of the PE curriculum*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers have the ability to unpack the PE curriculum's content.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers use available PE resources appropriately.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree

Do not know

Teachers design suitable PE learning opportunities for the pupils in our school.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers feel confident when teaching the PE curriculum.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers are enthusiastic about teaching PE*
Strongly disagree
Disagree Neutral
Agree
Strongly agree
Do not know

Teachers have a positive attitude towards teaching PE.*
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers reflect regularly on the nature and content of the PE programme and PE curriculum in our school.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

During PE lessons teachers provide pupils with appropriate learning experiences that meet their developmental needs*

Strongly disagree
Disagree
Neutral
Agree

Strongly agree
Do not know

Teachers regularly review their PE planning and implementation of the PE curriculum and PE programme in their classroom.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers are provided with opportunities to engage in PE communities of practice (A Community of practice refers to groups of people who share a common interest and learn how to improve practice as they interact regularly). The community can be made up of teachers from outside your own school.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Provision is made for teachers to develop their teaching knowledge of PE collaboratively within the school.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers have opportunities to observe other teachers' PE lessons.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers engage in PE CPD*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Teachers use digital technology to promote pupils' interaction and entertainment when teaching PE.* Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Parental Involvement in the PE programme in our School

In the context of PE in primary education please answer the following questions as to what extent parents are involved in the PE programme in your school.

Please rate each item from 1-6, 1- Strongly disagree, 2 –Disagree, 3 – Neutral, 4- Agree, 5- Strongly agree.
If there is any item that you cannot answer please use option 6 Do not know.

The parent body supports the school's PE programme*
Strongly disagree
Disagree
Neutral
Agree
Strongly Agree
Do not know

The parent body holds a positive attitude towards the school's PE programme*
Strongly disagree
Disagree
Neutral
Agree
Strongly Agree
Do not know

The parent body supports school transport initiatives such as walk/cycle to school*
Strongly disagree
Disagree
Neutral
Agree
Strongly Agree
Do not know

The parent body assists my school to deliver the PE programme*
Strongly disagree
Disagree
Neutral
Agree
Strongly Agree
Do not know

The parent body fundraises to help advance the PE facilities and resources in my school*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree
Do not know

Community Section

In the context of PE in primary education please answer the following questions as to what extent Community Partnerships are part of the PE programme in your school.

Please rate each item from 1-6 , 1- Strongly disagree, 2 –Disagree, 3 – Neutral, 4- Agree, 5- Strongly agree.
If there is any item that you cannot answer please use option 6 Do not know.

Our school has links with local sport clubs*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Our school celebrates local PA achievements*

Strongly disagree
Disagree Neutral
Agree
Strongly agree
Do not know

Our local community has sponsored the school to enhance the provision of PE resources* Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Do not know

Our local community has sponsored the school to enhance the provision of PE facilities e.g. school hall, school field etc.*

Strongly disagree
Disagree
Neutral
Agree

Strongly agree Do not know

Thanks

Thank you for your time and for participating in this survey.

Get link

Never submit passwords through Google Forms.
This form was created inside of University College Cork. Report Abuse

Link to Survey:
https://docs.google.com/forms/d/e/1FAIpQLSc8BDqPQpN4GnYcF_qTIfJWZ7mNV1CLmsNPRC1ADOOK6qoq1w/viewform?usp=pp_url

C2

Pupil Survey for 5th and 6th Class Pupils

Information Sheet for Pupils about the Research Project

Purpose of the Study: This Research Project is looking at how well PE programmes are implemented in primary schools in Ireland and what effect the PE programme has on pupil's attitudes towards PE, physical activity, wellbeing and academic achievement. **What will the study involve?** Your class teacher will conduct a survey in your classroom, and this will take approximately thirty minutes.

Why have you been asked to take part? You have been asked because your principal and teacher have agreed to take part in the project.

Do you have to take part? No, participation is voluntary. You will be asked to sign a form which explains what the study is about and what will happen to the information you provide. You can also stop participating in the study, even if you have already agreed, and you do not have to give a reason. After you have finished, you can still change your mind up until 6 weeks after your surveys have been completed (which will be in a year).

Will your participation in the study be kept confidential? Yes, absolutely! Your answers will be anonymised, which means that no one will know that they are yours. Your name and any other identifying information about you will not be used.

What will happen to the information you give? Your information will become part of a securely stored database with the data from your group and other children and young people. The researcher will use this data to evaluate the fidelity of the implementation of quality PE programmes and its outcomes on final-stage primary-level pupils' attitudes toward PE, physical activity, wellbeing and academic achievement.

What will happen to the results? The results will be presented in a paper as part of a PhD study. We also hope to talk about the study's findings at conferences and to publish the findings in articles, blogs, on social media and in books.

What are the possible disadvantages of taking part? We don't expect any negative consequences for you in taking part.

What if there is a problem? At the end of the process, we will talk with you to see how you found the experience and how you are feeling. If you feel upset, you should talk to your teacher or contact the researcher below.

Who has reviewed this study? Approval has been given by the UCC Social Research Ethics Committee, and all members of the research team visiting schools have been Garda vetted.

Any further queries? If you need any further information, you can contact:
Úna Kingston (Researcher): 115223192@umail.ucc.ie

Dr. Joao Costa (PhD Supervisor): joao.costa@ucc.ie

Dr. Emmanouil Adamakis (PhD Supervisor): emmanouil.adamakis@ucc.ie

Thank you for agreeing to participate in this research project. Please answer the questions outlined below. You will need to answer each one before you are allowed to move to the next question. * Indicates required question

Informed Consent

Do you agree to participate in this research? *
I do not agree
I agree
Option 3

For anonymity and coding purposes, please use the following coding system: The first **THREE** letters of your **FIRST** name and **DAY** of birth. Example- Christian, 19.03.1982 = **CHR19**).
*

Your answer

Demographic Questions

What is the name of your school?*

What is your gender?
*

Boy
Girl Other:

What is your age in years?*
Your answer

(Optional Question) What is your height in cms?
Your answer

(Optional Question) What is your approximate weight in kgs? Your answer

What is your nationality?*
Irish Other:

Do you attend PE lessons in school?*
Yes
No

If you answered "**No**", please specify the reason why you do not attend lessons in school.
Your answer

Are you currently taking part in any sport outside of school?*
Yes
No

In the past 12 months, have you had an injury during PE or sport outside of school?*
I did not have an injury.
I had an injury during PE.
I had an injury during sport outside of school.
I had an injury during both (PE and sport outside of school). I do not remember.

If **you are taking part in sport outside of school**, please complete the questions below.

How **many** sports do you practice outside of school?
1
2
3
4
More than 4

How often do you participate in sport outside of school? Answer **in times per week**.
1
2
3
4
5
6
7

How many years have you been practicing sport outside of school? Give your **answer in years**.*
Your answer

What is **the type of sport that takes most of your time** that you are currently practicing outside of school?

Ball games and team sports (e.g., soccer, GAA, rugby, basketball)
Racket sports (e.g., tennis, badminton)
Condition orientated sports (e.g., running, swimming, cycling) Technique-coordinative sports (e.g., athletics, gymnastics, martial arts) Other:

How do you feel after you take part in sport?*
Very unhappy
Unhappy
Neither happy nor unhappy
Happy
Very happy

The Stirling Children's Wellbeing Scale

Here are some statements about how you might have been feeling or thinking about things **over the past couple of weeks.**

For each one please put a tick in the box which best describes your thoughts and feelings; there are no right or wrong answers.

1. I think good things will happen in my life.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

2. I have always told the truth.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

3. I've been able to make choices easily.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

4. I can find lots of fun things to do.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

5. I feel that I am good at some things*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

6. I think lots of people care about me.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

7. I like everyone I have met.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

8. I think there are many things I can be proud of.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

9. I've been feeling calm.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

10. I've been in a good mode.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

11. I enjoy what each new day brings.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

12. I've been getting on well with people.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

13. I always share my sweets.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

14. I've been careful about things.*

Never
Not much of the time
Some of the time
Quite a lot of the time
All of the time

15. I've been feeling relaxed.*

Never

Not much of the time
Some of the time
Quite a lot of the time
All of the time

International Physical Activity Questionnaire We are interested in finding out about the kinds of physical activities that you do as part of your everyday life. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at school, at home and your other activities. Think about when you are moving from place to place, in your free time, exercising or taking part in sport activities.

1. Think about the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, running at speed, aerobics, or fast cycling?

If you did **no vigorous physical activities -> Skip to question 3** *

Your answer

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

(Write your answer in ..... hour(s) and/or ..... minutes per day)

Your answer

3. Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think about these physical activities that you did for at least 10 minutes at a time.

During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or slow jogging? Do **not** include walking!

If you did **no moderate physical activities -> Skip to question 5**

*

Your answer

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

(Write your answer in ..... hour(s) and/or ..... minutes per day) Your answer

5. Think about the time you spent **walking** in the **last 7 days**. This includes at school and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time? **If you did not walk -> Skip to question 7** *

Your answer

6. How much time did you usually spend **walking** on one of those days?

(Write your answer in ..... hour(s) and/or ..... minutes per day) Your answer

7. The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at school, at home, while doing work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch TV or play video games.

During the **last 7 days,** how much time did you spend **sitting** on a **weekday**?

(Write your answer in ..... hour(s) and/or ..... minutes per day) *

Your answer

Attitude Towards Physical Education Survey

This form will assess pupils' attitude towards Physical Education (PE). For every statement, please tick the answer that best describes what do you believe.

1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly agree

1. I feel my PE teacher makes my PE class boring for me*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

2. My PE teacher gets me excited about PE.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

3. My PE teacher makes my PE class interesting for me.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

4. I feel my PE teacher makes learning in my PE class fun for me.*

Strongly disagree
Disagree
Neutral

Agree
Strongly Agree

5. My PE teacher makes learning in my PE class unpleasant for me.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

6. I feel the games I learn in PE make my PE class boring for me.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

7. The games I learn in my PE class get me excited about PE.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

8. The games I learn in PE make my PE class interesting for me.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

9. I feel the games I learn in my PE class make learning fun for me.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

10. The games I learn in my PE class make learning unpleasant for me.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree 11. I feel my PE teacher makes learning in my PE class useless for me.*

Strongly disagree
Disagree
Neutral

Agree
Strongly Agree

12. My PE teacher makes my PE class useful for me.* Strongly disagree
Disagree
Neutral
Agree
Strongly Agree 13. I feel my PE teacher makes learning in my PE class seem valuable for me.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

14. My PE teacher makes my PE class seem important to me. *

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

15. My PE teacher makes my PE class seem unimportant to me.*

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

16. I feel the games I learn in my PE class are useless to me.*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree

17. The games I learn in my PE class are useful to me. *

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

18. I feel the games I learn in my PE class are valuable to me. *

Strongly disagree
Disagree
Neutral
Agree
Strongly Agree

19. The games I learn in my PE class seem important to me.
*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree

20. The games I learn in my PE class seem unimportant to me.
*

Strongly disagree
Disagree
Neutral
Agree
Strongly agree

Link for the Pupils' Survey
https://docs.google.com/forms/d/e/1FAIpQLSdGQD_yL03puViTbTEIVAhdzMzVUHd0nJz3FkXXtoB1wprWzQ/viewform?usp=pp_url

C3 Physical Education-External Qualitative Observation Tool

Dimension	Indicators	Observation Notes
Teachers' PE Delivery Class: Lesson Duration: Curriculum Strand:	PEP_1 Teachers have knowledge of the PE curriculum PEP_2 Teachers have the ability to unpack the PE curriculum's content. PEP_3 Teachers use available PE resources appropriately. PEP_4 Teachers design suitable PE learning opportunities for the pupils in our school. PEP_5 Teachers feel confident when teaching the PE curriculum. PEP_6 Teachers are enthusiastic about teaching PE PEP_7 Teachers have a positive attitude towards teaching PE.	

C3 Physical Education-External Qualitative Observation Tool

	PEP_9 During PE lessons teachers provide pupils with appropriate learning experiences that meet their developmental needs.	

C3 Physical Education-External Qualitative Observation Tool

Satisfaction with Government Leadership for PE Support	GL_1 The government provides sufficient human resources for PE teaching.	
	GL_2 The mainstream primary school class size is adequate for the successful delivery of a PE lesson.	
	GL_3 I am satisfied with the provision of funding from the Department of Education for quality physical facilities such as suitable PE buildings, open fields, outdoor obstacle courses.	
	GL_4 I am satisfied with the provision of funding from the Department of Education for physical resources for PE such as PE equipment, playground equipment is adequate	

C3 Physical Education-External Qualitative Observation Tool

Senior Leadership and PE Professional Learning	SL_2 School leadership provides opportunities for management to discuss PE teaching and learning with class teachers. SL_4 School leadership ensures adequate provision of PE literacy resources in our school (e.g., "Move Well Move Often" PDST resource, etc.). SL_5 The School leadership vision for PE in our school is clearly disseminated to staff and pupils. SL_6 School leadership regularly reflects on the nature and content of our PE programme and the PE curriculum in our school. SL_7 School leadership ensures that staff have regular opportunities to update and upskill the quality of PE provision in our school. PEP_8 Teachers reflect regularly on the nature and content of the PE programme and PE curriculum in our school.	

C3 Physical Education-External Qualitative Observation Tool

	PEP_11 Teachers are provided with opportunities to engage in PE communities of practice (A Community of practice refers to groups of people who share a common interest and learn how to improve practice as they interact regularly). The community can be made up of teachers from outside your own school. PEP_12 Provision is made for teachers to develop their teaching knowledge of PE collaboratively within the school. PEP_13 Teachers have opportunities to observe other teachers' PE lessons. PEP_14 Teachers engage in PE CPD	

C3 Physical Education-External Qualitative Observation Tool

NCCA PE Curriculum and School PE Programme	NCCA_1 The PE curriculum Gymnastics Strand is covered in our PE programme. NCCA_2 The PE curriculum Games Strand is covered in our PE programme. NCCA_3 The PE curriculum Athletics Strand is covered in our PE programme. NCCA_4 The PE curriculum Dance Strand is covered in our PE programme. NCCA_5 The PE curriculum Outdoor and Adventure Strand is covered in our PE programme. NCCA_6 The PE curriculum Aquatics Strand is covered in our PE programme. NCCA_7 I am satisfied with our PE programme.	

C3 Physical Education-External Qualitative Observation Tool

	NCCA_9 Fundamental movement skills are covered in our PE programme.	
Middle Management in relation to PE in our School	MM_1 It is obvious that our PE programme is the responsibility of a member of our Middle Management team. MM_2 Middle management responds to the needs of the staff in relation to PE. MM_3 Middle management responds to the needs of the pupils in our school in relation to PE. MM_4 Middle management manages the maintenance and upkeep of resources and materials for PE in our school. MM_5 Middle management makes provision for the required PE equipment and sports resources in our school.	

C3 Physical Education-External Qualitative Observation Tool

Parental Involvement in the PE programme in our School	PI_1 The parent body supports the school's PE programme PI_2 The parent body holds a positive attitude towards the school's PE programme PI_3 The parent body supports school transport initiatives such as walk/cycle to school PI_4 The parent body assists my school to deliver the PE programme PI_5 The parent body fundraises to help advance the PE facilities and resources in my school	
Community Partnerships with our School in relation to our PE programme	CP_1 Our school has links with local sport clubs CP_2 Our school celebrates local PA achievements CP_3 Our local community has sponsored the school to enhance the provision of PE resources	

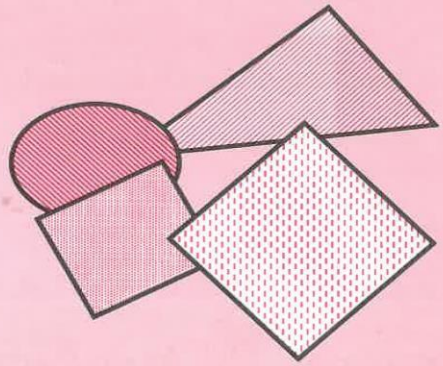
C3 Physical Education-External Qualitative Observation Tool

	CP_4 Our local community has sponsored the school to enhance the provision of PE facilities e.g. school hall, school field etc.	
General Remarks		
Collected Documents from School related to the PE Programme		

C326

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DRUMCONDRA PRIMARY MATHEMATICS TEST – REVISED



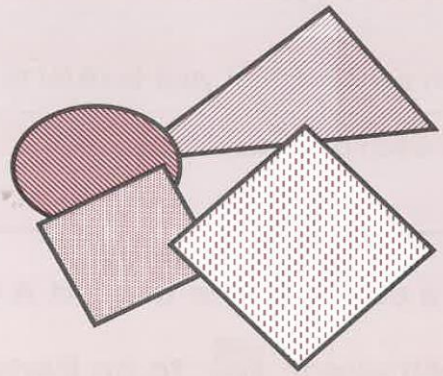
NAME	O BOY
DATE OF BIRTH	O GIRL
SCHOOL	
TEACHER	
TODAY'S DATE	

Raw Score (Part A)	
Raw Score (Part B)	
Raw Score (Part C)	
Total Raw Score (A + B + C)	
Standard Score	
Sten Score	
Percentile Rank	

LEVEL 5
FORM A

EDUCATIONAL RESEARCH CENTRE, ST PATRICK'S COLLEGE, DUBLIN 9

DRUMCONDRA PRIMARY MATHEMATICS TEST – REVISED



NAME	O BOY
DATE OF BIRTH	O GIRL
SCHOOL	
TEACHER	
TODAY'S DATE	

Raw Score (Part A)	
Raw Score (Part B)	
Raw Score (Part C)	
Total Raw Score (A + B + C)	
Standard Score	
Sten Score	
Percentile Rank	

LEVEL 6
FORM A

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