Empowering and disempowering climates in physical education: Measurement, associated outcomes and intervention effects

By

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ABSTRACT

The research comprising this thesis is based on an integrated framework, that pulls from both Achievement Goal Theory (AGT; Nicholls, 1989) and Self-Determination Theory (SDT; Deci & Ryan, 2000), in considering relevant features of the motivational climate and their implications (Duda, 2013). Duda (2013, Duda & Appleton, 2016) conceptualises an 'empowering' motivational climate as one that is more task-involving, autonomy-supportive and socially-supportive. A 'disempowering' motivational climate is ego-involving and controlling.

Numerous studies have assessed and examined the correlates of the perceived motivational teaching environment from AGT or SDT perspectives. This thesis (Chapter 1) describes how a measure of perceptions of the empowering and disempowering features of the motivational climate (i.e., the EDMCQ-PE) was adapted and validated in the context of secondary physical education (PE). Prior to this research, there has not been an assessment tool which measures the motivational environment created by PE teachers using Duda's integrated conceptualisation.

In Chapter 3, the EDMCQ-PE is used to examine, both cross-sectionally and longitudinally, the relationships between pupils' perceptions of the empowering and disempowering features of the motivational climate to their motivation and associated outcomes. It was found that a PE teacher created environment that was deemed to be more empowering predicted increases in enjoyment and concentration via autonomous motivation. Perceptions of disempowering motivational climates in PE corresponded to increases in boredom via controlled motivation.

The next step was to intervene with the aim of optimising the motivational climate operating in secondary school PE. The *Empowering PE*™ training was delivered to members of a PE Department at one school. Aiming to address criticism and limitations of 'one-off' workshop

deliveries, efforts were made to further develop and embed more empowering PE strategies over time via an extended intervention that incorporated principles of communities of practise (Chapter 4). Finally, Chapter 5 examined the impact of the school-based *Empowering PE*™ workshop and subsequent associated professional development programme using community of practice principles on 1) PE teachers' understanding of motivation and optimal and dysfunctional motivational strategies, and reported motivational strategies employed, (2) Senior Leadership Teams (SLT) perceptions of the PE teachers understanding, engagement and impact of the PDP, and (3) quality of pupils' motivation and indicators of engagement within physical education.

The findings of the thesis suggest that in the future, the EMCQ-PE could be used by both teachers and researchers as a validated measure of the motivational climate manifested in PE. Future work on the further development of this assessment tool, however, was recommended. Results also indicate the importance of promoting more empowering PE environments and reducing disempowering teacher behaviours. Finally, findings suggest that the motivational climate in PE classes can be optimised via targeted training and also following up educational workshops with more continuous interaction and exchange between those who have received the training (as can be achieved via supporting a professional development programme using community of practice principles).

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CONTENT LISTING

LIST OF PAPERS

This thesis is comprised of the following papers. Study design, data collection, statistical analysis and writing were conducted by Daniel Milton. Prof Joan Duda, Dr Paul Appleton and Dr Anna Bryant advised on study design, data analysis and paper editing. Where listed, other secondary authors also advised on study design, data analysis and paper editing

1. **Milton, D**., Appleton, P. R., Bryant, A., & Duda, J. L. (2018). Initial Validation of the Teacher-Created Empowering and Disempowering Motivational Climate Questionnaire in Physical Education. *Journal of Teaching in Physical Education*, *37*(4), 340-351.
2. **Milton, D**., Appleton, P. R., Bryant, A., Duda, J. L., & Quested, E (In Prep). Examining the mediating role of motivation in the relationships between teacher-created motivational climates and quality of engagement in Welsh secondary school Physical Education. *Journal of Education Psychology*

During the period of postgraduate study within the School of Sport, Exercise and Rehabilitation Sciences at the University of Birmingham, the following articles, book chapters and conference abstracts were accepted for publication/presentation

Publications

1. Choi, S. M., Sum, K. W. R., Leung, F. L. E., Wallhead, T., Morgan, K., **Milton, D**., ... & Sit, H. P. C. (2020). Effect of sport education on students' perceived physical literacy, motivation, and physical activity levels in university required physical education: a cluster-randomized trial. *Higher Education*, 1-19.

Book Chapters

1. Morgan, K., **Milton, D.,** & Longville, J. (2020). Motivating pupils for learning in physical education. In *Learning to Teach Physical Education in the Secondary School* (pp. 183-198). Routledge.

Conference presentations

1. **Milton, D**., Appleton, P., Quested, E., Bryant, A. & Duda, J. (2015). Empowering and disempowering climates and Welsh pupils' motivation and engagement in PE. International Physical Literacy Conference, Vancouver, Canada, July 2015.
2. **Milton, D**., Appleton, P., Bryant, A. & Duda, J. (2020). Promoting more positive motivational climates and healthy experiences in PE via school tailored *Empowering PE*™ training and the development of a community of practice. Physical and Health Education for Life Long Learning, Online Presentation, Cardiff, July 2020.

Presentations and Research Webinars

1. **Milton, D**. (2019). Season Planning Using Empowering Coaching Principles. Birmingham University, Birmingham, Wales, June, 2019.
2. **Milton, D**. (2020). Motivational Climate: Creating an empowering rugby environment: From Theory to Practice. Canada Rugby Football Union. Online. April 2019.
3. **Milton, D**. (2020). Building an empowering university rugby programme: Key Learnings. Guelph University. Online. April 2019.
4. **Milton, D**. (2020). Motivational Climate: From Theory to Practice. Cadoxton Primary School, Online, Wales, June, 2020.

5. **Milton, D**. (2020). Games Based Approaches to Coaching: Using Empowering Principles. Welsh Rugby Union, Online, Wales, July, 2020.
6. **Milton, D.,** Appleton, P., Bryant, A. & Duda, J. (2021). Promoting more *Empowering PE*™ in PE and Sports settings. Trent University, Online, March, 2021.
7. **Milton, D.,** Appleton, P., Bryant, A. & Duda, J. (2021). Promoting more *Empowering PE*™ via the development of a professional development programme using the principles of community of practice. Birmingham University, Online, December, 2021.

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ABBREVIATIONS

AGT	Achievement Goal Theory
AFPE	Association for Physical Education
AoLE	Area of Learning
B-ESEM	Bi-Factor - Exploratory Structural Equation Model
CFA	Confirmatory Factor Analyis
CFI	Comparative Fit Index
CI	Confidence Interval
CoP	Community of Practice
CPD	Continuing Professional Development
EFA	Exploratory Factor Analysis
EDMCQ-C	Empowering and Disempowering Motivational Climate Questionnaire - Coaching
EDMCQ-PE	Empowering and Disempowering Motivational Climate Questionnaire - Physical Education
ESEM	Exploratory Structural Equation Model
H-ESEM	Higher Order - Exploratory Structural Equation Model
MLR	Maximum Likelihood Estimator
PDP	Professional Development Programme
PE	Physical Education
PL	Professional Learning
RMSEA	Root Mean Square of Approximation
SDT	Self-Determination Theory

SLT	Senior Leadership Team
TLI	Tucker Lewis Index
WMS	What Matter Statements
WRMR	Weighted Root Mean Square Residual

CHAPTER 1.

GENERAL INTRODUCTION

'At a time where policy makers and curriculum developers do not read research and "teachers rarely take a scholarly approach to their work" (Bailey & Kirk, 2009, p. 4), there is a very real risk that research will continue to become increasingly irrelevant and will fail to support development in and of the subject. A link between critical research and critical practice is needed' (Casey & Larrson, 2018)

The Larger Context to the Present Thesis

Following reports of a 'crisis in education' in Wales, it has been suggested that high-quality education should be considered more than just academic attainment, which tends to drive policy development (Rees & Taylor, 2013). Wales is currently amid curriculum reform, encompassing a wide range of areas, including the National Strategy for Enquiry and Research, a National Approach to Professional Learning, and reform to Initial Teacher Education (Welsh Government, 2017a, 2017b). This transformation has included new professional standards for teaching and leadership that focus on five key areas: pedagogy, collaboration, professional learning, innovation, and leadership (Welsh Government, 2017a, 2017b). The on-going transformation in Welsh education reinforces the need for current educational research (such as work comprising this thesis) to embrace and potentially contribute to such desired change(s). In so doing, it is important to develop a transformational relationship between researchers and teachers that contributes to a programme of research that is robust scholarly, engages teachers and impacts practice. With a focus on developing new broader curricula, there has been a call for increased professional development in order for teachers to develop the skills and knowledge to enact new curriculum (OECD, 2019)

Within their report, Rees and Taylor (2013) suggested that the health and well-being of children should be considered as a measure of school effectiveness alongside educational attainment. Therefore, protecting play, socialisation, and chances to be active are critical in ensuring that wellness of pupils stays a priority (James et al., 2021). Two prominent researchers within the field of motivation confirm this focus on well-being for pupils in school environments:

'Yet more important than achievement outcomes, in our view, is students'

> psychological growth and wellness. Although not all students can or will excel at the cognitive agendas that are the central focus in many schools, schools should nonetheless be supportive contexts for development, provide conditions that enhance students' adaptive capacities and mental health, and, importantly, do no harm' (Ryan & Deci, 2020 p2)

Researchers have outlined that quality learning experiences are crucial to continuing participation in physical activity and PE (Kirk, 2005). Research findings on children's development and physical activity suggest several benefits of PE, including effects of social, emotive, cognitive, physical outcomes and children's overall lifestyle (Bailey et al, 2018; Song, 2020). Bailey & Kirk (2009) outlined the necessity for educational experiences that focus on the growth and expression of the body in ways that continue to become more apparent and compelling.

In Wales, emphasis placed on the potential benefits of PE have been supported by calls to make PE a greater priority and a core subject (Schools and physical activity task and finish group, 2013). Physical education entails experiences in which pupils learn to move' (i.e., increase their physical competence) and 'move to learn' (e.g., acquiring a range of skills and understandings beyond physical activity, such as cooperating with others) through movement (AFPE, 2015).

Considering the physical and mental benefits of physical activity (Bailey et al., 2009), almost 80% of children globally are not sufficiently active (Guthold, Stevens, Riley, & Bull, 2020). Data on the physical activity levels of children in Wales indicate that only 18% of children meeting the recommended levels of physical activity every week (Active Healthy Kids Wales, 2018). Not surprising given that so many children are insufficiently active, a significant amount of research has pinpointed the factors influencing children's physical activity motivations (Rhodes, Janssen, Bredin, Warburton, & Bauman, 2017). Motivational experiences in PE have been recognised as critical determinants of (Curran & Standage, 2017) children's physical activity levels inside and outside school (Hagger & Chatzisarantis, 2016; Abos, Murillo, Sevil-Serranno & Garcia-Gonzalez, 2021).

Therefore, addressing the quality and determinants of physical activity and PE is vital. Unfortunately, the New Curriculum for Wales does not explicitly mention PE (Welsh Gov, 2017). However, there has been the design of a new Health and Well-Being Area of Learning and Experience (AoLE; Welsh Government, 2017). A critical component of the new AoLEs is a series of What Matters Statements (WMS) linked and interrelated across the four domains of learning (Welsh Government, 2020).

Table 1.1

AoLE, Health and Well Being (Welsh Government, 2020, p. 74-75).

What Matter Statements (WMS)	Developing physical health and well-being has lifelong benefits.
	How we process and respond to our experiences affects our mental health and emotional well-being.
	Our decision -making impacts on the quality of our lives and the lives of others.
	How we engage with social influences shaped who we are and affect our health and well-being.
	Healthy relationships are fundamental to our well-being

Within this new health and well-being area of learning, there may be innovative opportunities for both PE and the way teachers deliver and implement PE into the curriculum. Considering the emphasis on research into the practice of the new curriculum, the focus on health and well-being, and the high numbers of young people in Wales, high-quality evidence is needed to inform curriculum reform and the implementation of this new curriculum.

Research in recent decades recognises that a teacher-created motivational climate plays a critical role in influencing the quality of pupils' motivation in PE (Duda, Papaioannou, Appleton & Quested, 2014). Nevertheless, teachers still suggest they have challenges motivating pupils (Turcotte, et al., 2018) and need further support to develop a more adaptive learning environment, motivational

climate and pupil motivation in PE (Verret, Grenier, Masse & Bergeron, 2017; Girard, Desbiens & Hogue, 2021). In order to create thriving pupils, we require thriving teachers (Ryan & Deci, 2020).

Over the last 30 years or more, the perceived motivational climate created by PE teachers has been considered from a psychological perspective (Morgan, 2017). Two critical social-cognitive theories of motivation that distinguish the types of teaching environments and understanding the impact of teacher's behaviours on pupils' motivation are achievement goal theory (AGT; Ames, 1992; Nicholls, 1989) and self-determination theory (SDT; Deci & Ryan, 1985, 2000). Both theoretical frameworks consider individual perceptions and recognise the influence of personal and environmental factors on motivation.

In recent years, Duda (2013) has developed a conceptualisation of the motivational climate integrating the theoretical concepts from AGT and SDT to give a fuller picture of the environment created by coaches and teachers. The motivational climate within this integrated framework is multidimensional. This climate can be considered more or less empowering and disempowering depending on its capacity to meet (or frustrate) individuals' needs (Duda and Appleton, 2016; Duda et al., 2018). Despite a considerable body of research into the concept of motivation within PE settings, it is still widely considered to be misunderstood as a concept by practitioners (Roberts 2012). This has significant implications for PE teachers to optimally facilitate a lifelong engagement in physical activity and promote a sense of well-being in their pupils. To do such, PE teachers must understand how to create an environment that fosters positive (high quality) motivation. While Denison, Mills and Konoval, (2015) suggested that coaches and teachers may use ‘empowering’ (in their view, athlete centred and autonomy supportive) strategies to normalise controlling behaviours, there is a consistent body of evidence that suggests engaging authentically in developing task focused and autonomy supportive behaviours (i.e., two aspects of what are considered empowering

behaviours according to Duda's framework, 2013) can have positive benefits for teachers/coaches and pupils/athletes (Duda et al., 2014).

It has been suggested that future research on the PE teacher-created motivational climate would benefit from adopting Duda's theoretical conceptualisation of the motivational climate (Milton, Appleton, Bryant & Duda, 2018). If there is to be a link between critical research and critical practice based on this framework (as advocated by Casey and Larrson, 2018), firstly there needs to be a robust measure of Duda's theoretically integrated conceptualisation of the motivational climate within PE settings. Secondly, a determination of the motivational processes and outcomes associated with empowering and disempowering motivational climate in PE settings is warranted. Finally, consideration needs to be given to motivation related interventions aiming to promote more empowering and less disempowering PE motivational climates that are based on Duda's conceptualisation. Such efforts could inform the content of professional development programmes (PDP) and determine the impact on practice for teaching practitioners.

To date, there has been a minimal attempt to measure the motivational environment created by PE teachers drawing from tenets and constructs, embedded within AGT and SDT through Duda's conceptualisation, and assess the concomitants. Furthermore, in regard to bridging the gap between theory and practice, there has been no attempt to assess and subsequently apply these concepts to the authors' knowledge. This thesis will aim to address gaps in the literature and promote the link between critical research and critical practice via the following objectives:

1. Test the validity and reliability of a multidimensional questionnaire that aims to assess the empowering and disempowering features of the motivational climate as created by the PE Teacher (EDMCQ-PE),

2. Cross-sectionally and over time, examine the relationships between the empowering and disempowering motivational climate created by the PE teacher to pupils' motivation and experienced enjoyment, concentration and boredom in PE,
3. Following the delivery of a bespoke training programme (*Empowering PE*™) which aims to facilitate PE teachers' understanding of what constitutes and contributes to more or less empowering and disempowering strategies and their effects, develop and support a professional development programme (which draws from principles of community of practice) focused on implementing empowering strategies to optimize the motivational climate created by teachers in PE over time.
4. Via mixed-methods, examine the impact of this multi-component intervention on PE teachers and their pupils

In regard to these objectives, it is necessary to outline and establish the core elements of AGT (Nicholls, 1989) and SDT (Deci & Ryan, 2000) to establish critical conceptual and theoretical frameworks underpinning this thesis. Relevant research grounded in these theories will also be reviewed.

Achievement Goal Theory

According to AGT (Nicholls, 1989; Ames, 1992; Roberts, 2001), at least two central achievement goals exist which reflect how pupils interpret their competence. More specifically, pupils could decide on their level of demonstrated competence according to a task- and ego-involved goal. A task-involved pupil views their competence as self-referenced and perceptions of success related to effort and mastery of the skill and/or task set. A principally ego-involved pupil tends to focus on external criteria to judge success, such as explicitly outperforming other pupils, demonstrating superior ability over others, and exerting minimal effort if necessary to demonstrate that superiority (Duda, 2001).

In the context of PE for example, teachers can engage in task-involving behaviours, which encourages pupils to adopt task-involved goals i.e., effort, working together, values learning and mastering tasks/skills. A teacher may also create an ego-involving motivational climate that supports pupils to adopt more ego-involved goals (Duda et al., 2014). Ego-involving behaviours would include emphasis on being the best, valuing talent and comparison and rivalry between pupils. A significant body of research has emphasised the adaptive and maladaptive consequences of task and ego involving motivational climates, respectively (see Duda & Balaguer, 2007, for a review of this literature). To date, from an AGT perspective, research has confirmed that a task-involving and less ego-involving climate predicts more adaptive motivational processes and outcomes in PE. Within PE, pupils' perceptions of a task involving climate predict enjoyment, increased well-being, better peer relationships, and effort, which leads to improved competence and more persistence in participation in PE (Duda et al., 2014, Duda & Balaguer, 2007). On the other hand, PE pupils' perceptions of ego involving motivation climates predict anxiety, reduced effort when failing, greater reported ill-being, reduced quality of relationships and disengagement in PE (Duda et al., 2014). This is supported by Jaitner et al.'s (2019) review of empirical research grounded in AGT, which suggested that there is particular pedagogical significance in promoting mastery goals and mastery climates if the aim is to promote psychological well-being, healthy living, increased sports participation and motor skill development in PE students. Further discussion is required regarding how to apply theoretical concepts and strategies to routine PE lessons in schools, which can be problematic given that PE teachers' attitudes have been described as primarily performance-pedagogical focused and reflecting a strong preference for sports, competition, and social comparison (Jaitner, Rinas, Becker et al., 2019).

In sport and PE settings, the motivational climate from an AGT perspective has been tapped using the Perceived Motivational Climate in Sport Questionnaire or the hierarchically structured

Perceived Motivational Climate in Sport Questionaire-2 (PMSCQ; Selfriz, Duda & Chi, 1992; PMCSQ-2; Newton, Duda, & Yin, 2000). The more recent PMSCQ-2 assesses two higher-order factors, task and ego involving climates, based on scores obtained on six subscales (Smith et al., 2015).

Self-Determination Theory

Self Determination Theory is a social-cognitive theory that provides a comprehensive approach to understanding the nature, antecedents and consequences of individuals' motivations. SDT explains how and why people engage (Deci & Ryan, 2000; Deci & Ryan, 2020). It also elucidates the differential qualities or types of engagement that arise from the different qualities of motivation (Reeve, 2012; Curran & Standage, 2017). Several mini theories within SDT look to explore aspects of motivation. One of the most prominent concepts is the support of basic psychological needs (Deci & Ryan, 2000).

SDT initially focused on understanding what contributes to variability in intrinsic motivation, where activities are completed for their own sake, engagement and fun are at the heart of the desire to continue (Ryan & Deci, 2017). However, intrinsic motivation is not always possible; thus, understanding the different forms of extrinsic motivation and their influence is equally important to understanding variability in motivation. According to SDT (Deci & Ryan, 2000), there are four major subtypes of extrinsic motivation, namely external regulation, introjected regulation, identified regulation and integrated regulation (Morgan, Milton & Longville, 2020). External regulation is linked to rewards and constraints, while introjected regulation is evident when there is a focus on pleasing/impressing others or avoiding feelings of guilt (Morgan et al., 2020). These external sources of motivation are considered controlling and contingent on outcomes (including internalised contingencies). While extrinsic motivation can sometimes regulate or motivate in the short term, little research suggests that this can lead to sustained engagement in physical activity (Teixeira, Carrac,

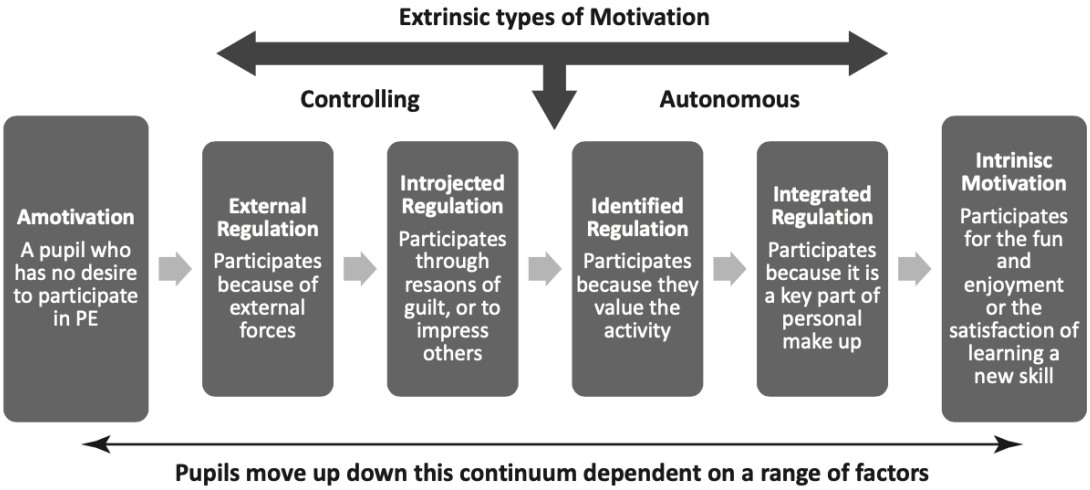
Markland, Silva & Ryan, 2012). Another practical implication of teachers supporting self-determined motivation in pupils is an increase psychological well-being (Bagoien, Halvari & Nesheim, 2010).

While external regulation and introjected regulation represent controlled motivation, some extrinsic motives can be enacted autonomously. People participate and put the effort in because they see the value of consciously identifying or personally endorsing the potential benefits of an activity (Deci & Ryan, 2000; 2020). This type of regulation is called identified regulation, where there is a high degree of choice or willingness to act. The most autonomous form of extrinsic motivation is integrated regulation, where the activity is a crucial part of the individual's makeup and matches their interests and core values (Morgan et al., 2020). These autonomous forms of extrinsic motivation share the idea of volition and a high degree of choice with intrinsic motivation but are primarily different as intrinsic motivation is grounded on interest and engagement (and the activity is satisfying in and of itself), whereas autonomous extrinsic motivation is based on identity and value (and in this case, as a means to an end; Deci & Ryan, 2000; 2020).

SDT (Deci & Ryan, 2000) also refers to amotivation, where people do not value, have an interest or have the competence to engage in the activity. Not surprisingly, amotivation strongly relates to a lack of engagement and other adverse psychological effects (Cheon, Reeve, Lee & Lee, 2017). Several visual displays have outlined these different motivation regulations as a continuum of motivation varying in their self-determination. The figure below represents one adapted for PE by Morgan et al. (2020).

Fig 1.1

Continuum of motivation (Morgan et al., 2020)



Within SDT research, there is an assumption that all individuals have a set of basic needs, which, if supported, will lead toward psychological growth, well-being and integration (Deci & Ryan, 2000; 2020). Therefore, it is thought that the quality of motivation and optimal performance occur due to the satisfying (or thwarting; Deci & Ryan, 2000; 2020) of these fundamental psychological nutriments. (Smith et al., 2015). Autonomy, competence and relatedness have been identified as the fundamental, basic psychological needs (Deci & Ryan, 2000; 2020). Autonomy refers to the extent to which people feel a sense of ownership and initiative where individuals act according to their interests and are the origin of their actions (Deci & Ryan, 2000; 2020). Competence is fulfilled when individuals feel that they can succeed and grow and experience a sense of mastery (Deci & Ryan, 2000; 2020). Relatedness is realised when individuals sense belonging and connection while being respected and cared for by others (Deci & Ryan, 2000; 2020). Many studies in sport and PE have maintained the links between supporting basic psychological needs and adaptive motivational processes (i.e., greater autonomous motivation) and positive outcomes (Duda et al., 2014).

SDT based research within PE has typically focused on autonomy support (Amorose & Anderson-Butcher, 2007; Bartholomew, Ntoumanis, & Thøgersen-Ntoumanis, 2010). Studies have examined the effects of more autonomy support in PE as perceived to be manifested (Cheon, Reeve, Ju & Jang, 2014; Gonzalez-Cutre, Sicilia, Beas-Jimenez & Hagger, 2014; Ntoumanis, 2012; Standage

et al., 2007). SDT considers features of the social environment that hold implications for basic psychological need satisfaction (as well as need frustration). An autonomy-supportive PE teacher is aware of his or her pupils' preferences and offers meaningful alternatives. Decisions about learning and mastery are made with the pupil in mind, and requests are accompanied by a meaningful rationale (Cheon & Reeve, 2013). Within a socially supportive environment, each pupil feels important, valued, and cared for as a student and individual (Mageau & Vallerand, 2003). PE research indicates that such environments positively predict need satisfaction and ensuing autonomous motivation (Cheon et al., 2012), which has been found to correspond to pupils' increased classroom engagement, skill development and future intentions to participate in physical activity (Cheon et al, 2012).

Other research in the field of education, PE and sport has shown the effectiveness of intervention studies that aim to enhance autonomy supportive behaviours (Hastie, Rudisill & Wadsworth, 2013; Su & Reeve, 2011), addressing the social environment created by significant others (Bartholomew et al., 2010; Hagger, Chatzisarantis, Culverhouse & Biddle, 2003; Mageau & Vallerand, 2003; Wallhead, Gran & Vidoni, 2014) and reducing sedentary behaviour/increasing physical activity in PE (Lonsdale et al., 2013). This extensive body of research indicates that teachers can benefit from understanding and developing strategies that support student autonomy and their students benefit from the greater employment of such strategies.

Undoubtedly, this abundance of SDT research, specifically within education settings, supports the fundamental principles of promoting more autonomy supportive teacher behaviour to developing increased quality motivation and associated outcomes in PE pupils. Furthermore, SDT also supports the concept that specific environments can thwart basic psychological needs (Smith et al., 2015). An individual's autonomy, competence and relatedness can be actively blocked by maladaptive strategies and behaviours (Bartholomew, Ntoumanis, & Thøgersen-Ntoumanis, 2011). This is apparent, particularly in teachers who develop more controlling environments (Duda et al., 2014). For instance,

not all choices will allow pupils to experience positive autonomous feelings. Meaningless choices, i.e., choices that implicitly create pressure or choices a pupil does not want to make, will thwart the basic psychological needs and thus reduce the quality of motivation (Assor, Kaplan & Roth, 2002; Moller, Deci & Ryan, 2006). Reeve (2009) suggests that PE teachers still engage in controlling behaviours due to the long-standing beliefs that they demonstrate a higher level of competence by the teacher and are more effective. Without control, it is not easy to structure practical lessons. This indicates that further research is needed to understand this complex motivational landscape.

There is a careful balance for PE teachers to develop strategies and apply them in practice with explicit knowledge of the role between structure and control. To some, structure features may seem in conflict with the sense of providing autonomy and choice for pupils (Curran & Standage, 2017). It is, however, possible to maintain autonomy while creating a sense of supporting structure. In such cases, for example, the teacher needs to provide a meaningful rationale for what students are needing to do. Jang et al., (2010) recommend providing clear expectations and structures in a particular context where teachers maintain voice and choice, enabling pupils to retain autonomy and foster competence. It is important to note that teachers who develop autonomy-supportive behaviours typically support pupils' other basic psychological needs (Aelterman et al., 2016). It has been suggested that a limitation of SDT literature is the assumption that the impact on motivation and subsequent consequences develops in theoretically expected ways irrespective of context (Standage, Duda & Ntoumanis, 2003).

In the case of SDT-based research, PE-centred studies have tended to rely on self-report measure of the motivational climate. PE settings have often adapted items from other questionnaires to provide ratings for autonomy support; for example, the Health Care Climate Questionnaire (HCCQ; Williams, Grow, Freedman, Ryan & Deci, 1996) in addition to the Teacher as Social Context Questionnaire (TASCQ; Belmont, Skinner, Wellborn & Connell, 1988). The TASCQ has also

provided ratings on interpersonal involvement. Bartholomew and colleagues developed a questionnaire to assess Controlling Coaching Behaviour Scale (CCBS) (Bartholomew et al. 2010). Teachers who use controlling behaviours pressurise pupils and tend to be punish mistakes, provide overt normative and favour certain pupils (Ames, 1992; Bartholmew et al., 2009; Newton et al., 2000).

While there has been a considerable body of research in both AGT and SDT, there is a suggestion that many PE contexts are still not creating the need for supportive contexts to develop quality motivation (Ryan & Deci, 2020). Motivational processes of pupils need to be more directly linked with specific teaching practices (Kadir, Yeung, Ryan, Forbes, & Diallo, 2018; Rogat, Witham & Chinn, 2014). Policies and authentic learning opportunities to develop pupil motivation and engagement have not been widely adopted (Patel & Zambrano, 2019). According to Ryan and Deci (2020), these are gaps that we should be aspiring to close. It has been argued, given existent AGT and SDT-based research, that a more complete picture of the motivational climate (Duda, 2013) is needed. Duda's theoretically integrated model of the PE teacher created motivational climate, which is reviewed next, can provide such a picture (Milton et al., 2018) and facilitate the development of more multi-dimensional interventions (Gonzalez-Cutre et al., 2014).

A Theoretically Integrated Conceptualisation of the Teacher-Created Motivational Environment

Considering the plethora of evidence regarding the implications of the motivational climate as conceptualisation based on the tenets of SDT or AGT, an integrated framework has been proposed where the motivational climate is considered from both perspectives (Duda, 2013). Both theoretical frameworks recognise the influence of personal and environmental factors on motivation (Duda & Appleton, 2016; Duda et al., 2018). In support of considering facets of the motivational climate from both perspectives, Standage and Treasure (2002) suggested that considering the constructs and

overarching tenets of both SDT and AGT corresponded to positive associations to task/mastery orientations and more self-determined forms of motivation and negative associations between amotivation and external regulation. A task-involving/mastery climate and the provision of autonomy support by the teacher positively predicted intrinsic motivation in PE (Ommundsen & Kvalo, 2007). At the same time, pupils who experienced autonomy-supportive environments regardless of their achievement involvement persisted longer and experienced greater enjoyment than those pupils in controlling conditions (Spray, Wang, Biddle & Chatzisarantis, 2006). More recently, research has indicated that autonomy-supportive climates for pupils will benefit from also fostering a mastery climate regardless of the motivational profiles and abilities of the pupils (Wilhelmsen, Sorensen & Seippel, 2019).

Duda's (2013) integrated approach proposed that environments high in autonomy support, relatedness support and task involved would be more adaptive and considered ‘empowering’. Conversely, an environment that promotes ego-involving and controlling behaviours would be maladaptive and ‘disempowering’. Regardless of the pupil’s achievement level in sport or PE, past research concerning the motivational climate suggests that PE teachers and coaches who are more empowering will foster enjoyment, commitment, and persistence and increase intrinsic motivation in all pupils (Duda et al., 2014). Conversely, teachers and coaches who adopt more disempowering strategies increase young people’s experience of anxiety, intention to dropout, and decreases in effort (Duda et al., 2014)

In order to assess the degree to which the PE-teacher created motivational climate is empowering or disempowering, a valid and reliable measure is needed. While the Motivational Climate in Physical Education Scale (MCPES; Soini, Liukkonen, Watt, Yli-Piipari & Jaakkola, 2014) evaluates some dimensions of the motivational climate, it does not capture any of the perceived controlling behaviours of teachers and coaches. Within a coaching environment, Appleton et al.

(2016) pulled from Duda's framework to develop the Empowering and Disempowering Motivational Climate Questionnaire (EDMCQ). This was the first questionnaire developed using Duda's framework but to date, no reliable and validated measure assesses the teacher created motivational climate using Duda's conceptualisation within a PE setting. With such a bespoke measure, it would be possible to ascertain the potential implications of empowering and disempowering motivational climates on students' motivation and responses in PE.

The significant role PE teachers in structuring an environment that impacts the quality of engagement in pupils

As described above, there has been a significant body of literature supporting the impact of the motivational climate created by teachers (e.g., Curran & Standage, 2017; Jakkola et al., 2017). Many studies have demonstrated how the use of fostering autonomy support, encouraging communication, providing rationales and offering genuine choice can have a significant impact on developing pupils' motivation (Aelterman et al., 2019, Mastagli, Van Hoye, Hainaut & Bolmot, 2021). Similarly, those teachers who are considerate of pupils, take into account their problems, develop trust and respect and invest time and energy into knowing pupils also impact the climate created (Vasconcellos et al., 2019). Recent research in PE settings has confirmed support for creating empowering motivational climates, which was associated with improved concentration and reduced distraction (Mastagli et al., 2021). Despite how much we know from theory and the motivational literature about the environment and conditions that promote quality motivation, engagement, and authentic learning, specific policies and training on motivation have not yet been widely adopted (Patall & Zambrano, 2019). Further evidence of Duda's conceptualisation of the motivational climate and its effects on pupils has to be gathered.

In the validation of the Empowering and Disempowering Motivational Climate Questionnaire for coaches (EDMCQ-C; Appleton, Ntoumanis, Quested, Viladrich & Duda, 2016), Appleton and

colleagues suggested that future research diversify samples and consider other types of sports and settings when examining the psychometric properties of the empowering and disempowering dimensions (Duda, 2013). Relevant to the present work, studies are needed which would validate the EDMCQ within a PE setting and provide further evidence regarding the potential benefits of developing more empowering and less empowering disempowering motivational climates in this context. From a pedagogical and practical perspective, the administration of the EDMCQ to PE pupils would allow teachers and researchers to ascertain the motivational climate created within particular PE programmes. This information could provide further justification for developing continuing professional development (CPD; please note within this chapter CPD will generally be called professional development programmes; PDP) and professional learning (PL) opportunities for teachers (Milton et al., 2018). However, to do this, there needs to be careful instrument development which is critical if there is to be any confidence in the validity and reliability of the measures employed (Messick, 1995). It has been pointed out that specific to assessments of motivation in educational settings, all too often, there has been limited attention paid to the validity of the assessment tools (Lonsdale, Sabiston, Taylor & Ntoumanis, 2010).

Critical research to critical practice in physical education: Developing effective professional development programmes

It has been suggested that theory-informed and evidence-based practices are vital in PE (Rodrigues, et al., 2020). In order to make significant changes in practice, there is a need to transform the traditional PE teacher habitus (Jaitner et al., 2019). Developing motivational climates that focus on autonomy support and relatedness, which are task involving and focused on the demonstration of effort, has been found to correspond to greater self-determined motivation and-moderate to vigorous physical activity (MVPA) PE pupils (Chen, Wang, Wang & Zhou, 2020). As suggested by Hancox et al. (2016), developing training programmes for teachers which draw from Duda's (2013) multi-

dimensional conceptualisation of the motivational climate, are likely to hold significant positive implications for the teachers and pupils alike. There is limited evidence on the effect of interventions to developing PE teachers' motivational strategies and the subsequent impact on pupil motivation (Borghouts et al., 2021). Such interventions are critical for pupils to become more self-directed and lifelong learners (Ryan & Deci, 2017).

Deppeler (2010) suggests that mere knowledge transmission is insufficient to support changes in practice in the field of education. Professional development is advised to address 'real' difficulties encountered in the field and help develop close links between theory and practice (Girard et al., 2021). Professional development programmes in PE can help teachers improve the content of what they teach and understanding of optimal learning strategies (Harris, Cale & Musson, 2012). However, most CPD/PDP offerings (including those focused on PE) tend to be quick, one-day courses held outside the school (Jess, McEvilly, & Carse, 2016, Edwards et al., 2018). Although workshop-based training can be excellent in conveying a significant amount of material in a short amount of time, it is well recognised that the content covered during the traditional one-day professional development programmes can be both superficial and ineffective (Hunzicker, 2011). Teachers frequently dispute the effectiveness of these short courses and are often "passive consumers" rather than actively participating in their development (Armour & Yelling, 2004). To ensure a long-term change in educational practice, it must be embedded in teachers' everyday work, theoretically based, empirically supported and delivered by experienced facilitators who recognise and understand the complexities of teachers' day-to-day work (Armour and Yelling 2010; Armour and Makopoulou 2012; Aelterman et al., 2013, Aelterman, Vansteenkiste, Van Keer, & Haerens, 2016; Girard et al., 2021; Viens, Dubé, & Guay, 2019). To achieve such purposes, how the PDP is developed becomes critical and whether the PDP also takes into account the realities of the specific school context and teachers' motivation/what they feel they need. (Girard et al., 2021).

It has been stated that there is a lack of evidence for the impact of PDP and PL across the whole field of physical education and that there is a need to focus on supporting PE teachers more effectively (Armour, Makopoulou, and Chambers, 2012). Recent research has demonstrated the effectiveness of teachers understanding of motivating strategies; however, the observed effect sizes were small, suggesting that they are having a limited impact (Makopulou, Penney, Neville & Thomas, 2019). In recent years there has been conflicting evidence about the need, quality, availability and success of such PDP. For instance, Lander, Eather, Morgan, Salmon & Barnett (2017) suggest that ongoing (rather than one-off) professional development appears to be a key element of effective interventions in PE curriculums. Makopoulou's (2018) findings imply that effective tutoring is a dynamic, intricate, and multifaceted process. In order for tutors to develop a nuanced and critical understanding of the pertinent literature and their own practises, it is crucial that those responsible for educating PDP providers provide meaningful, clear and relevant and ongoing support. Makooulou's findings reinforce the challenges and complexities that are faced when developing effective PDPs. Research also suggests that there is both considerable variability (Lander et al., 2017) and relatively few intervention studies to date that look at motivational strategies and need supportive training for teachers (Aelterman et al., 2013; Sparks, Lonsdale, Dimmock & Jackson, 2017; Girard et al., 2021). Further limitations of the interventions implemented to date include reliance on either pupil or staff perceptions, omission of baseline measurements and omission of some dimensions of the motivational climate (Aelterman et al., 2013; Girard et al., 2021).

In order to develop our knowledge in this area, there are recommendations that motivation-based interventions are central to understanding why some pupils display high levels of enjoyment, emotional and cognitive engagement in comparison to those that exhibit a lack of interest, experience boredom and exhibit a lack of effort (Curran & Standage, 2017). A central focus for such PE interventions is understanding the motivational climate and facilitating pupils' autonomous

motivation alongside promoting their engagement (Curran & Standage, 2017; Girard et al., 2021). A more sustained approach to the teacher training component, ongoing consultation with the teachers, a comprehensive intervention that includes pedagogical strategies applied to practice and sound measurement of the research design elements (Lander et al., 2017). Other considerations in developing compelling motivation-based interventions were ensuring at least two measurement times (Tessier, Sarrazin, & Ntoumanis, 2010), considering all theoretically-relevant dimensions of the motivational climate (Legg, Newland & Bigelow, 2018). The conducting in-depth qualitative case study research, before and after the intervention, is also advocated to provide rich, contextualised, meaningful accounts of the motivational picture (Mitchell et al., 2013).

Communities of Practice (CoP) have offered one potential solution to developing professional development programmes (PDPs) that support embedding time and teacher collaboration within them (Casey & Goodyear, 2015). While attention to and research on CoPs is increasing, there is still only a small body of empirical research examining the effectiveness of teacher-based learning communities (Yoon & Armour, 2017). Lave and Wenger (1991) and Wenger (1998) established the concepts of contextual learning and CoP, which provide a new way of thinking about teacher learning (Korthagen 2010; Levine & Marcus 2010; Lieberman & Miller 2011; Wenger-Trayner & Wenger-Trayner 2015). Within a PE context, Borghouts et al. (2021) has made a call for more elaborate CoP based professional development programmes which make sure that teachers are involved and experience ownership over their individual, departmental goals and direction of their learning. The potential advantages of CoP to embed motivation-related strategies in practice over time have also been highlighted in the work of Girard and colleagues (2021). Engaging in PDPs involving CoP would allow the researcher to document emerging issues while supporting, refining, and innovating the approach taken within the context at hand (Fleitz, 2004).

Overall Methodological Approach to the Thesis

Recognising that a researcher's philosophical perspective will influence how their research endeavours are designed (Kivunja & & Kuyini, 2017) is critical. My qualified Teacher Status (QTS) and twelve years of teaching in school settings across both Wales and Australia, alongside my understanding of pedagogy, schools and young people's physical activity participation, proved advantageous in the contexts of this thesis. When introduced initially to the theoretical concepts at the heart of this thesis, they impacted me as a teacher, coach, lecturer and father. Undoubtedly my experiences have shaped the series of studies comprising this thesis through the knowledge gained, connections established within the field and potential agency. These experiences, along with the reflexive space a PhD allows, impacted in return the dissertation's theoretical, methodological and empirical foundations. This reflexive approach allowed me, the researcher (with a teaching and coaching background), to visualise, apply and think deeply about the direction of the programme of study. For example, methodologically, my experiences as both a teacher and coach informed the item adaption for the questionnaire assessing the empowering and disempowering features of the motivational climate and the application of the theoretical concepts in teaching. Finally, my previous teaching experiences were critical in my being able to both access and be accepted as a boundary spanner within the school PE setting as part of the professional development programme described in this thesis.

A researcher's reflexivity is required to ensure that they are always aware of their influences on the research participants and procedures (Charmaz, 2014). Berger (2015) argued that the reflexivity of researchers influences the overall research process in three ways: when researchers: a) share the experience of research participants; b) move from an outsider to an insider of the study context, and c) have no personal familiarity with research participants. In the following paragraphs, I present different aspects of my experience as they influenced the project in order to examine the influence of my subjectivity as a researcher (Peshkin, 1988).

I was a PE teacher for ten years, working in Australia and Wales. In my earlier years, I was passionate about enhancing the motivation of pupils, the quality of teaching, and my learning and was fortunate to participate in various PE and Coaching CPD programmes. As I developed, it was apparent that the CPDs only had a fleeting effect on my practice. However, working with teaching colleagues alongside my coaching roles, the influence of mentors significantly impacted my development in positive and sustained way. I completed an MSc in feedback which again impacted my digital skills and approaches to learning. However, being a teacher, coach, and researcher impacted my work-life balance. It became the norm to study and work late into the night alongside my wife, a primary school senior leader and headteacher who was also very busy.

My experiences coaching rugby both at the university and the national U18s significantly impacted how I saw myself as a practitioner and influenced my coaching and career direction, where I moved into higher education and started my PhD. My experiences as a teacher and coach led me to this PhD project when it came to my attention, and I held high regard to learning new skills and applying the theoretical concepts to my practice. Furthermore, my experiences as a PE teacher and international rugby coach gave me access to several PE teachers and schools that could help support the project. The novelty and hard work of establishing a quantitative measure to assess the motivational climate at the start of the PhD gave me enormous personal satisfaction. The last part of the project, where I engaged in a professional development programme using the principles of CoP, gave me the most satisfaction and pleasure. This study was developed for the following three reasons 1. My unique experiences, 2. Ease of access to the sample for the project, and 3. My wanting to learn more about and apply the theoretical concepts to practice.

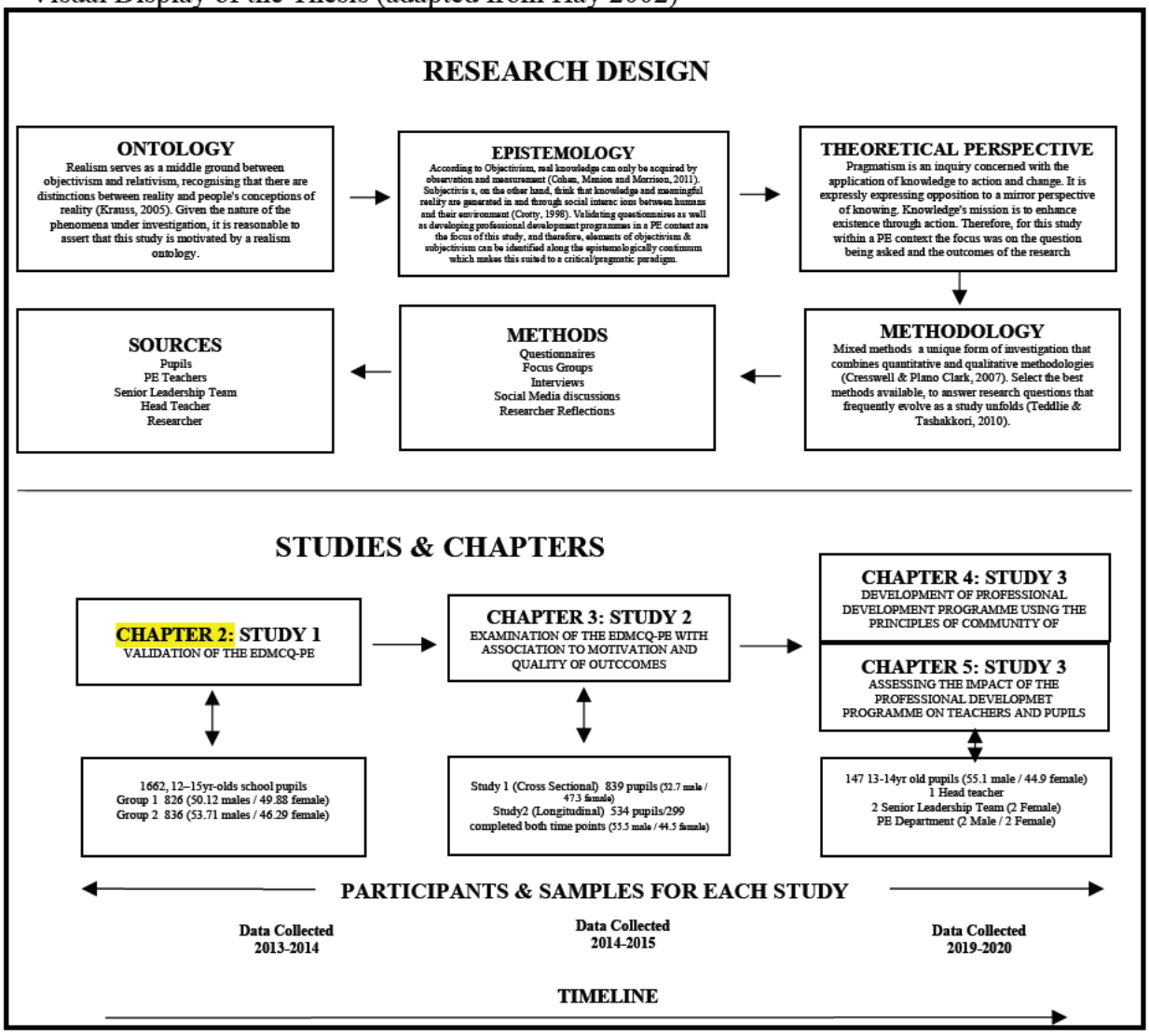
The experiences outlined above have consciously and unconsciously influenced the overall research process underpinning this thesis. The teaching experience helped me better understand the research participants and their work contexts. This experience was critical when administering and

interpreting responses to the questionnaires and also designing the PDP. On the one hand, my teaching experiences enabled 'teacher buy-in' and a level of authenticity to the development of the PDP and application of strategies linked to the theory. On the other hand, my experiences could also be very similar to those of the participants, inhibiting a fresh outlook or thinking outside the box (Corbin & Strauss, 2008). In order to counter this, I kept an audio reflective diary to increase my awareness and take a wider perspective (Casey & McPhail, 2018)

This thesis comprises three studies and four empirical chapters (See Figure 1.2) designed to meet the overall aims, which are: (1) to validate a measure of the empowering and disempowering features of the motivational climate created by secondary school PE teachers, (2) determine the relationships between perceptions of the empowering and disempowering facets of the teacher-created motivational climate to pupils' quality of motivation and associated outcomes, and (3) to create, implement and examine the impact of an intervention designed to support the development of empowering motivational climates via the delivery of a bespoke workshop (*Empowering PE*™) and associated community of practice.

Figure 1.2

Visual Display of the Thesis (adapted from Hay 2002)



As a former PE teacher and applied researcher, the aims of the thesis research which were addressed within an applied educational context lent itself to the adoption of a pragmatic paradigm. The pragmatic paradigm is more concerned with the 'questions to be asked and the research outcomes than with the theory that underpins it' (Feilzer, 2010, p.7). According to Creswell and Plano (2007), the pragmatic paradigm theoretically recognises the existence of unique and multiple realities that can be objectively studied and focuses on resolving practical difficulties in the actual world. They assert that this liberates the researcher from the limits imposed by the necessity of choosing between positivism and interpretivism/constructivism perspectives.

Tashakkori and Teddlie (2009, p. 342) define pragmatism as a 'deconstructive worldview that rejects terms such as 'truth' and 'reality' in favour of 'what works' as the truth of the research topics under 'examination.' One of this perspective's appeals is that it enables the researcher to employ a variety of techniques to resolving problems based on real-world experience (Creswell, 2009). Christ (2013) concurs, arguing that a researcher's philosophical approach should not be so rigid as to confine views to an either-or position. He asserts that numerous authors of mixed methods literature advocate for pragmatism to oppose dichotomous modes of thought. The purpose of mixed methods research is to bridge this divide by quantitatively quantifying some properties of the phenomena in issue while qualitatively capturing others (Christ 2013). In regard to this point, Kivunja and Kuyini (2017) suggest that a pragmatic approach allows the researcher to choose the most appropriate research methods for the purpose, with an emphasis on workability and with the intent to gain knowledge specific to the research questions. This pragmatic paradigm advocates that relationships in research are best determined by what the researcher deems appropriate for that particular study, that there is no single reality and that all individuals have their own unique interpretations of reality, that a mixed-methods methodology is permissible, and that research should be conducted for the benefit of people. (Kivunja and Kuyini, 2017). There has been increasing calls in physical education, in order to stimulate self-development, professional self-expression and recognition, that more pragmatic approaches are both warranted and needed (Palamarchuk et al., 2020).

The mixed-methods approach allowed this researcher to address a number of the methodological gaps within the literature. Firstly, there has been a call for multi-method research to extend past ADT and SDT research where time and resources allow (Smith et al., 2015), and obviously this same point is relevant to Duda's theoretically integrated model. Secondly, there have been calls for more qualitative work using motivational theories and conducted within the

educational environments where the detailed picture of experiences, practice and motives need to be explored. Thirdly, longitudinal designs measuring different outcomes in the case of robust samples in relation to and the climate dimensions have been advocated by Appleton and Duda (2016). Finally, there has been a call to establish the role of motivation as a domain within physical literacy and the need to measure it as part of effective interventions (Carl et al., 2021). Therefore, this thesis can contribute to understanding motivation and the role it can play within physical literacy research.

The Impetus for the Research Program Comprising this Thesis

Grounded in Duda's (2013) recent integration of concepts and tenets embedded in AGT and SDT, this thesis comprises a series of studies aimed at firstly developing a valid and reliable measure to assess the teacher-created motivational climate in PE based on Duda's integrated framework. Secondly, to examine the relationship between perceptions of the motivational climate, pupils' motivation and quality of engagement in PE. Thirdly, this thesis entailed the development and support of a multi-component PDP using the principles of a CoP to promote PE teachers' implementation of empowering behaviours. Overall, the studies conducted as part of this thesis aim to move to apply and SDT and AGT (or the integrated model) which have been limited to one methodology and set of methods. In trying to address the multifaceted nature of these theories and the attempts to bridge critical research to critical practice, the approach taken aimed to address methodological, conceptual and application to practice gaps within the motivation intervention-based literature (Duda, 2001; Appleton & Duda, 2016; Ryan & Deci, 2020; Smith et al., 2015). Within the thesis as a whole, data were collected from teachers and pupils in educational settings across Wales and both quantitative and qualitative methods were employed.

Chapter two addresses the need to develop and adapt an existing motivational climate questionnaire from sport, grounded in Duda's (2013) integrated conceptualisation of the environment, and adapt and validate it within a PE context. Existing questionnaires assessing the perceived

motivational climate in PE (e.g., Soini et al.'s (2014) have tended to focus on only a few particular features of the motivational environment (i.e., their item content is either AGT or SDT based). Their item content does not assess the multi-dimensional features of the environment relevant to AGT *and* SDT and as assumed in Duda's (2013) model. Furthermore, none of the current measures of the motivational climate manifested in PE captures the higher-order constructs of empowering and disempowering environment recently described by Duda (2013). Establishing the EDMCQ-PE as a psychometrically sound instrument would make a significant contribution to the PE literature by

1. Providing researchers with a valid and reliable questionnaire that captures the empowering and disempowering strategies used by PE teachers,
2. Allowing for the examination of the correlates and antecedents of these motivation-related teaching climates, and
3. Allowing for the evaluation of interventions designed to change the motivational strategies (in regard to empowering and disempowering aspects) used by PE teachers.

An essential process in developing a new measure is to take a robust approach to validation techniques, including modelling the factor structure. CFA and ESEM are statistical techniques for determining a scale's factor structure. Internal consistency can be tested using Cronbach alpha which allows researchers to test the degree to which all items in a scale measure different aspects of the same attribute (Clark & Watson, 1995). A further focus of Chapter two was to test the factorial validity of the bespoke measure (i.e., the EDMCQ-PE). Marsh, Hau and Wen (2004) proposed that, in preliminary investigations, researchers consider a number of findings regarding a scale's factor structure (i.e., model fit, standardised factor loadings and factor correlations). In order to test the factorial validity of the scale, the processes outlined by Morin, Arens and Marsh (2016) were used in Chapter two. Finally, the study conducted in Chapter 2 assessed the gender invariance of the samples via the recommendations by Millsap and Yun-Tein, (2004). Testing invariance ensures meaningful

latent mean comparisons across relevant groups (Marsh, Nagengast & Morin, 2013). In the present work, invariance in the responses provided by male and female secondary pupils was tested.

Building on Chapter two and addressing several important issues related to AGT and SDT research (Keegan, Spray Harwood & Lavallee, 2011; Ntoumanis, 2012), the study conducted in Chapter three examined the relationships between the perceived empowering and disempowering features of the motivational climate, pupils' motivation and reported enjoyment, boredom and concentration in PE. Two studies were conducted involving cross-sectional and longitudinal samples and employing the validated EDMCQ-PE along with other validated measures of motivation and the targeted outcomes. Study one tested the hypothesised model at a single time point during the school year using two samples of school pupils. The model was then support longitudinally across two school years using a similar but distinct (from those recruited in study one) sample of secondary school pupils. Establishing whether the hypothesised correlations and mediating effects were supported and repeated within and across the three samples, as well as cross-sectionally and over time, offers originality, significance, and rigour to research on motivational climate and PE. There has been a dearth of research conducted so far to evaluate Duda's (2013) conceptual model in PE contexts, and longitudinal research has been scarce (Appleton & Duda, 2016; Liu, Xiang, Lee, & Li, 2017; Sun, Li, & Shen, 2017) to analyse changes in AGT or SDT hypothesised associations over time.

The initial focus of Chapter three was to create a parcelling approach to estimate the latent constructs of empowering and disempowering climates and autonomous and controlled motivation. When estimating complex structural models, parcelling has substantial advantages. For example, it is more stable, less parsimonious, and less biased (Little, Cunningham, Shahar, & Widaman, 2002; Kline, 2010). Therefore, this was an essential step to examine a complex structural model containing the constructs of the motivational climate, motivation and relevant outcomes. Using the approaches recommended by Little et al., (2002) and Kline (2010), a pragmatic approach to parcelling was taken.

The second aim was to test the hypothesised model using Structural Equation Modelling (SEM), firstly by randomly splitting the sample and then testing the model in both samples, allowing a robust approach to validity and reliability (Morin & Maiano, 2011). Following this and Kline's (2010) suggestions, the measurement models' overall fit was tested along with the mediating role of motivation using approaches successfully implemented in previous studies with similar samples and measures (e.g., Felton & Jowett, 2013).

A secondary aim of Chapter three was to subsequently expand the cross-sectional results gained by testing the model with an independent sample over two-time points. Collecting data at more than one point throughout the school year allowed the examination of whether changes in one variable (autonomous motivation, for example) over time were predicted by another one (e.g., perceived empowering climate). This longitudinal study can further the understanding of inter-relations between the variables across time (Stenling, Ivarsson & Lindwall, 2017). The specific research questions regarding hypothesised mediation in the longitudinal model were answered using a structural equation path model. The equivalence of factor loadings and the indirect effects between the variables were tested.

Having validated and tested the EDMCQ-PE in practice, Chapter four aimed to develop a research-informed PDP using Community of Practice (CoP) principles to improve teachers' understanding of pupil motivation, the motivational climate and promotion of empowering strategies (and decreasing of disempowering PE teacher behaviours). Multiple sources of qualitative data informed the study, with the purpose of this longitudinal research being to analyse the benefits, challenges and key considerations when implementing a PDP using principles of CoP. The project was divided into four distinct phases:

1. Needs assessment (i.e., Edwards et al., 2019),
2. Delivery of a theory-based training programme focused on improving the

motivational climate in PE classes and promoting high-quality, more self-determined motivation in pupils (the *Empowering PE*™ workshop),

3. Establishment and continuation of a professional development programme (aimed at facilitating more empowering/less disempowering motivational climates in PE) based on principles of Community of Practice, and
4. Post-intervention assessment

Chapter four contributes to the current literature by furthering the understanding of developing effective PDPs using the principles of CoP in PE settings.

The final study described in Chapter five focuses on implementing the *Empowering PE*™ teacher training workshop and a follow-up PDP (delivered within a CoP). The impact of the multi-component intervention on teachers' understanding of motivation and reported motivational strategies and pupils' motivation and quality of engagement were examined. No previous studies, grounded in Duda's (2013) conceptualisation of the motivational climate, have examined the impacts of an intervention to improve PE teachers' understanding of building motivational climate-enhancing tactics (and related motivational strategies) via a longitudinal mixed-methods study. A concurrent mixed methods approach that allowed an in-depth study of this particular school used multiple sources of qualitative (interviews, focus groups and online social media groups) and quantitative (responses to questionnaire) data. The quantitative and qualitative methods were chosen to complement each other and answer different research questions within the overall purpose of this research (Schoonenboom & Johnson, 2017). In this context, the pupils' perceptions were collected via pre and post questionnaires using the validated EDMCQ-PE alongside other relevant measures. The teachers' understanding of motivation, the motivational climate and strategies used pre, during, and post-intervention were ascertained via interviews, focus groups, and an online social media

collaborative tool to gain a fuller picture of views on perceived pupil motivation engagement and the evolving motivational climate within the school setting.

Chapter six, the overall discussion and conclusion, summarises the key findings and learnings from the four preceding chapters and discusses three critical themes that emerged: (a) the validity of the EDMCQ-PE, (b) the confirmation of the differential implications that empowering and disempowering motivational climates can hold within the PE context, and (c) the role that theoretically informed, sustained PDPs can have on teacher practice, pupil engagement and the potential role they have to play at a time of curriculum reform in Wales.

CHAPTER 2.

Initial validation of the teacher-created Empowering and Disempowering

Motivational Climate Questionnaire in PE (EDMCQ-PE)

The following manuscript is 'published' in the *Journal of Teaching and Physical Education*

Milton, D., Appleton, P. R., Bryant, A., & Duda, J. L. (2018). Initial validation of the teacher-created empowering and disempowering motivational climate questionnaire in physical education. *Journal of Teaching in Physical Education*, *37*(4), 340-351.

Abstract

Purpose: Guided by Duda's (2013) hierarchical conceptualization of the motivational climate that draws from self-determination and achievement goal theories, this study provides initial evidence of the psychometric properties of the Empowering and Disempowering Motivational Climate Questionnaire-PE (EDMCQ-PE).

Method: Questionnaire-based with two samples of Welsh secondary school pupils.

Results: Exploratory structural equation modelling (ESEM) provided a better fit of the data to the hypothesised model than confirmatory factor analysis. Moreover, a two-factor composite (i.e., empowering and disempowering) lower-order model provided an acceptable fit and clear parameter estimates. This two-factor model also demonstrated scalar gender measurement invariance.

Discussion: The evidence from this study suggests the EDMCQ-PE is a promising scale for the assessment of secondary school pupils' perceptions of the empowering and disempowering features of the motivational climate created by their physical education (PE) teachers. Moving forward, the statistical approach employed in this paper can inform future studies that develop questionnaire methodology in physical education (PE) and from an applied perspective, the EDMCQ-PE can be used by researchers and teachers to assess the motivational climate in PE and help inform the pedagogy underpinning teachers' classes.

Keywords: achievement goal theory; self-determination theory; ESEM

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Introduction

Despite the many benefits of Physical Education (PE), not all pupils have an empowering experience in PE. For example, 35% of Welsh children do not enjoy school sport and PE (Sport Wales, 2015). Over 20 years of research confirms that a key determinant of the quality of a pupil's experience in PE is the teacher-created motivational climate (Duda, et al., 2014). Recently, Duda (2013; Duda & Appleton, 2016) suggested a hierarchical and multidimensional conceptualization of the coach-created motivational climate that integrates the major social environmental dimensions emphasized within achievement goal theory (AGT; Ames, 1992; Nicholls, 1989) and self-determination theory (SDT; Deci & Ryan, 1985, 2000). Duda's conceptualization suggests the motivational climate created is multidimensional and can be more or less 'empowering' and 'disempowering.' Given the motivational climate created by teachers in PE has received considerable attention in previous research from an AGT or SDT perspective, and holds important pedagogical implications for pupils' motivation (Braithwaite, Spray & Warburton, 2011), the quality and quantity of their engagement and learning (Reeve, 2012), levels of moderate-to-vigorous physical activity, and psychological responses in PE (Van den Berghe, Vansteenkiste, Cardon, Kirk, & Haerens, 2014), future research on the PE teacher-created motivational climate may benefit from adopting Duda's theoretically integrated model.

In order to examine the PE teacher created motivational climate as conceptualised within Duda's model, an initial step is the development of a valid and reliable questionnaire. Therefore, the primary aim of this study was to provide an initial examination of the psychometric properties of the Empowering and Disempowering Motivational Climate Questionnaire-PE (EDMCQ-PE). Establishing the EDMCQ-PE as a psychometrically sound measure would make a significant contribution to the PE literature by: (a) providing researchers with a valid and reliable questionnaire that captures empowering and disempowering strategies employed by PE teachers, (b) allowing for

an examination of the correlates and antecedents of these motivation-related teaching climates, and (c) evaluating interventions that seek to change the motivational strategies employed by PE teachers. Moreover, from a pedagogical perspective, establishing the EDMCQ-PE as a valid and reliable questionnaire will enable teachers to determine the extent to which their own communication and behaviors (using self-report data and pupil's perceptions) in class are more or less empowering and disempowering.

AGT: Task- and Ego-involving Motivational Climates

AGT proposes that the motivational climate is the social environment surrounding pupils and is a function of what teachers say and do, how they organise, communicate, try to motivate, and use praise and feedback following desirable performance or mistakes (Duda, 2001). A main assumption of AGT is that the teacher-created motivational climate can shape pupils' perceptions of competence in PE by emphasizing a task- and/or ego-involving criteria (Ames, 1992). A task-involving criteria of competence centres on personal progress, effort, task mastery and learning new skills. In contrast, ego-involving criteria revolves around the demonstration of superior, comparative ability with minimal effort (Nicholls, 1989). A task-involved conception of competence is promoted within an environment where the teacher values hard work, effort, skill development and pupils working together (i.e., a task-involving climate; Ames, 1992). An ego-involved conception of competence is assumed to be more likely to emerge when a teacher criticises pupil mistakes and recognises and rewards only the most able performers (i.e., an ego-involving climate; Ames, 1992). Research (for a summary see Liu, Xiang, Lee & Li, 2017) shows that pupil perceptions of a task-involving climate predict more adaptive motivational processes and outcomes in PE, whereas an ego-involving climate in PE predicts maladaptive motivational processes and negative outcomes in pupils. Although the literature that has adopted AGT to examine the motivational climate created by PE teachers has been psychological in nature, Morgan (2017) recently explained that the achievement-related structures

inherent to task- and ego-involving climate can also be understood from a pedagogical perspective which holds direct implications for how PE teachers teach.

SDT: Autonomy Supportive, Socially Supportive, and Controlling Environments

SDT is concerned with the study of human motivation and personality (Deci & Ryan, 2000) and predicts that the satisfaction of three psychological needs (i.e., autonomy, competence and relatedness) will promote more autonomous motivation (e.g., participating in PE because one enjoys it and/or values the benefits) resulting in sustained behavior, quality engagement, and well-being. Conversely, unsatisfied and/or thwarting of the three psychological needs leads to controlled motivation (e.g., participating in PE out of fear, guilt or pressure, or to receive rewards/ praise). In this case, pupil disengagement, undesirable behaviors and ill-being are expected outcomes (Deci & Ryan 1985, 2000). Key motivational climate dimensions within SDT are autonomy support, social support, and controlling teaching. An autonomy-supportive PE teacher recognises pupils' preferences and provides meaningful choices. Decisions made about learning and mastery are pupil-centred, and a rationale is provided with requests (Cheon & Reeve, 2013). Within a socially-supportive environment every pupil matters, feels valued and cared for as a pupil and person (Mageau & Vallerand, 2003). In contrast, controlling teachers pressure pupils to behave, think and feel in a specific way (Reeve & Jang, 2006). Research evidence (for a summary, see Sun, Li & Shen, 2017) supports a positive relationship between autonomy- and socially-supportive climates in PE with the satisfaction of pupils' psychological needs, autonomous motivation, well-being, and effective functioning. In contrast, controlling climates positively predict pupils' unsatisfied and thwarted psychological needs, controlled motivation, ill-being and disengagement in PE. This evidence suggests that, as per AGT, the motivational climate according to SDT holds significant pedagogical implications for teachers that allow pupils to thrive (or not) in PE (Curran & Standage, 2017).

Integrating SDT and AGT: Empowering and Disempowering Motivational Climates

Building upon research concerning the motivational climate from a SDT or AGT perspective, Duda (2013) proposed that it is possible to simultaneously examine an interconnected array of facets of the social environment proposed in both theories. Specifically, based on the tenets of SDT and AGT and previous research, Duda suggests there are more empowering (i.e., those which are more task-involving, autonomy- and socially-supportive) and disempowering (i.e., they are more ego-involving and controlling/relatedness thwarting) climates. In integrating the climate dimensions from AGT and SDT, Duda's (2013) framework highlights that each climate dimension is important in predicting basic psychological need satisfaction and thwarting, motivation regulations and outcomes (see Duda & Appleton, 2016). That is, although there is theoretical (and often statistical) overlap between the climate dimensions proposed by AGT and SDT, no dimension is redundant within Duda's perspective (Appleton, Ntoumanis, Quested, Viladrich & Duda, 2016). To date, Duda's (2013) framework has informed an examination of the motivational climate and its correlates in youth sport. Smith et al. (2016), for example, reported that athletes who perceived the environment to be more empowering reported more autonomous motivation. Conversely, a perceived disempowering environment was associated with higher scores on controlled motivation and amotivation.

Although it is important to recognise that young people may have different reasons for participating in youth sport (i.e., where participation is generally voluntary) compared to PE (i.e., where participation is generally compulsory for all pupils), creating an empowering learning environment (and reducing disempowering environments) in both contexts are equally important (Mayorga-Vega, & Viciana, 2014). Regardless of the young person's achievement level in sport or PE, research concerning the motivational climate suggests that teachers and coaches who are more empowering will foster enjoyment, commitment, persistence and increase intrinsic motivation in all young people (Duda et al., 2014). Conversely, teachers and coaches who adopt more disempowering

strategies increase the extent to which young people experience anxiety, drop out, avoidance and decreases in effort (Duda et al., 2014) in sport or PE. Thus, Duda's (2013) model seems to offer equal potential for investigating the motivational climate in both youth sport and PE. Adopting Duda's model in PE is also advantageous because, in contrast to previous research on the teacher-created motivational climate in PE which has generally adopted AGT or SDT, it integrates and considers in a more comprehensive way the features of the motivational climate (based on AGT and SDT) which have pedagogical significance.

Given the prominence of SDT and AGT research to an understanding of the nature and implications of the PE teacher-created motivational climate, it seems reasonable to suggest that Duda's (2013) integrated framework could also inform future research in PE. However, such work requires a valid and reliable measure of the degree to which PE teacher-created motivational climates are empowering and disempowering. Soini et al.'s (2014) Motivational Climate in Physical Education Scale (MCPES) is one measure which evaluates task- and ego-involving, and autonomy and socially supportive climates as created by PE teachers. However, the MCPES does not capture controlling teaching and the items for the MCPES were derived from scales based purely within AGT. Thus, it is possible that the SDT-based climate dimensions are not accurately defined nor sufficiently captured in the MCPES.

Recently, Appleton et al. (2016) adopted Duda's framework to inform the development and initial validation of the EDMCQ; a scale that draws from AGT and SDT to capture empowering and disempowering motivational climates. An initial study by Appleton et al. (2016) suggested that Exploratory Structural Equation Model (ESEM) (compared to confirmatory factor analyses; CFA) solutions of the EDMCQ multidimensional, higher-order structure provided a best fit in multiple groups of youth athletes. However, inspection of the factor loadings revealed that many autonomy-supportive and some controlling and socially-supportive items failed to load significantly

on their intended factor and demonstrated elevated and significant factor loadings on non-intended dimensions (i.e., autonomy- and socially-support items loaded onto the task-involving dimension; controlling items loaded onto the ego-involving dimension). Appleton et al. (2016) findings suggest that, rather than a hierarchical structure representing five lower-order and two higher-order factors, the EDMCQ in its current format may be best represented by two composite factors whereby task-involving, autonomy- and socially-supportive items load onto an empowering factor, and ego-involving and controlling items load onto a disempowering factor. However, Appleton et al. (2016) did not test the fit of the two-factor model nor compare its fit against a hierarchical model.

Present Study

Guided by Duda's framework (2013), the aim of this study was to examine the psychometric properties of an adapted EDMCQ that captured secondary school pupils' perceptions of the empowering and disempowering features of the PE teacher-created motivational climate (EDMCQ-PE). Aligned with Appleton et al. (2016), the current study sought to identify the best approach to modelling the factor structure of the EDMCQ-PE and establish the internal reliability of pupils' scores. Consistent with Appleton et al. ESEM (compared to CFA) models were expected to provide the best approach to modelling the scale's factor structure. A two-factor composite model was also expected to provide the best modelling approach. Extending the analyses of Appleton et al. and to further establish the psychometrics of the scale, gender measurement invariance was also tested.

Methods

Participants

A total of 1662, 12–15-year-old (M = 13.74; SD = 0.81) Welsh pupils participated in this study. Group one (N = 826) comprised 50.12% males (M age = 13.77 years; SD = 0.95 years) who

received 2.5 to 4 hours of PE lessons per week. Group two (N = 836) comprised 53.71% males (M age = 13.72 years; SD = 0.66 years) who received 3 to 4 hours PE per week.

Climate Measures

After at least 12 weeks of PE lessons, pupils completed the EDMCQ-PE (See Appendix 1). The 34 items from the EDMCQ-C were adapted from sport to a PE context (e.g., "my coach encouraged players to try new skills" adapted to "my teacher encouraged pupils to try new skills"). The terminology in each item that made reference to the theoretical concepts was not changed. Responses were provided on a 5-point scale (i.e., 1 = "strongly disagree" to 5 = "strongly agree"). The average Flesch-Kincaid reading level was 6.0, suggesting items were suitable for the target age group.

The EDMCQ-C includes 16 items from the Perceived Motivational Climate in Sport Questionnaire-2 (Newton, Duda & Yin, 2000) which capture task- (nine items) and ego- (seven items) involving climate features. These features included cooperative learning (e.g., "My teacher encouraged pupils to really work together in class"), important role (e.g., "My teacher made sure everyone had an important role in the class"), effort improvement (e.g., "My teacher encouraged pupils to try new skills"), punishment for mistakes (e.g., "My teacher yelled at pupils for messing up") and unequal recognition (e.g., "My teacher had his or her favourite pupils").

Pupils' perceptions of autonomy-support were assessed using five items (e.g., "My teacher gave pupils choice and options") taken from Reinboth, Duda and Ntoumanis's (2004) adapted version of the Health Care Climate Questionnaire (Williams, Grow, Freedman, Ryan, & Deci, 1996) and Reeves (2006) proposals on autonomy supportive climates emphasizing participating for intrinsic reasons (e.g., "My teacher thought it important for pupils to participate in PE because the pupils enjoy PE").

Pupils' perceptions of their teachers' controlling behaviors were measured via 10

items, including eight items from the Controlling Coaching Behaviors Scale (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2010) which tapped teachers' controlling use of rewards (e.g., "My teacher mainly used rewards/praise to make pupils complete all the tasks he or she set during class"), negative conditional regard (e.g., "My teacher paid less attention to pupils if they displeased him or her"), intimidation (e.g., "My teacher shouted at pupils in front of others to make them do certain things"), and excessive personal control (e.g., "My teacher tried to control aspects of pupil's lives outside of PE"). Two further items were included in the EDMCQ-C measuring controlling use of rewards (e.g., "My teacher only allowed us to do something we like to do at the end of class if we had done well during class").

Pupils' perceptions of their teachers' social support were measured using three items (e.g., My teacher could really be counted on to care, no matter what happened) originally presented in the Social Support Questionnaire-6 (Sarason, Sarason, Shearin, & Pierce, 1987) and modified for use with coaches by Reinboth et al. (2004).

Procedures. An ethics committee of the 1st, 2nd and 3rd authors' University approved the project. The first author subsequently made contact with head teachers to introduce the project (See Appendix 2). Information letters describing the project purpose and procedures were then distributed to parents who could opt-out their child from the project (Appendix 3). The project was also explained verbally and in writing to the pupils. Pupils who agreed to participate completed consent forms followed by an inventory which included the EDMCQ-PE (Appendix 4). Data collection took place at 11 schools, a small team of data collectors led by the 1st author administered the questionnaires (See Appendix 5 for guidance for all data collectors) and pupils completed the inventory without discussing answers with classmates or teachers. The inventory took 20-40 minutes to complete.

Data Analysis

Testing alternative models. Structural equation modelling analyses were performed in Mplus 8.0 (Muthén & Muthén, 2017) using the procedures outlined by Morin, Arens and Marsh (2016) for CFA and ESEM. CFA and ESEM are statistical approaches to testing the factor structure of a scale. Marsh et al. (2004) suggested that in preliminary analyses of a scale's factor structure, researchers should compare the findings (i.e., model fit, standardized factor loadings and factor correlations) using CFA and ESEM. CFA utilises the Independent Cluster Model where first-order factors are allowed to correlate, observed variables load only onto their intended factor, and cross loadings on non-intended factors are restricted to zero. In contrast, ESEM integrates the principles of exploratory factor analysis (EFA) within the CFA framework (Asparouhov & Muthen, 2009), items cross load onto non-intended factors which is reported to better represent (and evaluate) the factor structure of complex multidimensional structures such as the EDMCQ-PE (Asparouhov & Muthen, 2009) where factors overlap. Previous research generally supports the use of ESEM over CFA as the most appropriate approach to modelling multidimensional scale's factor structure (Marsh, Nagengast & Morin, 2013)

A higher-order ESEM model (H-ESEM), tested via an approach where lower-order factors are defined within an ESEM and CFA estimates the higher-order factors (Marsh et al., 2013), and a bi-factor (Holzinger & Swineford, 1937) ESEM model can also be tested when determining the best fitting measurement model. In a bi-factor model, the covariances among item answers can be described by a pattern matrix in which each item loads onto a general (or global) factor (e.g., empowering climate) and a group (or specific) factor (e.g., task-involving climate). Furthermore, all correlations are constrained to be zero among the group-factors and the global-factors. Although researchers have relied on an approach (B-CFA) in which items load on a global factor and only one group factor, it is now possible to test a bi-factor structure within ESEM (B-ESEM; Morin et al., 2016) where items are permitted to load on multiple factors.

In this study, we initially examined the fit of the original model tested by Appleton et al. (2016) which included the targeted five lower-order climate dimension factors via CFA and ESEM. The approach associated with the best fit (i.e., CFA or ESEM) informed the testing of higher-order and bi-factor models. Finally, the best fitting model was compared to the fit of a simpler two factor composite (i.e., "empowering" and "disempowering") lower-order model. Models were tested based on the robust Weighted least square (WLSMV) estimator. For the ESEM, target rotation was used where all cross loadings were specified to be close to zero and the main loadings were freely estimated (Morin et al., 2016).

Invariance. Millsap and Yun-Tein's (2004) recommendations for invariance testing with categorical variables were adopted. First, we combined the samples and the findings from the "tests of alternative models" informed the model tested. The validity of the model in boys and girls was then tested via a multiple group analysis without any equality constraint (configural invariance). Measurement invariance of factor loadings and thresholds (scalar invariance; Muthén & Muthén, 2012) was then tested. Total or partial scalar invariance ensures meaningful latent mean comparisons across gender (Marsh et al., 2013).

Assessment of Model Fit. Goodness of fit was evaluated using the Comparative Fit Index (CFI), the Tucker Lewis index (TLI) and Root Mean Square of Approximation (RMSEA) with its 90% confidence interval. Hu and Bentler (1999) proposed the following cut off criteria: CFI and TLI >.90 and > .95 and RMSEA values < .08 and < .06, which are considered as indicators of acceptable and excellent fit, respectively. To allow a degree of flexibility in the cut-off criteria, the parameter estimates, statistical conformity and theoretical relevance were also consulted when evaluating and comparing model fit (Marsh, Hau, & Wen, 2004).

When comparing the fit of the structural models and nested models in the invariance process, it is advised that competing models provide a similar degree of fit to the data and the change in CFI

is < 0.1 and increases in RMSEA are < 0.15. In particular, Marsh and colleagues (2009; 2010) suggested that fit indices that correct for parsimony (e.g., RMSEA) are particularly important in ESEM given the large number of estimated parameters. For this study, we also examined the WRMR when comparing the alternative models. While not describing the fit of the models, lower WRMR values reflect better fit.

Internal reliability was tested using Cronbach's Alpha. An alpha above .80 constitutes a reliable measure (Clark & Watson, 1995), while .70 and .60 are generally agreed as the lower limits for scales with 10 or more and less than 10 items, respectively (Hair et al., 2010).

Results

Testing Alternative Models in Group One

CFA versus ESEM. CFA provided a poor fit, and the ESEM an excellent fit, to the data for the five-factor lower-order model, respectively (see Table 2.1). ESEM also resulted in lower factor correlations ($|r|$ = -0.448 to $|r|$ = .506) than the CFA ($|r|$ = -.699 to $|r|$ = .939), providing further support for the use of ESEM over CFA (see Table 2.2; Marsh et al., 2009).

ESEM parameter estimates (see Table 2.3) revealed well defined factors for task-involving and controlling dimensions due to substantial target factor loadings (task involving $|\lambda|$ = .207 to .783; controlling $|\lambda|$ = .222 to .475). Autonomy support ($|\lambda|$ = .357 to .680) and ego-involving ($|\lambda|$ = .350 to .923) factors were fairly well defined, although both factors had two items which did not load as intended (autonomy support item 16 $|\lambda|$ = -.001, item 22 $|\lambda|$ = .098; ego-involving item 5 $|\lambda|$ = -.130, item 10 $|\lambda|$ = .033). Finally, the social support items did not load on their intended factor ($|\lambda|$ = .040 to .132). In total, four items did not load significantly onto their intended factor and a number of items cross-loaded (and in some cases had higher loadings) onto non-intended factors. Two task-involving items (Item 1 $|\lambda|$ = .476; Item 4 $|\lambda|$ = .349) cross loaded on the autonomy support

factor, and two autonomy support items (Item 16 |λ| = .502; Item 22 |λ| = .463) and three social support items (Item 8 |λ| = .339; Item 14 |λ| = .421; Item 27 |λ| = .476) cross loaded on the task-involving factor. Likewise, two ego-involving items (Item 5 |λ| = .426; Item 10 |λ| = .489) loaded onto the controlling factor. Overall, although the results supported the ESEM solution, social support items did not load onto their intended factor and cross-loaded onto the task-involving factor, and a number of other items loaded onto non-intended factors.

ESEM versus H-ESEM and B-ESEM. The H-ESEM solution provided an excellent fit (see Table 2.1). The higher-order factors had a significant negative correlation of |*r*|= -.913; however, none of the lower-order factors had significant ($p < 0.05$) factor loadings on the higher order factors (TI: |λ| .404; AS: |λ| .479; SS: |λ| -.934; CO: |λ| .695; EI: |λ| .765). For the B-ESEM, an orthogonal bi-factor target was employed when estimating the model (Reise et al., 2011). The B-ESEM model provided an excellent fit (see Table 2.1) that was superior to all the other models. Results from the B-ESEM solution (see Table 2.3) revealed a well-defined empowering G-factor with significant loadings on all 17 items (|λ| = .213 to .539). In contrast, the disempowering G-factor was less well defined with five significant factor loadings (three ego-involving and two controlling; |λ| = -.122 to .590). Over and above the G factors, three of the items (two empowering; AS: item 16 and 22; one disempowering EI: item 5) failed to demonstrate significant target factor loadings on their S factors, and the parameter estimates also revealed multiple non-target cross loadings. Three autonomy-supportive, three socially supportive and two ego-involving items had significant factor loadings on non-intended S factors (all >.30. See Table 2.3). This suggests the task-involving, controlling and to a lesser extent ego-involving S factors tap into relevant specificity and add information to the G factors. The autonomy and social support S factors, however, appear to be less well defined.

Table 2.1

Goodness of Fit Statistics and Information Criteria for the Models Estimated on the EDMCQ-PE

	X2	df	CFI	TLI	RMSEA	RMSEA 90%CI	WRMR
Model (Group 1)							
CFA	2747.02*	517	.88	.87	.07	07/ 08	2.02
ESEM	944.15*	401	.97	.96	.04	04/ 04	0.85
H-ESEM	943.47*	405	.97	.96	.04	04/ 04	0.86
B-ESEM	691.25*	366	.98	.97	.03	03/ 4	0.69
Two Factor (ESEM)	1868.72*	494	.92	.92	.06	06/ 06	1.40
Model (Group 2)							
ESEM	932.71*	401	.97	.96	.04	04/ 04	0.82
H-ESEM	918.70*	405	.97	.96	.04	04/ 04	0.83
B-ESEM	772.45*	366	.98	.97	.04	03/ 04	0.73
Two Factor ESEM	2406.22	494	.91	.89	.07	07/ 07	1.58

Note. CFA= Confirmatory factor analysis; H = Hierarchical model; B = Bifactor model; ESEM = Exploratory structural equation modeling; df = Degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval; WRMR = weighted root mean square residual; ESEM were estimated with target oblique rotation; bifactor-ESEM were estimated with bifactor orthogonal target rotation; * $p < .01$.

In sum, ESEM models best fit the data in group one and although all three ESEM model provide an excellent fit, the B-ESEM had the best fit. However, parameter estimates revealed that the ESEM solutions failed to align to the theory underpinning the model.

Re-testing the ESEM-related Models in Group Two

All three ESEM models provided an excellent fit to the data (see Table 2.1) in group two, with the B-ESEM providing the best fit. The ESEM produced correlations in keeping with the theoretical assumptions of the model ($|r|$ = .47 to .43, see Table 2.2). The lower-order empowering factors correlated with each other positively but were negatively associated with the disempowering factors. The lower-order disempowering factors correlated with each other positively but negatively with the empowering lower-order dimensions. The parameter estimates (see Table 2.4) revealed well defined factors for task-involving, controlling and, to a lesser extent, ego-involving climate dimensions due to substantial target factor loadings (varying from $|\lambda|$ = .29 to .90). There were two ego-involving items that did not load substantially on the intended factor (items 5 and 10, $\lambda|$ = -.20 and -.07, respectively). The parameter estimates for autonomy- and social-support were less well defined with many items failing to load on their intended factor but loading significantly on the task-involving factor.

Table 2.2

Standardized Factor Correlations for the CFA and ESEM solutions for the EDMCQ-PE

	Task Involving	Autonomy-Supportive	Socially-Supportive	Ego-Involving	Controlling Coaching
Task Involving		94** / 95**	94** / 98**	- 55** / - 63**	- 68** / - 64**
Autonomy-Supportive	51** / 43**		87** / 96**	- 48** / - 54**	- 62** / - 61**
Socially-Supportive	43** / 34**	28** / 21**		- 59** / - 73**	- 7** / - 74**
Ego-Involving	- 45** / - 47**	- 23** / - 31**	- 34** / - 32**		86** / 84**
Controlling Coaching	- 25** / - 19**	- 035/ - 28**	- 25** / 10**	44** / 42**	

Note. CFA correlations (above the diagonal) ESEM correlations (below the diagonal). Group 1 correlations to the left and Group 2 to the right. * $p < .05$. ** $p < .01$

Regarding the H-ESEM, the factor correlations showed that the lower-order factors loaded ($|r| = .30$ to $.65$) non-significantly ($p > 0.05$) onto the higher-order dimensions. In addition, the higher-order factors of empowering and disempowering showed a level of multi collinearity ($|r|=1.21$). For the B-ESEM, there were some inconsistencies with the G factor where both the empowering and disempowering target loadings were not well defined. The empowering G factor had only five significant factor loadings ($|\lambda| = -.23$ to $.29$; see Table 2.4) with three task-involving, one autonomy-supportive and one socially-supportive items loading significantly. The disempowering G factor had nine significant factor loadings ($|\lambda| = -.235$ to $.368$) including five ego-involving and four controlling items.

Over and above the G factors, four items failed to demonstrate significant target factor loadings on their respective S factor. All nine task-involving and 10 controlling items loaded significantly on the target factor, and five of the seven ego-involving factors loaded significantly on the intended factor. This finding is in keeping with S factor results from group one. There were also similarities with the S factors of autonomy-support and social-support; however, for group two, all the items failed to load on their intended factor and loaded significantly on the task-involving S factor. Also similar to group one, the same two ego involving items cross-loaded significantly onto the controlling factor (items 5 and 10 $\lambda| = -.47$ and $.69$). This suggests that task-involving, controlling

and to a lesser extent ego-involving S factors tap into relevant specificity and add information to the G factor. The autonomy- and socially-supportive S factors, in contrast, appear to be less well defined.

In summary, the fit to the data of all three ESEM models was excellent, with the B-ESEM model having the best fit. Parameter estimates, particularly in the case of autonomy support and social support, were problematic, however. Overall, the results based on the responses to the scale provided by group two were similar with the findings from group one.

Two-factor Composite Model: In both groups, an ESEM model with two lower-order factors (i.e., empowering and disempowering) provided a reasonable fit to the data (see Table 2.1). Investigation of the parameter estimates (see Table 2.5) revealed that items loaded significantly ($p <$ .001) onto their intended factor. In addition, the parameter estimates revealed a well-defined factor for the empowering climate due to substantial target factor loadings (group one: $|\lambda| = .29$ to .90; group two: $|\lambda| = .50$ to .73). For the disempowering climate, the majority of target factor loadings were consistent with the underlying conceptual model (group one: $|\lambda| = .30$ to .83; group two: $|\lambda| = .20$ to .67) with the exception of controlling coaching items 15 and 29 which loaded more strongly onto the empowering factor in both groups, and controlling coaching item 20 which loaded more strongly onto the empowering factor in group one. Standardised correlations were keeping with the theoretical assumptions of the model (group one: $|r| = -0.48$; group two: $|r| = -0.51$).

In sum, the fit of a two-factor composite model was not as strong as the other ESEM models, albeit the fit was still acceptable in both groups and the majority of the items loaded as intended in the two-factor model (which was not the case for the other ESEM models). As a result, the two-factor model was adopted when testing for gender measurement invariance.

Internal Reliability

Cronbach's alphas for group one were: task-involving $\alpha = .86$; autonomy support $\alpha = .67$; social support $\alpha = .65$; ego-involving $\alpha = .78$; controlling $\alpha = .64$; empowering $\alpha = .90$;

disempowering α = .82. Group two's Cronbach's alphas were: task-involving α = .86; autonomy support α = .71; social support α = .68; ego-involving α = .76; controlling α = .68; empowering α = .91; disempowering α = .82.

Measurement Invariance across Gender for the Two-factor Model

Indices of fit for configural invariance were CFI=.91, TLI=.90, RMSEA=.06, 90CI%=0.06-0.06, WRMR=2.13 and scalar invariance CFI=.91, TLI=.92, RMSEA=.06 90%CI= 0.054-0.058, WRMR=2.49, offering support for scalar invariance. Non-standardised factor loadings were statistically invariant across gender, thus only standardised factor loadings for the boys are reported. Standardised factor loadings (see Table 2.5) revealed the majority of empowering and disempowering items for the boys positively and more strongly loaded on their intended factor (than on the non-intended factor), except for controlling coaching items 15, 20 and 29 which loaded more strongly onto the empowering factor. For the non-reference (girls) group, standardised factor loadings for empowering items ranged from .53 to .74 ($p < .001$) on the empowering factor and -.13 to .20 on the disempowering factor. The standardised factor loadings for the disempowering items ranged from .19 to .74 ($p < .001$) on the disempowering factor and -.23 to .47 on the empowering factor. Again, controlling items 15, 20 and 29 loaded positively and more strongly onto the empowering compared to the disempowering factor. Finally, the correlation between the empowering and disempowering factor was -.46 ($p < .001$) in the boys and -.60 ($p < .001$) in the girls.

Table 2.3
Standardised Factor loadings for ESEM and B-ESEM of the EMCQ (Group 1)

Item	CFA		ESEM						B-ESEM						
	Factor Loading	Uniq	T	A	S	E	C	Uniq	T	A	S	E	C	G-F	Uniq
1	.67**	.56**	**.21****	.48**	.1*	-.1*	-.07	.5**	**.38****	.32**	.12**	-.19**	-.14**	.44**	.49**
4	.77**	.41**	**.29****	.35**	.25**	-.09*	-.10**	.66**	**.50****	.21**	.26**	-.20**	-.21**	.4**	.62**
11	.75**	.45**	**.44****	.36**	.18**	.11**	-.15**	.68**	**.49****	.13**	.20**	-.06*	-.21**	.54**	.68**
13	58**	.66**	**.41****	.28**	.15**	.16**	-.1*	.4**	**.4****	.08	.15**	.01	-.13**	.48**	.4**
18	.61**	.62**	**.47****	.19**	.03	-.01*	.07*	.73**	**.45****	.08*	.04	-.18**	.01	.42**	.73**
23	.70**	.51**	**.49****	.07	.06	-.31**	.13**	.51**	**.53****	.02	.07	-.35**	.02	.34**	.46**
28	.70**	.51**	**.62****	.01	.03	-.15**	.01	.56**	**.57****	-.05	.01	-.24**	-.08*	.35**	.42**
30	.73**	.47**	**.76****	-.06	.02	-.03	-.08*	.65**	**.73****	.04	-.12**	-.12**	-.16**	.21**	.6**
34	.71**	.49**	**.78****	-.01	-.06	.01	-.08**	.41**	**.67****	.03	-.17**	-.11**	-.14**	.32**	.37**
3	58**	.66**	.13**	**.36****	.1*	-.14**	-.07	.45**	.32**	**.26****	.13**	-.2**	-.14**	.29**	.45**
6	52**	.73**	.04	**.68****	-.02	-.01	-.03	.39**	.22**	**.55****	.02	-.08*	-.04	.43**	.36**
16	.73**	.47**	.50**	**-.01**	.23**	-.16**	.06	.47**	.62**	**.02**	.16**	-.21**	-.07	.22**	.44**
22	.62**	.62**	.46**	**.1***	.09*	-.11**	.1**	.59**	.51**	**.08**	.08	-.15**	.01	.27**	.57**
32	51**	.75**	.32**	**.46****	-.05	.1**	.04	.52**	.35**	**.39****	-.11**	.03	.04	.41**	.52**
8	.6**	.64**	.34**	.23**	**.13****	-.02	-.06	.7**	.37**	.02	**.25****	-.12**	-.13**	.42**	.67**
14	.72**	.48**	.42**	.17**	**.04**	-.25**	.02	.5**	.49**	.08*	**.11***	-.31**	-.09*	.34**	.5**
27	.66**	.57**	.48**	.1*	**.04**	-.05	-.15**	.57**	.46**	-.03	**.10***	-.17**	-.22**	.34**	.56**
5	31**	.90**	-.29**	.26	-.03	**-.13****	.43**	.59**	-.21**	.23**	.08	**.01**	.38**	.16	.58**
9	.78**	.39**	-.03	-.01	.0	**.61****	.24**	.28**	-.28**	.01	-.14**	**.62****	.38**	.02	.27**
10	.68**	.54**	-.07	.03	-.39**	**.03**	.49**	.68**	-.37**	-.07	-.14*	**.15***	.45**	.40**	.68**
19	.76**	.42**	.06	.06*	.1**	**.88****	.06	.72**	-.17**	.00	.04	**.80****	.17**	.15	.72**
21	.5**	.75**	.0	-.01	.06	**.35****	.3**	.64**	-.13**	.01	.01	**.39****	.31**	.16*	.64**
25	.65**	.58**	-.11*	.03	-.05	**.47****	.13**	.48**	-.33**	-.09*	.04	**.46****	.19**	.17**	.47**
33	.84**	.29**	.09**	-.01	.01	**.92****	.04	.47**	-.24**	-.07**	-.04	**.83****	.17**	.17	.36**
2	59**	.66**	-.16**	-.01	-.04	.21**	**.36****	.63**	-.33**	-.07	-.01	.26**	**.44****	.01	.61**
7	.70**	.51**	-.17**	-.12**	-.09*	.23**	**.35****	.60**	-.43**	-.13**	-.2**	.28**	**.50****	-.12	.55**
12	.72**	.48**	-.09*	-.13**	-.02	.28**	**.48****	.60**	-.36**	-.15**	-.05	.35**	**.53****	.07	.59**
15	-.3**	.91**	.07	.11*	.39**	-.17**	**.35****	.49**	.37**	.21**	.31**	-.08*	**.22****	.01	.48**
17	.63**	.60**	-.02	-.13**	-.02	.28**	**.43****	.74**	-.27**	-.12**	-.1*	.34**	**.47****	.08	.68**
20	-.13**	.98	.08	.01	.43**	-.09*	**.47****	.41**	.3**	.1	.34**	.02	**.33****	.05	.36**
24	.60**	.64**	.02	.09*	-.42**	.12**	**.45****	.89**	-.28**	.00	-.17**	.21**	**.37****	.59**	.81**
26	54**	.71**	-.09*	.10*	-.22**	.07	**.46****	.6**	-.28**	.00	.05	.18**	**.39****	.43**	.54**
29	-.15**	.98*	.29**	.01	.16**	-.09*	**.46****	.19**	.39**	.15**	.06	.00	**.37****	.43	.19**
31	.2**	.96**	.08	.1*	-.05	.17**	**.22****	.41**	.04	.21*	-.2**	.21**	**.24****	.43	.39**

Note. Bold signifies items on their intended factor – Note T= Task-involving; A= Autonomy Support; S= Social Support; E= Ego-involving; C = Controlling *p < 0.05, **p < 0.001.

Table 2.4
Standardised Factor loadings for ESEM and B-ESEM of the EMCQ (Group 2)

Item	ESEM						B-ESEM						
	T	A	S	E	C	UNIQ	T	A	S	E	C	G-F	UNIQ
1	**.65****	.02	0.02	-.06	-.09**	.48**	**.62****	.25**	-.12*	-.17**	-.11**	-.13	.49**
4	**.56****	.08	.17**	-.03	-.17**	.62**	**.65****	.24**	.04	-.16**	-.2**	-.23**	.61**
11	**.57****	.13**	.12**	-.08*	-.09**	.57**	**.74****	.09*	-.01	-.14**	-.14**	-.14	.56**
13	**.56****	.16**	.01	.03	.03	.45**	**.63****	.1*	-.09*	-.01	.007	-.07	.41**
18	**.35****	.29**	-.02	-.15**	.03	.72**	**.61****	.02	-.04	-.08*	-.07**	.13	.57**
23	**.29****	.35**	.01	-.38**	.11**	.66**	**.66****	.07	-.01	-.26**	-.07	.26**	.61**
28	**.38****	.25**	.08	-.21**	-.01	.43**	**.58****	.31**	-.01	-.23**	-.13**	.20**	.35**
30	**.36****	.3**	.15**	-.14**	-.06	.54**	**.7****	.07*	.08*	-.13**	-.17**	.08	.54**
34	**.36****	.31**	.12*	-.15**	-.02	.33**	**.68****	.07	.06	-.12**	-.13**	.11	.34**
3	.42**	**.12***	.24**	-.01	-.15**	.43**	.57**	**.2****	.12**	-.12**	-.18**	-.12	.43**
6	.53**	**.15****	.04	.08	.01	.43**	.48**	**.38****	-.06	-.01	-.02	-.10	.39**
16	.46**	**.23****	.05	-.07	-.13**	.45**	.58**	**.34****	-.04	-.13*	-.20**	.07	.44**
22	.26**	**.42****	-.08	-.07	-.05	.61**	.49**	**.23****	-.05	.01	-.17**	.29**	.58**
32	.42**	**.27****	.11**	.02	.1**	.42**	.53**	**.32****	.04	-.03	.03	.02	.41**
8	.48**	.11*	**.03**	-.14**	-.13**	.64**	.58**	.21**	**-.07**	-.2**	-.19**	.02	.6**
14	.48**	.08	**.07**	-.3**	-.07**	.51**	.66**	.14**	**-.06**	-.33**	-.17**	-.03	.49**
27	.28**	.28**	**.11***	-.15**	-.09**	.50**	.54**	.22**	**.04**	-.16**	-.2**	.17*	.49**
5	.16**	-.17**	.14	**-.2****	.49**	.62**	-.04	.36**	.05	**-.29****	.47**	.07	.6**
9	-.16**	.16**	.03	**.7****	.18**	.27**	-.38**	.02	.08*	**.61****	.32**	.17**	.27**
10	.00	-.18**	-.14	**-.07**	.69**	.62**	-.24**	-.14**	-.11*	**.03**	.69**	.08	.57**
19	.06	.04	.05	**.9****	.01	.70**	-.32**	.03	.02	**.68****	.22**	.35**	.7**
21	-.06	-.04	.07	**.41****	.2**	.63**	-.24**	-.09*	.08*	**.33****	.3**	.19**	.59**
25	.11*	-.11**	.01	**.57****	.20**	.44**	-.26**	-.04	-.04	**.41****	.35**	.31**	.42**
33	.13**	-.02	-.01	**.88****	.04	.40**	-.34**	.06	-.06*	**.65****	.25**	.37**	.36**
2	-.07	.22**	-.23**	.16**	**.47****	.55**	-.19**	.08	-.09	.32**	**.47****	-.15*	.54**
7	-.26**	.24**	-.19*	.25**	**.48****	.53**	-.34**	.01	.04	.46**	**.52****	-.24**	.50**
12	-.07	.02	-.10	.26**	**.54****	.58**	-.27**	-.11**	-.02	.33**	**.60****	.06	.57**
15	.11	-.01	.52**	-.08*	**.22***	.51**	.23**	.27**	.41**	-.25**	**.16***	.16	.46**
17	-.02	.03	-.17**	.20**	**.55****	.72**	-.22**	-.09*	-.06	.31**	**.59****	-.02	.73**
20	-.10	.13	.56**	.04	**.33****	.47**	.2**	-.06	.52**	-.04	**.29****	.18	.45**
24	.05	-.3**	-.14	-.02	**.62****	.84**	-.28**	-.2**	-.2**	.01	**.66****	.21*	.84**
26	.09	-.33**	.02	-.05	**.57****	.63**	-.25**	.02	-.09	-.114	**.59****	.25*	.62**
29	.05	.16*	.30**	-.19**	**.39****	.27**	.32**	.02	.24**	-.16**	**.28****	.04	.26**
31	.23**	.03	-.02	.07	**.35****	.5**	.11**	.09*	-.07	.06*	**.35****	.1	.48**

Note. Bold signifies items on their intended factor. T= Task-involving; A= Autonomy Support; S= Social Support; E= Ego-involving; C = Controlling. *$p < 0.05$, **$p < 0.001$.

Table 2.5
Standardised Factor loadings for Two Lower-Order Factor ESEM and Measurement Invariance Across Gender

	Group 1		Group 2		Gender Invariance[a]	
Item	Empowering	Disempowering	Empowering	Disempowering	Empowering	Disempowering
1	**.65****	-.10*	**.67****	-.08*	**.68****	.00
4	**.69****	.15**	**.67****	.13**	**.67****	-.08**
11	**.76****	-.12**	**.73****	-.1**	**.71****	.00
13	**.65****	.003	**.66****	-.1	**.67****	.09**
18	**.64****	.25**	**.59****	.17**	**.64****	.04
23	**.61****	-.03	**.66****	-.02	**.63****	-.11**
28	**.62****	-.12**	**.65****	-.08*	**.62****	-.10**
30	**.65****	.01	**.67****	-.04	**.63****	-.09**
34	**.67****	.09*	**.67****	.13**	**.59****	-.05*
3	**.48****	.03	**.59****	-.01	**.54****	-.04
6	**.61****	-.13**	**.62****	-.09**	**.62****	.16**
16	**.61****	-.12**	**.63****	-.08*	**.59****	-.12**
22	**.60****	-.12**	**.5****	-.09**	**.56****	.00
32	**.67****	-.06*	**.67****	-.05	**.56****	.19**
8	**.57****	-.03	**.59****	-.13**	**.58****	-.06*
14	**.59****	-.15**	**.64****	-.18**	**.61****	-.15**
27	**.53****	-.16**	**.56****	-.14**	**.53****	-.14**
5	.04	**.36****	.3**	**.40****	.12**	**.36****
9	-.06*	**.72****	-.21**	**.62****	-.10**	**.64****
10	-.14**	**.54****	-.003	**.66****	-.08**	**.60****
19	.09*	**.83****	-.14**	**.67****	.02	**.71****
21	.04	**.54****	-.14**	**.44****	-.04	**.47****
25	-.14**	**.52****	-.10*	**.57****	-.10**	**.52****
33	.01	**.84****	-.15**	**.67****	-.03	**.71****
2	-.13**	**.49****	-.01	**.54****	-.06*	**.47****
7	-.27**	**.48****	-.19**	**.57****	-.22**	**.51****
12	-.16**	**.61****	-.09*	**.67****	-.12**	**.65****
15	.44**	**.13****	.45**	**.19****	.39**	**.18****
17	-.10*	**.58****	-.04	**.65****	-.08**	**.64****
20	.39**	**.26****	.33**	**.33****	.35**	**.30****
24	-.05	**.59****	-.07*	**.63****	-.05*	**.60****
26	-.03	**.55****	.04	**.58****	.01	**.57****
29	.45**	**.30****	.46**	**.28****	.40**	**.30****
31	.15**	**.37****	.29**	**.43****	.19**	**.38****

Note. Bold signifies items on their intended factor. *$p < 0.05$, **$p < 0.001$. [a] = standardised factor loadings of reference group (boys).

Discussion

This study identified the best approach to modelling the EDMCQ-PE's factor structure, established the internal reliability of pupils' scores on the scale, and confirmed gender measurement invariance in two groups of Welsh pupils. Aligned with Appleton et al.'s (2016) findings in youth sport, the ESEM solution provide a better fit compared to CFA solution for the scale's structure. Further support for the ESEM over the CFA solution was gleaned via the reduced correlations between the five climate dimensions. These findings replicate earlier studies (e.g., Myers, Chase, Pierce & Martin, 2011) which evidenced the superiority of ESEM, and provide further support for its use when examining the factor structure of complex, multidimensional scales.

From a theoretical perspective, there is a clear overlap between items tapping task-involving, autonomy- and socially-supportive (empowering) climates, and between items capturing controlling and ego-involving (disempowering) climates (Appleton et al., 2016). It is therefore unsurprising that ESEM outperformed CFA when modeling the EDMCQ-PE. This is because when conducting CFA, items cannot cross loading onto non-intended, albeit related factors and this subsequently leads to inflated factor correlations and poorer fit (Marsh et al., 2013). In comparison, ESEM permits items to load on both intended and non-intended factors. This more flexible approach resulted in a better fit and reduced correlations between the factors in the current study. Building upon Appleton et al.'s (2016) finding with the EDMCQ-C, it seems the factor structure of the EDMCQ-PE is best represented by ESEM.

Despite best fit emerging with the ESEM solutions, the parameter estimates revealed elevated cross-loadings. This suggests the ESEM solutions across both groups did not fully support Duda's (2013) theoretical model underpinning the scale. Specifically, two task-involving items had elevated and significant factor loadings on autonomy-support in group one, and many (or all) of the autonomy- and social-support items had high factor loading values on the task-involving dimension in group one

and/or two. Likewise, in both groups, two ego-involving items had elevated scores on the controlling dimension. Elevated cross-loadings were also evident in the ESEM conducted by Appleton et al. (2016) when examining the psychometrics of the EDMCQ-C. Moreover, evidence of cross-loadings is consistent with the assumption of ESEM that complex, multidimensional structure scales will rarely have indicators that are "pure" indicators of one factor (Marsh et al., 2013). As Appleton et al. (2016) explained, the cross-loading of task-involving, autonomy- and social-support items onto non-intended lower order factors is understandable given the theoretical overlap between the key features of these empowering climate dimensions. For example, it is likely that in encouraging a task-focused approach to competence, PE teachers will provide their pupils with meaningful choices and rationales during the lessons, welcome pupils' input during activities and teamwork, and take a socially-supportive approach when correcting mistakes and errors. In contrast, a controlling PE teacher who conveys negative conditional regard and intimidates the pupils will likely be ego-involving by responding to pupils' mistakes with criticism. Despite permitting items to cross-load onto a non-intended factor in ESEM, however, it is expected that items load most strongly (and significantly) onto their intended factor – this was not the case in this study for a number of the items.

The failure of some items to load most strongly (and in some case, significantly) onto their intended factor was also evident in the B-ESEM. The B-ESEM was associated with the best model fit in both groups, yet only five items (from 17) loaded significantly onto the G disempowering factor in group one. In group two, only five items loaded significantly onto the G empowering factor and nine items loaded significantly onto the G disempowering factor. Moreover, replicating the findings from the ESEM, a number of items failed to load significantly and most highly on their intended S factor in both groups. The findings relating to the B-ESEM model are thus generally consistent with those reported by Appleton et al.'s (2016) examination of the EDMCQ-C's factor structure and reinforce their conclusion that despite being associated with the best fit, the B-ESEM solution does

not accurately represent Duda's (2013) multidimensional, hierarchical model of the motivational climate.

The findings associated with the ESEM solutions are noteworthy because Marsh et al. (2010) suggested that the appropriateness (and adoption) of a particular model should not be based on fit indices alone, and parameter estimates should be consulted. In contrast to the five lower-order factors ESEM and B-ESEM solutions, the fit indices for the two-factor composite model were lower. Importantly, however, the model fit was still acceptable and the parameter estimates were less problematic across both groups. Specifically, all the task-involving, autonomy and social support items loaded significantly and most strongly onto one (empowering) factor, and all the ego-involving items and the majority of controlling items loaded significantly and strongly onto a second (disempowering) factor. The cross-loading of a number of controlling items onto the empowering factor was consistent in both groups and was invariant across boys and girls. Despite these cross-loading items, and departing from Duda's (2013) proposed hierarchical model of the motivational climate, the two-factor model seems to offer a cleaner solution compared to the other models tested in this (and Appleton et al's) study. The adoption of a two-factor model is also partly reinforced by the findings testing the other ESEM models in this study and in Appleton et al. (2016), where many empowering items loaded most strongly onto one factor and a number of ego-involving items loaded most strongly onto a second factor with the controlling items. Thus, researchers adopting the EDMCQ-PE (and EDMCQ-C) may wish to proceed by adopting this less complex two-factor structure. Doing so would enable researchers to capture empowering and disempowering teacher-created motivational climates in PE, and would reduce the complexities associated with establishing the psychometrics of the scale in other samples.

The controlling items that cross-loaded onto the empowering factor in the two-factor model were 15 ("My teacher only allowed us to do something we like to do at the end of class if we had

done well during class"), 20 ("My teacher only rewarded pupils with prizes, treats or fun activities if they performed well in PE"), and 29 ("My teacher mainly used rewards/ praise to make pupils complete all the tasks he or she sets during class"). All three items were originally included in the EDMCQ to capture the subtle use of rewards that can control behavior (and performance), as per a key assumption of SDT (and specifically cognitive evaluation theory; Deci, 1975). This key assumption applied to PE suggests that when teachers use rewards and praise in a controlling manner (e.g., to ensure pupils complete set tasks in class), pupils are more likely to have their feelings of autonomy and intrinsic motivation towards the task undermined (Deci & Ryan, 1975). However, in this study, the findings suggest that pupils did not interpret these teaching strategies involving rewards and praise as just controlling/disempowering. Instead, the strategies were also perceived as empowering. The reason why these controlling items were perceived as empowering is unclear. One possible explanation, consistent with cognitive evaluative theory, is that the use of rewards may not have been viewed by the pupils as controlling (thus undermining feelings of autonomy), but rather as informational which enhancing of feelings of competence, and the satisfaction of the psychological need for competence is a key correlate of an empowering motivational climate (Duda & Appleton, 2016). It may also be that the rewards given in response to doing and performing well during class were interpreted by pupils in a task-involving manner, such as recognition for personal development, successfully executing a teaching instruction, and/or the application of effort. Future research should determine the extent to which the use of rewards as stipulated in items 15, 20 and 29 in PE are empowering over the short and long-term. For example, qualitative research with teachers and pupils may reveal the extent to which the use of rewards is task-involving and competence promoting. We recommend that until future research clarifies whether (and why) these controlling strategies are empowering, items 15, 20 and 29 should not be included in the EDMCQ-PE.

Regarding measurement invariance, the findings in the current study suggest the two-factor

model showed scalar invariance across boys and girls. This particular finding provides further information on the psychometric properties of the scale, and suggests the EDMCQ-PE can be used to provide meaningful latent mean comparisons across boys and girls in terms of their perceptions of the overall empowering and disempowering features of the motivational climate manifested in PE classes. Such comparisons are important given the call by authors (e.g., Duda et al., 2014) for interventions that attempt to manipulate the teacher-created motivational climate in PE to enhance the empowering (and minimize the disempowering) characteristics of this environment. In addition, scalar invariance means it is possible to test, and compare across gender, theory-informed process models (see Duda & Appleton, 2016) that include PE teacher-created empowering and disempowering climates. Such research would also contribute to the nomological validity of the EDMCQ-PE.

Limitations and Future Directions

A limitation of this study is that additional indicators of validity and reliability were not examined. This is because we wanted to first determine the best solution representing the structure of the EDMCQ-PE. In the future, researchers should consider other forms of validity (e.g., predictive validity; invariance across countries, age) and reliability to further establish the psychometrics of the EDMCQ-PE. A further limitation is that the multilevel nature of the data (i.e. pupils with classes) was not considered. This is because within the two groups of pupils, there were a limited number of classes per parameter which made it unfeasible to test the multilevel nature of the data. Future research should attempt to address this issue by recruiting pupils from a larger number of classes (and schools) and accounting for clustering effects when examining the EDMCQ-PE's factor structure (see Myers, 2013, for an example). Future research should also test EDMCQ-PE's factor structure in a range of school settings and pupils given the current study was limited to secondary school Welsh pupils. From a pedagogical and practical perspective, the EDMCQ-PE could be used by teachers and

researchers to establish the empowering and disempowering climate being created in secondary school PE. The scale could be used, for example, to determine the extent to which teachers (based on self-report and/or pupils' perceptions) are (or are not) employing motivational strategies that are known to foster or hinder pupils' autonomous motivation, learning, engaging and psychological health. In turn, the identification of the presence and/or absence of specific motivation-related strategies could inform the content of PDP education workshops, to ensure PE teachers' future attempts to create a motivational climate in class are more empowering and less disempowering. Moreover, such PDP education workshops could enhance PE teachers' understanding of why the motivational climate and specific empowering and disempowering strategies impact on their pupils.

Conclusion

The evidence from this study suggests that, in its current format, the EDMCQ-PE does not replicate the hierarchical structure of the motivational climate proposed by Duda (2013). This finding is consistent in youth sport (Appleton et al., 2016) and suggests further work is required to amend the EDMCQ in order to better represent the structure of the motivational climate according to Duda's (2013) model. Such work may focus on re-writing and/or deleting items that failed to load on its intended factor and/or had elevated factor loadings on non-intended factors in this study. However, the current study does suggest the EDMCQ-PE may be used by researchers and teachers to capture the two key composite climate dimensions (i.e., empowering and disempowering) proposed by Duda (2013) and that this approach to modeling the scale's factor structure (i.e., two lower-order factors) is scalar gender invariant.

CHAPTER 3.

Examining the mediating role of motivation in the relationships between teacher-created motivational climates and quality of engagement in Welsh secondary school Physical Education

The following manuscript is 'under review' in the *Journal of Educational Psychology*

Milton, D., Appleton, P. R., Bryant, A., & Duda, J. L. (2022). Examining the mediating role of motivation in the relationships between the teacher-created motivational climates and quality of engagement in Welsh secondary school Physical Education

Abstract

Purpose: Grounded in Duda's (2013) integrated model of the motivational climate, the current study examined the role of motivation quality in the relationship between empowering and disempowering teacher-created motivational climates and indicators of quality engagement in Welsh secondary school PE.

Method: The hypothesised model was tested cross-sectionally and longitudinally in several samples of secondary school pupils from Wales. Data were collected via questionnaires measuring the motivational climate, autonomous and controlled motivation and positive and negative outcomes (enjoyment, concentration and boredom). Cross sectional data were collected for 832 pupils (439 males and 386 females) while longitudinal data stemmed from the responses of were 299 pupils (166 males and 163 females). All pupils were from schools in South East Wales aged between 12 and 15 years (M: 13.72; SD: 0.66). Structural equation modelling was used to test the hypothesised model and the mediating role of autonomous and controlled motivation.

Results: The hypothesised model was supported cross-sectionally and longitudinally, indicating that empowering climates positively predicted pupils' autonomous motivation for PE, whereas disempowering motivational climates positively predicted controlled motivation. In turn, autonomous and controlled motivation positively and negatively predicted indictors of pupils' engagement in PE. Analyses also revealed that the relationships between empowering and disempowering climates with enjoyment, concentration and boredom were indirect via autonomous and controlled motivation.

Discussion: In summary, results support the role of autonomous and controlled motivation in the differential relationships between empowering and disempowering motivational climates and indicators of the quality of pupil engagement in PE. The implications of the findings suggest that

targeted professional learning opportunities for PE teachers are critical to creating empowering climates and reducing disempowering strategies.

Keywords: achievement goal theory; self-determination theory; Mediation; Motivational Climate

Acknowledgments: One of the samples used within this multi-study paper was collected within the wider Sport Wales funded Empowering Physical Education project.

Introduction

A considerable body of evidence supports the significance of the teacher-created motivational climate in PE for the prediction of differential pupils' cognitive, affective and behavioural outcomes (Duda et al., 2014; Ntoumanis & Biddle, 1999; Papaioannou, Theodosiou, Pashali, & Digelidis, 2012). The motivational climate is the social psychological environment manifested and stems from what significant others (such as PE teachers) say and do, how they provide feedback, and create the learning environment in lessons and school sports (Ames, 1992; Duda et al., 2014). Building upon research conceptualising the motivational climate from a self-determination theory (SDT; Deci & Ryan, 2000, Ryan & Deci, 2020) or achievement goal theory (AGT; Ames, 1992; Nicholls, 1989) perspective, Duda (2013) proposed that it is possible and important to simultaneously examine an interconnected array of facets of the social environment proposed by both theories. Specifically, based on the tenets of SDT and AGT and previous research, Duda suggests there are more or less empowering and disempowering motivational climates. Furthermore, in integrating the climate dimensions from AGT and SDT, Duda's (2013) framework also suggests that empowering and disempowering climates will differentially predict motivation-related processes and indicators of optimal/compromised functioning and well/ill-being (see Appleton & Duda, 2016). This study aims to provide an initial test of Duda's conceptual framework in secondary school PE in Wales. Specifically, across two studies, we examined the expected mediating role of pupils' motivation regulations in the relationships between empowering and disempowering teacher-created motivational climates and indicators of quality engagement in Welsh secondary school PE.

Empowering and Disempowering Motivational Climates

Adopting Duda's model in PE is advantageous because, in contrast to previous research on the teacher-created motivational climate in PE that has generally been guided by AGT or SDT, it integrates and considers more comprehensively the array of the motivational climate dimensions

which have pedagogical significance (Milton et al., 2018). Based on the tenets of SDT, AGT and previous research empowering motivational climates are characterised as task-involving, autonomy-supportive and socially supportive (Duda, 2013). AGT proposes that a task-involved climate is fostered when the teacher values hard work, effort, skill development and pupils working together (Ames, 1992). Within SDT, an autonomy-supportive climate is characterised by the teacher recognising pupils' preferences, valuing meaningful choices, making decisions regarding learning and mastery that are pupil-centred, and ensuring a rationale is provided with requests (Cheon & Reeve, 2013; Ryan & Deci, 2020). SDT also assumes that in a socially-supportive environment, every pupil is important to the larger goals and objectives and feels valued and cared for as a person (Mageau & Vallerand, 2003; Reinboth, Duda & Ntoumanis, 2004). Duda (2013) described a disempowering motivational climate as more ego-involving and controlling. Within AGT, an ego-involved climate occurs when a teacher focuses attention on and rewards the best performing pupils and disapproves of pupil mistakes (Ames, 1992). In contrast, SDT considers that a controlling climate pressures pupils to behave, think and feel in a specific way without acknowledging their perspectives (Ryan & Deci, 2020; Reeve & Jang, 2006).

Duda et al. (2014) proposed that PE teachers who are more empowering will foster optimal functioning and engagement in PE pupils, whereas disempowering teaching strategies are more likely to be positively associated with maladaptive functioning and disengagement in PE. In support of these assumptions, previous research has demonstrated a positive relationship between dimensions of an empowering motivational climate and pupils' enjoyment, concentrated effort and effective functioning (Cheon & Reeve, 2013; Hastie et al., 2013; Jaakkola et al. 2017; Ntoumanis, 2012; Reinboth, et al., 2004), a greater focus on tasks, better peer relationships, and more significant effort and more persistence in PE classes (Papaioannou, Marsh & Theodorakis, 2004; Ntoumanis, 2012; Reinboth et al, 2004). Conversely, individual facets of a disempowering motivational climate have

emerged as a positive predictor of pupils' amotivation, boredom and disengagement (Cronin, Allen, Mulvenna & Russell, 2018; Standage, Duda, and Ntoumanis 2005; Sun, Li & Shen, 2017), reduced effort when failing, and reduced quality of relationships with others in PE (Standage, Duda & Ntoumanis, 2006).

Although the aforementioned research has measured individual facets of the motivational climate proposed within Duda's model in PE until recently, no research has examined overall empowering and disempowering motivational climates created by teachers and their link with engagement-related correlates in PE. This was partly due to there being no validated measure that captured empowering and disempowering motivational climates created by PE teachers. However, this measurement gap was addressed first by Milton and colleagues (2018), who reported on the tailoring and subsequent validation of the Empowering and Disempowering Motivational Climate Questionnaire in PE (EDMCQ; Appleton, Ntoumanis, Quested, Viladrich & Duda, 2016). The EDMCQ was initially developed within the youth sport context to capture adolescents' perceptions of their coach's empowering and disempowering strategies in training and competition. Following contextualising the scale from youth sport to PE, Milton et al. (2018) supported a two-factor structure that captured the two composite climate dimensions of empowering and disempowering. Subsequent studies have provided further support for the validity and reliability of pupils' scores on Milton et al.'s adapted version of the EDMCQ (Girard, Desbiens, & Hogue, 2021). More recently, with a sample of French pupils, Mastagli, Van Hoye, Hainaut, and Bolmont (2021) employed an alternative measure of the empowering (but not disempowering) PE teacher created motivational climate originally developed by Escriva-Boulley (2015). The factor structure of the empowering scale was supported, and pupils' scores on the scale were found to be reliable (Mastagli et al., 2021). Moreover, empowering climates scores were positively related to pupils' autonomy, competence, and relatedness need satisfaction, positive affect and reported concentration in PE.

Autonomous and Controlled Motivation

In addition to highlighting the critical facets of empowering and disempowering motivational climates, Duda's model draws from AGT and SDT to propose several psychological and motivational mechanisms (e.g., goal orientations, basic psychological needs, motivation regulations) that predict differential outcomes in the context in question. These variables explain (are assumed to mediate) the relationship between empowering and disempowering motivational climates in PE and pupils' optimal/compromised functioning, degree of engagement and experiences of well-being/ill-being, respectively. One such mechanism is the extent to which pupils' motivation for PE is more or less self-determined. SDT distinguishes between more autonomous and controlled motivations (Deci & Ryan, 2000); more autonomous forms of motivation represent participating out of interest and enjoyment or because of the personal value or understanding the importance of engaging. Controlled forms of motivation are when pupils feel pressure to participate either to protect their own perceived self-worth or external pressure from teachers, along with participating to avoid punishment and/or to gain praise and rewards (Deci & Ryan, 2000; Haerens et al., 2015).

Previous studies in sport have confirmed that young people who perceive the environment to be more empowering and/or less disempowering also report higher autonomous motivation (Fenton et al., 2017, Smith et al., 2015). Higher controlled motivation scores have been reported by young people who also perceive their psychological environment as more disempowering and/or less empowering (Castillo-Jiménez et al., 2022; Fenton et al., 2017; Smith et al., 2016). Research in PE has also confirmed that pupils' autonomous motivation predicts increased concentration, physical activity and greater engagement (Aelterman et al., 2013; Haerens et al., 2010; Ntoumanis, 2005). In comparison, motivations reflecting controlled reasons are generally positively correlated with adverse outcomes such as lower levels of physical activity, unhappiness and boredom (Haerens et al., 2010; Ntoumanis, 2005; Standage, Duda & Pensgaard, 2005). These findings provide evidence of the inter-

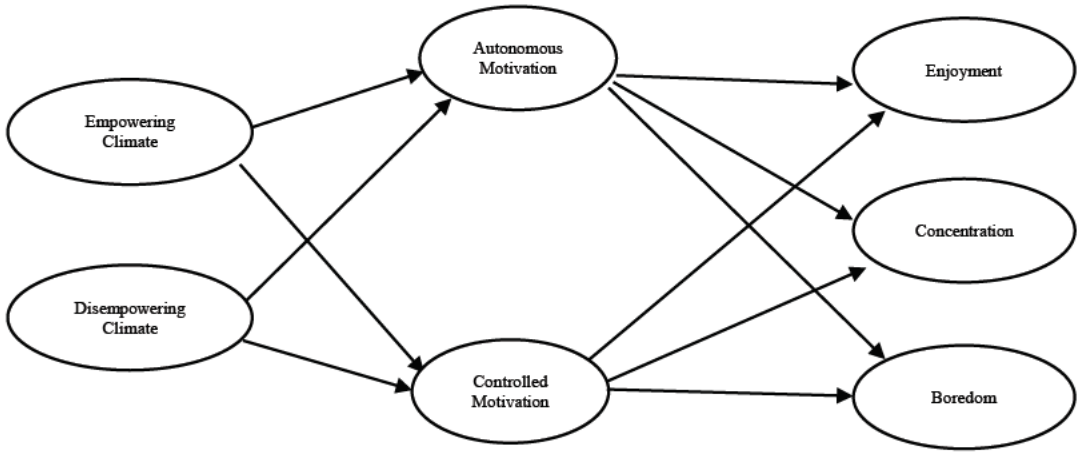
relationships between key constructs within Duda's integrated model of the motivational climate and predicted consequences. To date, however, research has failed to provide a direct test of the assumption that a young person's quality of motivation for PE will mediate the relationship between their perceptions of empowering and disempowering motivational climates and indicators of quality of engagement. Moreover, studies which have examined the interplay between characteristics of the motivational climate, assumed mediating role of motivation, and outcomes in PE have tended to adopt a cross-sectional design (Castillo-Jiménez et al., 2022; Mastagli et al. 2021). Longitudinal studies have been called for as they allow for the examination of changes in such variables over time and provide insight into cause-and-effect relationships (Appleton & Duda, 2016; Liu, Xiang, Lee, & Li, 2017; Sun, Li, & Shen, 2017).

The Present Study

Drawing from Duda's (2013) integrated approach, the main aim of the present research was to examine the mediating role of motivation quality for PE (i.e., autonomous motivation, controlled motivation) in the relationships between empowering and disempowering features of the teacher-created motivational climate and indicators of quality engagement in PE (see Fig. 3.1). The assumed mediational roles of autonomous and controlled motivation were tested cross-sectionally (study 1) and longitudinally (study 2) in Welsh secondary school pupils. Specifically, study one tested the hypothesised model at one time point during the school year across two samples of pupils with the aim of cross-validating the proposed model. Study two tested the model longitudinally over two-time points across the school year in a similar (albeit separate) sample of pupils recruited in study one.

Figure 3.1

Model outlining the role of motivation mediating the relationship between empowering and disempowering climates and indicators of quality engagement.



Study one

Study one provided an initial cross-sectional test of whether empowering and disempowering motivational climates were associated with the quality of pupils' engagement in PE (enjoyment, concentration and boredom) via autonomous and controlled motivation. Based on the conceptual model proposed by Duda (2013) and previous findings from youth sport (Castillo-Jiménez et al., 2022; Fenton et al., 2017; Smith et al., 2015), it was hypothesised that pupils' perceptions of an empowering climate would be positively associated with autonomous motivation and negatively with controlled motivation. In contrast, it was expected that pupils' perceptions of a disempowering climate would be negatively associated with autonomous motivation and positively with controlled motivation. Finally, it was hypothesised that autonomous motivation would be positively associated with enjoyment and concentration and negatively correlated with boredom in PE. In contrast, the relationships were expected to be reversed for controlled motivation. Finally, it was also hypothesised that autonomous and controlled motivation would mediate the associations between the climate dimensions and the targeted outcomes.

Method

Participants: 832 pupils (439 males and 386 females) from schools in South East Wales aged between 12 and 15 years old (M: 13.72; SD: 0.66) participated in this study.

Procedure: Ethics committees at the authors' Universities approved the project. The first author subsequently made contact with headteachers to introduce the project (See Appendix 2). Parents were informed about the purposes of the research and were allowed to withdraw their children from the project. The project was also explained verbally and in writing to the pupils. Pupils who agreed to participate completed consent forms (See Appendix 4). and then completed a multi-section questionnaire. Data collection took place at a total of three secondary schools. The first author administered the questionnaires, and pupils responded without discussing answers with classmates or teachers. Attempts were made to minimise the teacher's involvement by giving them a task to complete while the questionnaire was completed. The inventory took on average 20 minutes to complete. The data were collected during the summer term, and the teachers had taught the pupils PE over the academic year. The questionnaires were administered at the start of their PE lesson.

Measures: All questionnaires were administered in English by the researcher, the participants' mother tongue. Participants responded to the items on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). When answering the questionnaires, the participants were instructed to "think about what it has usually been like in your PE lessons during the last 3-4 weeks".

Motivational climate: Via the Empowering and Disempowering Motivational Climate Questionnaire-PE (EDMCQ-PE; Milton et al., 2018), pupils' perceptions of the teacher-created empowering (17 items) and disempowering (17 items) features of the motivational climate were assessed. The empowering climate items measure autonomy supportive (e.g. "My teacher gave pupils choices and options"), task involving (e.g. "My teacher made sure pupils felt successful when they improved") and socially supportive (e.g. "My teacher could really be counted on to care, no matter

what happened") teaching strategies in PE. The disempowering climate items measure controlling (e.g. "My teacher yelled at pupils for messing up") and ego-involving (e.g. "My teacher only praised pupils who performed best during a class") teaching strategies in PE. Initial evidence supporting the psychometrics of the EDMCQ-PE were reported by Milton et al., (2018).

Motivation: Pupils' self-reported quality of motivation towards PE was measured using the perceived locus of causality questionnaire (PLOCQ; Goudas et al., 1994). The items assess autonomous (e.g., "I take part in PE because PE is enjoyable) and controlled (e.g. "I take part in PE because that's the rule") motivation. Previous research supports the validity and reliability of secondary school aged pupils' scores on the PLOCQ (Lonsdale et al., 2011).

Enjoyment, Boredom and Concentration: Pupils' self-reported enjoyment (e.g., "I usually had fun") and boredom (e.g. "I usually wished the lesson would end quickly") in PE lessons were measured using the subscales of the satisfaction interest scale (SIS; Duda & Nicholls, 1992). Pupils' self-reported concentration in PE (e.g., "I thought carefully about the skills, tasks, and activities") was measured via a scale developed by Standage et al. (2005). Young people's scores on these measures have been reported to have acceptable reliability in previous research (Duda & Nicholls, 1992; Standage et al., 2005).

Data Analysis: Data screening procedures were adopted to detect errors, outliers and normality in line with guidelines from Tabachnick and Fidell (2007). Internal reliability was tested using Cronbach's alpha. An alpha above .80 constitutes a reliable measure (Clark & Watson, 1991), while .70 and .60 are generally agreed as the lower limits for scales with >10 items or <10 items, respectively (Hair, Black, Babin, & Anderson, 2010). Descriptive analyses using SPSS were completed to generate subscale means and Pearson's correlations, which examine the pattern of associations.

The first step when testing the hypothesised model involved adopting a parcelling approach. Parcelling was adopted to estimate the latent constructs of empowering and disempowering climates and autonomous and controlled motivation. As Little et al. (2002) and Kline (2010) described, parcelling has significant advantages when estimating multifaceted structural models: it is more stable, less parsimonious and less biased. A pragmatic approach to the use of parcelling was taken, and various methods of parcelling were considered. When properly constructed, parcels can clarify representations of even multidimensional constructs (Graham, Tatterson & Widaman et al., 2000; Hall, Snell & Foust, 1999). We followed Little et al's (2013) guidance on multidimensional parcelling. Firstly, any decisions must be theoretically justifiable and secondly, using three indicators per parcel, provide definitive tests of structural model parameters. In order to retain theoretical justification, parcels were created that represented each facet or characteristic of the construct under consideration, e.g., each empowering parcel contained items relating to autonomy support, social support and task involving climates (Little et al., 2002). This approach was consistently followed with disempowering and similarly autonomous and controlled motivation. The parcels retained their theoretical justification due to the few engagement indicators (enjoyment, concentration and boredom).

The hypothesised model was then tested using Structural Equation Modelling (SEM) based on maximum likelihood estimation samples in Mplus (Version 6.1; Muthén & Muthén, 1998–2013). This was completed across two samples. In each case, the model was tested using the robust maximum likelihood (MLR) estimator, which provides standard errors and fit indices that are robust to the Likert nature of the items and handling missing data. In order to test the stability and cross-validate the hypothesised model, the data was split randomly in two within SPSS. Following the recommendations by Kline (2010), the first stage was to check the fit of the overall measurement models. Goodness of fit was evaluated using the comparative fit index (CFI), the Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA) with its 90% confidence interval (CI).

Hu and Bentler (1999) proposed the following cutoff criteria: CFI and TLI >.90 and >.95 and RMSEA values <.08 and <.06, which are considered as indicators of acceptable and excellent fit, respectively. To allow a degree of flexibility in the cutoff criteria, the parameter estimates, statistical conformity and theoretical relevance were also consulted when evaluating and comparing model fit (Marsh et al., 2004).

Thirdly, the hypothesised model was tested and the assumed mediating role of autonomous and controlled motivation using the MODEL INDIRECT command in Mplus as recommended by Cerin and Mackinnon (2008). Kelloway's (2014) procedures were used to test mediation where the researcher is encouraged to estimate the confidence interval (CI) around the indirect effect. There is evidence of mediation, or a specific indirect effect, when their 95% bootstrap-based confidence interval does not contain zero, i.e., zero is not included within the lower and upper bound CIs. Previous studies have investigated mediational models using the same approach (e.g. Felton & Jowett, 2013). Bootstrapping is a nonparametric resampling process that does not confirm the sampling distribution's normality. Bootstrap-generated 95% bias-corrected confidence intervals (CIs) were constructed for 5000 samples on the hypothesised model (Preacher & Hayes, 2008).

Results

Preliminary Analyses: These were completed on the full sample of 832 pupils. Data screening procedures were adopted to detect outliers and normality in both samples in line with guidelines from Tabachnick and Fidell (2007). The internal consistency (see Table 3.1) estimates (α) for all the measures ranged from 0.75 to 0.91, indicating acceptable reliability. The mean scores (See Table 3.1) demonstrated that the sample perceived moderately high empowering climates and moderately low disempowering climates. Mean scores also showed relatively high levels of autonomous motivation, concentration and relatively low levels of controlled motivation and boredom (See Table 3.1).

Table 3.1

Internal Consistency, Means & Correlations for Cross Sectional Sample (n = 832)

Total n = 832	1	2	3	4	5	6	7	M	SD
1 Empowering	(.91)	- 54**	55**	- 17**	52**	50**	- 41**	3 72	62
2 Disempowering		(.86)	- 31**	35**	- 32**	- 30**	40**	2 72	71
3 Autonomous Motivation			(.94)	- 13**	83**	69**	- 60**	3 87	97
4 Controlled Motivation				(.75)	- 20**	- 11**	43**	2 79	77
5 Enjoyment					(.86)	67**	- 67**	3 08	1 05
6 Concentration						(.89)	- 59**	3 74	93
7 Boredom							(.84	2 39	1 08

**. Correlation is significant at the 0.01 level (2-tailed).

Internal Consistency scores in brackets ()

Bivariate correlations revealed that pupils' perceptions of empowering climates were positively related with autonomous motivation, enjoyment and concentration and negatively correlated to controlled motivation and boredom. Disempowering climates were positively related with controlled motivation and boredom and negatively related with autonomous motivation, enjoyment and boredom. Consistent with Duda's (2013) framework, empowering and disempowering climates were negatively correlated. Following this, the sample was randomly split into two using SPSS before testing and cross validating the hypothesised model in Mplus.

Parcelling: Results for the parcelling approach revealed consistent and significant factor loadings for both samples with a range in random sample one from .17 to .90 and random sample two .18 and .91 (see Table 3.2).

Table 3.2

Parcelling approach: Factor Loadings

Parcels	Parcel 1	Parcel 2	Parcel 3
1 Empowering	87** / 85**	88** / 87**	84** / 83**
2 Disempowering	81** / 0 80**	90** / 91**	77** / 74**
3 Autonomous Motivation	90** / 92**	85** / 86**	17** / 18**
4 Controlled Motivation	35** / 28**	90** / 86**	50** / 85**

**. P-Value is significant at the 0.01 level (2-tailed).

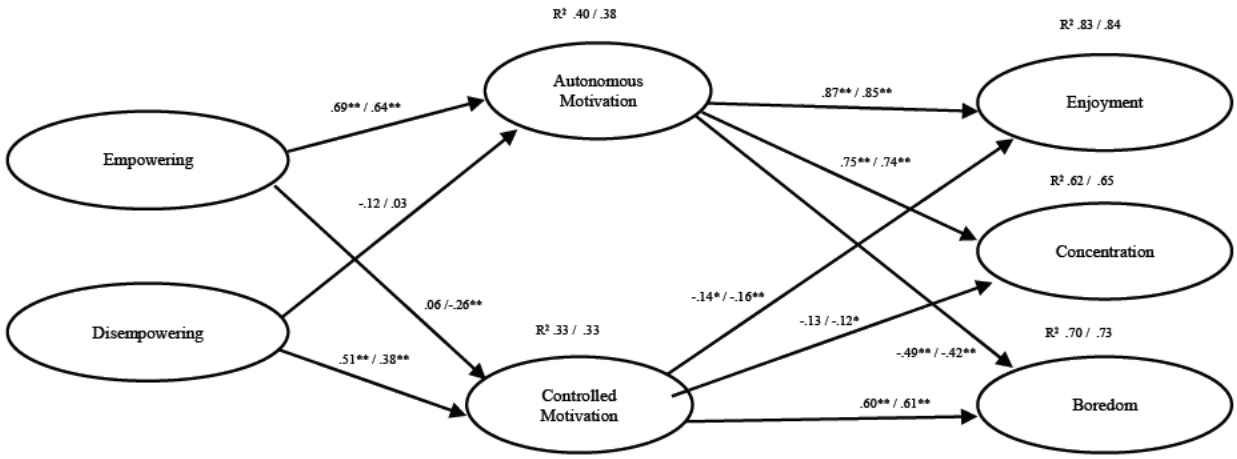
Values to the left and right of the / left: random sample 1 / right: random sample 2

Assessment of model fit: The hypothesised models demonstrated an acceptable fit to the data across both cross-sectional random sample one (χ^2 (12) = 383.18*; df = 175; CFI = .94; TLI = .93; RMSEA = .06; RMSEA 90%CI = .05 - .06) and cross-sectional random sample two (χ^2 (12) = 655.67*; df = 175; CFI = .93; TLI = .92; RMSEA = .06; RMSEA 90%CI = .05 - .06) (* = p < .01).

Path analysis: The model sought to further explore the hypothesised associations between climate dimensions, motivation and outcomes (enjoyment, concentration and boredom). In random sample one (see Figure 3.2), perceptions of empowering climates positively associated with autonomous motivation which in turn positively associated with enjoyment and concentration and negatively with boredom. Disempowering climates positively associated with controlled motivation which in turn was positively associated with boredom and negatively correlated with concentration. These findings were replicated in random sample two (see Figure 3.2) with two exceptions, that is observed negative associations between empowering climates and controlled motivation and controlled motivation and concentration. The effect sizes (R^2) ranged from 0.33-0.84 in random sample one and 0.33-0.83 in random sample two (see Fig. 3.2).

Figure 3.2

Cross Sectional (Random 1 & 2) including estimates for the full model



*$p < 0.05$, **$p < 0.001$
Values to the left and right of the / = left: random sample 1 / right: random sample

Indirect Effects: The indirect effects and bootstrapped bias corrected 95% CI are reported in Table 3.3. Results in cross sectional sample one demonstrated that an empowering climate had a significant positive indirect effect on enjoyment and concentration, and a significant indirect effect on boredom, via autonomous motivation. In contrast, a disempowering climate had a significant positive indirect effect on boredom via controlled motivation and a small but significant negative indirect effect on enjoyment via controlled motivation. These relationships were replicated in cross sectional sample two with the exception of one additional indirect effect: a small but significant negative indirect effect between empowering and boredom via controlled motivation.

Table 3.3

Cross Sectional (Random 1 & 2) Indirect Effects

Indirect Effect			**Random 1**			**Random 2**		
Outcome	**Motivation**	**Climate**	**Lower .5%**	**Estimate**	**Upper .5%**	**Lower .5%**	**Estimate**	**Upper .5%**
ENJOYMENT	**Autonomous**	**Empowering**	*0.43*	***0.61****	*0.76*	*0.40*	***0.55****	*0.70*
	Controlled	**Empowering**	*-0.04*	***0.02***	*0.08*	*-0.00*	***0.04***	*0.08*
	Autonomous	**Disempowering**	*-0.09*	***0.05***	*0.19*	*-0.09*	***0.02***	*0.14*
	Controlled	**Disempowering**	*-0.14*	***-0.07****	*-0.02*	*-0.10*	***-0.06****	*-0.02*
BOREDOM	**Autonomous**	**Empowering**	*-0.50*	***-0.34****	*-0.17*	*-0.38*	***-0.27****	*-0.16*
	Controlled	**Empowering**	*-0.28*	***-0.07***	*0.14*	*-0.27*	***-0.16****	*-0.04*
	Autonomous	**Disempowering**	*-0.11*	***0.02***	*0.06*	*-0.07*	***-0.01***	*0.05*
	Controlled	**Disempowering**	*0.11*	***0.30****	*0.49*	*0.10*	***0.23****	*0.36*
CONCENTRATION	**Autonomous**	**Empowering**	*0.34*	***0.52****	*0.70*	*0.33*	***0.47****	*0.62*
	Controlled	**Empowering**	*-0.04*	***0.02***	*0.07*	*-0.01*	***0.03***	*0.07*
	Autonomous	**Disempowering**	*-0.09*	***0.04***	*0.17*	*-0.08*	***0.02***	*0.12*
	Controlled	**Disempowering**	*-0.17*	***-0.07***	*0.03*	*-0.10*	***-0.05***	*0.01*

Study Two

The findings of Study one highlighted that the cross-sectional relationships between empowering and disempowering motivational climates with indicators of pupils' engagement (enjoyment, concentration and boredom) are mediated by the quality of their motivation in PE. Therefore, the first objective of Study two was to use an independent sample to test the hypothesised model longitudinally over two time points within the school year. This type of longitudinal study with more than one data point for all variables determines whether changes in one variable (e.g., empowering climate) predicts changes in a second variable (e.g., autonomous motivation) over time (Stenling, Ivarrson & Lindwall, 2017).

Procedure: Ethics committees at the authors' Universities approved the project. Schools were recruited through a project funded by Sport Wales. The first author subsequently made contact with headteachers to introduce the project. Information letters describing the project objectives and procedures were then distributed to parents who could opt their child out of the project. The project was also explained verbally and in writing to the pupils (See Appendix 4). Pupils who agreed to participate completed consent forms followed by a questionnaire. Data collection took place at a total of 11 secondary schools across Wales. A small team (5 in total) of trained data collectors led by the first author administered the questionnaires, and pupils completed the inventory without discussing answers with classmates or teachers (See Appendix 5). One school completed an online version of the questionnaire administered using the same procedures (albeit electronically). The pupils completed the questionnaire at timepoint one (T1) in October and November, with timepoint two (T2) in February and March. Due to school-related issues, one school dropped out of the study at time two. We matched the pupils' responses over the two-time points by creating an anonymised coding system.

Participants: 534 pupils (272 Males and 262 females; SD: 0.72) from Years 8 to 10 (13-15 years old) completed the questionnaire at T1 and 299 pupils (166 males and 163 females; SD: 0.64) completed the questionnaire at the T2. Pupils were recruited from schools across all regions in Wales and took PE classes as part of their weekly school curriculum.

Measures: The measures used were the same as in study one.

Data Analysis: The statistical analyses were performed using the following steps. As per study one, internal reliability and descriptive analyses were produced in SPSS. Next, a one-way between-group analysis of variance was conducted to compare the scores for those pupils who completed the T1 questionnaire versus pupils who completed T1 and T2 questionnaires. For the longitudinal analyses, the pupils who only completed T1 were subsequently removed. The same parcelling approach was taken as per study one. A confirmatory factor analysis (CFA) was performed to assess the suitability of the proposed measurement model and to estimate error-free correlations between the latent variables. Assessment of model fit followed the same procedures as study one.

A structural equation path model was formed to test the relationship between the variables at the two-time points, and the path analysis at T2 to answer the specific research questions. In order to test the equivalence of factor loadings over time following the CFA, the requisite equality constraints were enforced, constraining comparable parameters from each time wave using the BY command within Mplus (Geiser, 2012). The possible mediation (indirect effects) were examined between variables in line with the hypotheses. The next step was to account for or control the time 1 value to each of the time 2 variables and then test the hypothesized model including the indirect effects for the paths between the T2 variables. The parceling, bootstrapping, and mediation approach was followed using the same procedures as study one.

Results

Preliminary Analyses: Attrition is a common issue in longitudinal research. In this study, the percentage of missing data at T2 (41%) was partly due (21% of the missing data) to a school that dropped out of the study after T1 data collection. This accounted for over 20% of the missing data. The rest of the missing data were from pupils in attendance at T1 but absent at T2 across the schools. Results of ANOVAs revealed there was a statistically significant difference for disempowering, $F(1, 534) = 4.96$ $p = 0.03$, autonomous motivation, $F(1, 533) = 4.33$ $p = 0.04$, concentration, $F(1, 530) = 5.38$ $p = 0.02$ and boredom, $F(1, 531) = 5.63$ $p = 0.02$ between the two groups. Despite reaching statistical significance, the actual difference in mean scores between the groups (see Table 3.4) was minimal, with the effect size calculated using eta squared being smaller than .01 for all four variables. There was no statistically significant difference for empowering, controlled motivation and enjoyment. Even so, the differential attrition is considered as a limitation to the generalizability of the results and discussed further below. As recommended by Kang (2013), pairwise deletion of the missing participants was chosen because the data were not missing at random

Descriptive statistics and internal reliability tests were then completed on the sample of 299 pupils who completed the questionnaire at both time points. The mean scores (see Table 3.4) demonstrated that the sample perceived moderately high empowering climates and moderately low disempowering climates. Mean scores from both T1 and T2 showed relatively high means for autonomous motivation, concentration and relatively low controlled motivation and boredom. At T2, there was a higher mean for enjoyment than T1 enjoyment (see Table 3.4). Bivariate correlations (see Table 3.4) revealed across both T1 and T2 that pupils' perceptions of empowering climates were positively related to autonomous motivation, enjoyment and concentration and negatively related to controlled motivation and boredom. Across both T1 and T2, disempowering climates were positively

related with controlled motivation and boredom and negatively related with autonomous motivation, enjoyment and concentration.

Table 3.4

Means, standard deviation, internal consistency and correlations for longitudinal sample

T1&T2 N = 299	1	2	3	4	5	6	7	8	9	10	11	12	13	14	M	SD
1 Empowering T1	(.90)	.60**	-.54**	-.35**	.51**	.38**	-.23**	-.13*	.46**	.41**	.46**	.40**	-.48**	-.30**	3 72	62
2 Empowering T2		(.90)	-.43**	-.51**	.42**	.52**	-.19**	-.20**	.35**	.53**	.34**	.45**	-.41**	-.43**	3 68	62
3 Disempowering T1			(.86)	.67**	-.21**	-.18**	.35**	.17**	-.16**	-.24**	-.20**	-.20**	.35**	.24**	2 72	71
4 Disempowering T2				.85)	-.13**	-.23**	.26**	.32**	-.11	-.23**	-.13*	-.18**	.22**	.32**	2 80	71
5 Autonomous Motivation T1					(.88)	.69**	-.20**	-.14*	.78**	.57**	.63**	.53**	-.66*	-.55**	3 87	97
6 Autonomous Motivation T2						(.90)	-.17**	-.07	.56**	.77**	.48**	.66**	-.55**	-.65**	3 90	88
7 Controlled Motivation T1							(.67)	.40**	-.18**	-.17**	-.18**	-.20**	.39**	.29**	2 79	77
8 Controlled Motivation T2								(.64)	-.15*	.09	-.09	-.05	.21**	.31**	2 88	75
9 Enjoyment T1									(.89)	.55**	.63**	.44**	-.64**	.47**	3 08	1 05
10 Enjoyment T2										(.90)	.43**	.63**	-.52**	-.67**	3 91	96
11 Concentration T1											(.81)	.55**	-.61**	-.50**	3 74	93
12 Concentration T2												(.82)	-.40**	-.58**	3 73	92
13 Boredom T1													(.86)	.55**	2 39	1 08
14 Boredom T2														(.87)	2 21	99

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Assessment of model fit: Results for the parcelling approach revealed consistent and significant factor loadings ranging from .52 and .92. Model fit from the hypothesised model including the relationships between the variables at T1 and T2 demonstrated an acceptable fit to the data 1: χ^2 (12) = 638.38*; df = 372; CFI = .94; TLI = .93; RMSEA = .05 CI: 0.04-0.06); (* = p < .01).

Longitudinal test of relationships: Parameter estimates for the relationships between each variable at T1 and T2 showed significant strong positive relationships. The correlations between each variable across T1 and T2 ranged between λ| =.41 to .72 (see Table 3.5). Concerning the parameter estimates of the proposed model at time point 2 controlling for T1 scores (see Figure 3.3), perceptions of empowering climates positively associated with autonomous motivation (λ| = .68) which in turn strongly associated with enjoyment (λ| = .83), concentration (λ| = .68) and negatively with boredom (λ| = -.68). Disempowering climates were positively associated with controlled motivation (λ| = .43), which positively associated with boredom (λ| = .32). The effect sizes (R^2) ranged from 0.22-0.71 (see

Fig. 3.3).

Table 3.5

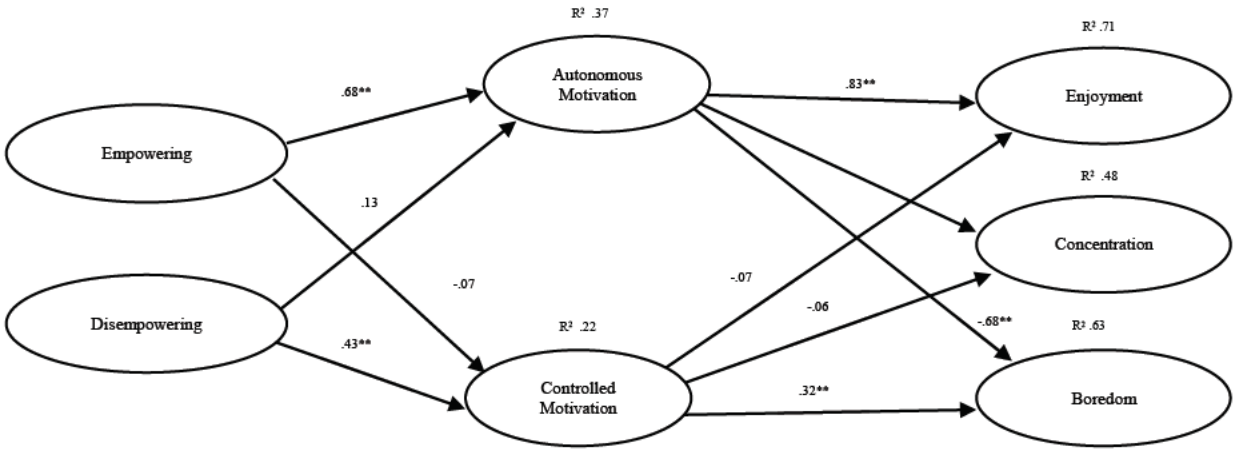
Parameter Estimates showing the relationship between variables at Time 1 and Time 2

T1 & T2 N = 299	Parameter Estimate
1 Empowering T1 & T2	.60**
2 Disempowering T1 & T2	.72**
3 Autonomous Motivation T1 & T2	.68**
4 Autonomous Motivation T1 & T2	.51**
5 Enjoyment T1 & T2	.43**
6 Concentration T1 & T2	.41**
7 Boredom T1 & T2	.45**

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 3.3

Longitudinal estimates for the full model at timepoint 2 (controlling for scores at time one)



Indirect Effects: The indirect effects and bootstrapped bias-corrected 95% CI's are reported in Table 3.6. Results demonstrated that empowering climate scores had a significant positive indirect relationship with enjoyment and concentration, and a negative indirect relationship with boredom, via its positive association with autonomous motivation. In contrast, disempowering climate scores had a significant positive indirect relationship with boredom via controlled motivation. No other significant indirect effects were observed.

Table 3.6

Longitudinal Indirect Effects

Indirect Effect			Lower .5%	Estimate	Upper .5%
Outcome	**Motivation**	**Climate**			
ENJOYMENT	**Autonomous**	**Empowering**	*0.66*	***1.01****	*1.43*
	Controlled	**Empowering**	*-0.02*	***0.01***	*0.10*
	Autonomous	**Disempowering**	*-0.04*	***0.15***	*0.36*
	Controlled	**Disempowering**	*-0.13*	***-0.04***	*0.01*
BOREDOM	**Autonomous**	**Empowering**	*-1.21*	***-0.85****	*-0.56*
	Controlled	**Empowering**	*-0.22*	***-0.04***	*0.13*
	Autonomous	**Disempowering**	*-0.30*	***-0.12***	*0.03*
	Controlled	**Disempowering**	*0.08*	***0.20****	*0.38*
CONCENTRATION	**Autonomous**	**Empowering**	*0.49*	***0.78****	1 15
	Controlled	**Empowering**	*-0.02*	***0.01***	*0.11*
	Autonomous	**Disempowering**	*-0.03*	***0.11***	*0.28*
	Controlled	**Disempowering**	*-0.13*	***-0.03***	*0.04*

Discussion

The primary purpose of the present research was to provide an initial test of Duda's (2013) conceptual model of the motivational climate in Welsh secondary school PE. Duda's model posits that empowering motivational climates in PE facilitate the quality of pupils' engagement, whereas disempowering motivational climates prevents its occurrence through the climate dimensions' differential relationships with autonomous and controlled motivation. Specifically, the model posits that empowering climates positively predict pupils' autonomous motivation for PE, whereas disempowering motivational climates positively predict controlled motivation. Finally, autonomous and controlled motivation are expected to positively and negatively predict the quality of pupils'

engagement in PE, respectively. This model was supported in two studies, including a 6-month prospective study, with secondary school pupils from Wales.

The Role of Empowering and Disempowering Motivational Climates in Pupils' Engagement in PE

The present findings underscore the extent to which the teacher-created motivational climate is empowering and disempowering matters in regard to the quality of pupils' engagement in PE. Young people may experience a range of physical, psychological, social and emotional benefits in PE when fully and optimally engaged (Curran & Standage, 2017). The findings from this study suggest that such engagement may depend on the PE teacher creating empowering motivational climates and adopting fewer disempowering strategies. Cross-sectional and longitudinal bivariate correlations confirmed that empowering motivational climates were positively associated with pupils' enjoyment and concentration and negatively associated with boredom in PE. In contrast, disempowering motivational climates were positively associated with pupils' self-reported boredom and negatively correlated with enjoyment and concentration in PE. These findings are in line with previous research in PE, which has shown that individual facets of empowering climates (e.g., task-involving or autonomy support or socially support) are positively related to indicators of pupils' quality engagement in PE. In contrast, specific characteristics of a disempowering teacher-created climate (i.e., ego-involving or controlling) negatively correlate to pupils' PE participation (Reinboth et al., 2004; Cheon & Reeve, 2013; Hastie et al., 2013; Ntoumanis, 2012, Jaakkola et al. 2017). The current findings align with those of Mastagli et al. (2021), who reported a positive association between pupils' perceptions of empowering teacher-created motivational climates and their level of concentration when participating in PE classes. The present findings are also in accord with past research that has tested Duda's (2013) conceptual model in youth sport, which has shown that empowering motivational climates predict adaptive outcomes. On the other hand, disempowering

climates typically leads to less adaptive and more maladaptive outcomes (Appleton & Duda, 2016; Castillio et al., 2022; Hancox et al., 2017).

The Mediating Role of Autonomous and Controlled Motivation

The present findings also offer initial support for Duda's and colleagues' (2016) conceptual model by highlighting the critical mediational role of a pupils' motives in the relationships between empowering and disempowering climates and indicators of engagement in PE. Across both studies, autonomous motivation for PE mediated the positive relationships between the teacher-created empowering motivational climate and indicators of pupils' engagement (i.e., enjoyment and concentration). As such, our findings on the role of autonomous motivation as a mediator of the effect of empowering motivational climates on outcomes in youth sport (e.g., Castillo-Jimenez et al., 2022; Fenton et al., 2017).

Study one also suggests that pupils' controlled motivation may be an essential mediator in the negative relationship between empowering climates and pupils' reported experiences of boredom in PE. However, this particular finding was limited to sample two in study one and was not replicated longitudinally. Thus, future research is needed to determine whether this particular finding is novel to a particular sample or is reproducible. In regard to the cross-sectional finding, it would appear when PE teachers create a motivational environment where pupils feel supported, that their opinions matter, that they are given meaningful and realistic choices, and where the focus is on effort and cooperation, pupils' reasons for doing a compulsory activity such as PE are more adaptive and self-determined (i.e., autonomous) in nature. Such autonomous reasons mean that pupils, in turn, derive more enjoyment and can fully concentrate in PE whilst experiencing less boredom.

In contrast, controlled motivation for PE mediated the positive relationships between the teacher-created disempowering motivational climate and boredom, and in study one, the negative cross-sectional relationship with enjoyment. To the authors knowledge, this is the first study to

highlight the mediating role of controlled motivation as proposed within Duda's (2013) conceptual model. Disempowering motivational climates, characterised by punitive, controlling teaching strategies that emphasise comparative ability, lead pupils to engage in PE for guilt, recognition seeking and the avoidance of disapproval. When these unhealthy motives regulate a pupil's motivation, the findings from the current study suggest they are less likely to derive enjoyment and report higher levels of boredom in PE.

Based on the critical assumptions of SDT and AGT, Duda's (2013) model offers a potential explanation for the mediating role of pupils' autonomous and controlled motivation on the effects of empowering and disempowering teacher-created motivational climates in PE. According to the model, empowering teaching strategies are more likely to foster autonomous motives towards PE (and fewer controlled motives) via the satisfaction of pupils' psychological needs of autonomy, relatedness and competence. Moreover, Duda's model proposes that an empowering motivational climate is more likely to encourage pupils to view competence in a task-involving manner (as defined in AGT). In contrast, disempowering strategies are more likely to foster controlled motives towards PE (and possibly fewer autonomous motives) via the dissatisfaction and/or frustration of pupils' psychological needs and the promotion of an ego-involving view of competence (as defined in AGT). Support for mediating role of basic psychological needs in the relationship between empowering and disempowering motivational climates and self-determined motivation was recently provided in the youth sport context (Castillo-Jiménez et al., 2022). To date, the mediating role of basic psychological needs (and views of competence specifically) in the relationship between empowering and disempowering motivational climates and pupils' motivation in PE remained unexplored. Thus, future research may wish to address this gap in the literature.

Limitations and Future Directions

Although this study has several noteworthy strengths (i.e., multiple samples; cross-sectional and longitudinal designs), there are limitations for consideration. As mentioned in the results of study two, 41% of the participants did not complete the questionnaire at Time 2. In addition, there were significant differences in scores on the targeted variables compared to pupils who participated at both time points, albeit these differences were small. Future research seeking to re-test the relationships outlined in this paper should limit the loss of generalizability caused by non-random attrition with multiple waves of data collection (Ribisl et al., 1996).

According to Stenling et al. (2017), whilst it is possible to test relationships longitudinally with data from two-time points, this limits one's ability to model non-linear forms of change and unravel actual change from measurement error (Ployhart & Ward, 2011). Therefore, future studies should look to collect data on the targeted variables in this study over three or more time points (Maxwell & Cole, 2007). We also did not account for 'clusters' within the samples collected. Future research should address this issue by recruiting pupils from a more classes (and schools) (see Myers, 2013, for an example). Future studies could also use samples with diversified subgroups of pupils to assess the invariance of the proposed measurement and structural models across, for example, gender, age groups, and pupils from different countries. Finally, this study was also limited by the exclusive reliance on self-report measures, and future research may wish to obtain self-report and observational ratings of the targeted variables when and where possible via validated scale. For example, researchers may wish to adapt the Multidimensional Motivational Climate Objective System (Smith et al., 2015) to rate the extent to which the motivational climate in PE is more or less empowering and disempowering (Duda, 2013) and the Engagement Rating Scale as an objective measure of pupils' engagement in PE (Reeve, Jang, Carrell, Jeon, & Barch, 2004).

Conclusion

In sum, the findings presented offer empirical support for the mediating roles of autonomous and controlled motivation in the relationships between empowering and disempowering motivational climates and indicators of the quality of pupils' engagement in PE. The findings further support Duda's (2013) conceptual model that outlines how differences in the motivational climate are differentially predictive of people's optimal engagement in specific activities. The practical implications of these findings point to the importance of professional learning opportunities for PE teachers concerning the creation of empowering climates and a reduction of disempowering strategies as they seek to optimally motivate and engage pupils in PE (for recent examples, see Fitton-Davis et al., 2021; Girard et al., 2021).

CHAPTER 4.

Using the principles from community of practice: Developing sustainable professional development programmes in Physical Education

Abstract

Background: Professional development is widely acknowledged as an important factor in improving education. Thus, understanding how to optimise Continuing Professional Development (CPD) to support and improve teaching quality is critical. Despite the many benefits of effective teacher professional development, most CPD offerings are one-day workshops held outside of the school's context The complexities of teacher learning and the difficulties inherent in developing effective PE-CPD when utilising a Community of Practice (CoP) to investigate impact planning require consideration.

Aims: This study developed a PE professional development programme (PDP) based on effective CoP principles and evaluated its impact in a Welsh secondary school. An analysis of the benefits, challenges, and critical considerations of implementing this approach will be presented.

Method: This longitudinal study took place within a secondary school in Wales. Overall, there was eight staff involved in the research project with mixed degrees of experience. Multiple qualitative data sources informed the study across five phases from July 2019 to May 2021. Interviews, focus groups, researcher reflections, collaborative discussions and an online social media tool were used to gather data which was analysed via a deductive thematic process.

Findings: Through the data analysis process, three themes were constructed that aligned with the research objectives: context and knowledge of effective CPD and the principles of CoP, creating and sustaining professional development opportunities incorporating CoP principles, impact of the PDP. The role of the boundary spanner and the integral contribution it can make was considered throughout.

Conclusions: This study adds to the existing research on PDPs in PE by combining effective professional development strategies and CoP principles. A deeper understanding and different ways to achieve behaviour change can be achieved through these programmes. It is important for researchers and developers of CPD programmes to understand the key factors that go into creating

these approaches, such as context, theory, technology, and the role of the "boundary spanner." Professional development should be developed using research-informed fundamental principles specific to each study's context and shared to increase understanding.

Introduction

There is widespread agreement that continued professional development (CPD) is a crucial factor in improving the quality of education (Parker & Patton, 2016; Armour, Quennerstedt, Chambers, & Makopoulou, 2017; Edwards, Bryant, Morgan, et al., 2019). Therefore, it is clear that understanding the ways of optimising CPD to support and enhance teaching quality is vital. However, despite the many benefits related to effective teacher professional development, most CPD offerings are one-day brief offerings in the form of workshops that occur away from the context of the specific school (Jess, McEvliy & Carse, 2017). Challenges also exist in identifying clear and compelling links between CPD, teachers' learning, and subsequent improvements for pupils (Parker & Patton, 2016; Yoon & Armour, 2017).

Within a Physical Education (PE) context specifically, professional development programmes (PDP) have the potential to improve content knowledge and develop teachers' pedagogical approaches (Harris, Cale & Muson, 2012). Although the findings regarding the nature and impact of PE-CPD resonate with those in broader education, researchers have argued that there is a lack of focus, direction, and limited support regarding PDP (Armour & Yelling, 2004, Armour, Quennerstedt, Chambers & Makopoulou, 2015). A lack of contextualising the information conveyed (Ko, Wallhead & Ward, 2006, Yoon & Armour, 2017) is a common feature within current PE Teachers' professional development. In addition, PE teachers tend to question the value of these one-off CPD courses. They tend to be given considerable information passively and are often the sole representative of their departments (Armour & Yelling, 2004).

Even with such critiques, traditional forms of PE-CPD continue (Yoon & Armour, 2017). Therefore, it is important to understand further what constitutes effective PE-CPD and enhance such effectiveness. Parker and Patton (2010, 2016) propose that opportunities to engage teachers in meaningful, connected, context-specific and authentic learning tasks are vital to effective PE-CPD.

Creating more informal, sustained opportunities for teachers to develop strong personal and professional relationships through discussing and sharing learning opportunities can be transformative in developing successful CPD offerings of the future (Parker, Patton, Goncalves, Luguetti & Lee, 2021).

Recent Developments in PE-CPD

Recent developments in PE-CPD have outlined the complexity of realising the impact on teachers' development and pupils' learning (Armour et al., 2015; Yoon & Armour, 2017). Edwards et al. (2019) put forward a list of nine essential principles for developing effective PDP within PE settings (See Table 4.1). In the last 15 years, there have been increasing CPD offerings that take a more sustained and extended approach that focuses on personal development and teacher collaboration (Lieberman & Miller, 2008; Chambers, et al., 2012; Yoon & Armour, 2017). In addition, there has been an increasing body of evidence that teachers should be involved in designing and applying their CPD (Lieberman & Miller, 2001, 2007, Little, 2008; Tannehill & McPhail, 2017). However, many PE-CPD programmes still do not account for the intricate nature of the learning process, consider the context and draw from evidence-based theoretical frameworks (strategies, concepts) while supporting the application of theory to practice (Armour et al., 2015).

It has been suggested the need for PDP to consider the complexity of the learning process while being innovative in approaches to bridge theory to practice (Armour et al., 2015; Yoon & Armour 2017). Developing PDP using the principles of community of practices (CoPs; Lave & Wenger, 1991) could be one potential solution. As a result, two definitions have emerged: a feature-based description where a community shares practice and a process-based definition where there is a constant process of peripheral participation (Hoadley, 2012).

Communities of Practice and PE-CPD

The complexities of teacher learning and the challenges faced in developing effective PE-CPD when using a CoP to explore planning for impact need consideration (Yoon & Armour, 2017). Evidence suggests the need to consider participation and acquisition in educational communities as critical contributors to teacher learning (Sfard, 1998). Lave and Wenger's (1991) work suggested that CoPs naturally exist. However, their conception was based on what exists in everyday practice and not environments deliberately planned to support learning (Barab & Duffy, 2012; Hoadley, 2012). More recently, principles of CoPs to develop teacher learning communities have become more prevalent. These communities of practice offer supportive and collaborative learning opportunities that are quite distinct from traditional professional development training (Lieberman, Miller, Wiedrick & Von Frank, 2011; Yoon & Armour, 2017). In contrast to naturally emerging CoPs, there are recent developments in which CoPs are used in a specific context, supported, and fostered to situate learning in an authentic context (Goodyear & Casey, 2015). In addition, there is a growing body of published work recognising the strengths of creating CoPs to deliver professional development for teachers (Patton, Parker & Pratt, 2013; Armour et al., 2015, Goodyear & Casey, 2015; Yoon & Armour, 2017).

The concepts of participation and acquisition are fundamental to structuring compelling educational opportunities, building on Sfard's (1998) approach to learning. Lave and Wenger's (1991) model of situated learning proposes that learning involves a social collaboration process, highlighting the connection between knowledge and the situation in which it is acquired and used. When considering CoPs from this position, these communities can vary significantly. Perhaps their use within research is not to establish their existence but clarify the key characteristics that enhance the support of and learning realised via CoPs (Oliver, Luguetti, Aranda, Nunez Enriquez & Rodriguez, 2018). With this at the heart of an approach to improve professional development in education, CoPs

can potentially be created for a specific purpose that is meaningful and revolves around authentic tasks (Wenger, 2010).

In the present work, Wenger's more recent approach was used, where the evolution of the concept shifted from individuals' learning and CoP groups emerging spontaneously. This approach holds that a CoP can be engineered and cultivated to enhance effectiveness and, in many cases, involves a facilitator (Wenger, McDermott & Snyders 2002). Wenger (2010) classified three elements as distinguishing a CoP from other groups and communities and which take into account the domain, the community, and the practice. With these underpinning principles, learning is understood as not the securing of new knowledge individually but as a process of engaging in teacher learning communities and interactions with others. From this perspective, mutual engagement (identity, e.g., being a member of a PE Department), a joint enterprise (shared goals of the PE department), and a shared repertoire (resources, pedagogical strategies, and innovation) characterise the learning process (Goodyear et al., 2014; Yoon & Armour, 2017). Some of the benefits of developing CoPs in this way include a) learning takes place to focus on teachers' work within schools and specific to their context (Armour & Yelling, 2004), b) communities form that foster collaborative settings where teachers can examine, share their views formally and informally, and identify strategies to transform their pedagogical approaches (Patton et al., 2013) and c) teachers, participating in CoPs, were more willing to take risks, reflect and improve on their 'failures' or setbacks while sharing successful strategies and practices (Parker et al., 2010; Armour et al., 2015; Oliver et al., 2018).

Despite the knowledge gained from recent research associated with professional development and CoPs in education, clarification on how these groups are created, sustained and the benefits remain to be answered (O'Sullivan, 2007; Patton et al., 2010, Parker & Patton, 2016). Goodyear and Casey (2015) suggested that there should be more consideration in supporting teachers in changing their practice. Recent research on PE has confirmed that using a boundary spanner can help sustain

CoPs (Goodyear & Casey, 2015) and illustrate the complexities of creating and planning effective CPDs (Yoon & Armour, 2017). Notwithstanding some increasing evidence, an in-depth picture of the benefits and critical characteristics to make and sustain the use of CoPs is still missing. In addition, there continues to be a lack of research on school-based learning communities (Yoon & Armour, 2017). To address the complexities of both CoPs and the school setting, it was considered appropriate in the present work to consider the principles of effective CoPs rather than allow and then investigate a naturally emerging CoP. Therefore, in this study, the focus is on the role that the principles of CoP can play in developing effective, theoretically informed PE CPD.

Theoretically driven CPD

Many PE-CPD programs do not capture the intricate nature of the learning process, appreciate the variability in the context and contemporary challenges, or support the bridge between theory and practice (Makopoulou & Armour, 2014; Armour et al., 2015; Edwards et al., 2019). In the present study, it was essential to be theoretically informed regarding the focus of the professional development, and the pedagogical content conveyed within the workshop. Through consultation with the school, enhancing pupil motivation and creating an optimal motivational climate in PE was identified as a key development area.

It has also been well established that teachers matter when it comes to the motivation of their pupils and whether pupils' participation is positive and sustained or results in negative consequences (Duda et al., 2014). However, motivation is still widely misunderstood in education settings. The fundamental principles to promote quality have not yet been widely adopted, and there remains a gap between policy, theory, and practice (Ryan & Deci, 2020). There has been a call for more effective professional development training centred on motivation to enable teachers to a) better understand the motivational theory and b) apply this knowledge to practice (Haerens et al., 2015). Few, if any, previous studies have investigated different ways to generate greater understanding and sustained use

of these concepts in PDPs using the principles of CoP. The present research, situated within a PE setting, makes a unique contribution to the existing literature. The benefits, challenges, and key considerations will be analysed when attempting to implement a theory-informed professional development sustained by using the principles of CoP. Many studies do not distinguish the difference between traditional learning communities and CoPs; therefore, the present work will also contribute to the literature by detailing the role of the community within the PDP, as advised by Parker et al. (2021).

Strategies for effective continuing professional development using the principles of a community of practice

Several recommendations to build effective CPDs and CoPs have been implemented in various educational settings (Armour et al., 2017; Edwards et al., 2019; Trust & Horrocks, 2019; De Carvalho-Filho, Tio & Steinert, 2020). This research has highlighted strategies worthy of consideration when designing professional development and CoP (See table 4.1). In the context of PDPs, we are unaware of any studies that have used the principles of CoPs and developed a theory-informed CPD programme centred on promoting teachers' understanding and application of motivational strategies to create more adaptive (empowering) less maladaptive (disempowering) motivational climates. Moreover, the effectiveness of PD for PE teachers. Incorporating learning communities informed by the principles of CoPs has received little empirical attention (Goodyear & Casey, 2015; Yoon & Armour, 2017). Therefore, using the strategies and recommendations from previous studies (see table 4.1), we developed a PE-CPD offering. The authors looked for commonalities between the suggested strategies for effective CoPs. These were then adapted to fit the context of this study used to support the implementation of the approach, development, and ability to sustain the CoP. We then assessed the benefits, challenges, and critical considerations concerning the evolution and development of the PE-CPD offering with the embedded CoP.

Table 4.1

Recent tips and strategies used to build effective professional development and CoPs

	Tips for implementing a CoP for faculty development **(Adapted De Carvalho-Filho, et al., 2020)**	**Professional development programmes & physical literacy** **(Adapted Edwards et al., 2019)**	**Recommendations for implementing CoP in schools** **(Adapted Trust & Horrocks, 2019)**
1	Gather a core group to launch the process	In depth needs assessment	Give members voice and choice in how they learn
2	Articulate the goals and values of the CoP	Create a supportive environment	Collaboratively develop a set of guiding principles with members that set the tone for the Community
3	Start with a specific task or project – make it problem orientated	Embed the content alongside the PE Departments current roles and find space to allow them to reflect on the learning process	Provide substantial support for the community
4	Make it worthwhile for members and the institution	Focus on teachers' growth and nurture them as learners and bridge the theory-practice gap	Create opportunities for social learning
5	Promote sustainability	Create a collaborative environment	Use technology to support and connect
6	Communicate success	Emphasis on sustainability and avoid one-off training opportunities	Build a sense of community
7	Evaluate the CoP	Do not rely on resource material as resource driven professional development programs do not adequately provide teachers with in-depth knowledge	Co-develop the purpose of the community with the members

In respect of the literature and strategies outlined in Table 4.1 the following principles were agreed upon and fitted to the contextual nature of this study (See table 4.2).

Table 4.2

Strategies of effective CPD and CoPs and application to this study

	Strategies used	**Application to this study**
A	In depth needs assessment	*Qualitative needs assessment of the Head Teacher, SLT and PE Department*
B	Gather a core group to launch the process	*Staff members of the PE Department with whole school support*
C	Start with a specific task or project embedded with theory and applied to practice:	*understanding and implementation of motivation and empowering motivational strategies*
D	Co-develop the purpose of the community with the members, giving them voice and choice with how they learn	*create individual and departmental goals shared and created by the participants.*
E	Create sustainable support structures, opportunities to collaborate and increase social learning	*establish 3-4 week touch points to review, reflect and shape the next cycle*
F	Use technology to support and connect	*Use the participants to come up with a way of online sharing that would engage and help sustain the group i.e., WhatsApp*
G	Make it worthwhile for members and the institution	*Evidence the learning and development throughout, build and share strategies including success and failure. Work it into their schedule – make it work for them*

H	Communicate success and evaluate the project	*Post intervention interviews to assess the impact of the approach and one year follow up to ensure sustained approach*

Purpose

In sum, this study will aim to develop a PE CPD programme underpinned by the principles of effective CoPs (Trust & Horrocks, 2019) and assess the impact within a PE department in a secondary school in Wales. The study will a) propose the creation of a theory-grounded PDP underpinned by principles of effective CoP and b) analyse the benefits, challenges, and critical considerations of implementing this approach.

Method

Researcher's Position

A researcher's philosophical outlook will affect how the research is designed (Kivunja & Kuyini, 2017). The overall design of this study was influenced consciously and unconsciously by my experiences as a teacher, coach, and lecturer. These encounters improved my understanding of the research participants and the environment in which they worked. When collecting the questionnaires and creating and supporting the PDP, these experiences were crucial. On the one hand, the development of the PDP and the use of theory-related strategies were made possible by the "teacher buy-in" and authenticity provided by my teaching experiences. On the other hand, I might have had similar experiences to the participants, preventing me from having a fresh perspective or thinking creatively (Corbin & Strauss, 2008). In order to counter this ,I kept an audio reflective diary to increase my awareness and take a wider perspective (Casey & McPhail, 2018).

Setting and participants

This study took place within a Secondary school PE department in Wales from July 2019 to March 2020. The context of the study was one where schools are situated with a transformative

education reform agenda (Welsh Government, 2020; Donaldson, 2015). Following institutional level research ethics committee approval (See Appendix 6), a purposive sampling procedure was employed to select schools for this study (Patton, 2002). Specifically, Welsh secondary schools that were part of existing collaborative research groups at the first author's university were invited by email to take part in the study. The school was recruited via email contact with the headteacher who showed interest and was invited to discuss the project and opt into the study (See Proposal Appendix 7). Written informed consents from the headteacher, the senior leadership team (SLT), and PE Department staff were collected in order to participate in the study (See Appendix 8).

The targeted Welsh secondary school was in South Wales, United Kingdom. It was a co-educational 11-16 comprehensive school with 785 pupils on the school roll. This school provided an authentic context for the complexity of creating, delivering, and sustaining a PDP using the principles of CoP. Overall, there was eight staff involved in the research project with mixed degrees of experience in teaching, leadership, and school settings, of which the PE department comprised three of the staff members.

Table 4.3

Participants within the project including their role and experience

Participants	Role	Experience & Context
Stanley	Head-Teacher	5 years as head of the school
Trevor	Interim Head-Teacher	Trevor took over as head teacher Christmas 2019
Adele	SLT responsible for staff development	Recently appointed
Katie	SLT responsible for teaching and learning	3rd year in the role
Archie	Overall Head of PE	7th Year as head of department
Anthony	PE Teacher & YR 7 Year Tutor	5th year teaching
Sophie	Head of Girls PE	15 years teaching currently part-time
David	Researcher & Boundary Spanner	10 plus years teaching experience working in higher education

Staff involved in the study were given pseudonyms to remain anonymous (See Table 4.3). The first author had both experiences of teaching secondary school PE, was currently a Senior Lecturer in sports coaching and PE at a University in Wales, and had an in-depth understanding of the theoretical conceptualisation of motivation and the motivational climate (see Milton et al., 2018) that informed

the intervention. He acted as a 'boundary spanner' in the development and evolution of the CoP (Goodyear & Casey, 2015). In line with Goodyear and Casey's (2015) study, the boundary spanner was expected to distribute, filter and facilitate the use of information in a different organisation. As recommended, the boundary spanner was from a separate professional organisation which brought in new information and sustained teacher enquiry.

Research Design: Professional Development Programme

This longitudinal study aimed to analyse the benefits, challenges, and key considerations when implementing a PDP. Using the school and participants described in table two, data were collected over eight months from July 2019 to February 2020 (See Table 4.4). There were five distinct phases to the project a) needs assessment (July 2019); b) delivery of a theory-grounded training programme centred on optimising the motivational climate in their PE classes and promoting quality motivation in pupils (i.e., the Empowering PE™ Workshop; September 2019); c) establishment and continuation of a professional development programme using the principles of a community of practice (October 2019 – February 2020), d) post-intervention interviews and e) one year follow up (Feb 2021). Unfortunately, due to Covid19, the one year follow up was disrupted with staff having limited face-to-face contact with the pupils. This led to conducting a brief follow-up with members of the PE Department only.

Table 4.4:

Initial timeline of study *

	July 2019 Needs Assessment	September Workshop Delivery	October-January Principles of CoP	February 2020 Post project interviews
1	Interview Head Teacher	Inset – Whole School	In person meetings every 3-4 weeks	Interview Head Teacher
2	Interview Senior Leadership	Half Day Workshop 1 during Inset	Interactions with staff within the intervention via WhatsApp group	Interview Senior Leadership
3	Focus Group PE Staff	Mid-September Workshop 2 & Review	Interviews, conversations and interactions with staff via individual and group meetings	Interview PE Staff
4		End of September Workshop 3 & Review	Include top- up workshop material	* ONE YEAR FOLLOW UP
5		Principles of CoP intervention established	New aims developed each cycle for individuals and department	Disrupted due to Covid but WhatsApp interviews recorded

*The data was collected from July 2019 to February 2020. Due to Covid19, the one year later follow up interviews were limited and not completed face to face. This was due to the school had been shut for large parts of the year due to the pandemic.

Data Collection

Multiple qualitative data sources informed the study; the source, code, and purpose are included in the table below (See Table 4.5; Parker et al., 2010). They included researcher reflections [voice memos using Gibbs (1988) reflective model as a template (See Appendix 9), semi-structured interviews (pre-and post-intervention) with the Headteacher and Senior Leadership Team (SLT); focus groups, interviews, collaborative discussions and the creation of an online WhatsApp group involving the boundary spanner and members of the PE department (See examples Appendix 10). There were two headteacher interviews, 4 SLT interviews, one focus group and six interviews conducted with members of the PE department (See example interview guide Appendix 11). The WhatsApp group generated over 130 interactions, and these were primarily used when the boundary spanner was not in the school. The WhatsApp messages were transcribed and used within the analysis. This interaction was done to help maintain the CoP and share practice and ideas. The interviews were audiotaped and then transcribed for purposes of analysis. Below is table 4.5 outlining the range of data sources and purposes:

Table 4.5

Data gathering tools

Data Source (Codes)	Description	Purpose
1. Researcher Reflections / Boundary Spanner (BS)	Informal voice memos recorded by the researcher that took place during the time over the course of the project.	To gather personal insights into how the project developed and the key learnings throughout the timeline.
2. Needs Assessment Interviews: Head Teacher and SLT (NAIHT & NAISLT)	Head Teacher and SLT interviews establishing the context and current understanding of professional development and CoPs.	To understand the school and staffs' current understanding of professional development, CoPs and the theory/concepts behind the workshops.
3. Needs Assessment Focus Group: PE Department (NAFGPE)	PE Department Focus Group establishing the context and current professional development and CoPs.	
4. Workshops to establish CoP: PE Department (WCoP)	Within and towards the end of the Workshops a CoP was developed with boundaries organised by the group.	To gather information on the creation of the PDP with principles of CoP.

5.	Social Media discussions via WhatsApp (SMWA)	Conversations, strategies, voice notes collected having used WhatsApp as a collaborative tool and discussion board throughout the period	To provide evidence on how the CoP was being sustained and developed
6.	Professional Learning Meetings Interviews with PE Department (PLMI)	Each visit to the school the researcher interviewed the teachers involved in the CoP	To provide evidence on how the CoP was being sustained and developed
7.	Post Professional Development Programme Interviews: Head Teacher and SLT (PPDPHT & PPDPSLT)	Post project interviews were conducted with the new acting head teacher and SLT on the impact of the CPD.	To understand the impact of the PDP and CoP from the SLT and Headteachers perspective
8	Post Professional Development Programme Interviews: PE Department (PPDPPE)	Post project interviews were conducted with the PE Department on the impact of the CPD.	To understand the impact of the PDP and CoP from the PE departments perspective
9	One Year Follow Up Interviews (OYFUI)	Interviews with all participants to see the sustainability of the project	To assess the sustainability and longer-term impact of the PDP

Phase 1 (July 2019): An initial needs assessment phase (pre-intervention) was conducted within the school at both the SLT level and within the PE Department (Edwards et al., 2019). This was done (See table 4.5) via interviews with the headteacher (NAIHT) and SLT (NAISLT) and a focus group with the PE Department (NAFGPE). This phase identified the views of the school leadership (Headteacher and SLT) and within the PE department, current understanding of motivation, strategies used to enhance or compromise motivation, whether they had received any formal training on such topics and finally, their knowledge of the concept of a CoP. The project was then introduced to the whole school during an inset day (Staff Training Day) in September 2019 to establish aims and objectives, promote whole-school buy-in, identify the key learning from the needs assessment and outline the remaining timeline.

Table 4.6

Content of Workshops within Phase 2

Workshop 1 (Early Sep 19)	**Workshop 2** (Mid Sep 19)	**Workshop 3** (End of Sep 19)
• Introduction to the training	• Introduce the ABC's Autonomy Belonging and Competence	• Recap the theoretical concepts within the workshop

• Philosophy and setting of initial individual and departmental goals • Understanding the quality and quantity of motivation • Collaborative discussion using applied examples	• Introduce the CLIMATE Acronym Co-operative contribution Learning emphasized Intrinsic focus Mastery orientated Authority with autonomy Taking other's perspectives Evaluation	• Collaborative discussion on theory to practice • Introduce the concept of a PDP using principles of CoP outlining the potential benefits and creating the boundaries and placing the author as the 'boundary spanner'
Theoretical Underpinning – Duda's Integrated Framework (2013) Integrates the motivation related dimensions of the motivational climate from Achievement Goal Theory (Ames, 1992) and Self Determination Theory (Deci & Ryan, 2001). Empowering climates are highly task involving (AGT), autonomy supportive and socially supportive (SDT). Disempowering climates are controlling (SDT) and marked by ego involving behaviours (AGT)		

Phase 2 (September 2019): Three evidence-based workshops (2.5 hours each; See table 4.6) were delivered following the inset day. The workshop contained three clear sections to minimise disruption to staffing (and increase the possibility of participation) in the school and was delivered over a month. The workshops were designed to increase the teachers' understanding of motivation and the principles of and rationale for creating more empowering and less disempowering climates within their PE lessons. In the first workshop (Early Sep 2019), the teachers were introduced to the theoretical concepts underpinning the Empowering PE™ training approach (see Appendix 12). In addition, the teachers reflected on the lack of training that they had received on the topic of motivation. Workshop two (Mid Sep 19) built on the theoretical concepts of motivation in workshop one. Additional content related to empowering behaviours that develop autonomy, belonging and competence (See table 4.6 and Appendix 13). Workshop three (End of Sept 2019) recapped the theoretical concepts and entailed collaborative discussions on bringing the theoretical concepts and principles to practice. Questionnaire results from the pupils were collected and were used in this session to engender further buy-in from the staff (See Appendix 14). Once there was a realisation that the environment could still be improved and that the results were specific to their context, this increased the authenticity and meaning of the PDP using principles of CoP for the staff involved. As the teachers did not know what a CoP was, the idea was introduced with potential benefits. A co-constructed discussion on creating the guiding principles while establishing the lead author's role as the boundary spanner for the CoP was undertaken (Trust & Horrocks, 2019). Within the final workshop, the participants highlighted

the importance of individual goals, and the boundary spanner reinforced the extent that teachers can have on pupils' motivation (Trust & Horrocks, 2019). Having established personal goals with each member of the PE department, the theories that underpin the promotion of motivation quality were discussed collaboratively (Edwards et al., 2019). Exemplar applied examples from the teachers' settings were shared. In line with the practical strategies discussed earlier, one of the discussions within this session established the role of social media and an online forum to support the group throughout the CoP (Trust & Horrocks, 2019; De Carvalho-Filho et al., 2020). This generated both voice and choice for the participants and introduced the use of technology to help sustain the professional learning opportunity. At this point, the teachers indicated that they felt that WhatsApp was the appropriate digital tool to enhance and embed collaborative learning.

Phase 3 (October 2019 to February 2020): Following the delivery of the three workshop sessions, the strategies and tips regarding effective professional development and CoP' (See Table 4.1) continued to form the basis of decisions made to create and sustain the PDP. For example, the author (boundary spanner) would spend a day every 2-3 weeks in the school developing opportunities to create collaborative conversations with the department on an individual and group basis. This was done to suit the needs of the individuals and their school context (Edwards et al., 2019). These flexible discussions focused on the previous 2-3 weeks of PE lesson delivery and concentrated on the lessons' pedagogy and social interaction with pupils (Edwards et al., 2019). These exchanges gave the participants space and time to discuss and share more empowering and less disempowering strategies that they had implemented, reflecting on what went well and how the process could be improved. The focused discussions were based on departmental goals and individual goals and agreed upon concerning the constraints and requirements of the teachers' context (Trust & Horrocks, 2019). The individual and departmental goals were then re-evaluated each time the boundary spanner spent time within the school (See Appendix 15; Antonio et al., 2020).

The professional learning meetings (PLMI, See Table 4.5) were developed and enhanced by a supportive WhatsApp group where the boundary spanner posted every week different theoretical content to generate and support the applied theoretical examples (See Appendix 10; Antonio et al., 2020). Throughout phase 3, participants could post their ideas and strategies and share lesson plans, resources, pedagogical approaches and examples from their lessons (Edwards et al., 2019). The face-to-face interactions combined with the online offering allowed further collaborative discussions related to strategies concerning the motivational climate inside core PE lessons and ideas for the wider school environment (Professional Learning Cycle Interviews, PLCI & social media WhatsApp SMWA, See Table 4.5). Throughout phases 2 and 3, the researcher would use voice memos to record his thoughts and feelings (Boundary Spanner, BS, See Table 4.4).

Phase 4 (February 2020): A post-intervention interview (PII) phase in February 2020 was conducted to establish the challenges and critical considerations of creating and sustaining professional development offerings using the principles of effective CoPs. This was done for two weeks (See Table 4.5 via interviews with the headteacher (PIIHT), SLT (PIISLT) and interviews with each member of the PE Department (PIIPE).

Phase 5 May (2021): A one year follow up phase was disrupted due to the impact of Covid19. It was hoped that all participants could have been interviewed to assess the impact of the PDP. In the end, following discussions with the PE Departments, the teachers participated in a short interview via a voice recording on WhatsApp (One Year Follow Up Interview, OYFUI See Table 4.5). The voice recording allowed them to answer questions and reflect on the impact of the PDP using the principles of CoP.

Data Analysis

Deductive thematic analysis was completed using six phases of analysis proposed by Braun and Clarke (2006): 1. Familiarisation with the data, 2. Generating initial codes, 3. Searching for themes,

4. Reviewing themes, 5. Defining and naming themes, and 6. Producing the report. This approach was used to answer the research questions identified and build on the strategies identified for professional development using the principles of effective CoP. The lead researcher repeatedly read the transcripts from various data sources to become familiar with the content and generate initial codes. Throughout the analysis, the peer examination strategy was used to member check and pass comments on how the higher order themes led to codes, sub-categories were defined, and findings were developed (Goodyear & Casey, 2015; See examples Appendix 16).

Trustworthiness was addressed using the following criteria: credibility, transferability, dependability, and confirmability (Lincoln and Guba, 1985). Strategies to support trustworthiness included: the researcher keeping voice memos, including personal reflections, questions and discussion with supervisors, theoretical propositions throughout the study (Parker et al., 2010) and member check, where the information gathered was presented back to participants for verification. Finally, triangulation was considered through multiple data sources (interviews, focus groups and researcher reflections) and discussions with the other investigators to exchange and confirm the findings (Merriam & Tisdell, 2015).

Findings

Through the data analysis process, three themes were constructed that aligned with the objectives a) develop a professional development opportunity using best practice ideas from the literature, and b) analyse the critical benefits, challenges and considerations of this approach. Tables 4.7 and 4.8 outline core codes, sub-themes and higher-order themes established through the analysis. In Table 4.7, three key themes were identified. Firstly, the context of the school and teacher's knowledge of CPD and CoP principles. Secondly, creating and sustaining effective CPD using the principles of CoP and thirdly, the impact of professional development using the principles of CoP. Finally, the boundary

spanner's role has been considered as an important overarching theme throughout the findings and discussion (See Table 4.8).

Table 4.7

Context, professional development, creating and sustaining a CoP and impact core codes, sub themes and higher order themes

Core Codes	Subthemes	Higher Order Themes
Tick box Training needed Reflective Learning & engaging Specific Lack of Time	Current thoughts on professional development	Theme 1: Context and knowledge of effective CPD and CoP
Lack of knowledge No knowledge	Current knowledge of CoP	
Clear Boundaries Personalised / Voice Immediate Flexible / Accessible Meaningful	Establishing the professional development	Theme 2: Creating and Sustaining a professional development using the principles of CoP
Sustained Increased Planning Generates Ideas Prompt timely and organised Impact	Theory informed	
Sharing strategies Cross gender Wider Impact Sharing knowledge	Accountable/ Collaborative	
Flexible & Ease of information Bigger impact Immediate	Use of Technology	Theme 3: Impact of the professional development using the principles of CoP
Practice Increased understanding Effective / Improved Excitement & Passion Reflection Longevity Collaborative / Bouncing	Benefits	
Increased evidence Greater follow up/Wider Impact Manage change Dissemination event	Way Forward	

Culture of Research Increased time		
Covid Well-Being Increased belonging Focus on theory	One Year On	

Table 4.8

Role of the Researcher / Boundary Spanner core codes, sub and higher order themes

Core Codes	Subthemes	Higher Order Themes
Build relationships Self-awareness Alternative solutions Reflections Digitally capable	Challenges	Overarching theme: Role of the Boundary Spanner
Staff relationships Managing relationships Power Dynamic Staff context Individulised approach	Understanding context	

Theme 1: Context and knowledge of effective CPD and the principles of CoP

Current thoughts and understanding of professional development (pre-intervention)

The first task following the recommendation by Edwards et al. (2019) is the needs assessment phase. Understanding the context, current knowledge of those involved in the project, and creating specific and relevant content were considered fundamental to establishing the project. Acknowledging potential barriers in these early discussions was critical to gaining insight into the school context. One of the SLT outlined, 'with my staff development hat on there is an awful lot that we now need to do' and 'I am sure if you asked the staff, they don't feel they have the time for it' (Needs Assessment Senior Leadership Team; NASLT, Adele). This was supported by the teachers within the PE Department in the Needs Assessment Focus Group Physical Education (NAFGPE), where Sophie mentioned, 'I think we're expected to do so much, though, aren't we? We're expected to be able to deal with counselling. Unfortunately, you're trying to learn on the job, aren't you? And there are 101

different jobs at the time as head of year, teaching the subject, doing this, chasing that child...' (NAFGPE)

There was also the view that the schools' recent provision of CPD was delivered without specificity and focused on knowledge transfer rather than embedded learning. The headteacher alluded to this 'Insets, twilight, all those sorts of things, I think can be quite cursory and tick-box' (NAHT, Stanley). For the headteacher and senior leaders within the school, the focus of CPD needed to be specific, reflective and focused on learning and incorporating ideas that supported the professional learning approach linked to the new Curriculum for Wales. Stanley felt:

> With my Head Teacher's hat on, it would be that we give opportunities for staff to be reflective about motivation, so that that can inform their planning, so that they can plan engaging lessons, where the students will be more motivated, understanding what the triggers for motivation are, so that then outcomes can improve and the students can make more progress. (NAHT)

Understanding pupil motivation and effective building relationships as part of the school development plan and an area that had not been explicitly explored in previous CPD. The senior leaders supported this reinforcing the need for specificity, with Adele stating 'it is actually tailoring our training and making it more explicit' (NASLT). Finally, the training needed to focus on learning rather than training, making the CPD offering engaging. Kate the SLT responsible for teaching and learning was adamant that the CPD should be interactive 'because I don't want to stand a listen to someone for an hour – you know – because I'm not motivated. So, what do I want to do? I want to be hands-on; I want to learn something; I want to be engaged. The times goes quicker, you learn more' (NASLT, Kate). The PE staff within the needs assessment focus group recognised the need for training on motivation 'I think as a staff we definitely need more training on that' (NAFGE, Archie). Following the needs assessment and early workshops, the focus turned to the sustained PDP and embedding some of the principles of CoP.

Knowledge of the principles of CoP in education

While there is increasing use of professional development linked with the concept of CoPs within their design, there is still a lack of understanding and knowledge about their role within schools. For example, Stanley, the headteacher, had not heard of the term CoP or the potential benefits the principles a CoP could have in helping to sustain professional development:

> It was only when you came in the other day and we talked about community of practice. That was the first time I heard that term, and as a learning organisation, I think yes, if we're expecting students to be learners and be motivated to do that, well then I think it's important that, as adults who have already been through that process, in terms of getting a job and being a practitioner, I think it's important that we broaden our horizons... (NAHT, Stanley)

Both SLT's and the PE department had similar responses to the information when questioned by the researcher on their understanding of the term and or principles of a Community of Practice:

> David: 'Have you ever heard of a community of practice?'
> Adele: 'What do you mean by 'community of practice? Is that our research groups?'
> Kate: 'No'
> PE Sophie: 'No',
> All: 'No'
>
> (NASLT & NAFGPE)

These views hold particular implications to ensure that the boundary spanner understood the context of the environment in order to help create and sustain an effective PDP. With the knowledge of CoP being limited, introducing them to the concept and principles gave them the understanding of the benefits of this type of approach.

Theme 2: Creating and sustaining professional development opportunities incorporating CoP principles

There were some key sub themes that emerged in regard to the creation and sustaining of the PDP including its establishment, the theoretical framework that was used and the planning behind the CoP. The key principles taken from the literature around the creation and sustainability of the professional development (See Table 4.2) were linked to the findings which emerged.

Establishing the professional development

Giving members voice and choice in order to facilitate the group effectively was considered an important part of creating the PDP. Early on in creating the support network it was established that David (boundary spanner) understood the implications of time and the staff's other commitments 'I'll be coming in – it can be weekly, bi-weekly – whatever suits you…you need a bit of time in between each visit… to try things out, teach…you've also got other administrative work' (WCoP David). This approach was taken throughout the stage of setting up the intervention where David continued to set boundaries, personalise the information and ask for the groups input into the framework:

> next week, will be to (a) personalise it for you three as individuals, because you might have different goals within this professional learning; Andy yours might be more of a departmental focus, yours might be lesson-focused on multiple goals. Then we'll start to think about setting up the CPD using principles of CoP – how do you three best work? (WCoP Dave)

Sharing the questionnaire results within the session on establishing the PDP personalised the content and increased the buy-in from the staff. Seeing the findings regarding pupils' views of the motivational climate in PE classes, their motivation, and associated outcomes generated an increased sense of certainty that the PDP was worth the engagement and personalised the content both as individuals and as a department. As seen in Appendix D, this approach continued throughout the intervention; i.e., individual and departmental approaches were adopted to embed the learning. The generated individual and departmental goals were discussed in both group discussions and individual interviews to give the teachers their own space and comfort alongside their group identity. Dave used open questions to get target areas related to the theoretical concepts for the group to develop these personal and departmental goals, as alluded to in the following quotation 'Anthony, is there anything you specifically want to think about over the next phase … what do you want your goal to be' (PLCI Dave) As you can see in Appendix 15, the personal goals were then formalised and shared via the online sharing tool WhatsApp. Dave, the boundary spanner, understood the need for individual goals but also wanted to give the teachers the time to embed the principles into their practice 'I think giving them their two or three weeks of teaching now until the one-week holiday will give them that time

and space to embed some of these principles, before we look at what's next, and what's right for them as individuals, but also as a department'. Time and space, as suggested by Barab and Duffy (2012), along with the key concepts from the theory allowed the teachers to explore and practice the principles. Such an approach further engaged the participants. In fact, it increased their motivation for continued participation in the CoP. The boundary spanner did however still express concerns about the level of engagement of the PE Department and how the PDP was being received by the group:

> I've just been to the first session to build the community of practice and I'm getting a little bit nervous of this, I'm not properly sure how the staff really view it yet, the timings, we've decided to go via WhatsApp. I'm worried will people post? What will be the level of engagement? How often do they want me to engage? We've established some guidelines – I'm really mindful that this works for them, not seen as onerous, a chore, because as soon as it is then I've lost them (David)

What emerges from the reflection is the complex nature of being involved in PDPs. In this instance, the boundary spanner's reflection made it apparent that being comfortable with the 'messy' nature school-based research projects, understanding their own position and the context were all crucial in order to create the most effective type of learning environment and address the associated challenges of doing so. Embedding theory within the PDP was also considered a key principle.

Theory informed

A theoretically informed PDP was an important part of creating and sustaining what hoped to be an effective CoP. At various points throughout the data collection, the participants emphasised the theory. The boundary spanner explored this in his personal reflection:

> I've really enjoyed the opportunity to go into the schools, I was nervous, but it's really given me confidence, to know that these principles are definitely worth talking about, worth reflecting on...a rationale for why that role of the more capable other, the teacher in this instance, can have such an impact on a young person's environment and their life…The interactions we have can be vital, talking about it with staff in the workshops I think it's understanding it's not a light switch. It works over a long period of time and being an empowering teacher in one lesson might… light that candle. It might not be in that lesson, it might be subsequent to that, because of the interaction they had, it's transferred and gives them that motivation at another point. (David)

This was reinforced by the contributions of the boundary spanner and the teachers in the online WhatsApp group where theory was being used to generate ideas, strategies and a greater understanding over a prolonged period. This observation clearly has implications for the developing of more sustained PDPs. Examples of the content from the online WhatsApp groups can be found in Appendix 10.

The teachers referred to the theory content throughout the PDP and it allowed them something to plan towards (in regards to consistently realising the theoretical principles), share and keep at the forefront of their practice. Anthony, as an example, constantly used the theoretical concepts and examples we discussed throughout: 'The one I remember was how you speak to students, and just keeping everything motivational with them, praising them…when they put effort in and that's what I tried throughout the day' (PLCI). Whereas for Archie, the theoretical foundation of the PDP gave him a focus to discuss progress with the rest of the department:

> I've been having weekly informal discussions with them individually about this motivational climate empowering PE concept. I can gauge if they're embracing the theory and actually acknowledge that it's going on. (PLCI)

Interestingly, the boundary spanner discussed how the theoretical concepts being used to enhance motivation for the pupils were actually being used to try to create an effective CoP 'it reinforces this idea…it comes back to that motivational climate and that empowering environment that for this to fundamentally work, we have to live the theoretical principles ourselves…this idea of belonging and getting people to buy into these sorts of things, becomes really, really important' (David).

Accountable, sustainable and collaborative

During the PDP, the teacher's language focused on the level of accountability and sustainability. These were considered key concepts when discussing creating the boundaries and framework of the group. Anthony made this clear within the final workshop when he mentioned the importance of sustainability and longevity of the project:

> what we don't want to do is go away with work we've just spent the last 3 workshops doing…We don't want this to be a snapshot and one of those little interventions. You say it all the time, Archie, we do things and they stay around for x amount of weeks and then suddenly they just disappear (WCoP, Anthony)

Within education settings in Wales, there is an importance placed on evidence-based practice and sustained CPD with the move towards the new curriculum for Wales. This sustainability was considered vital and moving away from traditional forms of CPD. Archie, as head of the department, wanted there to be a level of accountability within the intervention 'I've been thinking about this and it comes down to this accountability but my job as a leader of the department is to ensure that I'm upholding the staff accountability…weekly informal discussions about how it is working for them' (PLCI, Archie). In his role, accountability which is a prominent discourse in education settings in Wales, was also critical. Archie also emphasised the longevity of the intervention effects 'it's collating evidence on what could potentially – what PE could look like in 18 months' time (PLCI, Archie).

The collaborative and meaningful approach was considered vital in the discussions on how to set up the dynamics of the group to ensure sharing of ideas and practice. Anthony mentioned about wanting to improve their daily practices by 'having the tool in place which allows us to share those good things' and how the informal collaborative discussions were a significant part of improving practice 'we have our best chats when we have 10 minutes, they're playing and we bounce back – I did this, I did this. If I tried this… It would be good' (WCoP). This was reinforced by Archie:

> I think having an area where Anthony and I can share practices with Sophie and she can share practice with us, I don't think we do share enough. I don't transfer to you at times, the stuff that I've done with rugby or football…it just doesn't happen, you know? By the time we've had a catch-up about other things…. (WcoP, Archie)

Enabling a safe and collaborative space amongst participants was a fundamental element identified by the participants that would prove integral to the success of the PDP. Archie continued 'In terms of advice, guidance, strategies, we would like that as a source, because we don't find the time to go

away and research new ideas – it's…a challenge, so to have an area which is accessible for us would be great' (WCoP). This lack of time, space and ensuring a safe and collaborative environment to share practice is a common feature in research enquiry work within education and linked to the principles outlined in the introduction (i.e., Edwards et al., 2019).

During the PDP, it became apparent that the prolonged nature and sustained approach enhanced the learning and development for the staff. As such, the planning of the programme in regard to how to sustain and enhance learning was integral. The comment below illustrates how information was shared and the timing was important to help the teachers generate strategies for their lessons related to the theoretical concepts:

> what's great – the pictures you've been putting in, if I'm on my way to work if it's a picture I'll probably look at it, even in bed, those infographs and they're great – I have a quick look, take what I want from it. But in the day I won't get the time write in there, it's really good seeing other people's thoughts, but the pictures are probably the best bit, especially in the morning because it's made me think 'I'm going to try this today. I'm going to reflect on this. (PLCI, Anthony)

Key themes emerged from the data around a) the format (visuals/ideas) and timing of the messaging and b) having the boundary spanner present to support, encourage questions and discussions and c) the individualised approach needed for each participant. This was reinforced by Archie and Anthony who felt both the timing and nature of the support from the boundary spanner was very important in order to sustain the theoretically informed CoP. Archie suggested 'what's been good is that it's been prompt – it's not necessarily been 'You should be thinking about this. It's a resource or an image with cues on it that allow us to think how we're going to teach our unit of work? With this theme…it's certainly created thoughts about how I teach anyway' (PLCI). These comments during the initial cycle were reinforced by the boundary spanner who reflected:

> Anthony, for instance, is loving the infographics, and that gives him a little snapshot, something to look at and have a quick reflect on and then pull out a few of the ideas and use them in his practice. Then Sarah...thinks this term assessments over the last two weeks have had an impact…but given the chance to explain and provide that rationale gave her a boost in

> terms of knowing that Aiden posts and she can post when she feels comfortable. She's actually going to mirror some of the strategies applied by the boys last term and see the effect it has on the girls. (David)

Sophie did feel that the timing hadn't allowed her to engage with the project as much as she would have liked due to the end of term class assessments taking place during the first two weeks of the CoP which led to feelings of guilt 'No. I feel a bit guilty because I haven't put a great deal in because I don't really feel I've done a huge amount yet…the timing wasn't ideal for me. But this term now I feel I'll be able to contribute a bit more, because I'll be able to try more.' (PLCI Sophie). The comments made by Archie, David and Sophie reinforce the need to understand the importance of planning such PDPs. Knowing their other commitments at any time in the school year, making the participants feel comfortable and understanding the individual contexts are vital. The boundary spanners reflections from one of the first meetings explicitly referred to this:

> The timing of the WhatsApp group, it's really important to think that Anthony doesn't want things on the evenings and at weekends, but he loves the morning WhatsApps; Sophie and Archie…are perhaps more likely to look at stuff at the weekend. So come up with a strategy…I'm going to carry on posting those picture messages, those infographics for Anthony on a weekly basis in the mornings…based on the comments from the interviews with staff I will probably drop some bits in on a Sunday morning for Archie and Sophie to use when it suits them...to make sure we meet the needs of each person... making sure you've got that buy-in from everyone… really make it work for people....Sophie won't look at stuff in the mornings because she's driving on her way to work…actually getting to know the group through these interactions can really help you provide that more detailed interaction which will make the community of practice work. (David)

Understanding the amount of information, when the information is shared as well as the timing of the CoP will have a significant impact on the success of creating and sustaining these types of approaches. These results indicate some key considerations for both creating and sustaining PDPs using the principles of CoP.

Theme 3: Impact of the Professional Development Programme

There were a number sub themes that developed related to the impact of the PDP. The sub themes that will be addressed within this section are the use of technology, the benefits of the PDP, the way forward and finally the sustainability from the one year follow up interview.

Use of Technology

While there was an understanding that an online forum would be used to share practice, it became apparent that the traditional school-based systems like (email/OneDrive) were not fit for purpose. The department proposed the use of the social media application WhatsApp as a better way to communicate. As Archie mentions some of the perceived benefits were:

> This concept of using social media, WhatsApp enabling ease of communication, the dashboard was brilliant, because we can pick up our phone, we can see an image, we can highlight the research –, know that this concept is the journey and actually the pressure doesn't sit with 'Oh, I've got to do it this day, this lesson, this year group.' It was nice having the community of practice offering so much flexibility (PLCI)

Archie continued with this theme outlining the ease of information and flexibility of sharing information in this way:

> because it is in your phone which is so accessible and it's on you most of the time, it's just been there, so you've always felt the need. When it's on email, when you are so busy in school, you have a list of things to do, that email sometimes becomes irrelevant, so I think when it's on your phone, even if I'm just walking in from the car park to the school, I have a look at what you've sent on a Sunday, it's just refocused me, given me what I need to do and has had an impact. So I think it's been really positive. (PPDPPE)

Sophie felt more comfortable in the format of the online WhatsApp group and actually felt being in the group increased her willingness to post and develop ideas 'No, I feel comfortable posting with the PE department and you. I think in a way it's quite good that it's not one-to-one, because if someone else has posted it spurs you on to post and also you can build on something that someone else has said' (PLCI). This informal online way of collaborating was considered vital in ensuring the departments voice was heard and embedding a flexible, easy way to engage in the PDP. Archie went on to confirm this point:

> There is a massive need for it, we have loads of dashboards where we share information. Take, for example, the passport learning pathway – that's great but it's clunky. It takes a few different clicks for me to access something that I want to implement. I can dip in and out of this as I want and it's really accessible…it's just individualised approaches. I might look at it on a Friday in Lesson 5 when I have a PPA, setting up my planning ready for the week ahead. Whereas another member of staff, they might do it on a Sunday afternoon when they've got some headspace, the community of practice allows us to do that. (PPDPPE)

Undoubtedly, understanding the context of the environment and suiting the technology to suit the intervention is vital to implementing and sustaining PDPs. It is not just implementing technology but understanding and using the appropriate tool within the context of the setting.

Benefits of the PDP

There were a number of perceived benefits from engaging in the PDP. All the participants felt that there was more longevity to the programme and an increased understanding as a result. Sophie mentioned 'with the PE department I think, because we have been part of this kind of research project and that community of practice, and you've seen what impact that has had on students, I think their commitment to that has been far greater than just maybe a member of staff who has attended one off sessions' (PPDPSLT). Anthony reinforced the importance of reminders and goals 'which we got through the community of practice, just to be on task. Not like a tick list, but maybe a mini-goal; because we all had a goal for a couple of weeks' (PPDPIPE). Sophie felt the CoP approach was different to the more traditional workshop offerings and had more potential for sustained development:

> I found this has more longevity; with regard to workshops, I've been to quite a few and a lot of the stuff is really good, but it just sort of stops there. You think about it for a week or so and then you don't kind of carry it on, but with having the WhatsApp group, it might not buzz all the time, but if someone puts something on it, it refreshes your memory and you're more likely to carry on with it (PPDPIPE, Sophie)

There were further benefits to planning, practice and understanding that came from being involved in the programme. Anthony mentioned that planning improved from being engaged in the CoP:

> definitely, just because we were talking about it and you were sending information which I'd look at on a Monday, which then made you think OK, I've got my 5 lessons now, what am I

> going to do based on the material which was sent in the community of practice, you refreshed what I was looking at. I'd look at my 5 lessons for the day…OK, I'm going to make sure I do this, where people who went to the workshops, they write the notes but sometimes it doesn't ever get put into planning. (PPDPIPE, Anthony)

Archie reinforced this by explaining that it gave them opportunities to plan and practice which led to increased understanding of the theories and ability to implement into practice 'The people enjoyed the workshops and came away with ideas and strategies to go off and try, and they've included that into their teaching, I know they have. Some are trial and error and positive outcomes and negatives that have been developed. I think that's what they've enjoyed most' (PLCI, Archie). A number of common views that emerged from the post intervention interviews relating to the principles of CoP within the PDP including the collaborative nature of the programme. This allowed a deeper level of understanding, flexible approach to learning, more sustained development and an enhanced sharing of practice:

> We looked at how we were going to be sharing best practice; to then upskilling ourselves….to then connecting with you at university level, where we suggested whether we could receive more of the research and theory behind what we do and why we do it...So the community of practice (PDP) allowed us to dip in and out without the constraints of regularly attending meetings. It was very thought-provoking. (PPDPIPE, Archie)

This flexibility within a school environment, where time is at a premium, allowed engagement in the programme to continue. Whereas Anthony emphasised the opportunity to collaborate in this comments that it was 'good to share. It's great to hear other peoples' thoughts' (PLCI) and also welcomed the opportunity of being part of the CoP and the benefits that followed:

> We normally do research groups in school and I felt whenever you go back to your research group, that's when you talk about it…The community of practice kept it fresh, there were people posting daily, weekly, or when there was a reminder from you. It kept me focused, kept me thinking a little bit outside the box. I would see stuff that Andy was doing which I could then relate to my lessons, and then we would have a conversation while we were on our lunch break together. It was really positive and it started off a lot of professional conversations…it was really helpful and far better way to get staff engaged with research, a topic, not just to be a one-off and forgotten. (PPDPIPE, Anthony)

The sustainability of the programme allowed collaboration and the development of theory informed practice to occur on a more regular basis. One participant particularly made reference to the ability to share practice between the male and female sides of the department that happened as a result of engaging in the CoP:

> I have enjoyed the process. I've been teaching quite a few years now and it's funny that when you first qualify you get quite a lot of funding to go on courses and to do things. And then you don't get anything really, you are kind of left to your own devices and you kind of get stuck in a bit of a rut. It's been nice even just to talk about it, I have tweaked a few things and Andy and I realised as well that we don't communicate enough good things that we're doing in our lessons. The boys do it naturally because they teach together. (PLCI, Sophie)

This suggests that engaging in these types of PDPs (with the embedded CoP) enhance and foster a sense of community and can break down some of the barriers that PE departments have faced in the past. Finally, the overwhelming majority of the interviewees mentioned how the professional development opportunity led to enjoyment, passion, excitement and increased effectiveness. Anthony reported that 'the project has been really positive…I would suspect…it has been really effective. I enjoyed coming along to the first couple of sessions and found them really informative' (PPDPIPE). Archie felt that personally 'it has regenerated my understanding of what excellent teaching and learning looks like' (PPDPIPE). On a departmental level as Head of Department he remarked 'I've seen my staff really enjoy the flexibility and the opportunity to go off without constraints, that we've been able to go off plan of the initial units of work, we've been able to tailor lessons to students' needs' (*PPDPIPE, Archie).* Finally, Sophie welcomed the opportunity to reflect on her progress during the CoP:

> I've been teaching for 10 and it's just really made me have a look at my teaching, if anything you get stuck in a groove and you do the same things day in, day out. But also just thinking why I'm doing things and is that the right way to do it, just because I've always done it that way? (PPDPIPE Sophie)

These results suggest a number of benefits from engaging in PDP that are aligned with the principles of CoP (Yoon & Armour, 2017). Enjoyment, collaboration, flexibility and finally impact on practice were the key benefits that emerged from the data.

A way forward to enhance future PDP offerings

There were some suggestions that moving forward there would still be potential barriers to the delivery, maintenance and impact of such a PDP. The interim head teacher mentioned that 'managing change is going to be a barrier in itself, because we're all reluctant to change generally. I think, you know, it's the message of selling it' (Trevor, PPDPIHT). However, one of the barriers prior to the PDP was time and Trevor explicitly referred to attempting to address this with future training 'rather than having our insets which are all theme-based, we're going to try to tailor one or two of those for departments to just have time, a day working together, and developing resources and schemes and projects almost to work, moving forward as the new curriculum comes in' (PPDPIHT). Another perceived barrier following the programme was related to following up on the project. While the CoP lasted for an extended time, Adele the SLT for teaching and learning, felt that there needed to be increased follow up to ensure lasting impact 'we have these different staff CPD opportunities, but I think unless something is followed up, maybe 6 months or a year down the line and we're looking at the impact on students…but unless somebody prompts them or reminds them it's not necessarily something that they put into practice' (PPDPISLT, Adele).

These findings suggest that in the future, there is a need to plan for this follow up and make it a critical part of the development and sustainability of the PDP. The majority of participants mentioned that the project had wider implications, with Archie mentioning that in the post PDP interview:

> Each class in each year group has been doing very different things. It's provoked informal by-passing conversations – you can just sense the enthusiasm in staff's voices, like 'I tried this and it worked!' but they never thought it would work because they'd never been given the

> opportunity. And I think it's allowed us to provoke thoughts on how do we do what we do – but better? (PPDPIPE)

And that 'it's been delivered and shared at whole-school level as well, so from a staff development perspective, it's been good as well' (PPDPIPE, Archie). This perspective was not shared by Kate who felt that it still needed to be shared wider 'I think what would be really good is for them to be presented to all staff, so all the staff know what's been going on' (PPDPSLT, Kate). Another interviewee alluded to a wider impact being needed for other staff not involved in the CoP:

> I would probably just say that if we were doing something more on a whole-staff level, they would have had to come back with, something that they've trialled or the impact they saw on something that they did. Or just a longer-based project in a way. The difference with the PE department and being part of that community of practice is that they have had some external pressure on them, they know there's going to be a follow-up (PPDPISLT, Adele)

This reinforces the impact that a more sustainable and more widespread approach can enhance the impact of the PDP. The PE department reinforced these ideas with Anthony feeling that the ideas could be shared with other year groups (this study was based with Year Nine, Key Stage Three) which would create a bigger impact 'So, I think moving forward it would be good to have a look at that Key Stage Four PE classroom-based lessons, because that would probably have a bigger impact on the whole school and all education' (PPDPIPE). The implication of results reported here indicate that consideration of the length of time, the follow up and the wider school impact would enhance future PDPs. As Archie indicates, the theoretical concepts at the heart of the current intervention are relevant for the whole school and not just for PE 'I'm going to share that practice around with as many people as possible…it becomes empowering education and effective teaching and learning, as opposed to motivational climate for PE and empowering PE. The concepts are so much the same' (PPDPIPE).

A number of the participants described how gathering evidence, engaging in research and disseminating it effectively were important in order to maximise the impact of the PDP. With Welsh Education reform taking place and research enquiry being encouraged, Kate wanted 'that culture of research constantly being used with all staff and definitely the work you've done' (PPDPISLT).

Archie reflected on the how this would help the department move forward ‘what is the research going to provide for us? What evidence is it going to give us to then give us a platform to deliver a new curriculum?’ (PPDPPE). Adele built upon this reinforcing the need to have opportunities to disseminate the information more effectively:

> we haven’t currently got an opportunity where staff are able necessarily to feedback on things that they are trialling…You know, we could be missing a trick here, that people are actually continuing with that and getting some really good research out of it and we’re completely unaware of it. (PPDPISLT)

One year on: Follow up interview

Due to the impact of Covid, the lead researcher was unable to complete the one year follow up as planned. However, he did manage to secure an interview with the PE Department to get their thoughts on the PDP. Overall, there was a variety of perspectives from the PE department. Archie the Head of Department gave a clear indication ‘To answer the impact one, yes. There is still an impact in the practice…we're still very much a PE department that shares practices, through various, techniques sometimes at whole school sometimes, observing each other's lessons, sometimes team teaching. I think we've certainly evolved as a department in sharing practice’ (OYFU). Anthony provided examples of the department continuing to share practice including the theoretical concepts:

> Myself and Andy will message ideas, things that we think might work in
> lessons, online lessons. In terms of the involvement in the project. Definitely, especially the motivation, and that sense of belonging, especially in online lessons, make them still want to belong and be part of the kind of community (OYFU)

Anthony also mentioned he still focused on the language he used as understood in regard to the theoretical concepts ‘We think about the concepts of motivation and motivational climate. And I know as a class teacher, I certainly think about some of the language that I use, some of the body language I see from the students’ (OYFU). There were a number of attempts to use the theoretical concepts to enhance the relationships with the pupils during Covid ‘I have been trying to set up online meetings and yeah…ring home for students, email them regularly to make sure that then they know

that we are there, there's a positive relationship between us and I actually want them to do well and invested in them to be honest, that seems to actually motivate students' (OYFU Anthony). Finally, Archie articulated how he continued to use the theoretical concepts in practice:

> We've modelled an example of having workouts of the week. We've had challenges that students and families can do together. We've had a weekly wellbeing, check-in. We've tried to look at various aspects of what would motivate an individual and tailor something towards everybody. (OYFU)

Covid has impacted both on the teacher's ability to sustain the impact of the PDP and the ability to collect data from the SLT and Head teacher. However, it was clear there was a lasting impact on the PE Department who were continuing to share practice and use the theoretical concepts from the workshops and PDP. Overall, these results indicate a number of considerations for building impactful and sustained PDPs and the benefits and challenges of using the principles of CoP to underpin them.

Discussion

The discussion will address the three themes that emerged within the results as well as the overarching theme of the boundary spanner.

Understanding current knowledge & context

For situated learning to be effective, the knowledge developed is inseparable from the contexts it originates from (Parker et al., 2010, Oliver et al., 2017). An essential finding within this study was linked to conducting pre-intervention interviews and focus groups so that it was possible to ascertain the school's and teachers' current understanding of the barriers to professional development and their knowledge of CoP. This enabled the boundary spanner to be more aware of how to shape the professional development programme. The approach adopted in this study is supported by previous school-based interventions in which an initial needs assessment was considered integral to developing effective professional development programmes (Edwards et al., 2019). Yoon and Armour (2017)

had found there was difficulty in applying the ideas and concepts of CoP to different schools due to their differing contexts. Thus, basing this study within one school had significant benefits.

The knowledge gained from the pre-intervention interviews and focus groups allowed the boundary spanner to be more aware of what the school and teachers needed. For example, he understood that teachers have different experience levels, and a one-size-fits-all model does not provide the best learning experience in school-based research (Hunzicker, 2011). Prior studies have criticised the impact of one-off workshops in PE CPD as teachers are less likely to retain the content with any longevity (Edwards et al., 2019). Within this study, the teachers themselves generated strategies and information within the PDP and, therefore, motivated them more by the sustained long-term approach. However, it was also apparent that they did not know what a CoP was or the principles behind its effective implementation. This allowed the boundary spanner to plan and develop an effective intervention using the recommendations for effective professional development with consideration of the principles of CoPs (Edwards et al., 2019; Trust & Horrocks, 2019; De Carvalho-Filho et al., 2020). This contextual knowledge was essential and allowed the researcher to adopt the principles from a range of studies to meet the specific needs of this study and the particular context of this school and this set of teachers. Therefore, the design for the professional development programme emerged from understanding both the school structures and also the teacher's knowledge (or lack of) of effective CPD and CoP (Yoon & Armour, 2017).

Creating and sustaining professional development opportunities incorporating CoP principles

The professional development programme using principles of CoP was developed intentionally. As discussed earlier, CoPs can potentially be created for a specific purpose that is meaningful and revolves around authentic tasks (Wenger, 2010). It was essential to keep Wenger's (2010) original concept of mutual engagement, in this case, the involvement of the PE Department, as a joint enterprise where the PE department shared common goals. A shared repertoire involved sharing,

developing and applying the theoretical principles underpinning the professional development opportunity. The teachers' community (PE Department) worked to solve motivation issues and improve practice and strategies (Leat, Lofthouse & Taverner, 2006; Cordingley, 2015). It was intended that this approach would lead the teachers to apply theory to successful practice (Cordingley, 2008). Following the adapted frameworks for developing professional development programmes and effective CoPs, the lead researcher established clear principles and identity before launching the opportunity using the tenets of CoP (Edwards et al., 2019; Trust & Horrocks, 2019). Developing guiding principles and giving members a voice and choice in their approach were critical elements in creating the CoP (Trust & Horrocks, 2019). Doing this made it apparent that shared departmental goals and specific goals to the individual were essential to the success in both effective developing strategies and increased the group's motivation. Therefore, it can be assumed that personalising content for the teachers alongside the departmental goals (joint enterprise) was critical in the context of this CoP. Further studies on this topic should explore the role of individual goals alongside mutual goals within a CoP. The findings in this study support boundary spanners that organise, encourage, and facilitate professional learning in various ways to facilitate the creation of effective PDPs (Makopoulou, 2018). However, a potential limitation to the approach adopted is that it is dependent upon whether education providers will be given the time and space for these specialised contextual types of professional learning.

Another critical finding within this study was the importance of the theoretical content underpinning the CoP. Prior studies have suggested that models were a distinguishing factor and essential to consider within the shared repertoire of Wenger's approach to CoP (Yoon & Armour, 2017). This common goal associated with the CoP increased a sense of belonging among the teachers. However, in this instance, rather than shared departmental goals, the shared purpose of using the theoretical content promoted the sense of belonging and shared identity, which ultimately translated

into meaningful practices and generated knowledge (Wenger 2000; Krishnaveni & Sujatha 2012). Examples of this were prevalent throughout the project. The boundary spanner and teachers noted how the theoretical concepts kept them focused on developing their practice and served as a focal point for the CoP. This study confirms that shared goals are vital to implementing a CoP informed professional development within education. However, one recommendation would be to have a continued focus on the theories that underpin the professional development programmes. Revisiting these theoretical concepts throughout the CoP is crucial; however, the specific elements of the theory being developed should be driven by the needs of the teachers (Trust & Horrocks, 2019).

Comparison of the findings with those of other studies confirms that the collaborative nature of the CoP was essential to sustainability (Goodyear & Casey, 2014; Yoon & Armour, 2017). Within the Welsh context where the study took place, this collaborative approach is in keeping with the professional standards for teaching and learning that are part of the ongoing curriculum reform (Welsh Government, 2020). Interestingly, the type of approach used within this professional development programme meets the needs of all five of the professional standards for teaching and learning. That is, not just the standard of collaboration was realised but also pedagogy, professional learning, innovation and leadership. Undoubtedly, a key driver in consolidating the collaborative nature was the sustained approach of the PDP, which led to the participants' accountability. In addition, there were opportunities for social learning and connecting both face to face as well as online to build relationships, and the teachers developed their strategies with input from the boundary spanner (Trust & Horrocks, 2019). Within this specific context, the drive to ensure the productivity of the CoP came from the teachers themselves wanting to move beyond the traditional one-off workshops. Therefore, this created an urgency and more significant commitment within their approach to the programme.

Impact of Professional Development Programme

The findings of this study suggested that the use of the social media platform WhatsApp provided the immediacy and flexibility that the teaching staff within the CoP wanted. WhatsApp's combination of mediums like videos, pictures and voice notes, and the constant availability of facilitators and learning, has made it a new and convenient tool for teaching-learning activities (Gon & Rawekar, 2017). The argument for using technology as a standard for professional development is not a new concept. For example, Armour and Yelling (2004) suggested that e-support could overcome the financial considerations of CPDs. Lund et al. (2008) suggested that teachers could use technical innovations to support teachers exchanging with facilitators over web-based technologies.

More recently, acknowledging the calls for increased opportunities for teachers to be supported in making pedagogical changes, social media was mooted as having the potential to support teachers looking to develop their practice (Elliot & Campbell, 2013; Goodyear et al., 2014). In light of the emphasis on digital technology and development in education and the new Welsh Curriculum, it is vital to ensure that digital and social media applications are considered to underpin professional development programmes and help support the principles of a CoP effectively (Donaldson, 2015). It works well in the collaborative, flexible and informal nature of a CoP as a form of social media. It should be considered a voluntary means through which researchers can support teachers in school, not perhaps a prescribed means like many digital platforms (Goodyear et al., 2014). Undoubtedly, these interactions helped sustain the use of the theoretical concepts and strategies and be an excellent means of sharing practice. It also allowed the boundary spanner to reinforce changing practice, support the development of strategies, and post resources, questions, and feedback to help facilitate the CoP. Due to Covid19, there has been significant development in schools around their use of digital technology. However, a note of caution. using a school-based platform may be more appropriate as they have recently developed similar functionality to WhatsApp.

Consistent with the literature, this study found that a CoP approach helped support teachers in developing strategies together, improving planning, and increasing collaboration (Armour & Yelling, 2007, Goodyear & Casey, 2015, Yoon & Armour, 2017). Some important findings specific to this study related to the reported increase in sharing between the male and female sides of the PE department. The female members of the department felt significantly more included and enjoyed the opportunity to share practice which tended to happen less frequently prior to the CoP. Another important finding was the enjoyment of engaging within a CoP informed PE CPD. Such findings support the implementation of this type of approach and the consistent and cyclical nature of the CPD delivered (Trust & Horrocks, 2017). The boundary spanner was able to support with resources, feedback, and questions online while also being embedded within the school for improvement cycles to motivate the group to reassess individual and departmental goals. This was important to help sustain and increase the enjoyment and engagement of the teachers.

Oliver et al. (2018) suggested that intentional CoPs benefit from having boundary spanners to help develop and 'flesh out' the theoretical concepts. However, this suggests a potentially simplistic notion that an expert is best placed to facilitate these groups in building the PDP. Understanding who will take the role of the boundary spanner and what particular skills and relevant experiences they bring are vital to the process and relatively unexplored areas. Literature suggests that CoP work effectively when boundary spanners get them started and help sustain them (Goodyear & Casey, 2015). However, there are still many unanswered questions about understanding the role of the boundary spanner in these settings. What factors go into choosing and designing the approach taken by the boundary spanner given their experience and skill set? How do we assess the approach taken by the boundary spanner? Haynor (2002) suggested that CoP facilitators develop social competence and be effective communicators. However, does Haynor's suggestion appreciate the complexity and understanding needed to create successful PE CPDs? Below is a simple list of questions that might

need to be asked to generate the contextual information needed to understand the boundary spanner's role further.

1. What theoretical knowledge do they have?
2. What prior experience running a CoP or PDP do they have?
3. What are their digital skills like?
4. What experience of building relationships do they have?
5. What understanding of the context they will be facilitating do they have?

Posing these queries should be fundamental elements of the research design process. Overall, the findings provide considerable support for continuing to develop professional development programmes informed by the principles of CoP. The present work contributes to existing knowledge of PE CPD. However, it has also provided unique contributions for researchers to recognise the importance of context, practical principles on planning, and sustain professional development informed by CoP, the use of technology, and the boundary spanner's role. As always, these findings need to be interpreted with caution. There were elements within the post-intervention interviews that suggested a need to communicate the success and create a more comprehensive or whole-school impact. In many ways, the success of the professional development programme was only shared within the confines of the PE department. While the impact of Covid cannot be overstated, and there were elements of the theoretical concepts still embedded within the practice, the removal of the boundary spanner impacted the long-term sustainability of the CoP. More significant efforts are needed to ensure how a CoP can continue once the boundary spanner or facilitator is no longer embedded within the school. Recommendations for future studies should be to a) ensure that professional development programmes are developed using research-informed and theoretically-grounded fundamental principles specific to the context of each study and b) clarify the use of the

boundary spanner and how once their role has finished, the key learnings and emerging changed practices from professional development programmes can be sustained.

Limitations and Future Directions

Future studies should replicate this approach in other school contexts across the UK in both primary and secondary education establishments to assess whether there are similarities in findings and emerging processes across the different contexts. This contextual nature of exploring effective PE CPD suggests that understanding the complexities on a local and individual basis is still an essential factor to consider. Nevertheless, the approach adopted in this research offered an in-depth professional development informed by principles of CoP. The overarching aim was to develop an authentic and sustainable change in practice. Unfortunately, the implications and depth of the one year follow up interviews were limited due to the Covid-19 pandemic. This impacted the ability to assess sustained change in practice based on the current findings.

Conclusion

If physical education moves beyond traditional CPD approaches, then using Wenger's (2007) concepts of communities of practice to help inform professional development programmes can help engage and sustain effective professional learning. This study makes a novel contribution to the existing research into PDPs within a PE context, bringing together effective professional development strategies and fundamental principles of CoP. These programmes can provide more continuous engagement with CPD material and a deeper understanding and promote different ways to realise behaviour change. Understanding the key considerations in creating these approaches, for instance, understanding the specific context, underpinning professional development with a theoretical framework, the use of technology, and understanding the contextual role of the 'boundary spanner', will provide food for thought for researchers and developers of CPD programmes. Key

recommendations for future studies should help ensure that professional development is developed using research-informed fundamental principles specific to the context of each study and shared to increase understanding. This will enable consistent reflection and development in professional development programmes.

CHAPTER 5.

Impact of *Empowering PE*™ and a follow-up professional development programme using community of practise principles on PE teachers, school leadership and pupils: A mixed-method longitudinal study

Abstract

Background: A new curriculum for young people in education is being developed in Wales. At the same time, statistics on children's physical activity levels in Wales are sobering, with only 18% of children meeting the recommended weekly levels. It is also clear that teachers influence their pupils' motivation and engagement, whether positive or negative. As a result, helping teachers improve the motivational climate manifested in their classrooms could be of benefit. Furthermore, efforts to create and implement effective Professional Development Programmes (PDPs) to enhance that motivational climate support recent calls for more research into PE teachers' relationships with their pupils.

Aims: The purpose of this study was to assess the effects of a school tailored *Empowering PE*™ workshop and subsequent PDP using the principles of CoP on (1) PE teachers' understanding of motivation, optimal and dysfunctional motivational strategies, and reported motivational strategies, (2) Senior Leadership Teams (SLT) perceptions of PE teachers' understanding, engagement, and impact, and (3) quality of pupils' motivation and indicators of engagement within physical education.

Method: This study used a longitudinal mixed-methods approach. The study lasted eight months at one secondary school in Wales (July 2019-February 2021). Participants: 8 staff (n = PE teachers; n = SLT members) and 147 Year 9 students (13 and 14 years old). Pre, during and post- intervention interviews, focus groups with staff were conducted. Questionnaires to assess pupils' perceptions of the motivational climate in their PE classes, their motivation to engage in PE, and the quality of engagement in PE were administered pre- and post-intervention.

Findings: Qualitative findings supported teachers' lack of understanding of the theoretical concepts of motivation and motivational climate pre-intervention. The workshop and ongoing professional development programme helped teachers enhance their understanding of the concept of motivation and to develop more empowering strategies. The PDP had a perceived positive impact on teaching,

learning, and well-being. PDPs with a theoretical foundation work better. Questionnaire data obtained from the pupils revealed no significant differences pre- and post-intervention.

Conclusions: Overall, results indicated that the multi-component PDP improved teachers' understanding of motivation and impacted their use of more empowering strategies. Teachers perceived that the development of a more motivational climate had a positive impact on pupils' the quality of motivation and engagement in PE classes. However, teachers reported more time is needed to embed professional learning strategies into classroom practice. The latter may explain why pupils' views regarding the motivational climate, motivation, and targeted outcomes reflecting engagement did not significantly change. Increasing understanding and application of empowering concepts and principles may be critical to the success of the New Curriculum for Wales (2020a, 2020b).

Keywords: Mixed-method; motivational climate; motivation, empowering, strategies

Introduction

Since 2014, Wales has advanced a series of significant, transformative reforms aimed at raising standards and developing a new curriculum and assessment arrangement for young people in education (Aldous, Evans & Penney, 2022). This transformative new curriculum set for implementation in 2022, provides the backdrop for this study. The key aims of the new Curriculum for Wales include the promotion of: 1. Ambitious capable learners, 2. Healthy, confident individuals 3. Enterprising, creative contributors and 4. Ethically informed citizens (Wales Government 2017a; 2017b). While it is beyond the scope of this chapter to provide a comprehensive overview of these reforms, the design of the new Health and Well-Being Area of Learning and Experience (AoLE) has been significant for Welsh Physical Educators (Welsh Government, 2020). The new AoLE is distinguished by a series of What Matter Statements (WMS) that are connected and interdependent across all four domains of learning (Welsh Government, 2020). An example of the WMS is 'developing physical health and well-being has lifelong benefits' (Welsh Government, 2020 p.74). Such aims of the New Curriculum for Wales clearly imply that there is a need to optimise the motivational climate created by teachers,

However, alongside the development of the new curriculum, the statistics on children's physical activity levels in Wales are sobering, with only 18% of children meeting the recommended levels of physical activity each week (Active Healthy Kids Wales, 2018). This lack of activity has been reinforced by the impact of Covid-19, where studies in Wales have emphasised the critical importance of preserving the enjoyment of physical activity and play in children to ensure their well-being remains a priority (James et al., 2021). Physical activity's physical and health benefits have been extensively documented over the last decade (King et al., 2019). Ensuring all pupils in physical education have positive experiences will play a significant role in delivering these benefits and enhancing physical activity (Mastagli, Van Hoye, Hainaut and Bolmont 2021).

It is also apparent that teachers matter when it comes to the motivation of their pupils and whether their engagement is positive and adaptive or maladaptive and non-optimal (Havik & Westergård, 2020; Taylor, Ntoumanis & Standage, 2007). Consequently, supporting teachers to optimise the psychosocial environment in their classes, i.e., the motivational climate, in order to ensure pupils' motivation is of high quality and sustained could support the development of the four aims of the New Curriculum for Wales.

One approach to conceptualising the motivational climate and explaining its effects on pupils' motivation was recently proposed by Duda (2013) and has gained increased attention in the PE, performing arts and youth sport settings (Hancox et al., 2017; Smith et al., 2015). The present study aimed to examine the impact of the delivery of a school tailored *Empowering PE*™ workshop and subsequent professional development programme (PDP) using the principles of Community of Practice (CoP) within one secondary school PE Department in Wales. Intervention studies have continued to build on a large body of evidence suggesting that teachers should strive to create a more empowering motivating climate in their classes; however, it takes time and support to see consequences of such interventions for developing teachers' understanding, impact on their practice and pupils' motivation (Girard, et al., 2021). What remains unclear is precisely how PDPs informed by Duda's (2013) theoretical concepts can enhance the teachers' ability to develop more empowering and less disempowering motivational climates and increase the quality of motivation and engagement in PE pupils.

Theoretical underpinnings

Teachers who promote the behaviours and strategies underlying an empowering environment for learning and engagement, where pupils are allowed to collaborate in their own development, are more likely to achieve learning outcomes and increase positive and higher quality forms of motivation (Noltemeyer, Palmer, James & Wiechman, 2019; Núñez & León, 2019). Studies have shown that

internal elements/individual differences influence pupils' motivation and engagement (e.g., their goal orientations) and social, environmental factors come into play as well (e.g., the motivational climate manifested; Duda & Nicholls 1992, Duda 2001; Duda et al., 1995; Nicholls, 1989, Ames 1992).

Initially drawing from achievement goal theory (AGT; Ames 1992), the past 25 years have seen a body of literature confirming that the teacher-created motivational climate is a significant factor influencing the quality of pupils' experiences in PE (Curran & Standage, 2017; Duda, et al., 2014, Garcia-Gonzalez, Sevil-Serrano, Abos, Aelterman & Haerens, 2019). This line of work assumes that the motivational climate arises from what teachers say and do, the feedback provided, organisation and grouping and the degree to which the pupils have voice and choice (Duda et al., 2014; Duda & Ntoumanis, 2005; Roberts & Treasure, 1992). SDT, like AGT, is a prominent theory on motivation that explains why people engage (Deci & Ryan, 2000; Deci & Ryan, 2020). It also clarifies the different types of engagement that result from different motivational qualities (Reeve, 2012; Curran & Standage, 2017). Within SDT, teachers' behaviours can support or thwart pupils' basic psychological needs of autonomy, competence and relatedness (Ryan & Deci, 2020). These basic psychological needs have been found to enhance feelings of value, choice and clear structures (Vasconcellos et al., 2019). Teachers who focus on support for autonomy, foster encouragement, clear explanations and offer authentic choices have enhanced pupils' autonomous motivation (Aelterman et al., 2019).

From an AGT perspective, the motivational climate can shape pupils' insights and reactions to achievement-related activities in PE by fostering the use of task-focused views of competence to judge achievement and performance (Milton, et al., 2018). In AGT, a task-focused motivational climate focuses on effort, individual improvement, and cooperative learning while avoiding comparison with others (Ames, 1992; Nicholls, 1989). While SDT-based social environment research in PE has focused on autonomy support (Amorose & Anderson-Butcher, 2007; Bartholomew, et al,

2010; Cheon, et al., 2014; Gonzalez-Cutre, et al., 2014; Ntoumanis, 2012; Standage et al., 2007). SDT also considers the impact of the social environment and when needs are supported, every student feels important, valued, and cared for (Mageau & Vallerand, 2003).

Recent developments have looked to integrate AGT and SDT to provide a more complete understanding/conceptualisation of the key characteristics of the motivational climates (Duda, 2013; Appleton & Duda, 2016). The limitations and inherent difficulties of translating educational theory into practice have been widely recognised and are sometimes referred to as the 'theory-practice gap' (O'Leary, Wattison, Edwards, & Bryan, 2015). In addressing this gap and taking on a more integrated perspective on the motivational climate, the present study drew from Duda's (2013) conceptualisation of the motivational climate that considers concurrently an interrelated array of features of the social environment held to be important based on SDT and AGT and previous research; Duda (2013) suggests there are more or less empowering (i.e., those which are more task-involving, autonomy- and socially-supportive) and disempowering (i.e., they are more ego-involving and controlling/relatedness thwarting) motivational climates. Studies within a PE setting have supported this integrated approach (See Chapters two & three). Other research grounded in Duda's (2013) concept of the empowering and disempowering climate has suggested that teacher created empowering environment holds implications for pupils' emotional states and impacts the quality of learning in education contexts (Hancox et al., 2017). While Mastagli et al. (2021) suggested that PE teachers who support developing pupils' competence, clear structures, planning for pupils' specific skill development while focusing on effort, individual progress, and providing transparent expectations can enhance motivation and concentration, reducing distraction. Finally, a study by Girard et al., 2021 suggested that creating an empowering climate is desirable. These findings provide preliminary support for the value of combining these two motivation theories to support PE teachers in establishing a favourable motivational climate Weeldenburg et al. (2021).

The findings and theoretical underpinnings described here have resulted in the development and testing of interventions to optimise the motivational climate. While studies have started to emerge examining the effects of teacher PDP interventions (primarily grounded in AGT or SDT and to some degree, an integrated approach), none have used Duda's (2013) integrated framework in full nor used a measure of the motivational climate in PE that is specifically grounded in this framework (EDMCQ-PE; Milton et al., 2018). For instance, both Girard et al.'s (2021) and Mastagli et al.'s (2021) studies had limitations by not fully representing the integrated model of the motivational climate by leaving out the disempowering dimensions. Girard's et al.'s study also delivered a two-day traditional training professional development course and concluded the training was not as effective as expected, raising questions about how to embed these theoretical concepts into effective training programmes.

In order for teachers to be able to implement theoretical concepts concerning the creation of empowering (and less disempowering) motivational climates and embed them in practice there is a need to develop effective PDPs (Armour, et al., 2015; Morgan, 2017; Edwards et al., 2019, Carl, Barratt, Topfer, Cairney & Pfeifer, 2021). There is still the perception that PE-CPD programmes have a tendency to be 1-day workshops that are not specific to the needs and conditions faced by the teachers or their schools (Jess, McEvily & Carse, 2017). Quite often these one-day workshops are considered to be superficial, marked by a provision of large amounts of information and have had their effectiveness questioned (Hunzicker, 2011). One way to address this is to develop PDP's using the principles of community of practice (CoP).

Professional Development Programmes

One of the novel aspects of the present research was the importance place on a sustained approach to a PDP. The PDP in this project entailed the delivery of the *Empowering PE*™ workshop with PE teachers at the targeted school. The workshop (See Chapter four, Table 4.6 p.114 for content) contained three 2.5-hour sessions to minimise disruption to staffing (and increase the possibility of

participation) in the school and was delivered over a month. However, the present research also drew from the communities of practice literature to facilitate continued training of the teachers and their embedding of strategies designed to enhance the motivational climate created in their PE classes (Edwards et al., 2019; Trust & Horrocks, 2019; De Carvalho-Filho., 2020).

There is a concern that current PDPs do not consider the context, contemporary theory or complexity of the learning process and therefore struggle to effectively bridge the gap between theory and practice (Armour et al., 2015). More recent research on the effectiveness of PDPs has suggested that embedding theoretical concepts alongside a more sustained and collaborative approach is vital in promoting the success and quality of such interventions (Braga, Jones, Bulger & Elliot, 2017). Therefore, reshaping the traditional 'one-off' workshop into PDPs that are ongoing, research-informed, and collaborative approaches is vital (Yoon & Armour, 2017). Tannehill, Demirhan, Caplova and Avsar (2021) suggest that PDPs for teachers should be centred on teacher needs, that teachers should be active collaborators who gain pedagogical skills and content knowledge and are supported with time and care. Developing effective PDPs is a dynamic, complex, and multifaceted process. It is essential that those responsible for PDPs offer substantive and continuous support for teachers to develop a nuanced and critical understanding of the pertinent literature and their own practises (Makopoulou, 2018).

A recommended approach to developing such PDPs is to use the collaborative principles from the CoP literature to underpin these approaches (Lander, Lewis, Nahavandi, Amsbury & Barnett, 2021). Previous research has suggested that this has already been successful in CPD programmes, where teachers have become more confident and empowered to create autonomy-supportive climates (Braga et al., 2017). Therefore, the present study builds on the existing professional development literature, taking a collaborative PDP approach using the principles of community of practice (CoP).

A review of the PDP and specifically CoP literatures and more detail approach regarding the design for this study can be seen in Chapter 4.

Developing effective PDPs to enhance the motivational climate supports the recent call for further research into the relationships between PE teachers and their pupils (Morgan, 2017). This was reinforced by Sun, Li, and Shen (2017), who suggested that future research in physical education should consider how instruction is delivered when examining the nature and impact of learning contexts. Pupils' motivation is associated with the quality of learning and achievement in education contexts (Hancox, Quested, Ntoumanis & Duda, 2016; Villavicencio & Bernardo, 2013). Therefore, the complex relationship between teacher and pupil interactions, the climate created by the teacher and the impact on motivation and attitudes to physical education needs greater focus. Therefore, this study addresses crucial needs by advancing the motivation and motivational climate literature, developing and implementing an approach to the delivery of PDPs that has been recommended by experts in pedagogy and professional development (REFS), and advancing the four purposes at the heart of Wales' new curriculum.

Current gaps in the literature

It is widely acknowledged that longitudinal (Cheon et al. 2016) and innovative (Meester et al., 2020) research designs are necessary for investigating the relevance and viability of motivational theories within educational settings. Recent studies have suggested that a more comprehensive approach to interventions and employment of different types of methodologies are critical to expanding knowledge on supporting teachers to optimise their teaching and the environments they create. Mastgli et al. (2021) supported previous research examining the motivational climate and associated outcomes. It has been recommended that such should consider longitudinal (e.g., Cheon, Reeve & Song, 2016; Braga et al., 2017) as well as the use of experimental designs (e.g., De Meester, Van Duyse, Aelterman, De Muynck, & Haerens, 2020). There have been few intervention studies on

training teachers in need of supportive strategies in PE (Girard et al., 2021; Aelterman et al., 2013; Sparks et al., 2017). Intervention studies using AGT and SDT are greatly needed to examine how incorporating these principles within PE curriculums and teachers' pedagogy could influence the learning environment (Sun et al., 2017). The ongoing development of approaches to evaluate and optimise intervention implementation in a way that does not lose sight of the essence of the theory (or theories) will be critical to the development of interventions that are effective in promoting physical activity (Quested, Ntoumanis, Thogerson-Ntoumani, Hagger & Hancox, 2017). These theoretically grounded PDPs will hope to address the earlier limitations of Empowering and Disempowering interventions in PE and youth sports, which have not fully considered the integrated approach to Duda's conceptualisation of the motivational climate (Girard et al., 2021).

Purpose of this study

To date, no previous studies employing Duda's (2013) conceptualization of motivational climate have examined the effects of an intervention designed to improve PE teachers' understanding of how to adopt more empowering motivational climate-enhancing strategies (and reduce the use of disempowering behaviours) using both a longitudinal and mixed methods approach. Another novel aspect of this work is the testing of a multi-component sustained PDP based on CoP principles (see chapter four). Therefore, the purpose of this study was to examine the effects of a school tailored *Empowering PE*™ workshop and subsequent PDP using the principles of CoP within one secondary school PE department in Wales on: (1) PE teachers' understanding of motivation and optimal and dysfunctional motivational strategies, and reported motivational strategies employed within the school day, (2) Senior Leadership Team members' (SLT) perceptions of the PE teachers understanding, engagement and impact of the PDP, and (3) perceptions of the motivational climate (empowering and disempowering), quality of pupils' motivation and indicators of engagement within physical education.

Method

Researcher's Position

Please see p113 and p38-41 of this dissertation for more detail on this.

Research Design

A longitudinal mixed-method approach was adopted. Mertens (2007) advises that researchers should be upfront about their philosophical perspective when conducting mixed methods research due to the methodological implications. In this study, a pragmatic position was taken; i.e., this study reflected research driven by questions developed from everyday school life problems (Van der Roest et al., 2015). In PE, there have been increasing calls and recognition that more pragmatic approaches are warranted and necessary (Palamarchuk et al., 2020). According to Hargreaves and Goodson (2006), a longitudinal design is required to examine change in processes within schools. In this study, the research was conducted over eight months (July 2019-February 2020).

There were several rationales for applying mixed methods in the present work. First, this is a distinct methodology of inquiry that allows for both quantitative and qualitative approaches (Cresswell & Plano Clark, 2007; Tashakkori and Teddlie, 2009). Secondly, this methodology enabled a direct comparison and could contrast the quantitative and qualitative results whilst also validating and expanding both data sets (Creswell, 2010). Thirdly, to understand particular elements within the purposes of the study with greater depth and breadth, a mixed-method approach to the PE context was considered more appropriate (Konig, 2016). In the present research, gaining perspectives from the teachers, senior leadership team, and pupils were critical elements of the concurrent mixed methods design and answered different aspects of the study's overall aim.

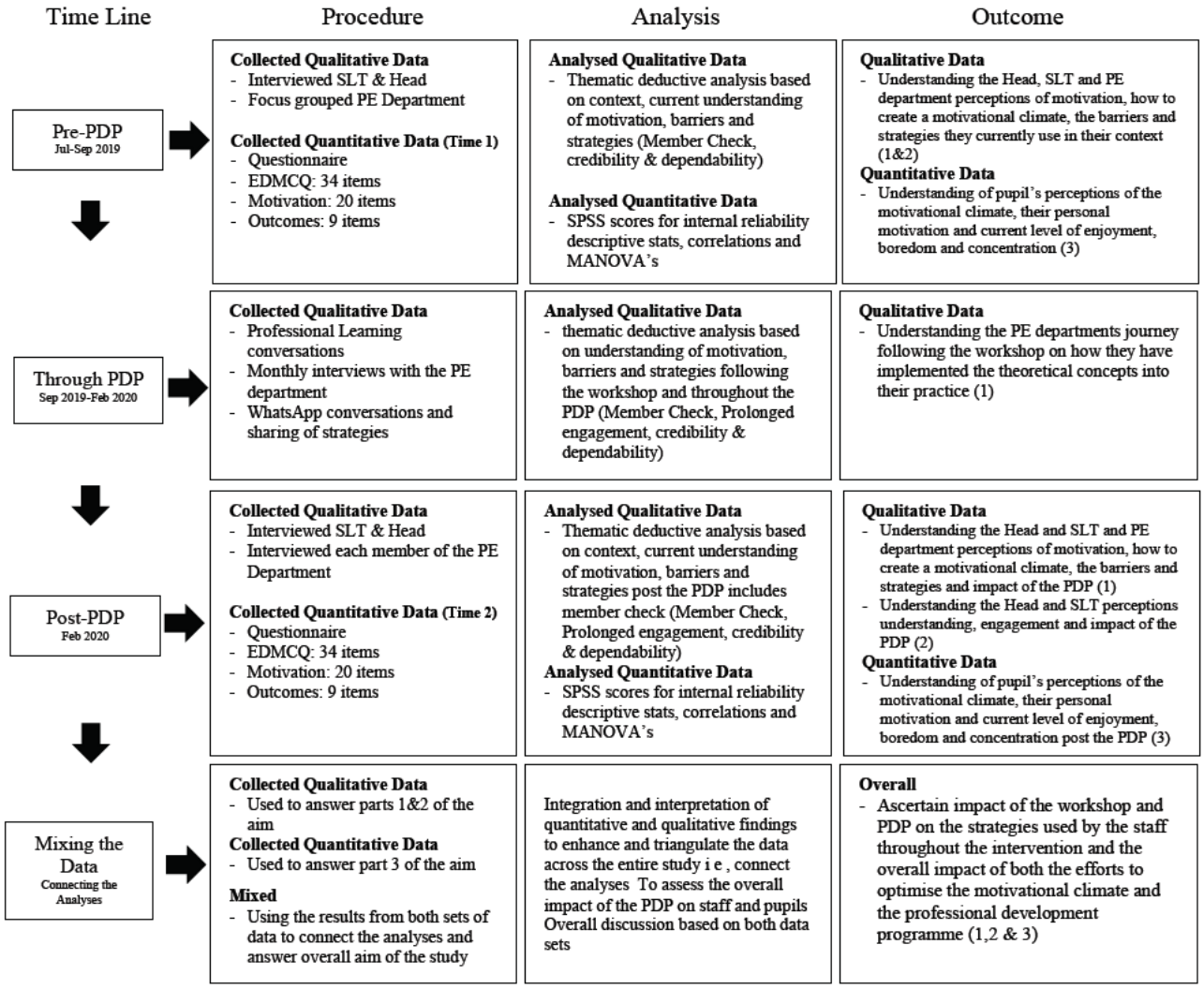
This mixed-methods design used multiple sources of data (both qualitative and quantitative), including pre-and post-intervention interviews and focus groups with the head, SLT and PE

Department (July 2019, February 2020), teacher reflections, researcher's voice memos, professional learning meetings, discussions via WhatsApp and one year follow up interviews with the PE Department (April 2021). Figure 1 below illustrates a detailed timeline and visual representation of the research design describing the overall process, procedure (method), analysis and outcome (how they answered the research question). To enable a researcher to identify an appropriate strategy, Creswell (2009) suggests four aspects need consideration: timing, weighting; mixing; and theorising/transforming.

For this study (See Figure 5.1), the impact of the *Empowering PE*™ workshop and subsequent PDP on teachers' understanding of motivation and perceived strategies that are adaptive and maladaptive (and why they are adaptive vs maladaptive) were examined qualitatively through interviews with the Head, Senior Leadership Team (SLT) and focus groups with the PE department pre and post the intervention. In addition, pupils' perceptions of the empowering and disempowering features of the motivational climate manifested in their PE classes, their motivation to engage in PE and the quality of engagement (as reflected by their reported enjoyment, concentration and boredom) were surveyed pre-and post-intervention assessing the targeted variables (e.g., Milton et al., 2018, Goudas et al., 1994, Duda & Nicholls, 1992) via validated scales.

Figure 5.1

Visual model of the timeline, data collection and data analysis process

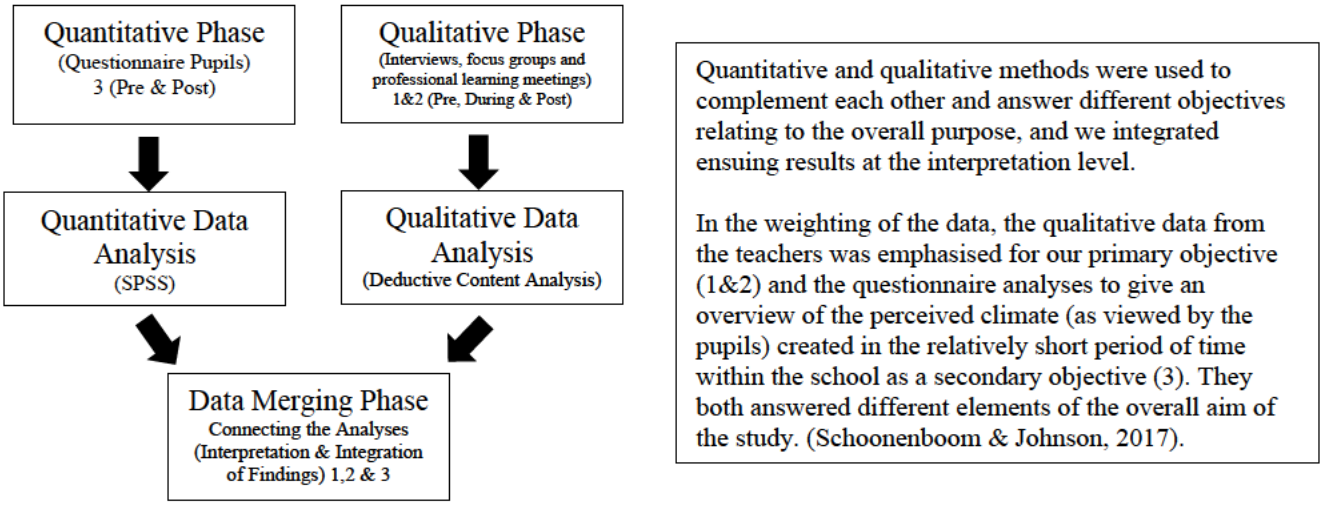


Aim to examine the effects of a school tailored *Empowering PE*™ workshop and subsequent PDP using the principles of CoP within one secondary school PE department in Wales on (1) PE teachers understanding of motivation and optimal and dysfunctional motivational strategies, and reported motivational strategies employed within the school day, (2) Senior Leadership Teams (SLT) perceptions of the PE teachers understanding, engagement and impact of the PDP, and (3) quality of pupils motivation and indicators of engagement within physical education.

As evident in figure 5.1, there was a specific timing to the data collection, in this case, collected concurrently. Weighting and mixing relate to the significance and integration of quantitative and qualitative research within the data collection (Creswell, 2010). Figure 5.2 below illustrates the approach taken to weighting and mixing within this study.

Figure 5.2

Concurrent/Parallel Research Design



Aim to examine the effects of a school tailored *Empowering PE*™ workshop and subsequent PDP using the principles of CoP within one secondary school PE department in Wales on (1) PE teachers understanding of motivation and optimal and dysfunctional motivational strategies, and reported motivational strategies employed within the school day, (2) Senior Leadership Teams (SLT) perceptions of the PE teachers understanding, engagement and impact of the PDP, and (3) quality of pupils motivation and indicators of engagement within physical education.

A variety of methods were used within the concurrent research design; See Figures 5.1 and 5.2 for an overview of the design. Using Schoonboun and Johnson's (2017) considered approaches to mixed methods, a simple design that is constructed for the specific purpose of this study was adopted. In order to conduct a parallel mixed analysis, the following three conditions were implemented: (a) both sets of data analyses (i.e., quantitative and qualitative data analyses) should occur separately, (b) neither type of analysis builds on the other during the data analysis stage, and (c) the results from each type of analysis are neither compared nor consolidated until both sets of data analyses have been completed (Schoonboun & Johnson, 2017).

Participants and setting

The study was conducted at one comprehensive secondary school in Wales, UK over an eight-month period (July 2019-February 2021). The stakeholders involved included two head teachers (both male), two senior leaders (both female), the PE Department (two male and two female PE teachers) and 147 Year 9 pupils (13 and 14 years old, 81 boys and 64 girls; See Chapter four for full details on participants).

Instruments and Procedure

Ethics committees from the authors' two Universities approved the project and the school and teachers were invited to participate in the study.

Qualitative

Several qualitative methods were used throughout the process and included interviews and focus groups: A semi-structured interview (See an example Appendix 11) was used pre (July 2019) and post (Feb 2020) the PDP, as this allows the interviewees to provide detailed information while allowing the interviewer control over the data received (Armour & Macdonald, 2012). The pre-and post- intervention interviews followed the same format and involved parallel questions, ensuring credibility and consistency across the different interviews and focus groups (Creswell, 2010). Interview questions were created and used to help understand the meaning and impact of motivation and the motivational climate in the views of PE teachers while understanding the 'motivational' strategies that were being used. The interview consisted of questions to settle the participants, general questions to probe understanding of crucial topics (such as understanding of motivation, motivational climate and strategies) and specific questions designed to understand the strategies teachers were using to 'motivate' pupils. In addition, the Headteachers and SLT were interviewed pre (July 2019) and post (February 2020) the intervention to understand their view of the motivational constructs and whether they perceived changes in teaching quality and pupil experience. Throughout the PDP, conversations and discussions via an online social tool were also used to support the development of strategies and understanding of theoretical content. All interviews, focus groups, and professional learning conversations were voice recorded, and online conversations were written up. Codes were used throughout to protect the interviewees' identities.

Quantitative

A multi-section questionnaire was administered pre- (Sep 2020) and post- (Feb 2020) the PDP with the pupils, assessing their perceptions of the teacher-created motivational climate, their motivation and reported outcomes capturing their experiences in the PE lesson. The measures were employed at both time points and took around 20 minutes to complete at each time. The same measures were used as in Chapter three. For further detail on the specific measures, see page 84 and 85. (See Questionnaire Appendix 17)

Intervention

Following the initial interviews with the SLT, Head and PE department, focus groups and questionnaires, a multi-component PDP was introduced for the PE teachers. This programme started with a theory-informed and evidence-based workshop developed by Duda (2013) initially for the *Empowering Coaching™* and tested in youth sports settings and subsequently adapted for a PE context. The workshop was delivered by the first author, who was both trained in delivering the theoretically informed workshop within PE settings, had spent twelve years as a PE teacher and was supported by an experienced, trained deliverer of the various versions of the *Empowering Coaching*™ training. During the early workshops, the pupils' questionnaire results were shared within the workshop sessions to engender further buy-in from the staff. Considering the findings, there was a realisation that the motivational climate manifested in PE classes could still be improved. These results were specific to their context, which increased the authenticity and meaning of the PDP using principles of CoP for the staff involved. For a detailed review of the PDP and its implementation, please see Chapter 4 Page 114-119.

Data Analysis

A mixed-methods analysis design (Tashakkori & Teddlie, 2009) was considered to be appropriate, i.e., a design where data are collected and analysed at two or more levels (e. g., individual pupil, classroom, school, school system) to incorporate individual components (Konig, 2016). The

quantitative data were analysed via SPSS, and the qualitative data analysed through constant comparison and deductive analysis (Braun & Clark, 2006).

Qualitative phases

Deductive thematic analysis (Patton, 2015) was used, after transcribing and anonymising the interviews, to adequately reflect the teachers' understanding of motivation and strategies to enhance the motivational climate. The authors decided to use a positivist deductive thematic analysis to explore the data. This was considered appropriate as existing research and theory (i.e. Duda's, 2013 conceptulisation) provided the lens through which the analysis and interpretation of the data was collected (Braun & Clarke, 2019). A first step in the analysis was to subdivide the data in pre-determined deductive higher order themes. The higher order themes were 1. Pre the PDP and 2. During and Post the PDP. This was done to enrich the deductive derived categories and was done twice to ensure trustworthiness (Braun & Clark, 2019). In order to ensure that the author (lead researcher) took into account their personal and social standpoint and position within the research, the deductive themes, subthemes codes were discussed with the wider research team to ensure credibility.

Quantitative phase

Data were firstly checked for normality and outliers. Secondly, using SPSS Version 23, internal consistency, descriptive statistics, Spearman rank-order correlations were first calculated to examine the quantitative data. A descriptive examination of the means was employed to characterise the sample for all variables over the two time points (empowering, disempowering; autonomous motivation, controlled motivation; enjoyment, concentration and boredom). Finally, repeated measures MANOVAS were employed on groups of variables, and analyses were completed to examine whether there were significant differences in the variables between time one and time two data. Time (Pre-post intervention) was used as the independent variable, and then the climate

dimensions (empowering, disempowering); motivation types (autonomous motivation, controlled motivation); and targeted outcomes (enjoyment, concentration and boredom) were used as the dependent variables the analyses.

Trustworthiness & Validity

The success of mixed methods can often depend on the approach taken to meet the quality standards for ensuring rigour in the development of the research design (McCrudden, Marchand & Schutz, 2019). For instance, touchpoint validity occurred where several findings connect with the research literature on motivation and motivational climate within school settings (Fischer, 2006). The quantitative data demonstrated rigour and validity by examining (coefficient alpha) whether survey items comprising a scale were internally consistent (Mcrudden et al., 2019). Qualitative rigour or trustworthiness can be based on prolonged engagement with the participants, member checks, dependability, and credibility (Mcrudden et al., 2019). Within this study, the researcher spent eight months within the school setting, giving prolonged engagement with the case matter and ensuring an understanding of the school, which added credibility to the findings. Member checking involved taking the conversations from the interviews, focus groups and discussions back to the participants and exploring how they felt about the accuracy of the findings (Creswell & Plano Clark, 2007). In addition, the researcher aimed to enhance dependability by thoroughly recording thoughts, methods, and decisions in the form of research voice memos, alongside discussing the data with the research team in depth and refining codes and themes.

From a mixed methods perspective, findings were congruent between multiple data sources. Several perspectives complemented each other as similar findings emerged in the interviews, focus group data, survey data, and professional learning meetings/WhatsApp discussions. Finally, triangulation of qualitative and quantitative data analyses was achieved by discussing the data with the research team, which helped sustain credibility.

Results

Qualitative results: In order to address the qualitative specific elements of the overall aim (1) PE teachers' understanding of motivation and optimal and dysfunctional motivational strategies, and reported motivational strategies employed within the school day, (2) Senior Leadership Teams (SLT) perceptions of the PE teachers understanding, engagement and impact of the PDP , key themes were developed after the initial coding and analysing of the qualitative data obtained from school staff (See Table 5.1)

Table 5.1

Initial Coding and Themes

Core Codes	Subthemes	Higher Order Themes
Progress What is success Well-being Lack of understanding of motivation Lack of training on motivation Assessment Focused Role to inspire, encourage & enthuse	Context & Lack of Understanding	Pre the PDP
Control / Fear Rewards Pupil Voice Rankings Disengagement Acknowledging people Modelling behaviour Relationships Mixed Ability	Current strategies of developing motivation pre the PDP	
Use of Language Well-being Task focused view of competence Variety Use of pupil voice Use of Questions Groupings Planning	Strategies tried through the PDP	During & Post the PDP
Pupils taking more responsibility Belonging through language & Relationships Understanding different contexts	Impact of the PDP	

Research informed: The ABC's
Thought provoking
Trial and Error
Stretch and challenge
Engaging teaching styles

As a result of the coding and careful discussion, the data were split into two higher-order themes: 1. Pre the PDP, and 2. During and post the PDP. This allowed clear separation between what the teachers, SLT and Head knew pre-PDP and what happened during and as a result of the PDP. Sub-themes were also developed to show the range of impact on the teachers and, subsequently, the pupils.

Pre-PDP

Sub Theme 1: Context and Lack of Understanding

While it was clear that all staff mentioned that their role was to 'challenge', 'enthuse', 'inspire' and make pupils and staff enjoy their time in school, it was apparent that they had received little or no training on motivation as a concept. Stan, the headteacher, articulated this with his responses in the pre-PDP interviews 'I think their [teachers] role is to help encourage and enthuse…I think what they need to do as a classroom teacher is to enthuse students for that thing that made you love your subject' and 'Nothing! It's only what I would have learned when I was a student doing an undergraduate degree in sport in college, and then using that knowledge to apply to situations in an educational setting.' This was confirmed by the other members of the SLT (Senior Leadership Team) and members of the PE department. They mentioned that aside from a couple of hours or a lecture in university, there had been very little training specifically on motivation or the principles of creating an adaptive motivational climate. Examples of this finding are comments from both Anthea (SLT) 'Do you know – very little…I would actually say I've had very little to none, in terms of specifically on motivation, or how you kind of motivate students.' and:

> We've done lots of stuff on teaching and learning, we've done nothing on motivational climate. The climate of your classroom – how do you stimulate an individual through your planning…how do you plan a lesson for an individual to come in and be motivated – that

> climate of stimulation? I wouldn't say we've done any of that, in my ten years here (Sandra, PE Teacher)

This highlighted that staff felt unprepared to develop an effective motivational climate and lacked the understanding to know if the strategies they were currently using were successful in creating positive forms of motivation in their pupils. Throughout the pre-PDP interviews and focus groups, it was clear that staff were keen to understand more about motivation and motivational climate and how they could impact their lessons. There was particular interest in using the language by the teachers and how to motivate disengaged pupils. Karen felt that the learning environment and behaviour needed to be focused on first before motivation could be developed 'you need to have the positive behaviour and the positive kind of learning environment first and foremost before you can actually work on that motivation aspect'. This reinforced the need to understand motivation and the motivational climate. Creating empowering motivational climates and using empowering strategies could positively impact the learning environment. The terminology used by the teachers on their understanding of the motivational climate is vague. It does not outline the specifics of what 'positive behaviour' and 'positive learning environment' look like in practice and their relationship to the motivational climate. Understanding that teachers' focus is not on motivating pupils themselves but on implementing empowering strategies will lead to a better quality of motivation and more motivated pupils. Adrian, one of the PE teachers, wanted to learn more about the language and its impact on pupil motivation:

> I would think knowing the language to use. I think it's quite easy to say the wrong thing as a teacher, because you get wrapped up in the moment, and I know I will have said it, when I said to someone 'Come in, if you don't get a C your mother's not going to be very happy and you're not going to get into college and ....' and I know I say that an awful lot. 'Do you want to go to college, because you're not going to get into college ....' and it's awful because you get wrapped up in the moment of them not working and you're like 'how can I just get you to work?' so I think having the correct language to use at the right time; knowing what strategies to use when, what can I put in place to get them back on task (Adrian, PE Teacher)

While Adrian acknowledged the impact of their attempts to motivate pupils prior to the intervention, it does suggest that some strategies being used were more disempowering than empowering. Sandra

felt that understanding the role of planning engaging activities that could enhance the motivation of pupils was an area of development ‘Planning, poor planning. Or things that aren’t going to work. You think it’s going to work but it turns out actually that the kids don’t like it, the activities, they're not engaged in it’.

Pre-PDP

Sub Theme 2: Current strategies on developing motivation

Several strategies were being used to mixed effect, but the understanding behind the motivational impact was not clearly understood across the school, both in the PE classes and other areas. Across the school, there seemed to be a number of extrinsic focused, controlling rewards being used, as an example:

> One strategy was ranking kids, and they thought that would motivate them. They published past papers or they did tests and then they ranked the whole year group and it was up on a board outside the classroom. We had huge issues from that…I remember the head of science coming to me, saying parents were phoning in, saying ‘How dare you! My kid’s on the bottom’ and the head of science was like ‘Well, you're on the bottom because you're not working hard enough.’ Those sorts of things. That did not work, at all. And you can see why, can’t you? But at the time the head of science was like ‘Well, you want to be top of the pile.’ (Karen, SLT)

In the view of the SLT and PE teachers, there was an understanding that building relationships were meaningful. However, specific strategies used to build the climate were impacting their lessons. In this instance, the quotation below demonstrated a lack of understanding around introducing activities effectively and the impact that this can have on all the pupils' motivation without careful thought to developing an empowering climate:

> We did rugby last year, and in one class half the girls really wanted to do it and the other half didn’t, and the other half that didn’t really ruined the climate of the class; because it just crept into the people not doing it and it affected how the ones that wanted to do it, could play. So that was difficult, because they weren’t all on side with it (Adrian, PE Teacher)

What emerges from this theme relates to a lack of understanding about quality motivation and how the climate can impact pupils' motivation. By developing the overall motivational climate of the lesson, the department and the school can potentially impact individuals' motivation.

During and Post PDP

Sub Theme 1: Strategies tried through the PDP

As a result of the PDP there was a change in the language and perception of the staff towards their own understanding, the barriers encountered and their ability to apply strategies to their practice. While the workshops themselves were considered impactful as Karen (SLT) suggested 'Workshops have been really positive…ideas and strategies…that's been a really good thing…staff enjoy ideas they can go and put into practice' and Sandra 'The workshop material was excellent. Very research-based…if I was going to summarise it – thought-provoking' there was also examples of a greater understanding of the theory and the strategies that staff were trying to implement into their lessons:

> from my perspective as a teacher, I've had a real emphasis on belonging and autonomy – being focused on task-oriented behaviours; where the students have come up with their own ideas about tasks…they've been given themes, they're been given success criteria, they've been given level and exercises, but it's all been driven by them…It's had huge, huge gains in empowerment, in terms of students just taking ownership of a lesson, and even their body language, their relationships with their peers, have been very effective (Alan HOD)

> I nicked one of the activities you suggested, which was to ask them to come up with a game, or an activity…I used the activity to allow them a broad interpretation of it and allowed students to just enjoy the game, I was able actually to intervene and say 'How do we challenge that?' Which was brilliant, because I didn't want to stand at the side and just watch all this work. And some did little 2 v 2s, some did 4 v 2s, the only condition I imposed was that it had to relate to the learning intention, so the learning intention was possession (Adrian, PE Teacher)

The workshops and sustained nature of the intervention allowed the staff to develop their strategies related to autonomy, belonging, and a task-focused view of competence, discuss, reflect and modify them. There was a change in the language used by the teachers via engagement with the theory discussed in the workshop. The change in communication style also resulted in both benefits to the

staff and their motivation and well-being within the school day as well with pupils where teachers went out of their way to foster conversations to build belonging:

> I only thought about it in my personal wellbeing; if I hadn't screamed at a kid I'd feel a lot better, a lot happier. I don't do it a lot, but normally – it used to be once a week and the kids knew when I go, I go! It literally only happened once last term just because I was trying to think about the way I speak to kids, everything's positive, even if they go to make a tackle in rugby, they don't even try to attempt it, but they ran towards them, because they were scared...I've thought about it in my progress leader role, just how I've been speaking to kids, the interaction, because as soon as I start negative, negative, negative, that kid just shuts off. I've been trying to open up conversations, to build that relationship. (Adrian, PE Teacher)

Throughout the PDP, not all strategies worked but were discussed and built upon within the PDP using principles of CoP. The professional learning meetings allowed the staff to unpick their strategies and discuss how they may enhance or modify them next time. While there was a success here for Adrian with one group, his ability to use the ideas of autonomy with a younger group needed clarity and further understanding:

> Year 7's autonomy, they wanted to be told. I found it was far more successful if I picked the teams for them, if I put conditions on the game, because they picked conditions which weren't related to the success criteria; or if I tried to say 'Look, you create your own possession activity' they really struggled. Not many leaders came about, they wanted to be shown it and then just get on with it a little bit more. Whereas there was massive success with the Year 9s. They loved it, and they were far more engaged, the student teacher was watching it as well and he couldn't believe how engaged they were, quite complex drills they came up with. It was good, really! (Adrian, PE Teacher)

The ability and importance to work with the staff over an extended period to help clarify their understanding of crucial empowering principles. This was picked up in the researcher's reflections:

> I think what struck me today was the value of the PDP… the interaction. It's the reaction of the department who are, as a basis of practices that have been posted or examples shared, the conversations. It's driving, shaping some of the things that they're doing, it's driving communications between the staff members; it's become the forefront of what they're doing (Researchers Reflections)

There is a significant implication for theory-informed PDPs, where collaboratively working with staff for a sustained period allows the development of strategies to create a more empowering PE climate.

This suggests that PDPs of this nature can allow the development and refinement of strategies and theoretical concepts. Therefore, there is more opportunity of embedding the concepts in the teacher's practice. The collaboration that went on within the professional learning meetings and online support group helped develop and enhance the theoretical concepts from the workshop. The extended time that the group spent discussing through the PDP allowed them to try different ideas out while sharing practice. Please see appendix A for examples from the online sharing platform used to enhance understanding and collaboration between the PE staff and the researcher to sustain the PDP.

During and Post PDP

Sub Theme 2: Impact of the PDP

Following the intervention, the staff involved in the PDP were allowed to discuss their understanding of motivation, the motivational climate and the PDP itself. The value of the workshop and the theoretical content delivered was clear to all involved in the project. The Head Teacher and SLT involved in the project believed there was engagement and longevity to the work that the staff had engaged with:

> staff enjoyed the workshops and came away with ideas and strategies to go off and try...Some are trial and error and positive outcomes and negatives that have been developed…And I think that's what they've enjoyed most, they've had these ideas that they can go and put into practice (Tony, Interim Head)

> they've had with you on a personal level and the meetings they've had with you. They seem to have been fully engaged with the research project and I think that has been because they've seen an impact on what they've been doing as well. They've been very positive in terms of what they've been trying to trial and put in place. They've been having positive kind of feedback from students with that. I think that helped to keep them going...Overriding message of positivity and benefits to the staff who engaged and that the climate is so important (Andrea SLT)

While the PE department felt the impact of their efforts to optimise the motivational climate, the intervention was a success for individuals within the PDP:

> I feel that's its regenerated my understanding of what excellent teaching and learning looks like...or me as a teacher certainly reignited my – my passion for teaching..., it has ignited me to think differently about my teaching...I think it's been really refreshing for the department, it's something new to focus on and something which has had an impact (Alan)

> I've been teaching for 10 and it's just really made me have a look at my teaching, if anything you get stuck in a groove and you do the same things day in, day out…just thinking why I'm doing things and is that the right way to do it, just because I've always done it that way? (Sandra, PE Teacher)

There were improvements recognised by the teachers engaged with the PDP from a motivational climate perspective, benefits to the teaching and learning and optimisation of the motivational climate linked to language. The Head Teacher who provided an observation of the PE teachers' lessons towards the end of the project noticed 'very motivational, positive language…there was constant reassurance of how things could be done and how well it was going...almost scaffolding the learning and allowing students to go off and be independent' (Tony, Interim Head).

The PE department themselves considered the benefits on the pupils around a range of aspects from the quality of students' work to their body language and relationship with their peers, Sarah noticed an 'Improvement in body language and relationships with their peers' while others:

> What I saw by certain students was remarkable. I know that's a strong word. Students who are not stereotypically sporty or enjoy football. It was crazy by giving them or emphasising (autonomy) had a significant impact on the motivation and quality of work (Alan, HOD)

> In Year 9 we rotate classes, so I had a rotation with female student…Football in January, it was quite cold on Astroturf, lots of them were very de-motivated. At the start of the lesson, they didn't want to do football; it was something alien to them. They'd never done it before, but we've had 6-8 lessons on it and they've absolutely loved it. Yesterday I had our first ever Year 9 football match...I was really positive with the language I used, lots of praise and that was the main thing I focused on, the language at the start…I let them have a bit of autonomy so they then went and created drills, and I said 'Can you go away, think of a netball drill that you could adapt in a football situation and it was fantastic! They were really engaged and motivated. (Adrian, PE Teacher)

A note of caution here is that while there is increased use of strategies, the way they are articulated was still superficial. For instance, while praise can increase belonging and build relationships, it can

undermine intrinsic motivation if the pupils rely on it. There were benefits from the PDPs longevity and the various methods of keeping the interactions going; fortnightly meetings and online interaction enabled the PDP to have a level of sustainability that is not present in one-stop workshops. Following the PDP at the end of project interviews, the staff in the project noted several benefits:

> They seem to have been fully engaged with the research project, because they've seen an impact on what they've been doing as well. They've been very positive in terms of what they've been trying to trial and put in place. They've been having positive feedback from students with that. I think that helped to keep them going. (Tony Interim Head)

> Allowed us to dip in and out…It was very thought-provoking but it was tending towards what each of us needed (Alan, HOD)

> (the PDP) kept it fresh, there were people posting daily, weekly, or when there was a reminder from you. So, as I said, it kept me focused, kept me thinking a little bit outside the box. (Adrian, PE Teacher)

This was supported in the one year follow up, which, while disrupted by the Covid19 pandemic, allowed Alan the HOD to reinforce the sustainability of the PDP 'To answer the impact one, yes. There is still an impact in practice…I think we have certainly evolved as a department in sharing practice and looked at the idea of a community of practice being more than just CPD.'

Taken in totality, these findings support the use of a theoretically informed school tailored Empowering PE™ workshop and subsequent PDP using the principles of CoP to develop teachers' understanding of motivation and motivational strategies. The PE teachers, SLT and Head, felt there was an increase in understanding of developing empowering and reducing disempowering strategies and a perceived positive impact on the pupil's motivation. A sustained and theoretically informed PDP using the principles of CoP were considered more effective than the traditional approaches to teacher CPD.

Quantitative results: pupils' perceptions of the motivational climate, motivation and targeted outcomes reflecting engagement

Data screening procedures were adopted to detect outliers and normality in both samples in line with guidelines from Tabachnick and Fidell (2007). The internal consistency (see Table 5.2) estimates (α) for all the measures ranged from 0.73 to 0.91, indicating acceptable reliability. The mean scores (See Table 5.2) demonstrated that the sample perceived moderately high empowering climates and moderately low disempowering climates at both timepoints. Data revealed that, prior to the teachers completing the workshop and subsequent PDP, pupils perceived the teacher-created motivational climate in PE to be more empowering than disempowering. However, mean scores suggest there was room for teachers to become even more empowering and less disempowering in their behaviours. There were minimal improvements in mean scores across some of the variables following PDP. These included pupils reporting higher scores on autonomous motivation, enjoyment, concentration and boredom in PE, and lower perceptions of disempowering climates and controlled motivation scores (See Table 5.2).

Table 5.2

Internal Consistency, Means & SD for Time 1 and Time 2 samples

Variable	Time 1 (N: 147)			Time 2 (N: 144)		
	M	SD	α	M	SD	α
1 Empowering	3 96	56	90	3 93	58	92
2 Disempowering	2 66	51	78	2 58	52	81
3 Autonomous Motivation	3 88	97	94	3 95	95	94
4 Controlled Motivation	2 93	84	80	2 84	74	73
5 Enjoyment	3 96	99	89	4 07	92	91
6 Concentration	3 85	96	86	3 90	95	89
7 Boredom	2 29	1 08	82	2 31	1 00	79

Bivariate correlations revealed that pupils' perceptions of empowering climates were positively related to autonomous motivation, enjoyment and concentration and negatively correlated to controlled motivation and boredom (See table 5.3). Perceived disempowering climates were positively related to controlled motivation and boredom and negatively related to autonomous

motivation, enjoyment and boredom. Consistent with Duda's (2013) framework, empowering and disempowering climates were significantly and negatively correlated.

Table 5.3

Bivariate Correlations for Time 1 and Time 2

Variable (Time 1 N:147)	2	3	4	5	6	7
1 Empowering	- 27**	54**	- 10	59**	56**	- 36**
2 Disempowering		- 11	33**	- 18*	- 19*	32**
3 Autonomous Motivation			- 06	86**	80**	- 54**
4 Controlled Motivation				- 12	- 08	39**
5 Enjoyment					80**	- 62**
6 Concentration						- 55**
7 Boredom						
Variable (Time 2 N:147)	2	3	4	5	6	7
1 Empowering	- 29**	71**	- 16	72**	67**	- 46**
2 Disempowering		- 14	13	- 14	- 11	11
3 Autonomous Motivation			- 16	85**	80**	- 56**
4 Controlled Motivation				- 19*	- 11	46**
5 Enjoyment					81**	- 56**
6 Concentration						- 54**
7 Boredom						

* p < 0 05 ** p < 0 01

Pupils' scores on targeted variables at time point one and two

The questionnaire data taken pre and post the motivation-based intervention indicated limited changes across the targeted variables. Means scores at time point two revealed lower perceptions of disempowering climates, higher autonomous motivation, and lower controlled motivation scores than time one (See table 5.2). Higher mean scores were reported on enjoyment and concentration at time point two compared to one (See table 5.2).

Repeated measures MANOVAs were conducted to examine whether differences existed between participants' scores on the targeted scales from time point one to time point two. The tests were conducted on groups of variables that were conceptually similar (e.g., the two dimensions of the motivational climate, the types of motivation, the targeted outcomes). Repeated measures MANOVAs revealed no significant differences over timepoints 1 and 2, and the contrast results all

moved through 0 on the confidence intervals (See Table 5.4). Results were as follows: empowering and disempowering (Wilks' lambda = 0.96, F (1.729) = 2.00, $p = 0.12$ $\eta_p^2 = 0.02$); autonomous and controlled motivation (Wilks' lambda = 0.99, F (.82) = 2.00, $p = 0.41$, $\eta_p^2 = 0.01$) and enjoyment, concentration and boredom (Wilks' lambda = 0.99, F (.67) = 3.00, $p = 0.57$ $\eta_p^2 = 0.01$).

Table 5.4

Contrast Results for MANOVAS

95% Confidence Interval for difference	Empowering	Disempowering	Autonomous Motivation	Controlled Motivation	Enjoyment	Concentration	Boredom
Lower Bound	- 52	- 05	- 31	- 09	- 33	- 26	- 25
Upper Bound	21	19	13	29	- 11	18	24

Mixing the Data Analyses

The quantitative and qualitative analyses answered different elements of the study's overall purpose. Mixing methods and subsequent analyses can contribute new insights into this study's specific context. Hence, the summary (See Table 5.5) below that outlines the key learnings from each set of results so that we can start to explicitly relate the quantitative and qualitative information (McCrudden et al., 2019).

Table 5.5

Connecting the Analyses

Overall Purpose: Examine the effects of a school tailored *Empowering PE*™ workshop and subsequent professional development programme (PDP) within one secondary school PE department in Wales			
Qualitative 1) teachers' understanding of motivation and motivational climate	**Key Learnings following the PDP** 1. Prior to the study a lack of understanding of motivation and the motivational climate 2. The workshop and sustained PDP allowed the teachers to develop strategies that enhanced	**Quantitative** 2) pupils' perception of the motivational climate, their motivation and quality of engagement.	**Key Learnings following the PDP** 1.Mean scores at timepoint two reported pupils' having a lower perceptions of disempowering climates. Increases to autonomous motivation and decreases to controlled motivation. Finally, the outcomes

	the motivation and motivational climate 3. There was an impact on the teaching and learning, well-being, and motivation of staff over the intervention 4. Theoretically informed sustained approaches to CPD are more effective		reported higher scores on enjoyment and concentration. 2. There were no significant differences between the timepoint 1 and 2 data.
The weighting of this study was heavily weighted towards the qualitative side of the data collection. It is important to report that pupils mean scores were higher on certain aspects of the questionnaire over the two timepoints. A note of caution is needed as the quantitative results also showed no significant differences between time 1 and time 2 samples. The quantitative data does in its simplistic form provide a limited degree of support for the qualitative data collected however there are implications that will be discussed below.			

Discussion

The current study sought to examine the effects of a school tailored *Empowering PE*™ workshop and subsequent PDP using the principles of CoP within one secondary school PE department in Wales on (1) PE teachers' understanding of motivation and optimal and dysfunctional motivational strategies and reported motivational strategies employed within the school day, (2) Senior Leadership Teams (SLT) perceptions of the PE teachers understanding, engagement and impact of the PDP, and (3) quality of pupils' motivation and indicators of engagement within physical education. It extends previous research suggesting CPD education workshops could enhance PE teachers' understanding of why the motivational climate and specific empowering and disempowering strategies impact their pupils (Milton et al., 2018). The study is situated within the context of the new Curriculum for Wales and the new Health and Well-Being AoLE which has the potential to be enhanced with the motivational climate created by teachers The following discussion is split into three sections outlining the key messages from the present research. the impact of empowering climates on pupils' motivation, 2. the benefits of sustained theoretically informed PDP's and 3. the characteristics of effective CPD.

Empowering climates and impact on pupils' motivation

As Girard et al. (2021) suggested, creating empowering environments in physical education is desirable and can positively impact teachers' practice and pupils' motivation. However, time and support are critical factors in developing these strategies. This study, using the principles of CoP to deliver a sustained and embedded PDP, supported the increasing body of evidence that task-focused, social belonging and autonomy focused strategies can have benefits on pupils' motivation (Behzadnia, Adachi, Deci & Mohammadzadeh, 2018; Leisterer & Jekauc, 2019; Vasconcellas et al., 2019). The perceived benefits for the pupils' motivation and engagement were evident in the qualitative findings, where teacher responses highlighted the significant impact on teaching and learning, well-being and increased autonomous motivation in pupils and staff throughout the study. These results build on other studies that have developed features of the motivational climate to influence PE teachers' strategies to support pupils' motivation (Serrano et al., 2020). The teachers engaged in the project suggest that their understanding of motivational climate, development of strategies to improve motivation and impact on their well-being were all evident due to the PDP. Perhaps the most exciting finding is the potential relevance to the development of the new curriculum for Wales and the four key purposes (Welsh Government 2017a, 2017b). The teachers' responses indicated increased motivation, increased body language and relationships with their peers. This would suggest that the theoretical principles of the *Empowering PE*™ and subsequent sustained PDP can contribute to the development of creating ambitious capable learners, healthy, confident individuals, enterprising, creative contributors and ethically informed citizens (Wales Government 2017a; 2017b). These responses have been called for in educational innovations as they provide a complete picture of pupils' experiences, practices, and motivations in school environments (Ryan & Deci, 2020).

While it was evident in the teachers' qualitative responses that there were perceived significant benefits and changes in the climate created and pupils' responses, there was limited support evident in the questionnaire data. In addition to that, there were no significant mean score improvements in

the variables between time point one and two. As McCrudden et al. (2019) recommended, engaging in mixed methods research allows reflecting critically on the research process and discussing why the quantitative results are not as strong in supporting the overall aim as clearly as the qualitative data. There are several possible explanations for the lack of meaningful improvement in the quantitative results, including a small sample size, which restricts statistical analysis and the findings' formal or categorical generalizability, a common issue in research on intervention programmes (Sandoval & Bell, 2004). While this study is classed as a longitudinal study to make further claims, future studies should look to increase the number of times the targeted assessments are collected to bring more reliability and validity to the quantitative results of this mixed-methods approach (Stenling et al., 2017). The increase in repeated measures while adding value would not, in this instance, clarify why we did not see a more significant difference in the mean scores across the two targeted time points. Another consideration that could be attributed to the length of the longitudinal study is the depth of understanding. While the researcher worked closely with the teaching team, he had limited contact with the pupils. Perhaps the change and greater understanding of the theoretical concepts evoked in teachers would take longer to emerge with the pupils or changes in teacher motivational strategies to be perceived. Due to the nature of the study, it is not evident how consistent the teachers were in implementing the strategies in every class, and while they were able to provide examples, it is not clear know how regular these strategies were evident in all classes and from class to class. Other contextual school-based factors such as the timing of the data collection (start of the school year versus the second time point in February) could impact the data collected. For instance, pupils are taught different activities at different time points of the year. Traditionally more popular sports are taught in the early stages of the term in Wales. At the same time, the weather was warmer and drier in September when the first questionnaires were completed compared to the colder, wetter winter

weather in February at timepoint two. Teachers' perceptions of the pupils' motivation were not the only perceived benefits of the study with the PDP itself considered an important element of the study.

Sustained theoretically informed PDP's

The findings from this study support the notion that theory-informed workshops with a subsequently tailored PDP can develop theoretical knowledge applied to practice, impact teaching and learning, enhance motivational strategies for teachers, and have the potential to positively impact pupils. This is supported in the literature by Braga et al. (2016), who reinforced both the collaborative nature and importance of establishing research-informed CPD in PE. Armour et al. (2017) suggested that research is yet to find the key to effective CPD, and there is a tendency for a list of actions to be produced. This research has tried to implement these actions to assess the effectiveness of theory-informed sustained approaches to PDP.

As evidenced within the teachers' reflections, the benefits of the theoretical concepts of creating more empowering PE in allowing the teachers to develop new strategies that impact both the pupils and teachers themselves are evident. Autonomy support, a sense of belonging, and increased pupil and staff well-being were essential critical reflections that the PE staff noted throughout and post the PDP. An implication, therefore, of this study is that it both supports and extends the current literature within the field by providing an in-depth example of the creation of relevant methods that support sustained, purposeful interactions and engagement with teachers to support professional learning that results in impact and change (Goodyear, Casey & Kirk, 2014). In addition to theoretically informed sustained PDP's some important characteristics in effective CPD were also clear findings.

Characteristics of effective CPD

Recent literature on effective PDPs has discussed the key characteristics of effective CPD (Parker & Patton (2017); and suggested there should be a strong focus on the pedagogic principles

(Morgan et al. 2018); supported the notion of learning communities forming the CPD (Tannehil et al., 2021) and commented on the complexity in practice of planning CPDs (Yoon & Armour, 2017). Data collected from the post PDP interviews with the staff involved in the project supported these characteristics. These findings also provide some tentative support to Armour et al. (2015), who encouraged researchers to recognise the dazzling complexity, understand the context, and bridge the theory to practice in innovative ways while developing the growth of PE teachers. In addition, researchers have advocated shared language of practices and the potential to identify signature pedagogies of CPD/PDPs to build and sustain the key characteristics (Tannehill et al., 2021). This would allow providers to assess, analyse, compare, and contrast different contexts and provide criteria for researchers. Based on the results from this study, while understanding the potential benefits of bringing a more systematic approach to effective CPD, researchers must be careful to retain the bespoke nature and particular context that is so important when developing these types of interventions. This is supported by Makopoulou (2018), whose findings suggested the ways tutors organise, encourage, and facilitate professional learning varies and needs to underpin the development of effective CPD. However, a potential challenge in implementing what could be effective CPD is whether education providers participating in such will be given the time and space for these bespoke contextual types of professional learning.

Finally, technology is irreversibly reshaping education, and digital tools are becoming increasingly important in school teachers' everyday jobs (Lander, Lewis, Nahavandi, Amsbury & Barnett, 2020). The future of school-based interventions and CPD will be informed by a digital way of working. With this particular research project, while the data was collected pre-Covid-19, the use of an online tool (WhatsApp) to support the development of the PDP informed by CoP helped sustain and embed the principles of Empowering PE (See Chapter Four). The impact of Covid-19 has only

reinforced the need for increased technology, and using online tools has become increasingly evident as teachers grapple with the shift to online working (Lander et al. 2020).

Strengths and Limitations

Based on Smith et al. (2015) recommendations to further extend research grounded in integrations of AGT and SDT and include a variety of methods, this study was grounded in Duda's (2013) integrated conceptualisation of the two theories and entailed the collection of mixed methods data. As such, this study begins to address conceptual and methodological gaps in the research. Cheon et al. (2016) called for future research examining the motivation climate to incorporate longitudinal elements and Meester et al. (2020) called for more innovative research designs. The present research aims to develop teachers' strategies for enhancing motivation and developing the motivational climate. Building on the SDT and AGT literature, this study supports interventions to develop and enhance motivation for teachers and pupils (Cheon et al., 2017).

Recent research related to the development of PE CPD has focused on primarily the teachers' perspectives (Lee, Choi, Griffiths, Goodyear, Armour, Son & Jung, 2019). A strength of the current study was the ability to assess both pupils' and teachers' and senior leadership team members' perceptions of motivation and the motivational climate pre and post a professional development programme. This study demonstrated an attempt to acknowledge the specific context of the school and individualise the PDP to the teachers within the study (Lee et al., 2019) and built on Morgan et al.'s (2018) work on personalising interventions for PDP in school settings. In the present projects, the PDP was designed in collaboration with the school, SLT and PE Department to ensure it met the needs of the overall research aims and the schools' development plan.

The current study further supports the literature on the benefits of a mixed-method longitudinal methodology in assessing educational interventions (McCrudden et al., 2019). It is also aligned with Braga et al.'s (2019) call for longer-term, systematic professional development

initiatives using the CPD literature to determine their effectiveness. One novel aspect of the study is being the first to use Duda's (2013) integrated conceptualisation of the motivational climate and embed this with a sustained PDP informed by the principles of CoP. This facilitated the development of teachers' understanding of the motivational strategies needed to develop more empowering and less disempowering climates.

Several limitations need to be acknowledged. Firstly, a limitation that should be considered is the nature of the school and the staff engaged in the project. While the study's findings suggest many positive outcomes for teachers, pupils, and schools within this context, there must be recognition of the teachers' perspective in the study. The participants committed to the study with an aspiration to learn, develop and improve. Therefore, they wanted the project to be perceived as successful. This context is important to note and, as with Morgan, Bryant, Edwards and Mitchell-Williams's (2018) study, was crucial to the success of the PDP and its more transformational and sustainable (in the constrains of the present study) impact. These observations suggest that working with teachers and schools that actively want to engage and develop their practice is critical in gaining support for such interventions. However, we also need to be mindful and consider the perspective of those we would like to recruit participants to these types of interventions who perhaps are not so willing to engage.

A second limitation of the present mixed-methods approach is the longitudinal nature of the quantitative data. These challenges are exemplified within the limited support of the results gained from this aspect of the mixed methods approach. Due to the nature of the intervention study, the questionnaire was administered a sample of pupils that was small in sample size and only collected twice. While two-time point data can be considered longitudinal, limitations are attached with the inability to unpick measurement error and change (Stenling, Ivarsson & Lindwall, 2017). Stenling et al. (2017) suggest that future studies should look to collect data at least at three-time points for

longitudinal work. This would better support the nature of the term-based timescales within UK schools as well (See Cheon, Reeve & Moon, 2012 for an example). In addition, more repeated measures (with hopefully a larger sample size) would allow exploration of contextual school issues, such as the time of year, the actual activities being taught, and other curriculum and timetable considerations on the observed responses of the pupils. Alongside repeated measure there is potential to suggest that future mixed methods research in this area should include teacher observations as an additional data source regarding any potential changes in the motivational climate (Smith et al., 2016).

Future Directions

The importance of the learning environment to pupil motivation is well-documented in the literature. However, the current study shows that future research would benefit from incorporating robust methodologies within school settings and encouraging teachers to engage with evidence-based interventions and demonstrate how and the degree to which they are implementing proposed strategies in each class and from class to class. Another interesting avenue for future research would be to replicate the study in different contexts (e.g., different age pupils, different educational contexts, sports coaching in contrast to PE teachers) both nationally and internationally and extend to more than a two timepoint quantitative data collection. It also would be important to extend the follow-up period to examine further the sustainability of the intervention. In addition, examining how the empowering motivational climate theoretical concepts can underpin school development plans within the Health and Well-being AoLE is an important next step in understanding the implementation of the curriculum, pedagogy and assessment of the new curriculum for Wales.

Future studies should consider extending the intervention by lengthening the support to sustain the PDP and implement it at all school levels. Perhaps as physical education has a similar focus to community sport, this intervention could be replicated in schools and community sports

settings nationally and internationally. Policy documents concerning the future of education in Wales (e.g., The Schools and Physical Activity Task and Finish Group's 2014 "Physical Literacy" document; Donaldson's 2015 "Successful Futures" document and the recently published new Curriculum for Wales 2020) have made specific recommendations regarding the curriculum, teaching pedagogy, promotion of pupils' physical literacy and the need to create more ambitious and capable learners. At the same time, many different strategies will be adopted in the next decade to improve the educational experience of pupils. This project strongly suggests that understanding motivation and the strategies that develop empowering climates and reduce disempowering climates can hold positive implications for teachers and schools developing their new curriculums.

Conclusion

The current research makes a unique contribution to the current literature on motivation, motivational climates and longitudinal mixed methods. Firstly, by examining changes over six months, including two distinct levels of analysis, this study found evidence to support the development of empowering strategies for teachers which subsequently was deemed to impact the quality of motivation for pupils in PE classrooms. The motivation-based intervention positively impacted on staffs' understanding of motivation and how they can create (and why) a more positive, empowering and less disempowering climate. Efforts to increase the understanding and implementation of the empowering concepts and principles may be crucial in supporting the successful implementation of the New Curriculum for Wales (2020a, 2020b). Teachers within this study confirmed that more time is needed to embed professional learning strategies to ensure the quality and sustainability of learning and impact in and out of the classroom. Secondly, no previous studies using Duda's (2013) conceptualisation of the motivational climate have investigated an intervention designed to enhance teachers' understanding of how to develop strategies that enhance the motivational climate via a mixed-methods longitudinal

study. Finally, this illustration of using a theory-informed workshop and subsequent sustained PDP using the principles of CoPs enhances the literature on CPD in education. The attempt to include a mixed-methods longitudinal design to examine the workshop's effectiveness and subsequent PDP provided a novel contribution to the literature.

CHAPTER 6.

General Discussion and Conclusion

General Discussion

Grounded within Duda's theoretically integrated conceptualisation of the motivational climate and consequences which pulls from Achievement Goal Theory (AGT; Ames, 1992; Nicholls, 1989) and Self Determination Theory (SDT; Deci & Ryan, 2000), the current thesis aimed to promote the link between critical research and critical practice by addressing the following objectives:

1. Test the validity and reliability of a multidimensional questionnaire that aims to assess the empowering and disempowering features of the motivational climate as created by the PE Teacher (EDMCQ-PE),
2. Cross-sectionally and over time, examine the relationships between the empowering and disempowering motivational climate created by the PE teacher to pupils' motivation and experienced enjoyment, concentration and boredom in PE,
3. Following the delivery of a bespoke training programme (*Empowering PE*™) which aims to facilitate PE teachers' understanding of what constitutes and contributes to more or less empowering and disempowering strategies and their effects, develop and support a professional development programme (which draws from principles of community of practice) focused on implementing empowering strategies to optimize the motivational climate created by teachers in PE over time.
4. Via mixed-methods, examine the impact of this multi-component intervention on PE teachers and their pupils.

A mixed-method approach was taken to address both methodological gaps within the literature and pragmatically answer the different objectives. The findings from the series of studies that formed the basis of the thesis create clear methodological, conceptual and practical contributions to knowledge with three themes emerging. Firstly, this thesis has provided some preliminary support for validity of the EDMCQ-PE in assessing pupils' perceptions of the degree to which their PE teacher

is being empowering and disempowering. Secondly, this thesis provides further evidence regarding the differential implications of empowering and disempowering climates in PE settings. Finally, this thesis points to the need to develop and implement research-informed, motivation-based interventions that entail more sustained development of teachers and are evaluated in PE settings.

The context of the thesis sat within secondary school PE in Wales at the time of an introduction of a New Curriculum for Wales with implications for PE. The research comprising this thesis also is couched and aligned with developments in the PE motivation literature based on Duda's (2013) theoretically integrated conceptualisation of the motivational climate. The collection of studies within this thesis draws on Duda's (2013) conceptualisation of the motivating environment as defined by AGT. - and SDT, emphasising aspects of the environment that may be viewed as more or less empowering or disempowering.

Historically PE cultures have demonstrated that they have been reluctant to adapt and have remained dominated by reproductive practices and behaviours (Griggs & Fleet 2021). The quality of PE teaching has been acknowledged as the most significant influence in shaping fun and engaging learning activities that allow pupils to make progress. Developing high-quality PE is vital in combating the increasing number of children who continue to drop out of participating in physical activity (Griggs & Fleet, 2021). Extensive literatures that are grounded in AGT (Nicholls, 1989), SDT (Deci & Ryan, 2000) and/or Duda's integrated framework (Duda, 2013) all indicate that optimised PE experiences for young people are more likely when the motivational climate is marked by empowering features.

Overview of Findings

Chapter two addressed the need to develop and provide initial validation, within a PE teaching environment, of an adapted measure of a recently developed and validated multi-dimensional assessment of the coach-created motivational climate (Appleton et al., 2016). The work presented in

Chapter two provided empirical evidence for the reliability and factorial validity of the EDMCQ-PE (Milton et al., 2018) in regard to the assessment of the empowering and disempowering features of the motivational and addressed the first objective of thesis. The measure was then used in subsequent studies within the thesis, and the observed findings provided further evidence of the validity (e.g., predictive validity) and reliability of the scale. Chapter two also included measurement and scalar invariance. The findings suggested that the two-factor model showed scalar invariance across boys and girls.

Within Chapter three, the EDMCQ-PE was used to measure the pupils' perceptions of the motivational climate, their motivation and the quality of outcomes such as enjoyment, concentration and boredom. The cross-sectional and longitudinal studies suggested that making PE environments more empowering will lead to more adaptive motivational processes and positive outcomes, including increased enjoyment and concentration. Findings also indicate that disempowering environments are predictive of pupils' controlled motivation and increased reported boredom. These findings addressed objective two and have applied implications in regard to optimising PE settings and working with PE teachers to better understand determinants of student motivation and the features and consequences of the motivational climate they create. The findings from Chapters two and three led to a longitudinal intervention study to develop PE teachers' understanding of motivational processes and the motivational climate (and strategies to optimise both) in Chapters four and five.

Chapter four proposed the creation of a theory-grounded Professional Development Programme (PDP) underpinned by principles of effective CoP. The benefits, challenges and critical considerations of implementing this approach were also addressed. The finding suggested that the development and maintenance of a CoP can provide more continuous engagement with theoretical material and PE teachers increased understanding to promote different ways to realise behaviour change. Being aware and appreciating the specific context, underpinning professional development

with a theoretical framework, using technology, and the contextual role of the 'boundary spanner' were factors suggested as critical to the success of the intervention. Stemming from the findings, key recommendations for future PDPs studies were presented, including the importance of ensuring that professional development programmes are developed using research-informed fundamental principles specific to the context at hand and shared amongst the stakeholders/participating teachers involved. The work described in chapter four tackled objective three of the thesis.

In addressing objective four, the final empirical chapter (Chapter Five) focused on reporting any observed impact of the PE teachers' engagement in the PDP on their knowledge of motivation and optimal motivational strategies. Impact on the pupils' perceptions of the motivational climate, motivation, and quality of engagement in PE was also determined. Results supported that the multi-component (*Empowering PE*™ training followed by the CoP) intervention positively impacted on PE staffs' understanding of motivation and how they can create a more empowering and less disempowering motivational climate. Teachers suggested, however, that more time was needed to embed the principles of the professional learning. The pupils' questionnaire results revealed that the mean scores at time two were lower than time one for disempowering climates, autonomous motivation, and controlled motivation. Enjoyment and concentration were higher at time two than at time one. The independent variables (empowering, disempowering, autonomous motivation, controlled motivation, enjoyment, concentration, and boredom) did not differ between the two time points (i.e., pre and post the PDP).

Overall, the findings were promising and may help facilitate the practical enactment of the Health and Well-being Area of Learning and Experience (AoLE) of the New Curriculum for Wales. For example, understanding motivation and creating empowering environments may support the innovative opportunities for PE, specifically how teachers deliver and implement PE into the curriculum. It could also be suggested that the findings specifically from the teachers perceptions

support previous research and theoretical concepts that task-involving, autonomy-supportive, and socially supportive teacher-created environments impact positively on teaching and learning.

Contribution to knowledge: Overall validity of the EDMCQ-PE

The first key contribution to knowledge of this thesis relates to the overall validity of the EDMCQ-PE. The EDMCQ-PE was adapted from sport (and referral to the coach) to provide the first measure of the motivational climate in PE with Duda's (2013) conceptualisation at its heart. The results from Chapters two, three and five provide initial support for the reliability and content, construct, discriminant and predictive validity of the EDMCQ-PE. The EDMCQ-PE was developed to enable researchers and teachers to objectively measure pupils' perceptions of the motivational climate in PE settings, specifically in regard to the two composite climate dimensions, e.g., empowering and disempowering (Milton et al., 2018). Adapting and validating the EDMCQ-C provided the starting point to address limitations in the literature, for example by ~~the~~ inclusion of a more diverse sample (i.e., PE pupils in contrast to youth sport participants).

A particular strength of this thesis was the employment of the EDMCQ-PE throughout the different studies within the thesis, with internal reliability confirmed in several different samples, both cross-sectionally and longitudinally. Evidence regarding the predictive validity of the measure can be found in Chapter three, where perceptions of the motivational climate (as assessed via the EDMQ-PE) related to quality of motivation and outcomes such as enjoyment, boredom and concentration across cross-sectional and longitudinal samples, in theoretically consistent ways. Testing several different models and identifying the best approach to establishing the factor structure of the EDMCQ-PE was suggested in Appleton et al.'s (2016) validation study of the EDMCQ-C. This approach was tested in this study to provide evidence regarding factorial and construct validity of the EDMCQ-PE. Utilising Marsh's (2010) advice, on basing model decisions on parameter estimates and not just fit indices, ensured that the less complex two-factor model can be used as long as researchers

are clear that this measures the composite two factor model of empowering and disempowering structures. As such, this reduces the complexities that are associated with the presumed hierarchical structure when establishing the psychometrics of the scale in other samples (Milton et al., 2018).

A particularly unique contribution of the study conducted (as described in Chapter two) was the inclusion of tests of measurement and scalar invariance. The findings suggested that the two-factor model showed scalar invariance across boys and girls. Testing measurement invariance addressed essential gaps in the literature identified by Duda et al. (2014) and helped provide a rationale for the intervention that followed in later Chapters. Scalar invariance means that future research can contribute to the nomological validity of the measure. By examining the validity and reliability across three studies, evidence for the psychometric properties of the EDMCQ-PE has been enhanced within this thesis. Prior to the present thesis, no attempt had been made to pull from Duda's (2013) model and test the relationships between students' perceptions of empowering and disempowering climates with their motivation, enjoyment, boredom and concentration in PE.

In particular, and of note (in Chapter 3) were the positive indirect effects of perceptions of an empowering motivational climate on enjoyment and concentration and the negative indirect effect on boredom across both samples. In general, the findings described in These findings support the well-established literature on the known benefits of the components of an empowering climate and the overarching empowering climate dimensions (Duda & Appleton, 2016; Duda & Balaguer, 2008; Duda et al., 2014).

The significance of establishing the EDMCQ-PE as a valid and reliable measure is vital for PE, Health and Well-being and schools in general. Evidence-based practice within education is now considered a fundamental aspect for schools to measure and bring accountability to research data collected and used within these educational contexts. The Welsh Government (2020) acknowledged the importance of evaluation and accountability to assess how well schools are developing the new

principles of the Curriculum for Wales. It called for practical tools for self-evaluation 'to establish an evidence base to determine the data and information that is needed to support effective evaluation, improvement and accountability throughout the school system' and 'develop a better system of collating and then providing data and information to support system improvement' (Welsh Gov, 2020, p25). Therefore, a theoretically-informed and validated motivational climate questionnaire specific to PE is relevant in supporting the development of the Health and Well-being AoLE.

Contribution to knowledge: Support for the role that empowering and disempowering climates can play in PE

The second critical theme is based upon the results from Chapter three, confirming the role that teachers can play in the motivation and engagement of their pupils by creating more empowering motivational climates and adopting fewer disempowering strategies. It builds upon the findings of Chapter two by examining the EDMCQ-PE within the different samples of PE pupils both cross-sectionally and longitudinally. While adding value to the validity of the EDMCQ-PE from Chapter two, chapters three's novel contribution to the field of motivation is that it is the first study within a PE setting to confirm the impact using Duda's (2013) conceptualisation.

Findings point to the advantages of an environment where teachers make pupils feel supported, value their opinions and pupils, provide pupils with meaningful, realistic choices, and place greater emphasis on improvement and exerting effort than demonstrating superior ability. Such a motivational climate results in pupils being more likely to be autonomously motivated. When pupils are more autonomously motivated, our results suggest that they are more likely to have a positive PE experience (i.e., more likely to report greater enjoyment of PE and concentration when engaged in PE). A strength of these results is that they emerged both cross-sectionally and, as have been suggested as a future direction of motivation-based studies, longitudinally (Cheon et al., 2016). The

strength of the longitudinal evidence is that it confirmed the cross-sectional relationships by examining the changes in such variables over time.

There has been substantial evidence highlighting the importance of PE teachers creating more task-involving and autonomy-supportive climates and the ensuing positive impacts on motivation (Garcia-Gonzalez et al., 2019), life skills and wellbeing (Cronin et al., 2018). While Mastagli et al. (2020) investigated the relationship between the motivational climate and concentration, prior to this thesis, no PE study (to our knowledge) has investigated this relationship using both Duda' (2013) conceptualisation of the motivational climate, and tested the hypothesised mediating role of quality of motivation on a range of engagement outcomes (enjoyment, boredom and concentration). There have been several studies examining the motivational processes and outcomes associated with empowering and disempowering climates in youth sport (Appleton & Duda, 2016; Fenton et al., 2017), including those using observational measures of the empowering and disempowering features of the motivational climate (Smith et al., 2016). Past work has also tested the integrated model within dance (Hancox et al., 2017).

The findings reported in Chapter three have implications for professional learning and PDPs. They point to the importance of collaborating with teachers to create and implement strategies that promote task-involving, autonomy-supportive and socially supportive environments in schools (Garcia-Gonzalez, et al., 2019; Ommundsen & Kvalo, 2007; Curran & Standage, 2017). The findings also point to the relevance of teachers understanding how to avoid disempowering strategies (and why this is important to do so) while implementing more empowering strategies (Duda and Appleton, 2016; Duda et al., 2014).

Overall, the findings described Chapters two and three (and other AGT- and SDT-based research in PE; Girard et al., 2021; Hancox et al., 2017; Mastagli et al., 2021; Rodrigues et al., 2020). provide a compelling rationale for an intervention to develop PE teachers' understanding of

motivation and implementation of strategies that support empowering and reduce the creation of disempowering climates. Duda's (2013) framework underpinned the training programme and subsequent PDP. As the number of motivation-based intervention studies based on AGT, SDT and this integrated framework grows (Girard et al., 2021; Mastagli et al., 2021; Roberts, 2012; Rodrigues et al., 2020) the employment of robust measures to assess features of the motivational climate is vital. Intervention programmes will be able to measure the 'baseline' motivational climates operating (in the views of pupils) as well as any change due to the intervention.

Contribution to knowledge: Developing research-informed motivation-based interventions that are sustainable

The final critical theme is the need to develop theoretically-based research-informed motivation interventions that can be sustained over time (in contrast to being a one-off workshop) and are evaluated. This will allow researchers and teachers at a time of curriculum reform in Wales to develop the link between critical research and critical practice (Casey & Larsson, 2018). The findings of this thesis support the call to educate teachers in the 'how' and 'why' of developing pupils' motivation and psychological wellbeing through the use of theoretically grounded education training programmes (Hancox et al., 2017).

Focussing on the findings in Chapter four provided clear support for Parker et al.'s (2021) call to evidence the effectiveness of sustained PDPs and, where possible, employ more longitudinal designs examining the delivery and impact of such PDPs. Such an approach is warranted in order move beyond continually engaging with CPD material, deepen understanding, and promote behaviour change in teachers. Yoon and Armour's (2017) work illustrated the complexity of planning and developing PDPs for PE. The points made in Chapter four suggested that considering the specific context, employing a theoretical framework, and having an effective boundary spanner need careful thought and are critical to the impact of any CoP. Another noteworthy discussion finding was the use

of technology (Lander et al., 2020). While the impact of the Covid-19 pandemic had not yet effected schools at the time of data collection, the use of an online support group to help develop and sustain the PDP was considered highly effective. As a result of the Covid-19 pandemic and technology irreversibly changing education, digital technologies are increasingly crucial to teachers' daily work (Player-Koro et al., 2018; Selwyn et al., 2015). The development and use of digital skills are also a critical development area in the new Welsh curriculum (Gatley, 2020).

Overall, the findings within Chapter Four provide tentative evidence for developing PDPs using a mixture of online and face to face support to generate maximum opportunities for learning. Such an approach also is conducive to embedding optimal motivational strategies in practice while also being realistic with time and understanding the context of the educational environment. Such opportunities for social learning and connection, both in-person and online, allowed the teachers to develop their own strategies with the boundary spanner's input (Trust & Horrocks, 2019). Moreover, the collaborative nature of the PDP using the principles of CoP was essential to sustainability (Goodyear & Casey, 2014; Yoon & Armour, 2017).

Chapter Five added to the considerable body of prior research (Duda & Appleton, 2016; Hancox et al., 2017; Smith et al., 2015;) indicating that creating a more empowering motivational climate is desirable. However, the findings suggested that it takes time and support to see the impact on teachers' practice and, in particular, pupils' views about the environment and motivation (Girard et al., 2021). Teachers confirmed that more time was needed to embed professional learning strategies to ensure the quality and sustainability of learning and enhance the impact in and out of the classroom. In the present thesis research, the PDP using principles of CoP was supported for only six months. A longer intervention was not possible due to Covid.

As detailed in Chapter Five, evidence was found to support the effect of the intervention on the reported use (by the teachers) of more empowering strategies and to enhance their perceptions of

developing a motivational climate which, they felt, subsequently impacts the quality of motivation in their PE pupils. The multi-component (workshop plus CoP) intervention positively impacted on staffs' understanding of motivation and view of how they can create a more positive, empowering and less disempowering climate. Efforts to increase the understanding and implementation of the empowering PE principles may support a more successful implementation of the New Curriculum for Wales (2020a, 2020b). Finally, the use of a theory-informed workshop and subsequent related and sustained PDP contributed to the existing research into the effective implementation of PDPs within a PE context. The attempt to include a mixed-methods longitudinal design to examine the workshops and subsequent PDP also provided a novel contribution to the literature (Girard et al., 2021).

Given the importance of the motivational environment for promoting optimal forms of motivation for pupils (and staff), the methodological and theoretical developments outlined in Chapters four and five could help to inform and help shape teachers' pedagogical approach to developing and implementing the New Curriculum for Wales. As Donaldson (2015) alluded to, collaboration and cooperative learning can positively impact motivation (of pupils and their teachers). Although the New Curriculum for Wales offers the space to move away from traditionally mandated curriculums and institutional obstacles, an authentic approach to developing the psychological needs of teachers and pupils will be critical (Ryan & Deci, 2020) to its success.

Overall Impact and Practical implications

Physical Education is the starting point for many pupils to develop and foster a healthy and active approach to their physical health and wellbeing (Leisterer & Jekauc, 2019). Based on the findings embedded in this thesis, the following practical implications for teachers, pupils, researchers, and education departments are proposed (See Table 6.1).

Table 6.1

Practical implications from the thesis

Practical implications	For Who
A critical need to measure pupils' perceptions of the motivational climate in PE through valid assessment tools, such as the EDMCQ-PE. This will facilitate the gathering of robust data on the motivational climate manifested in PE settings.	Teachers, Researchers
There is a need to use the EDMCQ-PE, in conjunction with other measures, to provide evidence of the impact of the teacher-created climate on other aspects of psychological wellbeing and motivation in PE.	Teachers, Researchers
There is a need for teachers and school management staff to better understand motivation and the strategies that develop empowering climates and reduce disempowering climates. This can have significant implications for increasing motivation for pupils, impact on the teaching and learning of teachers and for schools developing their new curriculums.	Teachers, Head Teachers, Senior Leadership Teams, Education Departments
There is a need to document approaches on how to successfully provide sustained theoretically-grounded PDPs to promote systematic behaviour change over time	Researchers

The efforts to embed critically informed research within the critical practice is are a strength of this thesis. As Girard et al. (2021) have advocated, evidencing approaches made to make changes to teaching practice, systematically documenting important issues and refining the way PE teachers are supported are vital. Fleitz (2004) focused on the importance of accompanying PE teachers on the journey to change their practice. This thesis's impact on developing a supported PDP has taken a robust evidence-based approach to bring theory to life in practical PE settings. Taking consideration of the present approach has the potential to enable researchers to build on the limitations and be clear on future directions when developing and designing future effective motivation-based school PDPs (Lander et al., 2017).

Limitations and Future directions

During this final chapter, several limitations have been discussed, and suggestions for ongoing work have been provided. A limitation of the work described in Chapter two is that different forms of validity, such as providing support for external validity (e.g., testing both pupil and teachers

perceptions of the climate created) and/or establishing invariance of the measure across countries and ages (e.g., 1ry school), would have been of benefit and should be included in the future development of the EDMCQ-PE. Another limitation was the multilevel nature of the data; all the samples collected from the three studies had limited numbers of classes related to pupils' groups to test and account for clustering when examining factor structure, as suggested by Myers (2013). Therefore, future research should consider having a sufficient number of groups/classes to allow for multi-level modelling. Subsequent work might also consider taking a longer approach to the quantitative data collection and increase the repeated measures to three or more (Stenling et al., 2019).

Another limitation of the EDMCQ-PE is that it does not replicate the hierarchical structure implied by Duda's (2013) integrated conceptualisation of the motivational climate. There is an argument to suggest from a theoretical standpoint that due to the strong associations between the various climate dimensions, it will continue to be a difficult task to represent this hierarchical structure within one measure (Appleton et al., 2016). For example, perceived autonomy-supportive environments are strongly linked to task-involving features of the climate and the perceived existence of social support (Appleton & Duda, 2016). In addition, Appleton and Duda (2016) suggest that there are overlaps between key features of ego involving and controlling climates.

A further limitation within the research described in Chapters two and three is that despite recruiting schools, teachers and pupils from all across Wales and capturing data in different PE environments, there was a focus on secondary school PE and the Welsh education context. Future studies should explore different ages of pupils, including primary level PE and the different UK and international education settings (Parker et al., 2021).

While helping to build a complete picture of the impact of the intervention, the questionnaire results (provided by the pupils) revealed that means scores at time point two showed lower perceptions of disempowering climates, higher autonomous motivation, and lower controlled

motivation scores than time one. Higher mean scores were reported on enjoyment and concentration at time point two compared to one. However, there were no significant differences on any of the independent variables (empowering, disempowering, autonomous motivation, controlled motivation, enjoyment, concentration & boredom) across the two timepoints (i.e., pre and post the PDP). Possible explanations for this include the limited length of the intervention where the teachers had time to try new strategies and develop their practice in line with the theoretical concepts emphasised in the PDP. As indicated in the qualitative findings, the teachers perceived that they were becoming more empowering teachers (between the 8 months from the Empowering PE™ training and CoP implementation to when the interviews were conducted), whereas, for the pupils, it was still a relatively short period to observe change to the degree that such change could be ascertained via the quantitative EDMCQ-PE (Moreno et al., 2011). The first questionnaire was collected at the start of the term (September) when pupils had recently had a break from school and the weather was better. In direct contrast to the second collection point 6-7 weeks post-Christmas (February), when the weather was colder, there is more rain and darker evening are apparent (Štveráková, et al., 2021) and the nature of what is delivered with PE classes may be different.

In terms of future developments of the present research, more work is needed to ensure a PDP using the principles of CoP can continue once the boundary spanner or facilitator leaves the school and to understand how such independence and CoP longevity can be promoted. Based on this thesis, we would suggest that future research should a) ensure that PDPs are developed using theory-informed principles specific to each study's context and b) clarify the use of the boundary spanner/facilitator and how key learnings from PDPs can be shared and sustained (Parker et al., 2021) including subsequent to the boundary spanner's input.

Finally, to reiterate earlier points and in consideration to the wealth of information gleaned, future research should consider using mixed methods approaches to develop more robust and

transparent research designs. While qualitative methodologies are prevalent in educational PDP research (Parker et al., 2021) and quantitative methodologies are predominant in the psychological motivation-based literature, there is clear space to complement investigations with robust mixed methods designs (Parker et al., 2021). In addition, reflecting on the different mixed-methods designs which can be adopted (Konig, 2016) and bringing variety to the data collection methods would add value if clearly linked to the aim and objectives of the studies being conducted. This is supported by Mcrudden et al. (2019), who propose that both an increase in the number of mixed methods studies and increase the rigour in the design process should be a goal for researchers.

Conclusion

The most important and potentially impactful findings from the four empirical chapters have been reviewed and discussed within this final chapter. The findings from the studies that make up this thesis collectively provide a validated measure of the motivational climate manifested in PE that teachers and researchers could use to establish an evidence-based practice as advocated in the New Curriculum for Wales (particularly within the Health and Well-Being AoLE). Taken in their totality, the present findings corroborate the extensive literature grounded in AGT (Nicholls, 1989) and SDT (Deci & Ryan, 2000) and support the use of Duda's conceptualisation of the motivational climate. Findings also indicate the importance of promoting more empowering PE environments and reducing disempowering teacher behaviours. Finally, findings suggest that the motivational climate in PE classes can be optimised via targeted training and the following up of educational workshops with more continuous interaction and exchange between those who have received the training (as can be achieved via developing and supporting a community of practice). These outcomes are an example of critical research and embedding such critical research in practice while also supporting the development of the new Health and Well-being AoLE within the Welsh Curriculum.

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APPENDICES

Appendices

Appendix 1
EDMCQ-PE Subscale

	EMPOWERING	
1	My teacher encouraged pupils to try new skills	Task-Involving
4	My teacher tried to make sure pupils felt good when they tried their best.	Task-Involving
11	My teacher made sure pupils felt successful when they improved.	Task-Involving
13	My teacher acknowledged pupils who tried hard.	Task-Involving
18	My teacher made sure that each pupil contributed in the class in some important way.	Task-Involving
23	My teacher made sure everyone had an important role in the class.	Task-Involving
28	My teacher lets us know that all pupils have the opportunity to make a valuable contribution to activities in class.	Task-Involving
30	My teacher encouraged pupils to help each other learn.	Task-Involving
34	My teacher encouraged pupils to really work together in class.	Task-Involving
3	My teacher gave pupils choices and options	Autonomy-Supportive
6	My teacher thought that it was important that pupils participate in PE because they (the pupils) really want to.	Autonomy-Supportive
16	My teacher answered pupils' questions fully and carefully.	Autonomy-Supportive
22	When my teacher asked pupils to do something, he or she tried to explain why this would be good to do so.	Autonomy-Supportive
32	My teacher thought that it is important for pupils to participate in PE because they (the pupil) enjoy it.	Autonomy-Supportive
8	My teacher could really be counted on to care, no matter what happened.	Socially-Supportive
14	My teacher really appreciated each pupil as an individual, not just as pupils in their classes.	Socially-Supportive
27	My teacher listened openly and did not judge pupils' personal feelings.	Socially-Supportive

	DISEMPOWERING	
5	My teacher makes us do laps/press-ups etc. if we make a mistake.	Ego-involving
9	My teacher gave most attention to the best pupils.	Ego-involving
10	My teacher yelled at pupils for messing up.	Ego-involving
19	My teacher had his or her favourite pupils.	Ego-involving
21	My teacher only praised pupils who performed the best during a class.	Ego-involving
25	My teacher thinks only the pupils best at PE should play in school teams.	Ego-involving
33	My teachers favoured some pupils more than others.	Ego-involving
2	My teacher was less friendly with pupils if they didn't make the effort to see things his or her way.	Controlling Coaching
7	My teacher was less supportive of pupils when they were not performing well.	Controlling Coaching
12	My teacher paid less attention to pupils if they displeased him or her.	Controlling Coaching
15	My teacher only allowed us to do something we like to do at the end of class if we had done well during class.	Controlling Coaching
17	My teacher was less accepting of pupils if they disappointed him or her.	Controlling Coaching
20	My teacher only rewards pupils with prizes, treats or fun activities if they have performed well in PE.	Controlling Coaching
24	My teacher shouted at pupils in front of others to make them do certain things.	Controlling Coaching
26	My teacher threatened to punish pupils to keep them in line during class.	Controlling Coaching
29	My teacher mainly used rewards/praise to make pupils complete all the tasks he or she set during class.	Controlling Coaching
31	My teacher tried to interfere in aspects of pupils' lives outside of PE.	Controlling Coaching

Appendix 2
Head Teacher Consent Form

STUDY INFORMATION
Motivation experiences of teaching PE

Dear Head Teacher/Head of PE Department,

We, a team of sport researchers from the University of Birmingham, in collaboration with colleagues from Sport Wales and Cardiff Metropolitan University, are conducting research into students' experiences of teaching and how that impacts upon their motivation and a number of outcomes associated with taking part in PE. Overall, the information collected could help us identify how different aspects of the teaching environment impact upon students' immediate responses to PE and more generally their motivation to take part in PE. This information could prove useful when trying to encourage students to stay engaged in physical activity in the future.

We would like to invite your school to participate in this project. Specifically, we would like to invite one male and one female PE teacher of year 9 students and the year 9 students to participate in this research. If you choose to take part, the teachers and students will be asked to complete 3 questionnaires [September 2013, January 2014, June 2014]. The teachers' questionnaires will ask about their experiences teaching PE and will take approximately 30 minutes to complete. The students' questionnaire will ask about their experience in PE and will also take approximately 30 minutes to complete. In addition to the questionnaire, the teachers participation in the project will involve them attending a 1 day workshop (January 2014) and a follow up workshop (April 2014). Both workshops focus on how to create more empowering climates when teaching in PE. **To be included in the project, it is important that the participating teacher and pupils will be in PE classes together throughout the school year.**

We would also like to film the teachers during three PE classes. During the filming sessions the camera will be focused on the teacher. For the purposes of this study we are not interested in the behaviour or actions of your students. On the day of recording, one or two researchers will come to the class and set up the filming equipment. To capture the verbal instructions delivered by the teacher, we will attach a small lapel microphone and digital voice recorder to him/her. These are both small and unobtrusive devices which will not hinder their performance in any way. Once the equipment has been set-up the session can continue undisturbed. The collected footage will be coded against a number of motivation based variables. After coding, the filming data as well as the questionnaire data will be stored confidentially and securely at the University of Birmingham.

The teachers will also be invited to take part in interviews (October 2013; July 2014) about their experiences as a PE teacher. The interviews will be audio- and video-recorded and last approximately 60 minutes.

For participation in this research it is essential that we have the consent of the teachers and the students and their parent or guardian. If the teachers consent to being involved in the project, an information letter explaining the purpose and nature of the study will be distributed to the parents or legal guardians of your students. The parents (or legal guardians) will be given the opportunity to opt their child out of the study and will be given at least 2 weeks prior to the baseline questionnaires (end of September 2013) to sign and return the form. On the day of questionnaire data collection student participants will be asked to read and provide signed consent to take part in the study. On

the day of filming student participants will be asked if they are happy for their teacher to be filmed. If any pupil or teacher objects or appears uncomfortable with the filming, then we will not film.

By agreeing to participate in this research the teachers and students are agreeing that their data can be used for scientific purposes and possibly published in a scientific journal. All data collected will only be viewed by the researchers working on the project. The teachers' and pupils' involvement in the research is voluntary and they will be free to withdraw from this study at anytime, or to withdraw their data from the study at any point up to one month following the date of the data collection. If they would like to withdraw from the study we request that they write to us using the contact details provided. If they choose to withdraw, their data will be destroyed.

If you have any queries or would like to discuss the research further, please feel free to contact Daniel Milton & Dr Eleanor Quested whose details can be found below. Thank you for taking the time to read this letter.
We hope you will be involved in this worthwhile project.

Yours truly,

Daniel Milton [redacted]

Dr Eleanor Quested [redacted]

Appendix 3
Parent Assent Form

STUDY INFORMATION

Motivation experiences of PE

Dear Parent/Guardian,

We, a team of sport researchers from the University of Birmingham, in collaboration with colleagues from Sport Wales and Cardiff Metropolitan University, are conducting research into students' experiences of teaching and how that impacts upon their motivation and a number of outcomes associated with taking part in PE. It is hoped that the information collected will contribute towards a greater understanding of how teaching environments influence students' engagement during PE classes.

Overall, the information collected could help us identify how different aspects of the teaching environment impact upon students' immediate responses to PE and more generally their motivation to take part in PE. This information could prove useful when trying to encourage more people to stay engaged in physical activity in the future.

The study will involve your daughter/son filling out 3 questionnaires at the start (September 2013), middle (January, 2014) and end (July, 2014) of the study period. Each questionnaire will take approximately 30 - 40 minutes to complete. The questionnaire will ask your child about their motivation to part in PE, how their teacher behaves during classes, how they feel about other people in their class and in general, their thoughts about themselves as a person and as a student and their feelings in PE and at other times. A trained research assistant will be present when your child completes the questionnaires and your child will not be required to sign their name anywhere on the questionnaire.

In addition, as part of this project a researcher will videotape a number of your child's PE classes to observe the teacher in action. During the filming sessions the camera will be focused on the teacher; however, it is possible that your child may inadvertently be recorded. For the purposes of this study we are not interested in the behaviour or actions of your child and they will not be assessed. The video recordings will be seen by the research team only and will not be available to third parties. In accordance with University of Birmingham regulations, all video recordings will be kept securely for ten years after the completion of the project at the University of Birmingham.

Your child's participation in this study is purely voluntary and information that she or he supplies will be held in the strictest confidence and will not be disclosed to any third party, including yourself and his/her teacher/school. Although it would help our research if all questions were answered, your child can omit answering some questions if he/she wishes to do so. Your child can withdraw his/her participation by informing us directly or via his/her teacher, with no negative consequences. Please inform us directly or via the school in case you do not want us to use the answers your child might have already provided to us. If you or your child chooses to withdraw from the study and/or would prefer their responses not to be included in our research, we will remove these responses from any future analyses or publications.

By agreeing to take part in this project, you and your child are agreeing to the results of the questionnaire being used for scientific purposes and with the results potentially being published in a scientific journal, provided the anonymity of your child is protected. That is, you can be assured that we will never publish your child's name next to something that they state in the questionnaire. Our analyses will be conducted at a group level and we will match-up questionnaires over time

using an ID code. When the study is completed, your child's school will receive a report of the key findings in the study with appropriate recommendations for teaching.

If you DO NOT want your child to participate in this project, then please sign and return the slip overleaf. If we do not receive this form back from you by (REPLACE WITH DATE 2 WEEKS FROM DATE XXXXXXX WHEN THIS LETTER WAS DISTRIBUTED), we will assume you consent to your child's participation in this study. Your decision to prevent your child from participating in this project will have no bearing on his/her relationship with the school or their PE teacher. Your child and his/her teacher's consent will also have to be secured before your child will be able to participate.

If you have any concerns/questions regarding the research investigation, please feel free to contact Daniel Milton & Eleanor Quested whose details can be found below. Thank you for taking the time to read this letter.

We hope you will be involved in this worthwhile project.

Yours truly,

Daniel Milton [redacted] Dr Eleanor Quested [redacted]

You are only required to sign and return this form if you <u>DO NOT</u> want your child to participate in this project.

Study: *Motivation experiences of PE*

Investigator: **Daniel Milton / Dr Eleanor Quested**

Child's Name: _____

I, _____ have read the information sheet. I understand the purpose and design of the study.

I DO NOT give permission for my child to take part in the above project.

Signed: _____

Date: _____

Please return this form to your child's school/teacher by (REPLACE WITH DATE), who will pass this onto the research team. Alternatively, please contact Dr Eleanor Quested, whose details are provided on the letter.

Appendix 4
Pupil Consent Form

STUDY INFORMATION

Motivation experiences of PE

Dear Student,

We, a team of sport researchers from the University of Birmingham, in collaboration with colleagues from Sport Wales and Cardiff Metropolitan University, would like to invite you to take part in a research study. Before you decide if you would like to take part you need to understand what the study is about and what you will be asked to do. Please take time to read the following information carefully.

The aim of the study is to find out about students' experiences in PE and how that impacts upon their motivation and a number of outcomes associated with taking part in PE. It is hoped that the information collected will help us to understand how teaching environments influence students' engagement during PE classes and how that impacts upon their general motivation to take part in physical activity.

If you choose to take part we will ask you to fill in 3 questionnaire at the beginning (September 2013), middle (January 2014) and end (June 2014) of the study period. Each questionnaire will take approximately 30 minutes to complete. The questionnaire will ask you about the teaching environment in PE, your motivation to take part, how you engage in the session and your well-being.

This study will also involve one or two researchers visiting your PE class and setting up filming equipment to film your teacher. This will not get in the way of your participation. When we film it is likely that you will be recorded by the camera. The camera will be focused on the teacher and we will record what he/she says to you. We are only looking at how your teacher behaves and not what you do in the class. The video recordings will only be watched by the research team. All video recordings will be kept securely at the University of Birmingham.

For you to take part in the research we must have your signed consent. If you would like to take part please sign and return the attached consent form. By agreeing to take part in the research you are agreeing that your answers can be used for science and possibly published in a scientific journal, but your name will not be used against anything you say. It is your choice if you want to take part. You are free to drop out from the project at any time, and to withdraw your data from the projectup to one month after the last data collection. If you would like to drop out from the project we ask that you (or your parent) write to us using the contact details below.

If you have any questions, please feel free to contact Dr Eleanor Quested whose details can be found below. Thank you for taking the time to read this letter.

Yours truly,

Daniel Milton [redacted]

Dr Eleanor Quested [redacted]

UNIVERSITY OF BIRMINGHAM

Study: *Motivation experiences of PE*

Investigator: Daniel Milton / Dr Eleanor Quested

I, _____ am willing to take part in a project conducted by researchers from the University of Birmingham, UK. I have read the information sheet and I understand the purpose of the study. The procedure of the study has been explained to me. I understand that any information I provide will be held in the strictest confidence, and that I have the right to withdraw from the study up to one month after my last data is collected, without giving reason or penalty by informing the main investigator.

Signed: _____

Date: _____

Appendix 5
Empowering PE Teaching in Wales: Data Collection Training

Project Background

Throughout Europe, pediatric obesity and overweight is at epidemic proportions. In 2007, approximately 20% of children and adolescents in European countries were overweight, and a third of these young people were obese. In Wales, 35% boys and 37% girls are documented to be overweight and obese, the highest figures in the UK (NHS International Comparisons of Obesity Prevalence, 2009).
This is worrying because obesity is consistently associated with increased risks of morbidity, disability, and pre-mature mortality (Visscher & Seifell, 2001; The public health impact of obesity. Annual Review of Public Health, 22, 355-375) as well as compromised well-being and quality of life.

The school context, and specifically Physical Education (PE), is expected to play an important role in fostering children's adoption of and adherence to an active lifestyle. PE is a mandatory subject in most countries, and thus provides an ideal setting in which we can intervene to increase physical activity levels and foster lifelong interest in active living in all children. Yet despite its potential benefits, PE is not meeting such health related aspirations for many boys and girls.

The motivational message and context in which physical activity promotion is couched are critical determinants of whether PE leads to uptake and sustained physical activity participation (and promote well-being). However, until now no systematic training is currently offered to provide PE teachers in Wales with the knowledge and skills to be able to effectively motivate children to adopt and maintain a healthy lifestyle, enjoy the activity at hand and feel good about themselves during exercise and as a result of their participation.

The proposed project will pull from the good practice being applied to youth sport coaches in a major European project involving over 10,000 children and their sport coaches (i.e., the 'PAPA project; www.projectpapa.org). This programme has facilitated the widespread dissemination of the Empowering Coaching™ training programme among sport coaches in five countries in Europe. This an existing training programme grounded in contemporary theories of motivation and personal development, and will be customised and pilot-tested for Welsh PE teachers in the current project.

Project Purpose
The purpose of this project is to customise and pilot-test the Empowering Coaching workshop in a sample of Welsh Physical Education (PE) teachers and to examine the effects of the workshop on students' motivation towards PE, quality of engagement in PE, and psychological health.
Instructions and Guidelines for Student Questionnaire Administrators

The following guidelines have been drawn up as part of a common procedure that will help to ensure consistency and quality throughout the Empowering PE Teaching in Wales project.

Informed Consent

The information letters will be used to inform participants about the research and invite them to participate. Participant and parent consent forms and information will be distributed at least two weeks prior to the targeted date for questionnaire completion. Parents (or legal guardians) will be given the opportunity to opt their child out of the study and will be given at least 2 weeks prior to the beginning of data collection to sign and return the form to the school teacher or research team. Thus, prior to questionnaire administration, the data collector should check with the teacher whether any forms have been returned. Should students agree to take part in the project they will be consenting to complete a series of questionnaires and be aware that their teacher may be filmed on a number of occasions during PE classes**.** On the day of data collection student participants will be asked to read and provide signed consent to take part in the study. The data collector should ensure that the participants fully understand the content of the information letter and how to complete the consent form by verbally explaining the key points prior to questionnaire administration.

Note: Different information sheets and consent forms will be distributed to the children/parents from those schools where questionnaire administration will not take place but filming may occur.

Student Questionnaire Content

The scales included are comprised of items previously validated in the targeted (or similar) setting and age group. Items will tap theoretically derived features of the motivational environment (e.g., need-supportive or need-thwarting features), psychological need satisfaction/thwarting (i.e., autonomy, competence, relatedness), motivation regulations, and associated outcomes, for example engagement and intentions to sustain physical activity.

We estimate that completion of the questionnaires that will take approximately 30 – 40 minutes, maximum. In the past, we have typically found that it is possible to effectively engage participants aged 10 and over in questionnaire based studies comprising approximately 9 A4 pages. The age group targeted in this study, and the classroom context will help to reduce the amount of time needed for the children to complete the task.

Variables in the Questionnaire

- Perceptions of the multidimensional motivational climate (34 items)
- Satisfaction of the basic needs for autonomy, competence and relatedness (17 items)
- Thwarting of the needs for autonomy, competence and relatedness (10 items)
- Motivation regulations to participate in PE (20 items)
- Engagement in PE (12 items)
- Skill development in PE (6 items)
- PE Course Achievement (1 item)
- Intentions to take GCSE PE (2 items)
- Intentions to be physically active (6 items)
- Motivation towards leisure time physical activity (19 items)
- Self-report of PA engagement (3 items)

- Depression (5 items)
- Self-esteem (5 items)
- Vitality (5 items)

Questionnaire Administration Procedure

Go through the key points on the information sheet with the children, ensuring confidentiality, the voluntary nature of study and withdrawal are emphasised
Remind children:

- It is not a test, but is an individual task
- There is no right or wrong answers
- It is their personal view that matters
- They do not have to answer every question, but it is helpful if they do so

It is always their choice – we can encourage them but we (or the teachers) should not coerce/force them to complete the forms!

It is vital that students are not rushed and are able to concentrate (are not distracted), as this will affect the validity of their answers. Ideally the questionnaire should be completed in a classroom and students should not be allowed to talk or be able to see each other's answers. The completion of the questionnaire should be performed in maximum 40 minutes. However, the time it takes for students to complete the questionnaire will vary. It is important that those requiring less time do not disturb others who have not yet finished. It may be worth discussing in advance if there is a task students can work on if they finish early.

It may be helpful to go through page one together with the children as this is sometimes more efficient. DOB variables are important for data matching, so it is worth ensuring these are completed accurately.

There is a key question on the first page:
"What is the name of your main teacher of the lesson you are attending today?"
The name of my main PE teacher is ……..
At T1, T2 & T3, this should be the same "core" teacher who is participating in the project. Students should focus on experiences in this teacher's classes when responding to the questions. It is important to highlight this to the students.

Instructions to Students

You may wish to follow this text to start the data collection, or to make the same points in your own words:
"We are researchers from Cardiff Met and are working in collaboration with University of Birmingham and Sport Wales. We would like to ask you to fill in a questionnaire, mostly by ticking the box that best fits your answer. The questionnaire is about your experiences in PE. The aim of the study is to find out about students' experiences in PE and how that impacts upon their motivation and a number of outcomes associated with taking part in PE. It is hoped that the information collected will help us to understand how teaching environments influence students' engagement during PE classes and how that impacts upon their general motivation to take part in physical activity.
Your parents and teacher have not objected to your involvement in this project. However, please keep in mind that your participation in this study is entirely your choice. You can drop-out of the

project at any time and you will not be in trouble with your parents, your teacher or the researcher. If you want to drop-out from the project, simply tell your teacher or the researcher. If you want to withdraw your answers please notify us within one month of today's date and your answers will not be used.
It is important that you complete and sign the consent form. Please ensure that this is handed to the researcher.
Before you start, please read the instructions with each question carefully. Answer the questions as honestly as you can but don't spend too much time on each question. Although it will help us if all questions are answered, if you particularly dislike a question, you don't have to answer it. We will keep your answers confidential and this means nobody apart from the research team will see your answers and your name will not be associated with your answers. Don't write your name on the questionnaire. When you have filled it in, please give the questionnaire to me.
You should not talk to each other until everyone has finished. Remember that it is your own opinion that is of interest and not that of anyone else. Although we are asking you not to talk, the questionnaire is not a test and there are no right or wrong answers. If you have any questions, please don't hesitate to ask the researcher.
When you have finished, please raise your hand and the researcher will collect your completed questionnaire and your signed consent form. Then wait until the others are finished. You can start NOW.

THANK YOU FOR YOUR HELP!"

Giving Help

- The questionnaire is self-explanatory but students may still have questions.
- Help should only be given if the question is a straightforward practical one, *e.g. whether to place a tick or a number in a box.*
- If the request for help would mean interpreting a question or suggesting an answer, then the instruction should be to "answer as best as he/she can" or to "answer the question as he/she understands it him/herself".
- If the student does not understand at all, they should write 'I don't understand' next to the question.

After Completion
On collection, flick through questionnaire to check student hasn't accidentally missed any questions.
Double check DOB is completed correctly – this is crucial to matching up questionnaires across time points. Put all questionnaires and consent forms in the sealable envelopes supplied by us, and complete the details on the data collection summary form (which may be printed on front of envelope).
Absent Students
Leave the teacher with a questionnaire, sealable envelope and consent form for every absent student. Ask the teacher to try to ensure all absent students complete the questionnaire under similar conditions. The student can place the questionnaire in the envelope, and seal it themselves, to help to reassure them that the teacher will not see their answers.
Teachers

- It is useful if teachers can be otherwise occupied while students complete the forms.

- The teachers will have been provided with information sheets prior to this data collection visit, however hard copies could be distributed again for them to read and ask questions.
- We may provide you with further details regarding the teachers' involvement in observation/interviews/workshops etc. to discuss with the teacher during the school visit.
- Please also ask teachers to provide names of absent children.

If you have any questions regarding data collection procedures, please don't hesitate to get in touch!

Daniel Milton [redacted]

Dr Eleanor Quested [redacted]

Appendix 6

Ethics Forms Birmingham and Cardiff Met (full documents available on request)

UNIVERSITY OF BIRMINGHAM
APPLICATION TO USE PROGRAMME ERN_12-1558P
Social, environmental and motivational processes in sport, dance, PE and physical activity settings

WHO SHOULD USE THIS FORM:

The following researchers may apply to carry out work under approved Programme ERN_12-1558P:

- Staff of the University of Birmingham; or
- Supervisors of research postgraduate students enrolled at the University of Birmingham/or
- Visiting/honorary researchers at the University of Birmingham

Students undertaking undergraduate projects and taught postgraduates should refer to their Department/School for advice.

HOW TO USE THIS FORM

- The applicant should consider each section and indicate how the proposed work fits within the Programme, and all questions should be completed in full.
- Copies of the study-specific participant documentation (based upon the approved sample documentation) and any additional materials specific to the study should also be submitted with the application.
- Researchers wishing to use an approved Programme should submit their application to the Programme Lead in the first instance. The Programme Lead will submit the application to the relevant Ethics Committee once he/she is satisfied that the application is appropriate and of a sufficient standard for review. **Unless each application to use the Programme is submitted and reviewed in this way, it will not have ethical approval – it is not sufficient to rely upon the original Programme Approval alone.**

NOTES

- Answers to questions must be entered in the space provided.
- An electronic version of the completed form should be submitted to the Research Ethics Officer, at the following email address: aer-ethics@contacts.bham.ac.uk. Please **do not** submit paper copies.
- If, in any section, you find that you have insufficient space, or you wish to supply additional material not specifically requested by the form, please put it in a separate file, clearly marked and attached to the submission email.
- If you have any queries about the form, please address them to the Research Ethics Team.

✓ **Before submitting, please tick this box to confirm that you have consulted and understood the following information and guidance and that you have taken it into account when completing your application:**

- **The information and guidance provided on the University's ethics webpages (http://www.rcs.bham.ac.uk/ethics/index.shtml)**
- **The University's Code of Practice for Research (http://www.as.bham.ac.uk/legislation/docs/COP_Research.pdf)**

5. SUMMARY OF PROJECT

Describe the purpose, background rationale for the proposed project, as well as the hypotheses/research questions to be examined and expected outcomes. This description should be in everyday language that is free from jargon. Please explain any technical terms or discipline-specific phrases.

5.1 PURPOSE

The purpose of this project is to explore pupils' & staffs' perceptions and illustrate the features of the motivational climate(s) as manifested within a Physical Education (PE) and Health and Well-Being (HWB) area of learning. In this study, we will also examine views of how and why the HWB & PE specific motivational climates impact on the quality of motivation, engagement, health and well-being of pupils and staff within Physical Education. A further aim of this project is to develop and support a community of practice to implement empowering teaching behaviours in order to optimize the motivational climate created by teachers in PE

5.2 BACKGROUND

This project will build upon the body of empirical evidence from projects associated with this programme of work that has primarily considered how we can train leaders to be more empowering (and less disempowering) and/or the impact on empowering and disempowering coaching/teaching strategies on athletes/pupils. In this particular study, we will focus on one particular school in Wales who are in the midst of curriculum change as a result of the Donaldson report.

This is a multi-method piece of work including questionnaires, interviews and focus groups. Following the delivery of the *Empowering PE* training, a Community of Practice (CoP) will be developed and followed for a term. A number of curriculum theorists have called for teachers to work together in a CoP with university/teacher collaboration to aid pedagogical change (Armour and Yelling 2007; Casey 2012a; Deglau and O'Sullivan 2006; Harvey and Jarrett 2013; O'Sullivan 2007; Parker et al. 2010; Patton et al. 2005). We do not for see any additional ethical issues as the data collected for this study will use methods that have already had ethical approval i.e., Interviews, Focus Groups and Questionnaires within this programme of work.

The school context, and specifically Physical Education (PE), is expected to play an important role in fostering children's adoption of and adherence to an active lifestyle. PE is a mandatory subject in most countries, and thus provides an ideal setting in which we can intervene to increase physical activity levels and foster lifelong interest in active living in all children. Yet despite its potential benefits, PE is not meeting such health- related aspirations for many boys and girls.

UNIVERSITY OF BIRMINGHAM
APPLICATION TO USE PROGRAMME ERN_12-1558P
Social, environmental and motivational processes in sport, dance, PE and physical activity settings

1. TITLE OF PROJECT

Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice

2. INVESTIGATORS

a) PLEASE GIVE DETAILS OF THE PRINCIPAL INVESTIGATORS OR SUPERVISORS (FOR PGR STUDENT PROJECTS)

Name: Title/first name/family name	Dr Paul Appleton
Highest qualification & position held:	PhD Research Fellow
School/department:	SportExR
Telephone:	[redacted]
Email address:	

b) PLEASE GIVE DETAILS OF ANY CO-INVESTIGATORS OR CO-SUPERVISORS (FOR PGR STUDENT PROJECTS)

Name: Title/first name/family name	Professor Joan Duda
Highest qualification & position held:	PhD Professor
School/department:	SportExR
Telephone:	[redacted]
Email address:	

c) IN THE CASE OF PGR STUDENT PROJECTS, PLEASE GIVE DETAILS OF THE STUDENT

Name: Title/first name/family name	Daniel Milton
Highest qualification & position held:	Senior Lecturer Sport & PE / PHD Student
School/department:	Cardiff Met / UOB
Telephone:	[redacted]
Email address:	

3. ESTIMATED DURATION OF PROGRAMME OF WORK

Estimated start date	July 2019
Estimated end date	July 2020

4. FUNDING

List the funding sources (including internal sources) and give the status of each source.

Funding Body	Approved/Pending/To be submitted

If applicable, please identify date within which the funding body requires acceptance of award.

CARDIFF METROPOLITAN UNIVERSITY
APPLICATION FOR ETHICS APPROVAL

When undertaking a research or enterprise project, Cardiff Met staff and students are obliged to complete this form in order that the ethics implications of that project may be considered.

If the project requires ethics approval from an external agency (eg NHS), you will not need to seek additional ethics approval from Cardiff Met. You should however complete Part One of this form and attach a copy of your ethics letter(s) of approval in order that your School has a record of the project.

The document ***Ethics application guidance notes*** will help you complete this form. It is available from the Cardiff Met website. The School or Unit in which you are based may also have produced some guidance documents, please consult your supervisor or School Ethics Coordinator.

Once you have completed the form, sign the declaration and forward to the appropriate person(s) in your School or Unit.

PLEASE NOTE:
Participant recruitment or data collection MUST NOT commence until ethics approval has been obtained.

PART ONE

Name of applicant:	Daniel Milton
Supervisor (if student project):	University of Birmingham Joan Duda / Paul Appleton / Anna Bryant
School / Unit:	University of Birmingham
Student number (if applicable):	N/A
Programme enrolled on (if applicable):	N/A
Project Title:	If using a working title, it should convey what the project is about
Expected start date of data collection:	10/07/2019
Approximate duration of data collection:	6months
Funding Body (if applicable):	N/A
Other researcher(s) working on the project:	University of Birmingham Joan Duda / Paul Appleton / Cardiff Met Anna Bryant
Will the study involve NHS patients or staff?	No
Will the study involve human samples and/or human cell lines?	No

Does your project fall entirely within one of the following categories:	
Paper based, involving only documents in the public domain	No
Laboratory based, not involving human participants, human samples, animals or animal derived material	No

Appendix 7
Research Proposal

CARDIFF SCHOOL OF SPORT & HEALTH SCIENCES
YSGOL CHWARAEON A GWYDDORAU IECHYD CAERDYDD

EmpoweringPE™

UNIVERSITY OF BIRMINGHAM

RESEARCH PROPOSAL

CASE STUDY OF THE WHOLE SCHOOL MOTIVATIONAL CLIMATE

What is the Motivational Climate?

The *motivational climate* is the social context, environment or atmosphere surrounding pupils, staff and school. It is created by what people say and do, how they organise, communicate and try to impact the pupils they work with. The climate is affected by why, when, and how Senior Leadership Team & teachers communicate with staff and pupils, organise the environment, respond and provide feedback following desirable performance or mistakes.

What happens when we improve the Motivational Climate?

If we improve the Motivational Climate we can maximise intrinsic motivation, performance, development and well-being among the staff and pupils we work with. Specifically, we want to create a climate that promotes staff and pupils' sense of autonomy, feelings of belonging, and focus on "task-focused" goals, which will allow them to feel they have the competence to thrive, be active and to continue to improve.

Aim of the proposal - The aim of the study is to explore the relationships and perceptions of the Motivational Climate within a whole school context and how thisimpacts on the quality of motivation for staff within a Physical Education (Health & Well Being) context

Methodology Overview – Mixed-Method = Qualitative Focus but with potential for small scale Quantitative.

Data Collection (suggested)

Data for School Focused		Data for School & My PHD	
Introduce the project and get to know the staff – December 2018			
Interview Head	Jan 2018	Interview Head Of PE	Jan 2019
Interview SLT	Jan 2018	Focus Group PE Staff	Jan 2019
Questionnaire Head, SLT & Staff	Jan 2018	Questionnaire HOPE & PE Staff	
Focus Group Tiered Leaders	Feb – April 2019	Workshop & Follow Up	Feb – April 2019
Report on MC	July 2019	Interview Head of PE	June 2019
Potential Follow Up – Empowering Schools	Sep 2019	Focus group PE Staff	June 2019

Potential Benefits - School

- **Impact on Schools Key Priorities** - 1. Achieving Exceptional Standards, 2. Provide outstanding care, support & guidance & 3. Inspirational teaching & leadership
- **Increasing Evidence Based Practice** - Benefits of sharing research, increase research culture within the school.
- **Impact on Inspection Framework & Preparation** - Two Key Areas - 5.1 Quality and effectiveness of leaders and managers & Two Key Areas - 5.3 Professional Learning

Potential Benefits – PhD

- Data collected for last study of the PhD

Follow Up

- Depending on the results and report from the data collection a proposal will be put forward for a continuation of the project through the Empowering ™ Programme.

Footnote – Intrinsic motivation refers to behavior that is driven by internal rewards. In other words, the motivation to engage in a behavior arises from within the individual because it is naturally satisfying to you.

Appendix 8
Letters of consent for school, head, SLT, PE department and Pupils

STUDY INFORMATION
Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice

Dear Head Teacher/Head of PE Department,

We, a team of sport researchers from the University of Birmingham and Cardiff Met University, are conducting research into students' experiences of teaching and how that impacts upon their motivation and a number of outcomes associated with taking part in PE. Overall, the information collected could help us identify how different aspects of the teaching environment impact upon students' immediate responses to PE and more generally their motivation to take part in PE. This information could prove useful when trying to encourage students to stay engaged in physical activity in the future.

We would like to invite your school to participate in this project. Specifically, we would like to invite the PE Department and year 9 students to participate in this research. If you choose to take part, the teachers and students will be asked to complete questionnaires [July 2019, January 2020]. The teachers' questionnaires will ask about their experiences teaching PE and will take approximately 30 minutes to complete. The students' questionnaire will ask about their experience in PE and will also take approximately 30 minutes to complete. In addition to the questionnaire, the teachers' participation in the project will involve them attending a 2x3 hour workshops (September 2019). Both workshops concern empowering teaching in PE. We also request that the teachers take part in focus groups (July 2019; January 2020) about their experiences as a PE teacher. The focus groups will be audio recorded and last approximately 60 minutes. Finally we will be interviewing yourself and or members of the Senior Leadership Team (July 2019; January 2020) about experiences of motivation. The interviews will be audio recorded and last approximately 60 minutes.

For participation in this research it is essential that we have the consent of the teachers and the students' parents/guardians and the assent of the students. If the teachers consent to being involved in the project an information letter explaining the purpose and nature of the study will be distributed to the parents or legal guardians of your students. The parents (or legal guardians) will be given the opportunity to opt their child out of the study and will be given at least 2 weeks prior to the first questionnaires (end of July 2020) to sign and return the form. On the day of data collection, student participants will be asked to read and provide signed assent to take part in the study.

By agreeing to participate in this research the teachers and students are agreeing that their data can be used for scientific purposes and possibly published in a scientific journal. All data collected will be kept confidential, stored securely at the University of Birmingham or Cardiff Met University and only be viewed by the researchers working on the project. Your involvement in the research is voluntary and you and the teachers and students are free to withdraw from this study at any point up to one month following the last data collection. To withdraw from the study, we request that you/they write to us using the contact details provided. If they choose to withdraw, their data will be destroyed.

If you have any queries or would like to discuss the research further, please feel free to contact Daniel Milton at Cardiff Met or Dr Paul Appleton at the University of Birmingham whose details can be found below. Thank you for taking the time to read this letter.

Yours truly,

Daniel Milton

Dr Paul Appleton

STUDY INFORMATION

Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice

Dear Teacher,
We, a team of sport researchers from the University of Birmingham and Cardiff Met University, are conducting research into students' experiences of teaching and how they impact upon their motivation and a number of outcomes associated with taking part in PE. Overall, the information collected could help us identify how different aspects of the teaching environment impact upon students' immediate responses to PE and more generally their motivation to take part in PE. This information could prove useful when trying to encourage students to stay engaged in physical activity in the future.

We would like to invite you *and your year 9 students* to participate in this research. If you choose to take part, you and your students will be asked to complete two questionnaires [July 2019, January 2020]. The questionnaires will ask about your experiences teaching PE and will take approximately 30 minutes to complete. The students' questionnaire will ask about their experience in PE and will also take approximately 30 minutes to complete. In addition to the questionnaire, the teachers' participation in the project will involve you attending a 2x3 hour workshops (September 2019). The workshops concern empowering teaching in PE. We also request that you take part in focus groups (July 209; January 2020) about your experiences as a PE teacher. The focus groups will be audio and last approximately 60 minutes.

For participation in this research it is essential that we have your consent, as well as the students' parents/guardians and the assent of the students. If you consent to being involved an information letter explaining the purpose and nature of the study will be distributed to the parents or legal guardians of your students. The parents (or legal guardians) will be given the opportunity to opt their child out of the study and will be given at least 2 weeks prior to the baseline questionnaires (end of July 2019) to sign and return the form. On the day of data collection, the students will be asked to read and provide signed assent to take part in the study.

By agreeing to participate in this research you are agreeing that your data can be used for scientific purposes and possibly published in a scientific journal. All data collected will be kept confidential, stored securely at the University of Birmingham or Cardiff Met University and only be viewed by the researchers working on the project. Your involvement in the research is voluntary and you are free to withdraw from this study at any point up to one month following the last data collection. If you would like to withdraw from the study we request that you write to us using the contact details provided. If you choose to withdraw, your data will be destroyed.

If you have any queries or would like to discuss the research further, please feel free to contact Daniel Milton at Cardiff Met or Dr Paul Appleton at the University of Birmingham whose details can be found below. Thank you for taking the time to read this letter.

Yours truly,

Daniel Milton [redacted]

Dr Paul Appleton [redacted]

UNIVERSITY OF BIRMINGHAM

Study: Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice

Investigators: Daniel Milton and Dr Paul Appleton

PLEASE READ THE FOLLOWING STATEMENTS AND SIGN YOUR INITIALS IN THE BOXES IF YOU AGREE

1. I confirm that I have read the information sheet dated..... (version.....) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time up to one month following my invitation to the project without giving any reason, without my legal rights being affected. ☐
3. I understand that I will be completing questionnaires and audio recorded focus groups relating to my experiences teaching PE, as well as taking part in workshops related to teaching PE ☐
4. I understand that my data will be stored securely at Cardiff Met University and the University of Birmingham ☐
5. I understand that the information collected about me may be used to support other research in the future. ☐
6. I understand that this project is compliant with the Data Protection Act 2018 ☐
7. I agree to take part in the above study. ☐

Name of Participant	Date	Signature

UNIVERSITY OF BIRMINGHAM

STUDY INFORMATION

Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice

Dear Head Teacher/Member of SLT,

We, a team of sport researchers from the University of Birmingham and Cardiff Met University, are conducting research into students' experiences of teaching and how they impact upon their motivation and a number of outcomes associated with taking part in PE. Overall, the information collected could help us identify how different aspects of the teaching environment impact upon students' immediate responses to PE and more generally their motivation to take part in PE. This information could prove useful when trying to encourage students to stay engaged in physical activity in the future.

We would like to invite you *and your year 9 students* to participate in this research. If you choose to take part, you and your students will be asked to complete two questionnaires [July 2019, January 2020]. The questionnaires will ask about your experiences teaching PE and will take approximately 30 minutes to complete. The students' questionnaire will ask about their experience in PE and will also take approximately 30 minutes to complete. In addition to the questionnaire, the teachers' participation in the project will involve you attending a 2x3 hour workshops (September 2019). The workshops concern empowering teaching in PE. We also request that you take part in interviews (July 209; January 2020) about your experiences of motivation. The interviews will be audio recorded and last approximately 60 minutes.

For participation in this research it is essential that we have your consent, as well as the students' parents/guardians and the assent of the students. If you consent to being involved an information letter explaining the purpose and nature of the study will be distributed to the parents or legal guardians of your students. The parents (or legal guardians) will be given the opportunity to opt their child out of the study and will be given at least 2 weeks prior to the baseline questionnaires (end of July 2019) to sign and return the form. On the day of data collection, the students will be asked to read and provide signed assent to take part in the study.

By agreeing to participate in this research you are agreeing that your data can be used for scientific purposes and possibly published in a scientific journal. All data collected will be kept confidential, stored securely at the University of Birmingham or Cardiff Met University and only be viewed by the researchers working on the project. Your involvement in the research is voluntary and you are free to withdraw from this study at any point up to one month following the last data collection. If you would like to withdraw from the study we request that you write to us using the contact details provided. If you choose to withdraw, your data will be destroyed.

If you have any queries or would like to discuss the research further, please feel free to contact Daniel Milton at Cardiff Met or Dr Paul Appleton at the University of Birmingham whose details can be found below. Thank you for taking the time to read this letter.

Yours truly,

Daniel Milton [redacted]

Dr Paul Appleton [redacted]

UNIVERSITY OF BIRMINGHAM

Study: Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice

Investigators: Daniel Milton and Dr Paul Appleton

PLEASE READ THE FOLLOWING STATEMENTS AND SIGN YOUR INITIALS IN THE BOXES IF YOU AGREE

1. I confirm that I have read the information sheet dated July 2019 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time up to one month following my invitation to the project without giving any reason, without my legal rights being affected. ☐
3. I understand that I will be completing questionnaires and audio recorded interviews relating to my experiences teaching, as well as taking part in workshops related to teaching PE. ☐
4. I understand that my data will be stored securely at Cardiff Met University and the University of Birmingham ☐
5. I understand that the information collected about me may be used to support other research in the future. ☐
6. I understand that this project is compliant with the Data Protection Act 2018 ☐
7. I agree to take part in the above study. ☐

Name of Participant	Date	Signature

UNIVERSITY OF BIRMINGHAM

STUDY INFORMATION

Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice

Dear Parent/Guardian,

We, a team of sport researchers from the University of Birmingham and Cardiff Met University, are conducting research into students' experiences of teaching and how they impact upon their motivation and a number of outcomes associated with taking part in PE. It is hoped that the information collected will contribute towards a greater understanding of how teaching environments influence students' engagement during PE classes.

Overall, the information collected could help us identify how different aspects of the teaching environment impact upon students' immediate responses to PE and more generally their motivation to take part in PE. This information could prove useful when trying to encourage more people to stay engaged in physical activity.

The study will involve your daughter/son filling out 2 questionnaires (July 2019/ January 2020). Each questionnaire will take approximately 30 minutes to complete. The questionnaire will ask your child about their motivation to part in PE, teaching strategies during PE, how they feel about other people in their class and in general, their thoughts about themselves as a person and as a student and their feelings in PE and at other times. A trained research assistant will be present when your child completes the questionnaires and your child will not be required to sign their name anywhere on the questionnaire.

Your child's participation in this study is purely voluntary and information that she or he supplies will be held in the strictest confidence and will not be disclosed to any third party, including yourself and his/her teacher/school. Although we require your consent for your child to participate in the study, your child can still chose not to participate if he/she wishes. Likewise, your child can return a blank questionnaire or omit answering some questions if he/she wishes to do so. Your child can withdraw his/her participation by informing us directly or via his/her teacher, with no negative consequences. Please inform us directly or via the school in case you do not want us to use the answers your child might have already provided to us. If you or your child chooses to withdraw from the study and/or would prefer their responses not to be included in our research, we will remove these responses from any future analyses or publications.

By agreeing to take part in this project, you and your child are agreeing to the results of the questionnaire being used for scientific purposes and with the results potentially being published in a scientific journal, provided the anonymity of your child is protected. That is, you can be assured that we will never publish your child's name next to their answers on the questionnaires. Our analyses will be conducted at a group level. When the study is completed, your child's school will receive a report of the key findings in the study with appropriate recommendations for teaching. Please note that all data collected will be stored securely and password protected. No individuals other than the researchers involved in the project will have access to the data

If you DO NOT want your child to participate in this project, then please sign and return the slip overleaf. If we do not receive this form back from you by (REPLACE WITH DATE 2 WEEKS FROM DATE XXXXXXX WHEN THIS LETTER WAS DISTRIBUTED), we will assume you consent to your child's participation in this study. Your decision to prevent your child from participating in this project will have no bearing on his/her relationship with the school or their PE teacher. Your child's assent will also be secured before he/she completes the questionnaires.

If you have any queries or would like to discuss the research further, please feel free to contact Daniel Milton at Cardiff Met or Dr Paul Appleton at the University of Birmingham whose details can be found below. Thank you for taking the time to read this letter.

Yours truly,

Daniel Milton

Dr Paul Appleton

You are only required to sign and return this form if you <u>DO NOT</u> want your child to participate in this project.

Study:	Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice
Investigators:	Daniel Milton and Dr Paul Appleton

Child's Name: _____

I, _____ have read the information sheet. I understand the purpose and design of the study.

I DO NOT give permission for my child to take part in the above project.

Signed: _____

Date: _____

Please return this form to your child's school/teacher by (REPLACE WITH DATE), who will pass this onto the research team. Alternatively, please contact Daniel Milton, whose details are provided on the letter.

UNIVERSITY OF BIRMINGHAM

STUDY INFORMATION

Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice

Dear Student,

We, a team of sport researchers from the University of Birmingham and Cardiff Met University, would like to invite you to take part in a research study. Before you decide if you would like to take part you need to understand what the study is about and what you will be asked to do. Please take time to read the following information carefully.

The aim of the study is to find out about students' experiences in PE and how they impact upon motivation and a number of outcomes associated with taking part in PE. It is hoped that the information collected will help us to understand how teaching environments influence students' engagement during PE classes and how that impacts upon their general motivation to take part in physical activity.

If you choose to take part we will ask you to fill in 2 questionnaires (July 2019/January 2020). Each questionnaire will take approximately 30 minutes to complete. The questionnaire will ask you about the teaching environment in PE, your motivation to take part, how you engage in the session and your well-being.

Your school and your parents have agreed for you to take part in this project, but you can still choose not to complete either or both of the questionnaires. Likewise, you can return a blank questionnaire or omit answering some questions if you wish to do so.

For you to take part in the research, we must have your signed assent. If you would like to take part please sign the attached assent form. By agreeing to take part in the research you are agreeing that your answers can be used for science and possibly published in a scientific journal, but your name will not be used against anything you say. It is your choice if you want to take part. You are free to drop out from the project at any point up to one month after the second questionnaire. If you would like to drop out from the project we ask that you (or your parent) contact us using the contact details below.

If you have any queries or would like to discuss the research further, please feel free to contact Daniel Milton at Cardiff Met or Dr Paul Appleton at the University of Birmingham whose details can be found below. Thank you for taking the time to read this letter.

Yours truly,

Daniel Milton [redacted]

Dr Paul Appleton [redacted]

UNIVERSITY OF BIRMINGHAM

Study: Promoting more positive motivational climates in PE via school tailored *Empowering PE* training and the development of a community of practice

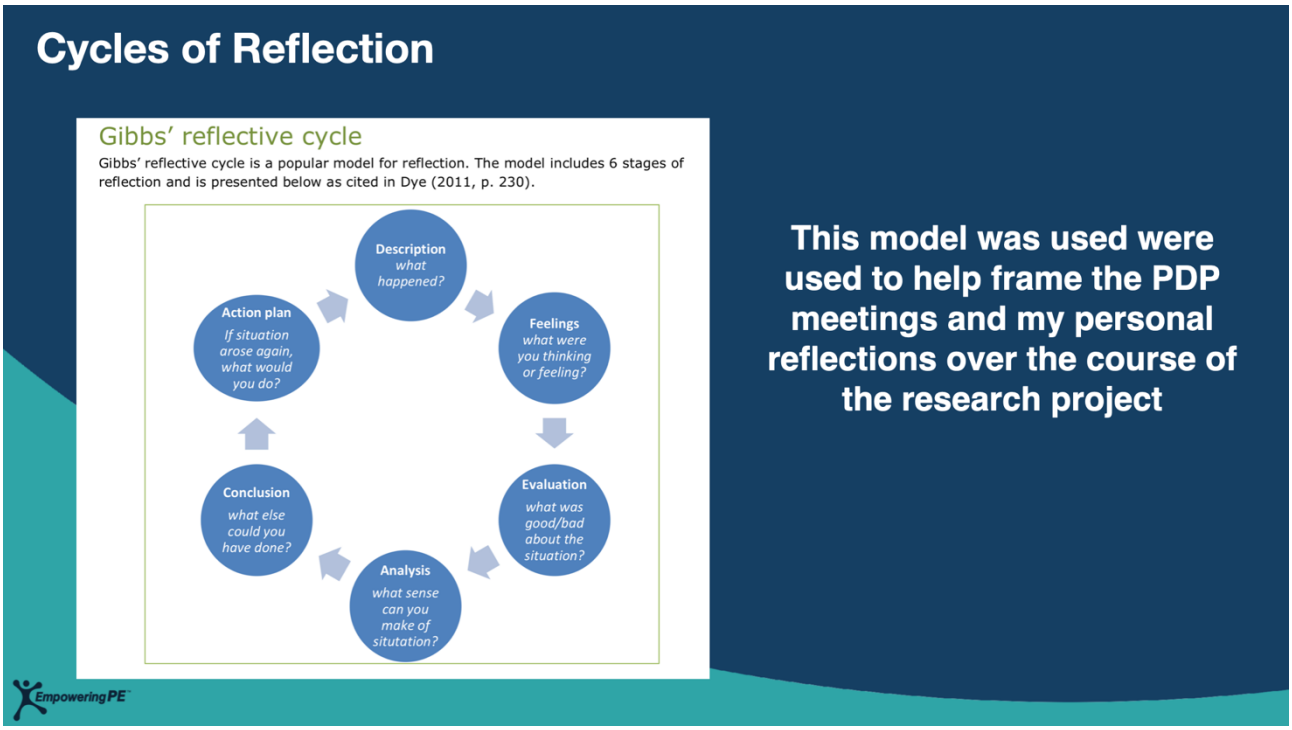
Investigators: Daniel Milton and Dr Paul Appleton

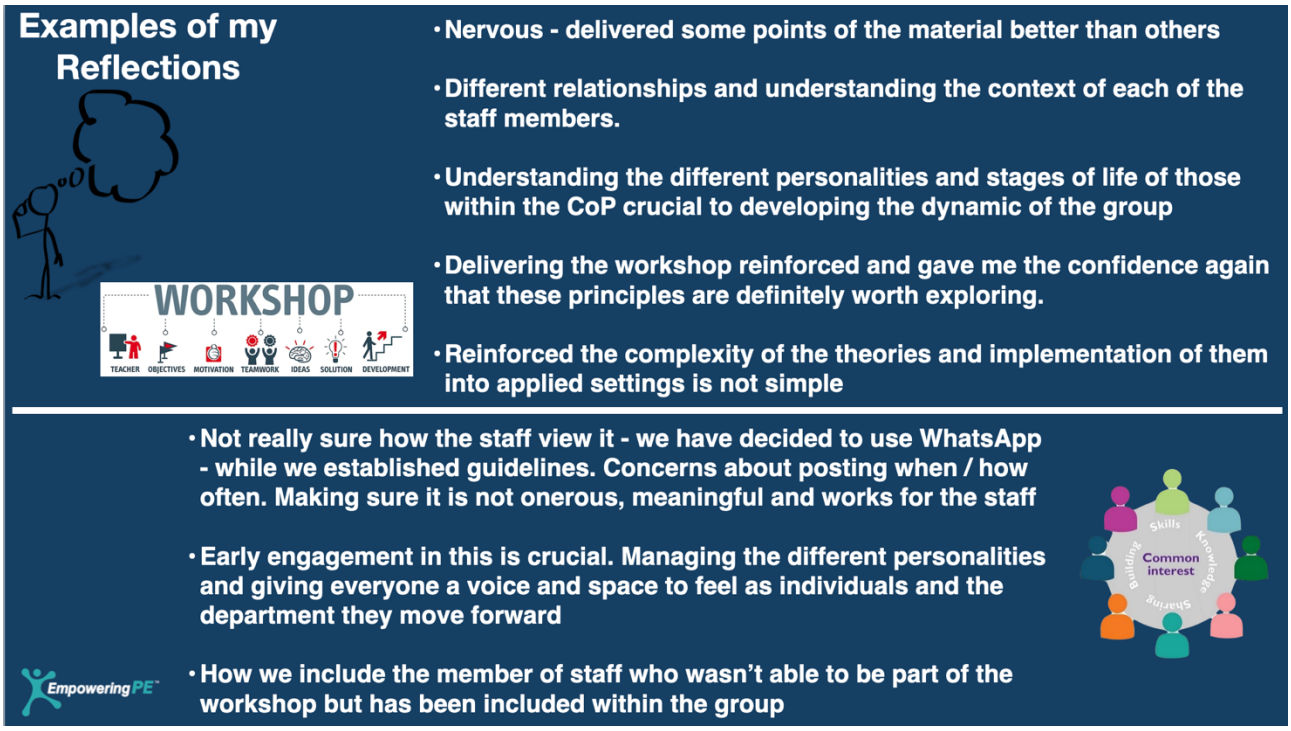
PLEASE READ THE FOLLOWING STATEMENTS AND SIGN YOUR INITIALS IN THE BOXES IF YOU AGREE

1. I confirm that I have read the information sheet dated..... (version.....) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time up to one month following my invitation to the project without giving any reason, without my legal rights being affected. ☐
3. I understand that I will be completing questionnaires relating to my experiences in PE, and I can choose to return a blank questionnaire or not respond to certain statements without any consequences ☐
4. I understand that my data will be stored securely at Cardiff Met University and the University of Birmingham ☐
5. I understand that the information collected about me may be used to support other research in the future. ☐
6. I understand that this project is compliant with the Data Protection Act 2018 ☐
7. I agree to take part in the above study. ☐

Name of Participant	Date	Signature

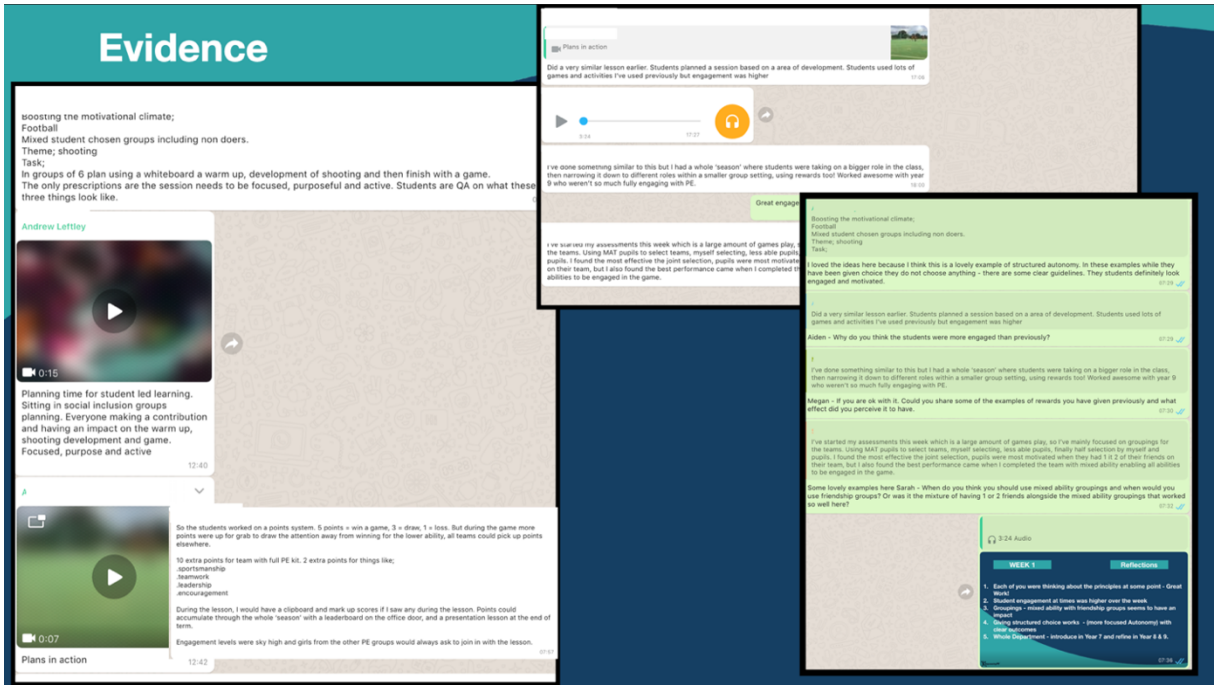
Appendix 9
Reflective Cycle that framed my thoughts and voice memos plus examples of key reflections

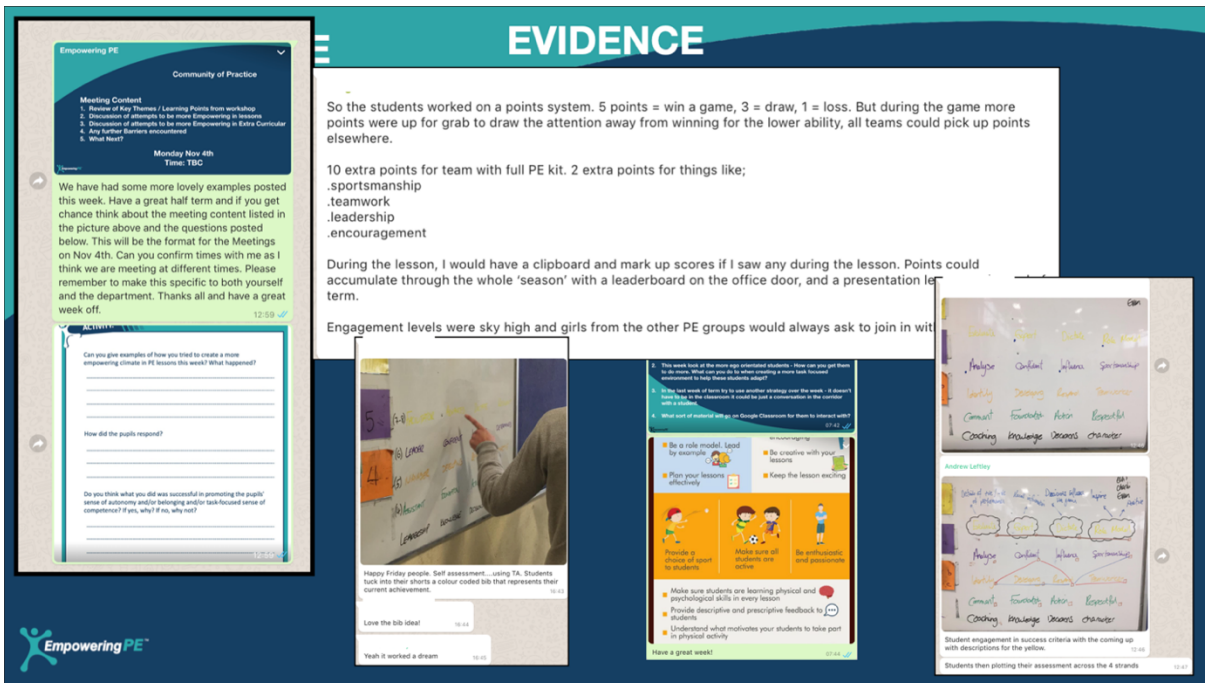




Appendix 10
Examples of the theoretical content and shared discussions from the online WhatsApp group

In these slides you can see evidence of the information shared by the boundary spanner, the responses from the teachers in the form of voice recordings and examples of strategies they were trying.





Appendix 11
Example Interview/Focus Group Guide

Empowering PE
Interview Topic Guide

Interview Information	
Date	
Moderator	
Observer	
Time Began	
Time Ended	

Section # 1: Introduction (Not Recorded)
Hi, my name is **XXXX XXXX** and I am part of the team of researchers at University of Birmingham/Cardiff Met working on the *Empowering Teaching* project. Thank you for indicating that you would be willing to participate in this interview/discussion. This interview is connected with a research project concerning Empowering Teaching and optimising the quality of engagement in PE for the pupils you teach. It will incorporate information about the new curriculum for Wales and how these can be integrated moving forward
The idea of an interview is to allow you to share your views. There are no right or wrong answers, but rather people often hold different points of view. All points of view, both positive and negative comments, are important. Of course, what to say, how to say it, and how much you want to say is up to you. You should not worry about what you are expected to say, whether you are on the right track, or whether you should agree as a group.
So that we do not miss any of your comments, I would like to tape our discussion. I have asked your permission to do this, as it will make our research work much easier. I should point out that your contribution will be anonymous and kept confidential, and that any published research that might result from such discussions will not contain your name.
Our discussion will last for approximately **one hour**. During this time, I would like to explore a number of issues on this topic. Before we begin, please make sure your mobile phone is turned off completely.

TURN ON AUDIO RECORDER

Section 2: Interview Questions and Probes (Recorded)

Ok let's get started.

1) Tell us your name, how long you have been teaching, where you currently teach and your role within the school?
   a) *Probe: Why did you get into teaching? Why did you become a teacher? (make PE specific if necessary)?*

2) What do you think is the most important role/responsibility of a teacher?
   a) *Do you think this is the same for children of all ages?*
   b) *Does it differ depending on the ability/attitude of the child/class?*
   c) *What does "success" look like teachers (make PE specific if necessary)?*

3) What do you know about the new curriculum for Wales, the What Matter Statements and the new Health and well-being Area of Learning?
   a) *Initial perceptions / How do you feel?*
   b) *Perception of the HWB A of Le and the WMS?*
   c) *Practical or classroom/combination of both?*
   d) What barriers and challenges might you face in the teaching of this AoLE?

4) The project the school is involved in is called "Empowering Teaching" and you have the opportunity to be part of a Community of Practice including workshops around Empowering Teaching. What does the term "Empowering Teaching" mean to you?
   a) *Probe: Could you explain further and give an example?*

We are now going to talk about children's motivation and experiences in lessons. We will also talk about how you and other teachers try to motivate students and what barriers you perceive to developing and sustaining motivation for Health & Well Being as well as sport and physical activity. Throughout this interview, you are welcome to offer examples from a range of PE contexts you work in or have worked in previously.

5) Thinking about your experiences participating in and teaching, how would you define (describe) the term "motivation"? *(make PE specific if necessary)?*
   a) *Probe: Could you give me an example of what you mean?*
   b) *Probe: What other words or phrases infer similar meaning to motivation?*

6) Thinking about the pupils you have worked with (and without naming them) what do you think are the characteristics of a highly motivated pupil and a pupil low in motivation (or unmotivated)? *(make PE specific if necessary)?*
   a) *Probe: How do they behave/respond?*
   b) *Probe: What are good indicators of motivation?*
   c) *Probe: Can you describe a highly motivated PE pupil and a PE pupil low in motivation?*

7) Thinking back to when you were training to be a teacher, and in CPD courses since then, what did you learn about motivation?
   a) *Probe: What do you remember being discussed in terms of motivation?*

   b) *Probe: What were the "take home" messages on this subject?*

8) There are many reasons (motives) for kids to participate in PE, sport and physical activity. From your experiences, which motives do you think are most common?
   a) *Probe: Are these the same in PE, sport and physical activities?*
   b) *Probe: Consider motivation that comes from within, as well as extrinsic motivators.*

9) Now let's think about the role teachers might play in motivating pupils in PE. Thinking about your experiences as a teacher during the last term, can you give some examples of strategies that are effective in motivating students?
   a) *Probe: What is the specific goal of the strategy? What behaviour/response do you expect to see in the pupil?*
   b) *Probe: What indicates to you that the motivational strategy is effective (i.e., what is the effect on the child?)*

10) Thinking about your own teaching practice and that you have witnessed, can you give some examples of strategies teachers use to motivate that you think are inappropriate or ineffective, and can you explain why? *(make PE specific if necessary)?*
   a) *Probe: What is the specific goal of the strategy? What behaviour/response do you expect to see in the child?*
   b) *Probe: What indicates to you that the motivational strategy is ineffective (i.e., what is the effect on the child?)*

11) Most classes include a range of children with different ability levels and perceived competence. From your experiences of working with mixed ability classes, how does this add to challenges of motivating pupils and how might this be overcome?
   a) *Probe: In your view, what are the best ways that teachers can motivate low ability pupils?*
   b) *Probe: What about high ability pupils? How can we motivate them most effectively?*

12) Thinking back over your experiences as a teacher, what are the major barriers teachers face, in terms of employing strategies to effectively motivate pupils?
   a) *Related to the school/the system?*
   b) *Related to the pupils' behaviour and/or attitudes?*

13) Pupil voice is particularly important part of the new curriculum for Wales, it also allows us to find out what pupils are thinking in relation to well-being. How do you think the use of Student Voice can enhance pupil's motivation?
   a) *Examples of Pupil Voice used positively?*
   b) *Any concerns about the use of Pupil Voice?*

Professional Learning

14) What do you perceive Professional Learning to entail? Do you think there is a difference between Training and Learning? Is there any information related to the Health and Well-being AoLE that you feel you haven't had, need or don't understand? (WMS/Four purposes)
15) What do you feel is effective about the professional learning being implemented in school? Have you been involved in a Community of Practice before?

Section #3: Ending Questions (Recorded)

Approximately 10 minutes prior to the end of the discussion:

The observer summarises the key points or most important aspects of the topic that have emerged from the discussion.

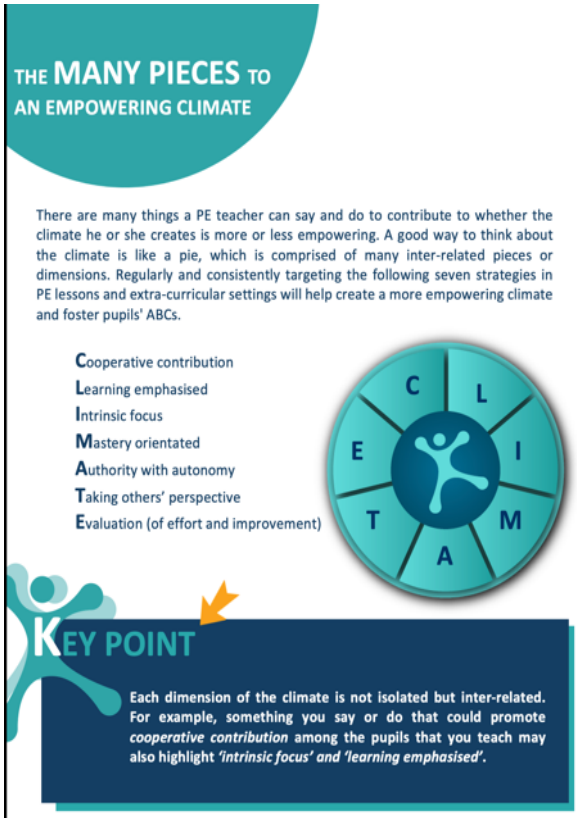
1) Is this an adequate summary?
2) Of all the points that were discussed, which one is the most important to you?
3) Have we missed anything? Would you like to add one last thing?

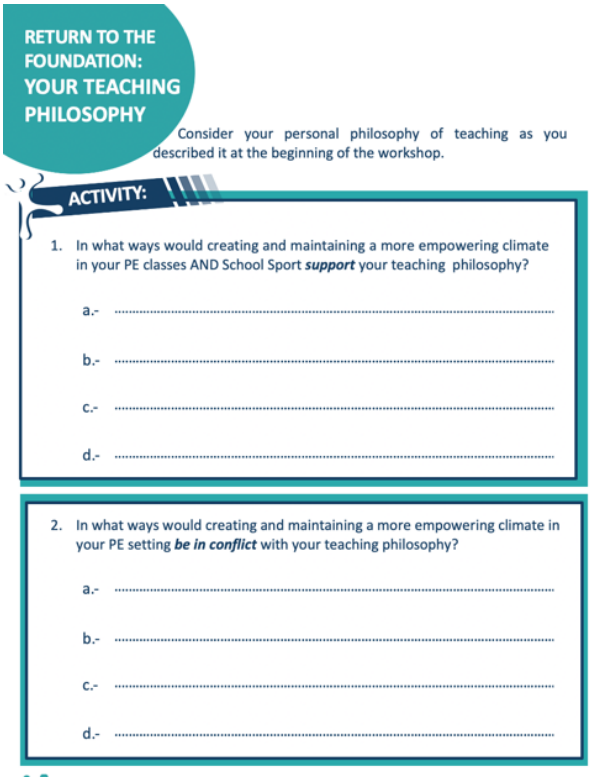
Section #6: Closing (Recorded)

I would like to again thank you for participating in today's discussion and remind you that any comments that you made here today will remain confidential and for research purposes only. I would also like to ask you help us out by keeping any thoughts and opinions expressed here today by the other participants as confidential.

Appendix 12

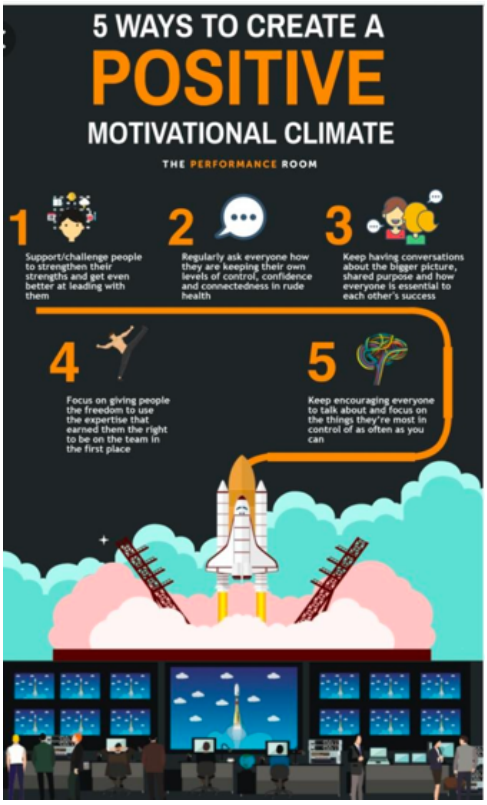
Examples of Workshop content and theoretical concepts





Appendix 13

Examples of additional theory content



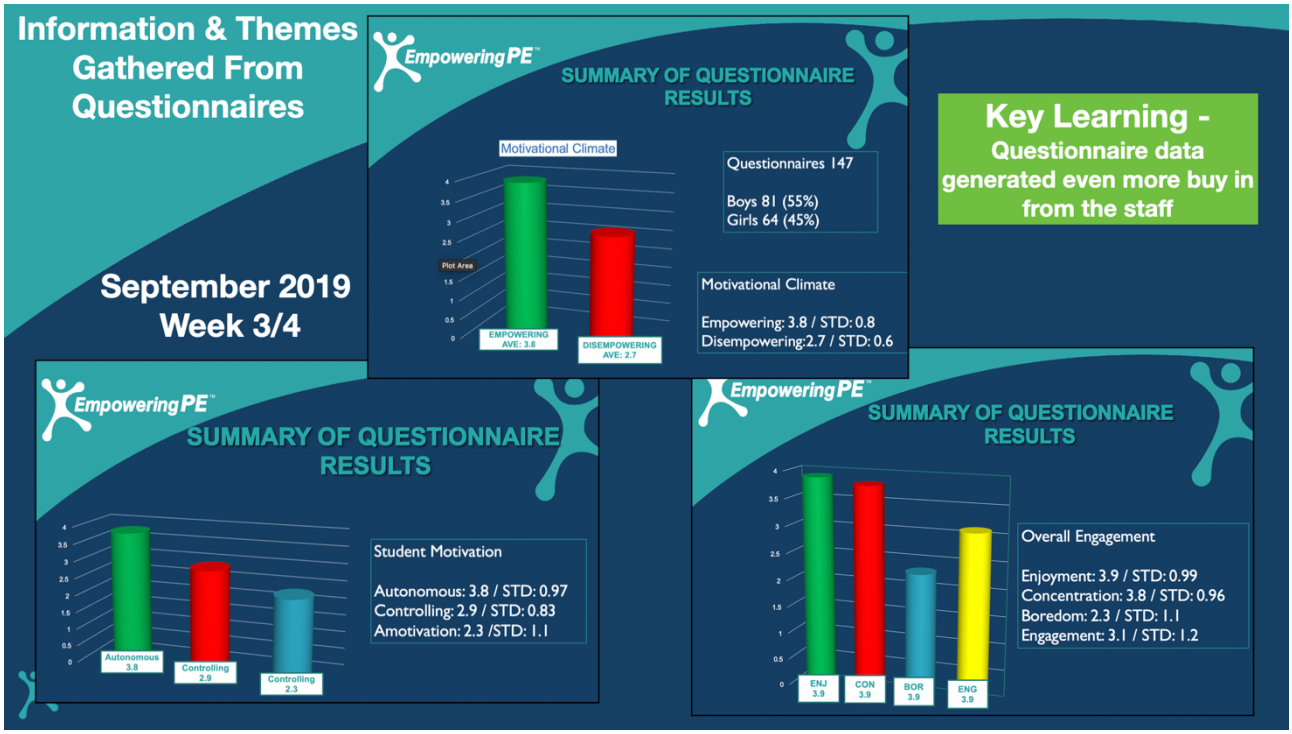
Conclusion

A positive impact of peer assessment in advocating pupil engagement is acknowledged. Yet, the efficacy of the assessment practice is highly dependent on its operating mechanisms such as: the quality of feedback, collaboration and pupil's perceptions. Research also highlights the fundamental role of success criteria (in peer assessment) in facilitating the academic learning and performance of pupils. The benefits of using success criteria to advocate pupil learning is undeniable, however, data from this inquiry reveals that the extent of transparency and explicitness (associated with the criteria) may have an adverse effect on the student's quality of learning. The data conforms to the past findings of Crook, Gross, Dymot (2006), G. Crisp (2012) and Sadler (2009) - they implied that the rigidity and explicitness of criteria restricted pupils from connecting with their cognition, reflection and intellectual processes.

The implications of this research are for educators to promote and implement sustainable forms of assessments like peer assessment – from within a secure, collaborative and co-operative learning environment. Instructors should provide regular training (to pupils) on the entire procedure of peer assessment – with opportunities for students to negotiate the success criteria in terms of its sequence, layout or objectives. Students should also be given the opportunity to evaluate the processes involved in their learning with considerations for developmental strategies – so to promote learner independence and accountability. Practitioners should also acknowledge the inherent risks of

Appendix 14

Example of content used from questionnaires to generate further buy in from staff

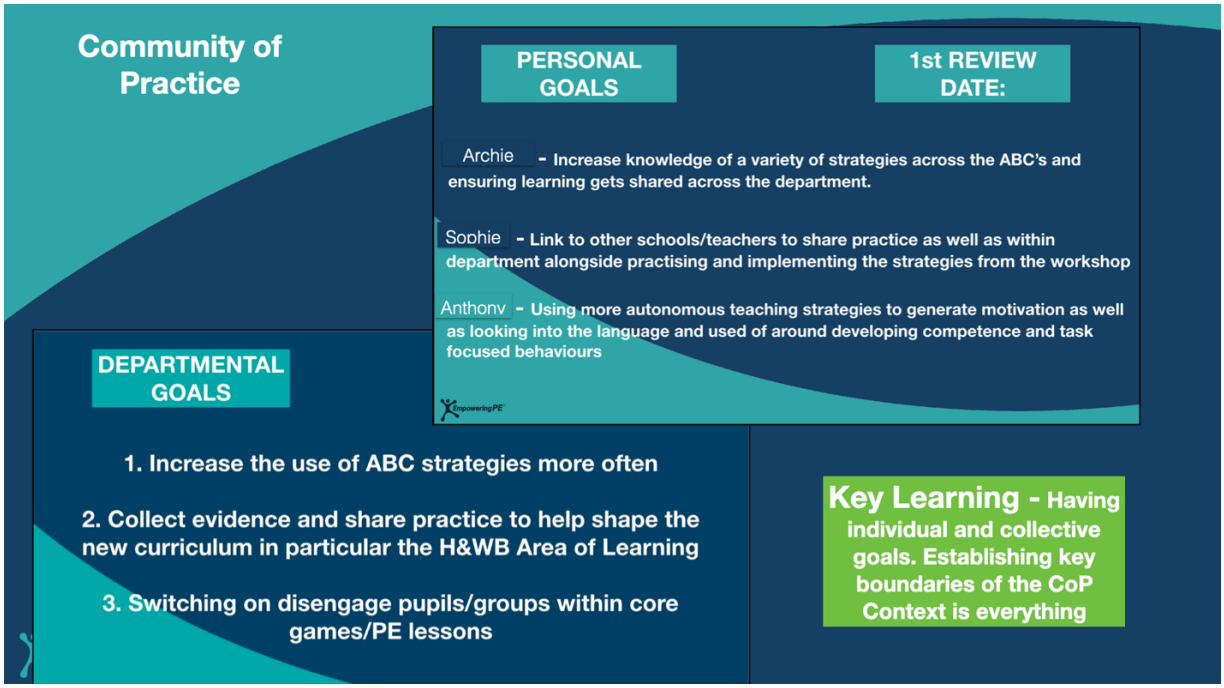


Appendix 15

Examples of the individual and departmental goals

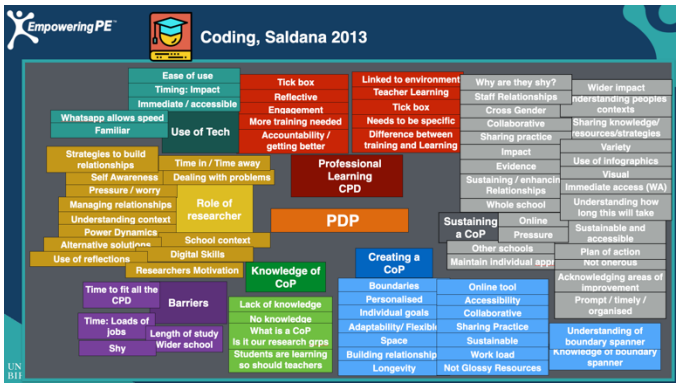
Examples of the individual and departmental goals that were used within the intervention

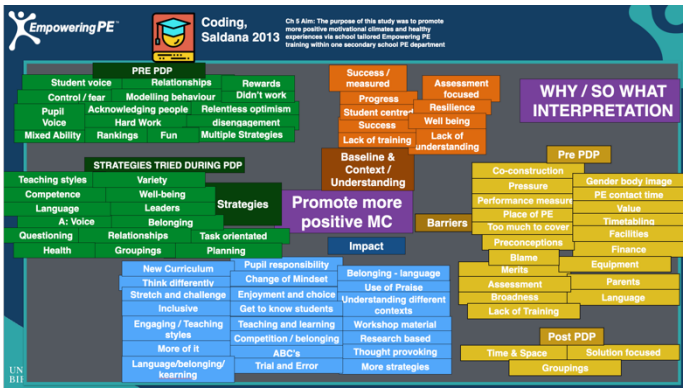
Each time the boundary spanner went into the school there was a review of the individual/personal goals and departmental goals. These were then adjusted if necessary following the professional learning meetings that occurred every 2-4 weeks.



Appendix 16
Examples of Data Analysis and Coding in Ch4 & 5

Data Analysis						
Person	What	Page	Quote	CODE	SUB Theme	HIGHER ORDER Theme
			INITIAL INTERVIEWS			
		3	Students progressing, for me. It's that rounded perspective of a student, so it's helping them to progress and become successful	Context & Aim		PRE -PDP
		3	It's just massively student-centred and making sure that they're leaving here the best people they can be, and that's not just academically, but for me it's them leaving here with their manners, with that resilience that they can go out and get a job and stick with it. It's just making sure we've got those rounded individuals leaving our school community out into society really.	Context and Aim		
		4	Yes, to me, that wellbeing aspect and with my kind of Staff Development hat on, that's a massive area at the moment that staff are underdeveloped in being able to have; certainly when we start thinking about mental health I know it's massively in the media at the moment and there's a push for teaching staff to have more training with that, and for me, I completely agree with it. The role of a teacher isn't just as somebody in the classroom any longer; it's as a counsellor, as a parent, you know, there are lots of different roles within that, and myself, I have students that come and speak to me about aspects linked to mental health at the moment and I feel I can only go so far with them, and this is what I say to them. 'I can only give you my kind of life experience advice, rather than counselling advice.' So as for Health and Wellbeing as an area, I think schools will need to look at it as two different things, in a way you've got that teaching aspect, with your PE and your food and things like that and your cross-curricular kind of approach to that; but there is that very separate identity of wellbeing that's massive	Context and Aim		
		4	Getting people to be engaged in the activities that you want them to do. But it's for them to want to do it. And if they don't want to do it, it's finding the tools to try to hook them in, whether that be for future success or whether they're working towards something in particular, that motivation aspect is really trying to inspire them to do something you want them to do	Baseline understanding of motivation		
		5	Do you know – very little, I would say. Or whilst it's been there it maybe hasn't been explicitly mentioned, so it would only be from my own understanding and taking away from it. So I would actually say I've had very little to none, in terms of specifically on motivation, or how you kind of motivate students. Maybe it's within behaviour management, occasionally. But I think a lot of that is the focus on poor behaviour and how you correct poor behaviour in the classroom, it's not necessarily that the poor behaviour is maybe because they have no motivation and how do you motivate them, and then by motivating them, maybe their behaviour would improve. So it's never really – like I said, explicitly mentioned in that way, if that makes sense	Lack of training / CPD		
		5	As I previously mentioned, I would say it's career aspiration, kind of wanting to be successful; a little bit of competition sometimes, particularly with groups of boys, or even younger siblings, them wanting to be better than their older siblings, so competition at times can be that motivator for some students. Parental pressure occasionally	Extrinsic reasons / Controlled motivation		
		5	wide range of sports that take place, I would say that for a smaller school we're very good at catering for lots of different sports and that's not closed to gender either. We have particularly strong rugby and football girls' teams that are successful. I would say one of the things we're lacking at present, which is something that I'm working on, actually with Andy, is about is the promotion of success within sport, within school. Certainly being the More Able and Talented Coordinator, it's something I've only taken on in the last 18 months, and as you would expect the first part of that has been very much concentrated on the more able, but we've just started now, in the last couple of months, looking at that talent aspect, and how we promote success within talent. Yes, trying to really open other students' eyes to the success we have within our school community, and hoping that maybe inspires other people into various sports	Understanding of motivation Success / measured		
		5	I would say that one-to-one mentoring and coaching aspect does have a massive influence on the motivation of students / and it's building strategies in with those, that when they're going into their exams and even in the lead up and the preparation for their exams, it's just building those little strategies, those coming away, reflecting, potentially keeping a journal, having a list of things they want to achieve in front of them, to really help them have that focus and that motivation towards what they want to achieve.	Strategies		





Appendix 17
Example of Questionnaire used in Ch 5

T2

1

1. Enter your birthday here: _____/_____/_____

For example, if your birthday is 17th August 1998, please write: 17 / August / 1998

2. Are you a boy or a girl? (shade one circle only): Boy O Girl O

3. How many brothers and sisters do you have in total? (including half brothers and sisters)

0	1	2	3	4	5	6	More than 6
O	O	O	O	O	O	O	O

4. What is the name of your school? _____

5. What is the name of your main teacher of the lesson you are attending today?

The name of my main PE teacher is _____

Section A: This list describes what teachers say or do to the pupils in their class. When giving your answers, think about your PE class during the last 3-4 weeks. What do *you* think it was like in this class most of the time *during the last 3-4 weeks*?

When completing this section, think about what it has usually been like in *this* class *during the last 3-4 weeks*.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. My teacher encouraged pupils to try new skills.	1	2	3	4	5
2. My teacher was less friendly with pupils if they didn't make the effort to see things his or her way.	1	2	3	4	5
3. My teacher gave pupils choices and options.	1	2	3	4	5
4. My teacher tried to make sure pupils felt good when they tried their best.					
5. My teacher makes us do laps/press-ups etc if we make a mistak					
6. My teacher thought that it is important that pupils participate in because they (the pupils) really want to.					
7. My teacher was less supportive of pupils when they were not performing well.					
8. My teacher could really be counted on to care, no matter what happened.					
9. My teacher gave most attention to the best pupils.					

Section C: Please shade the appropriate number to indicate **how well each of the reasons below reflects why *you* take part in PE**.

I take part in PE...	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Because PE is enjoyable.	1	2	3	4	5
2. Because I want to learn sports skills.	1	2	3	4	5
3. Because it bothers me when I don't.	1	2	3	4	5
4. Because that's the rule.	1	2	3	4	5
5. But I don't see what I get out of PE.	1	2	3	4	5
6. Because PE is exciting.	1	2	3	4	5
7. Because it is important for me to do well in PE.	1	2	3	4	5
8. Because I would feel bad about myself if I didn't.	1	2	3	4	5
9. So that the teacher won't yell at me.	1	2	3	4	5
10. Because I enjoy learning new skills.	1	2	3	4	5
11. Because it is important to me to improve in PE.	1	2	3	4	5

Section D: For the following statements, please indicate h
the statements, bear in mind **how *you* generally felt *dur***

During the past 3-4 weeks, in *this* PE class...	Str Dis				
1. I usually found doing PE interesting.					
2. I usually wished the lesson would end quickly.	1	2	3	4	5
3. I usually enjoyed doing PE.	1	2	3	4	5
4. I was usually bored.	1	2	3	4	5
5. I usually had fun.	1	2	3	4	5
6. I often daydreamed instead of thinking about how I was doing.	1	2	3	4	5
7. I really concentrated.	1	2	3	4	5
8. I paid attention.	1	2	3	4	5
9. I thought carefully about the skills, tasks, and activities.	1	2	3	4	5
10. When taking part, I asked questions.	1	2	3	4	5
11. I told my teacher what I liked and what I didn't like.	1	2	3	4	5
12. I let my teacher know what I was interested in.	1	2	3	4	5