

Predicting Lifelong Participation in Physical Activity: The Role of Dispositional and Contextual Motivation in Physical Education

A thesis submitted for the PhD in Sport and Exercise Psychology

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Covid-19 Impact Statement

My PhD journey started off so different to the way in which it ended. I originally was offered the PhD studentship with the end goal of testing an intervention that sport addresses girls' engagement in PE.

The original plan was to collect data from schools but on the first day, of what would have been the start of my research retrieval, the whole country went into lockdown. This in turn affected my ability to receive needed data to commence my study. I was unable to travel, enter the schools or have face-to-face interviews with both teachers and students, thus changing the whole of my thesis. Because of the unknown of covid, this lockdown continued for a year forcing me to rethink my research method.

To continue progressing with my PhD, I attempted to capture momentary data about what schools were doing to keep students' engagement in PE whilst the nation was in lockdown (see appendix 1). This led to another change in the direction of my thesis I began to collect data on the impact covid-19 (pre, during and post). This focus was short-lived, and I was advised to consider an alternative direction which is where my PhD is today.

Acknowledgements

Writing my acknowledgement has made me realise what a journey I have been on for the past 4 years. There have been many struggles along the way and challenges I have had to face but these have all been supported by my loving family and boyfriend who have supported me throughout. They have all been a constant support emotionally and morally for which I will be eternally thankful.

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Abstract

Physical inactivity is one of the biggest causes of mortality in the United Kingdom. To tackle the growing health concern, physical education lessons have been identified as an accessible source to promote later-life engagement in physical activity. Determinants of physical education have been extensively explored, yet very few studies have investigated its role in the long-term promotion of participation in physical activity.

The primary aim of this thesis is to identify the degree to which physical education experiences and factors support long-term participation in physical activity. To achieve this, physical education experiences were explored through prospective and retrospective studies. The thesis identifies factors associated with changes in engagement from year 7 to year 9 and provides an estimation of the effect each of these variables has on later-life physical activity engagement through structural equational modelling. Secondly, the thesis highlights the challenges that researchers are faced in collecting data as a consequence of an inadequate data set obtained through a triangulation approach.

Glossary of Terms

AGT: Achievement goal theory.

BPN: The basic psychological needs theory.

ECA: Extracurricular activity.

EMP: Empowering motivational climate.

Engagement: Multifaceted concept that embodies behavioural, emotional and cognitive dimensions.

Encouragement: Verbal persuasion.

Expectancy values: Expectation of success in relation to the value of task completion or goal attained.

Extra curriculum: Pursued in addition to the normal courses at school.

National Curriculum: A programme of education followed in school.

Motivational Climate: The learning environment.

PA: Physical Activity.

PE: Physical Education.

Reasoned actions: Intention to engage in the behaviour is a function of their attitude.

Self-efficacy: Belief one has in their ability to execute actions or tasks.

SDT: Self-determination theory.

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Chapter 1: Introduction of Thesis

Rationale for Thesis

Inactivity: the 4th leading factor contributing to mortality, with approximately 2 million people dying each year (1), is a major health concern that needs to be tackled. Physical inactivity is estimated to have cost the United Kingdom £7.4 billion per year, with £0.9 billion utilised by the NHS alone (2). Despite 42% of individuals aged 55 years and over being categorised as inactive compared to 29% of the adult population (3), adolescent years have been regarded as a prominent time point in a person's life when an individual's participation in PA begins to reduce, as demonstrated by longitudinal data (4). During the adolescent years, female physical activity (PA) participation rates have been noted to be much lower than their male counterparts (5). However, more recently between 2019-2020, United Kingdom government findings (6) have reported that there is no longer a difference between the amount of young males (44.7%) and females (45.3%) achieving PA recommendations. It is unclear whether the shift is due to increased female participation or a drop in male PA participation rates.

Despite recent findings, over the years, decreased participation rates have been mirrored during an individual's school years as several studies have shown a decrease in PA engagement from primary school to secondary school (7-9).. The decline during adolescence is influential in the long-term participation of PA as a person's adolescent years are influential in the development of the formation of attitudes and beliefs towards PA (10) as well as providing the foundations of perceptions of PA competence via experiences (11). Having quality experiences during physical education (PE) lessons underpins the fundamentals for an active lifestyle and perceptions of PA, sport, and exercise as according to Zeng (12), along

with Rady & Schmidt (13), student's attitudes towards PE have the potential to influence future PA engagement. The rationale is that if an individual is more active during their school years it will promote and encourage lifelong engagement and participation in PA, via attitude formation. Attitude formation is influenced by a person's experiences, learning and social factors (14). Thus, positive experiences during PE will lead to positive attitude formation.

For many, their first exposure to sport, exercise and PA is during PE delivered at school. PE is delivered across all 4 stages of the curriculum (Key stage 1: 5 to 7-year-olds, Key stage 2: 7 to 11-year-olds, Key stage 3: 11 to 14-year-olds and Key stage 4: 14 to 16-year-olds). It could be argued that PE provides an opportunity for adolescents to be physically active, and plays an important role in building a positive relationship with PA (15, 16) leading into later life. Yet, according to Dismore and Bailey (17), students often see the curriculum as a barrier to enjoyment in PE.

PE teachers have a unique opportunity to influence students' attitudes towards the curriculum as they often select and implement the PE curriculum (18). Consequently, it could be argued that the way teachers interpret and deliver the curriculum is underpinned by their predispositions (19-21). Thus, the role of the teacher is to be able to put aside their predispositions and create a motivational climate that promotes life-long PA.

Within PE, the motivational climate is the psychological environment created by teachers, impacted by their lesson design (e.g., instructions and choice) and feedback, which impacts student's motivation in the lesson (22). Teachers are at the forefront of impacting the motivational climate, providing them with a unique opportunity to influence students' exposure to sports (23) if they put their predispositions to one side. However, there is little

exploration of whether the motivational climate teachers perceive they create, is true or if it is perceived the same way by the students.

Due to the importance of the motivational climate and that PE is embedded as a key component within the United Kingdom's national curriculum (providing weekly PA exposure to every child between 4-16 years, regardless of ethical or socioeconomic background), it is not surprising that changing elements within the motivational climate are targeted within PE engagement literature. Literature, supported by theoretical frameworks (24), has shown that by creating a task-involving motivational climate (emphasis is placed on skill improvement, cooperation with others and individual progress), intrinsic forms of motivation are promoted (25), along with intentions to be physically active (26).

Across PE literature, the emphasis of research has focused on identifying factors that contribute to the (dis)engagement of adolescents (27-30), along with developing interventions that encourage students to be more physically active and engaged in PE (31-35). However, very few have investigated PE-related factors associated with long-term PA engagement, nor have they investigated the effect size. Consequently, the scope of this thesis aims to examine predictors of changes in PE engagement (e.g., extracurricular activities, PE environment and motivational orientation) from year 7 to year 9 (chapter 3), along with the effect long-term using retrospective data (chapter 4). The motivational climate was also evaluated via a triangulation approach (student, teacher, and outsider observer perspective) to highlight the importance of students' perception and interpretation of the environment (chapter 5).

Personal and Professional Involvement

Since the moment I could walk; sport, exercise and physical activity have been a large part of my life, whether this be social or competitive. Having been involved in a wide range of sports from dance to football, which I still play today, I would regard myself as a 'sporty' individual. My involvement in sports and PA has not only been from a participation perspective but also from a developmental perspective as I have coached football and worked as a Primary school PE teacher for 2 years alongside my MSc in Sport and Exercise Psychology and Postgraduate Diploma in Applied Psychology.

I would regard myself as positioned 'pro' PA based on my sport and exercise experiences. Despite my love and enjoyment for sports and PA, I cannot say the same about PE. Even as a sporty individual, the thought of engaging in PE drained my enthusiasm. For me, the PE experience was not negative, but nor would I regard it as positive. My memories around PE are based on the premise that the teachers would spend the lesson focusing on those who were refusing to engage, disregarding the development of the rest of us. For me, most of the lesson was spent going through the motions of the activities rather than developing my skills. Being in an environment that failed to encourage me to develop my competencies, but also applied pressure on me to achieve due to an expectation for myself to excel in all sports and activities led to an internal battle within me. On one hand, there was a perception that I was expected to be capable at all sports, whilst on the other hand I felt pressured to adhere to social norms as I didn't want to be different from others in my class as I felt as though this could open me up to ridicule.

Aside from peer influence, I would argue that the teacher has the capabilities to influence as a persons behaviour both positively and negatively based on the language they use and the

behaviours they display. If the teacher is enthusiastic and interacts with the students on a social level and instructional level they will be satisfying the psychological needs of the students, that will support the promotion of enjoyment within the lesson. The activity itself may have an impact on future behaviours as if success is not achieved, it is unlikely that the student will feel confident in successfully carrying out the desired behaviour in the future. Thus, decide not to engage in the behaviour in order to avoid disappointment. Past success and experiences gained during PE have the capability to impact future pre-conceptions on one's ability in regards to PA.

I would regard myself lucky as I had opportunities to develop my positive attitudes and perceptions of PA competency away from school sports. However, I wonder if I would be as active if my perceptions of PE were purely based on my PE experiences and not influenced by upbringing and external experiences.

Adopting a Post-positivist Perspective Towards Conducting Research

Understanding my background and beliefs informed the way I conducted research from a post-positivist perspective. Reflecting on my own epistemologies and understanding of the issue and how they affected my perceptions of the world is an important part of the post-positivist approach (36). I am aware that, like many, I hold the perception that adolescent do not enjoy PE and that these ideas are reinforced by key social influencers, based on my personal and observed experiences. My beliefs and values also placed great emphasis on the role of the environment and those situated in shaping and influencing the formation of attitudes and behaviours, which informs the way I work as an applied practitioner. The value I place on understating the role of others within the context influences the areas of PE and

engagement I am interested in. However, a social researcher from a post-positivist perspective assumes a learning role rather than one that aims to test ideas or theories (36). Consequently, the aim of the thesis was not to test my preconceptions of PE or the role of the motivational climate, but rather to explore influential factors of engagement, underpinned by motivational drives.

The purpose of my thesis is not to test current theories or ideas, but rather to gain a greater understanding of the influential factors that can inform a person's motivation and engagement towards PA. To address this, I see value in identifying the predictive factors and mediating factors of PE engagement in the promotion of long-term PA.

Social-ecological Framework Underpinning the Thesis

Underpinned by my own beliefs, values, and philosophical approach as an applied sports psychologist in training, an individual's cognitions and behaviours are altered and influenced by the environment and those around them. This thesis will be underpinned by a social-ecological framework. The social-ecological framework is a multilevel conceptualisation that recognises that there are multiple levels which influence and support the notion that behaviour is both an affect and affected by various contexts and situations. Originally presented as an ecological system theory (37), it has now been redefined as a framework that promotes health-related behaviour change (37), which is essential when investigating and supporting the development of behaviour change and positive attitude formation in PE. The framework typically represents four to five levels that behaviour is proposed to be affected by, including individual level and broader social, physical and policy environments. This thesis will be underpinned by four levels: intrapersonal, interpersonal, environmental and policy factors.

Central to the social-ecological framework is the individual (intrapersonal). The intrapersonal level considers the physical (demographics e.g., age and sex) and cognitive (relevant knowledge, beliefs, and attitudes around the behaviour) characteristics of an individual that are likely to have been a product of interpersonal interactions and broader sociocultural influences. Interpersonal interactions capture the community surrounding the individual (e.g., teacher, parent, and peers) and the role that others play in the formation of attitudes and values of PA. It considers the role of key personnel within the PE environment and how the environment influences student engagement. The third level, the physical environment looks at the wider community or the school that the individual is associated too, taking into consideration the motivational climate and accessibility to PA. The final level and outer level of the framework is policy; thus, this thesis refers to the national curriculum.

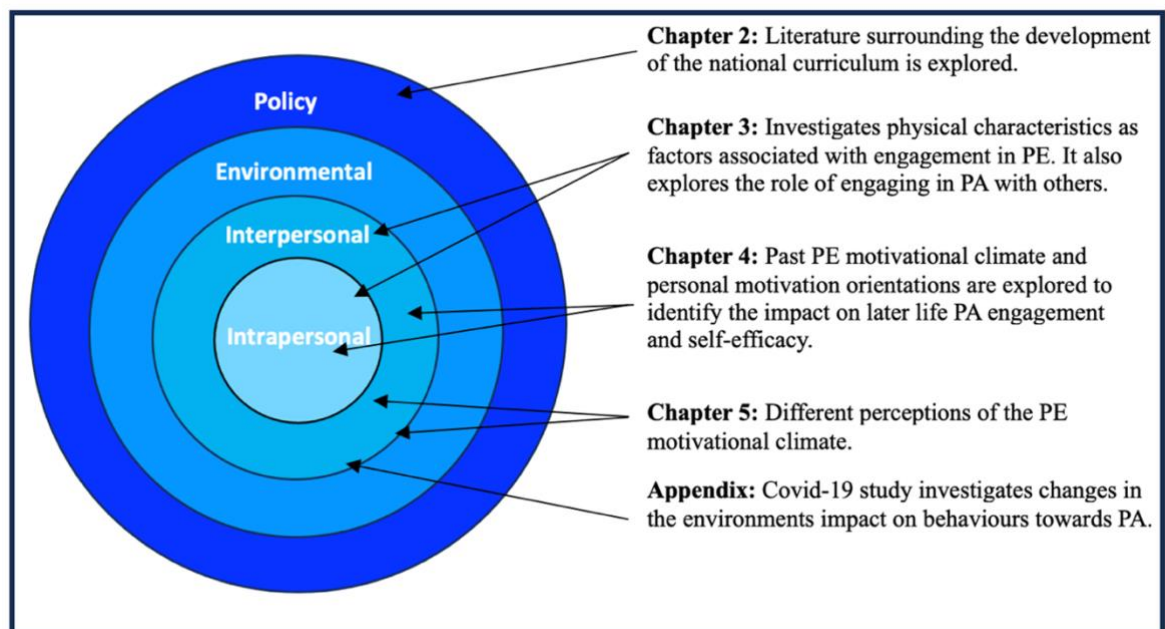


Figure 1. 1. Demonstrates the link between each chapter and the ecological approach.

Thesis Aims and Wider Research Programme

Based on my personal experiences and those around me, I see value in exploring the role of PE in influencing future engagement in PA. To date, literature has explored engagement in PE through a negative lens by exploring negative experiences and investigating predictive factors of engagement, rather than investigating why individuals remain engaged in PA across their lifespan. By identifying and underpinning the protective factors of engagement, they could be utilised by PE teachers and PE policies to support the continued engagement of those who are engaged in PE to adopt PA habits in later life, whilst also encouraging disengaged students to become engaged during PE.

To achieve this, the aim of the thesis is to examine factors associated with engagement in PE and determine whether the experience of school PE is associated with physical activity in adulthood. This is broken down into the following sub-aims: 1) Describe students' engagement in PE 2) Determine the association between engaging in PE at school and being active as an adult 3) Identify predictors of engagement in physical education (child, environment, and teacher).

Structure of Thesis

This thesis is presented in six chapters. Following this introductory chapter, a literature review is conducted to provide a narrowing scope of the current literature surrounding engagement in PE and inactivity, whilst chapters three to five are of an investigational nature. The final chapter presents conclusions and future directions.

Chapter 2: The literature review provides an understanding of the lack of current literature surrounding engagement in PE and later life PA. Using the social-ecological framework the

literature review begins by exploring the PE national curriculum as this provides a base for shaping experiences in PE. Interpersonal (e.g., teacher created motivational climate) and Intrapersonal (e.g., motivation and self-efficacy) factors influencing engagement were reviewed to highlight the gaps in the current research. Identification of the lack of empirical studies that have looked at predictors of engagement in PE over time as well as the life-long impact on adult PA habits provided the foundation for the investigation of the empirical chapters within this thesis.

Chapter 3: Using secondary data this section explores potential factors associated with disengagement in PE and how engagement changes over time, from year seven to year eleven. The cross-sectional dataset contributes to the current understanding of factors associated with disengagement in PE, whilst the longitudinal dataset develops the literature's current understanding by exploring each of the factors and the likelihood of their impact on different engagement levels from when they arrive at secondary school to when they graduate. Although the cross-sectional data does not bring any new information to light, it confirms previous findings that there is an issue with adolescents being disengaged in PE. The longitudinal data on the other hand, provides novel information as it emphasises the problem of disengagement in PE along with the factors associated with changes in engagement. Additionally, it highlights that shifts of engagement can occur within some individuals across their time at secondary school.

Chapter 4: Continuing with the exploration of why adolescents become disengaged in PE, Chapter 4 aims to gain a further understanding of how factors identified during a person's school years can shape an individual's current PA engagement. Past perceptions of their PE motivational climate and motivational orientations were evaluated alongside engagement in

PA to investigate the impact they can have on an individual's current engagement in PA and one's PA self-efficacy. The variable extra-curricular PA is included to provide insight into a person's engagement in PA away from PE. Self-determination and PE teacher interactions (motivational climate) were incorporated to explore the relationship between motivation during adolescence and the effect on adulthood PA. Unlike previous studies that have explored past experiences of PE influence on adulthood engagement in PA, this study estimates the effect of each of these variables and the impact they may have on later life engagement in PA. Consequently, rather than just an exploration of what a person's experiences were like at school and how they shaped current attitudes towards PA, this chapter identifies the strength of key predictors of PA engagement to help support the development of future interventions.

Chapter 5: Teachers have been identified as key social constructs when shaping the PE motivational climate (38, 39) and have the capabilities to shape and influence attitude formation (40, 41), that individuals can carry throughout their life in relation to PA. Studies have shown that environments that focus on personal development and enjoyment (task-involving motivational climate), instead of interpersonal competition are paramount in promoting long-term engagement and the development of positive attitudes towards PA. The focus of previous studies has been on the student's perspective, the teacher's perspective, or the observer's perspective. To date, no study has investigated the interaction of the three. This chapter addresses this gap within research by obtaining the perspectives of the students and teachers of the PE motivational climate via questionnaires as well as observational data from an outsider observer perspective. The three perspectives of the motivational climate are compared to investigate whether differences in perceptions occur. Further analysis of the student's questionnaires provides an investigation into the mediating effects of enjoyment in

sport, basic psychological needs and mood arousal on students' perception of an empowering motivational climate and their engagement in PE.

Chapter 6: The final chapter provides a discussion of the thesis findings and recommendations for future studies, teachers, and policymakers. The application of the findings are also considered in relation to the thesis limitations.

Chapter 2: Review of Literature

Introduction

Physical inactivity is the fourth leading cause of global mortality (1). Adults (including older individuals) are recommended to participate in at least 150 minutes of moderate-intensity aerobic physical activity (MVPA) per week, along with strengthening activities on two days (8). 63.1% of adults (16 and older) met the current guidelines for PA in England between November 2021 and November 2022 (42).

Physical activity (PA) guidelines for children and adolescents recommend at least 60 minutes per day of moderate-to-vigorous PA (MVPA), including activities that strengthen bones and muscles, at least three times a week (8). In England, between 2020 and 2021 only 44.6% of children and adolescents (5-16 years old) met the recommended guidelines for PA (6).

Similar to the findings between 2019-2020 (44.95%), but lower than 2018-2019 (46.8%) (6). The current findings however are higher than those between 2017-2018 (43.4%) (6).

When exploring the proportion of children who are achieving the UK recommended PA guidelines in relation to age, children in years 7 to 11 (43.6%) and years 3 to 6 (42.3%) are less likely to be PA (51.8%) than those in years 1 to 2 (51.8%) (6). This is reflected worldwide as globally, 25% of 11-year-olds compared to 16% of 15-year-olds are meeting current PA recommendations (8).

To date, research has identified a number of barriers and determinants associated with inactivity for adolescents including conforming to social norms, peer and friend relationships

(43-47) and body image (48). Additionally, with adolescent girls, there is a growing concern about appearing feminine and cool (49), as well as feeling self-conscious about their looks (50).

Schools have been used to implement interventions aimed at encouraging adolescents to be more physically active. Predominantly, schools are targeted for implementing interventions as adolescents spend most of their awake day within school premises (51). Physical education (PE) lessons promise to provide and contribute to the number of minutes an individual is physically active per day due to the nature of the lesson (52) but, PE can also be utilised to encourage students to lead an active lifestyle (53, 54).

Despite PE lessons providing a weekly opportunity for students to engage in PA, reports have found that PE only contributes to 8-11% of children's daily PA (55). It is evident that something needs to change (7, 56, 57), especially as physical activity participation decreases when children advance with age. The low effectiveness of interventions could be attributed to the lack of knowledge regarding the mechanism that is essential for behaviour change (58). Encouraging adolescents to become more physically active requires an individual to change their behaviour.

Theoretical frameworks of behaviour change suggest both external (e.g., contextual factors and social needs) and internal (e.g., motivations and beliefs) behavioural influences need to be considered, for new behaviours to be sustained. Behaviour change interventions that aim to increase PA should be based on a valid theoretical framework. This is, however, not always the case; interventions are often based on the 'It Seemed Like A Good Idea At The Time' (ISLAGIATT); principle. This approach to intervention design can result in a lack of

understanding of the intervention's target behaviours that the intervention is hoping to change. It is important to note that not all interventions are designed on this notion.

The most successful behaviour change programs take into consideration the behaviours themselves, but also the context in which they occur (59). The socio-ecological approach is a framework that is commonly applied as it emphasises the need to consider both the intrapersonal behavioural factors and the multiple-level factors that may influence a specific behaviour (60). Therefore, the socio-ecological model places a focus on the interrelationships between individuals, social constructs and the policy shaping the environment (61).

Using a socio-ecological approach the literature review will explore the following topics:

- 1) A critical discussion of the current National Curriculum for Physical Education in England to investigate the policy that is shaping the PE environment.
- 2) Measures of student engagement in PE; levels and predictors of engagement such as PA outside of school, motivation and social influences.
- 3) Behaviour change theories and theoretical frameworks used to encourage student engagement within PE.
- 4) Exploration of environmental, interpersonal and intrapersonal factors associated with engagement in PE to address the impact of interrelationships between individuals and social constructs.
- 5) An evaluation of the effectiveness of PE on the promotion of life-long participation in PA.

The PE National Curriculum

For many, their first time participating in sport is during a PE lesson delivered at Primary School. The PE National Curriculum (62) is a government document that outlines the aims of PE and provides brief information on the areas PE teachers should be trying to develop within their students. PE is compulsory across all four key stages of the curriculum. Thus, PE provides an equal opportunity for all students to participate in physical activity (PA) regardless of gender, ethnic background, or socioeconomic status (63).

PE has been identified as playing an important role in building a positive relationship with PA (15, 16), as well as imperative for leading a physically active lifestyle (64, 65). According to Green (64) (p. 357), PE “is or, at the very least, can be a crucial vehicle for enhancing young people’s engagement with physically active recreation in their leisure and, in the longer run, over the life-course”. However, the effectiveness of encouraging the promotion of a physically activity lifestyle long term has been questioned (66), with PE being regarded as a subject in ‘crisis’ as children are bored with disaffected lessons (66). This raises the question of whether the PE curriculum provides a framework which encourages and promotes involvement in PA as proposed within one of its aims.

Aims of the PE National Curriculum

The current PE curriculum was developed as a response to a review of the PE curriculum during 2011/2012 managed by the Department of Education (63). As a whole the PE National Curriculum aims to ensure students 1) develop competence in a broad range of physical activities 2) are active for sustained periods of time 3) can utilise tactics to engage in competitive sports and activities and 4) live a healthy and active lifestyle (67).

Key Stage 3 (Year 7 – Year 9) pupils should be taught to:	Key Stage 4 (Year 10 – Year 11) PE pupils should be taught to:
<p>-use a range of tactics and strategies to overcome opponents in direct competition through team and individual games [for example, badminton, basketball, cricket, football, hockey, netball, rounders, rugby and tennis]</p> <p>-develop their technique and improve their performance in other competitive sports [for example, athletics and gymnastics]</p> <p>-perform dances using advanced dance techniques in a range of dance styles and forms</p> <p>-take part in outdoor and adventurous activities which present intellectual and physical challenges and be encouraged to work in a team, building on trust and developing skills to solve problems, either individually or as a group</p> <p>-analyse their performances compared to previous ones and demonstrate improvement to achieve their personal best</p> <p>-take part in competitive sports and activities outside school through community links or sports clubs</p>	<p>-use and develop a variety of tactics and strategies to overcome opponents in team and individual games [for example, badminton, basketball, cricket, football, hockey, netball, rounders, rugby and tennis]</p> <p>-develop their technique and improve their performance in other competitive sports [for example, athletics and gymnastics] or other physical activities [for example, dance]</p> <p>-take part in further outdoor and adventurous activities in a range of environments which -present intellectual and physical challenges and which encourage pupils to work in a team, building on trust and developing skills to solve problems, either individually or as a group</p> <p>-evaluate their performances compared to previous ones and demonstrate improvement across a range of physical activities to achieve their personal best</p> <p>-continue to take part regularly in competitive sports and activities outside school through community links or sports clubs</p>

Table 2. 1 Outlines what students are required to learn in PE between year 7 and year 11, taken from the PE National Curriculum (67).

The national curriculum presents a number of compulsory subjects that schools must provide to students. These are broken down into two categories; core (compulsory and assessed/examined) and foundation (compulsory but not examined) (68). Core subjects include English, maths and science, whilst PE is designated as a compulsory foundation subject. Despite PE being a compulsory subject, it is only recently in the updated action plan (July 2023) that the curriculum now encourages 2-hours of PE per week to be delivered (68).

Prior to the updated action plan, time spent in PE appeared to decrease by age as key stage (KS) 3 (years 7-9.) averaged 124 minutes/week, which is 26 minutes more than those in KS4 (years 10-11) and an astonishing 90 minutes more than those in KS2 (years 3-6) (69). According to Youth Sports Trust (69), the growing pressure of trying to meet specific academic standards (e.g., Ofsted or STATS), has led to a number of schools in England reducing the allocated time for PA during their students' education timetables. A report in 2017 found that a third of UK secondary schools reduced PE time to support the demands of exam pressure for core subjects (69).

Teachers have also identified growing academic pressures, with 38% reporting that the PE provision had been reduced to allow more time to be allocated to core subjects (70, 71). Evidence for this downward trend was available each year between 2012 and 2017 (69). In response to such statistics, the Welsh Government (72), proposed to make PE a core subject rather than just compulsory to help tackle the decreasing time allocated to PE per week (57). By doing so, Harris (57) believes that teachers will begin to value PE as an integral part of learning just as much as English, Mathematics and Science, which are core subjects within the national curriculum, unlike PE which is a compulsory foundation subject. A Youth Sports

Trust study in 2018 (69), reported that 97% of teachers agreed that PE should be valued more within the national curriculum due to what it offers to young children.

The fact that PE holds a compulsory designation is a strength, however, the fact that it is only a foundation status is a potential weakness. Being regarded as a foundation subject means that it is subjective to loss of time allocation and reduced view of importance, despite several individuals working in educational positions referencing the need for PE to be more valued within the national curriculum (69). The following section will discuss the limitations of the curriculum content.

Downfalls of the PE National Curriculum

Within schools, PE teachers are required to implement the curriculum. The curriculum is minimalistic and open to personal interpretation (73), especially compared to the curriculum guidance for KS3 Maths (2500 words), Science (3000 words) and English as the KS3 and KS4 PE guidance is less than 600 words combined. This allows teachers to assert autonomy when designing, implementing, and evaluating lessons.

Teachers may design lessons influenced by their own, personal predispositions that are personal to them but may unconsciously drive them in the designing and delivering of their lessons (21). This may be presented by the sports that they chose for each gender along with player positions within certain activities (19, 20). As a result, teachers, along with stereotypical expectations may impact participation opportunities available for certain groups of students, such as adolescent girls (74).

Table 2.1 outlines what students are required to learn during KS3 and KS4. The guidance suggests several sports that require students to use tactics and strategies to beat an opponent, creating competition. Traditional, competitive team sports are a large component of the national curriculum for PE. The delivery of traditional team sports relies heavily on gameplay which promotes comparison to others, interpersonal competition and personal success in the sessions based on winning (30), which are in line with the characteristics of an ego-involving/performance-orientated motivational climate (places emphasis on success, outperforming, intra-team rivalry, unequal recognition, and punishment for mistakes). Despite clear evidence of the negative impact of competitiveness within PE, especially for those of lower abilities (75); this remains one of the key aims of the PE national curriculum in England.

A continuation of this limitation is that the guidance or the curriculum itself does not account for gender differences. There are two distinct groups operating in PE (76), males and females. One difference between genders in relation to PE and PA is the type of activities each find appealing. Male students prefer competitive (77), team-focused sports which are a prominent feature within traditional PE lessons, along with sports that are deemed masculine (78), whilst team games of a competitive nature predominantly disengage girls (69, 79-82). Adolescent females, when given the choice, tend to select activities that tend to be non-competitive forms such as fitness clubs (78, 83). Notably, it is recognised that girls find meaning in activities that are relevant to them, such as fitness classes. Thus, proposing that to develop a positive relationship between females and PA that can be continued once they reach adulthood, the activities delivered within PE lessons need to resonate with adolescent girls (84). However, on reflection of the guidance proposed by the national curriculum shown

in Table 2.1, females have not been taken into consideration when designing the current national curriculum.

Another aspect of the national curriculum that has been scrutinised is the repetitive nature of the instructional design and sports on offer (85). In some instances, the same activities are repeated each year, often delivered through the same drills that do not allow for time for students to develop the required skill before moving on to gameplay too quickly (86). Thus, there should be less emphasis on utilising tactics to beat an opponent, instead, the curriculum should be designed in a manner that allows students to get the fundamentals of the skill mastered before requiring them to apply the skill they have learnt to game situations.

Consequently, if the PE national curriculum, along with initiatives aimed at increasing PA participation within schools want to promote long-term engagement with PA, it needs to focus on building a positive relationship which promotes intrinsic motives such as enjoyment.

Although the PE national curriculum is not explicitly explored within the empirical chapters of this thesis, it is important to recognise the underlying impact the PE national curriculum may have on the PE environment and expectations of students and teachers. In line with the social-ecological framework, it is proposed that policies such as the PE national curriculum will help shape the cultural norms and establish expectations within PE lessons (87). In turn influences individual behaviours and interpersonal relationships, which are explored within chapters 4 and 5 of this thesis.

Engagement in PE

Definition of Engagement in PE

Students' engagement with PE has been identified as a key determinant of whether adolescents lead an active lifestyle (88). This has led to numerous studies investigating the role of engagement in PE and the factors that influence student engagement. While studies appear to be investigating the same factor, 'engagement', the terminology underpinning the word lacked consensus until more recently. Originally school engagement was viewed as the academic and social success of students in relation to student dropout (89). Today, engagement is regarded as a multifaceted concept that embodies behavioural, emotional, and cognitive dimensions. Behavioural dimensions of engagement capture a student's physical involvement and participation in the activity (89) with high attention and effort demonstrated, such as asking questions, showing effort and being persistent (40, 90). Emotional dimensions reflect the enjoyment and interest in relation to classmates, teachers, and the activity itself (40, 89). Whilst cognitive dimensions refer to competence and self-regulatory factors associated with the task or activity (for a review see (89). Concerning PE, a student is considered engaged when they are actively listening to their teacher, being persistent in acquiring and mastering knowledge and skills, whilst exhibiting enjoyment (91-94). On the other hand, disengagement in PE is characterised by the absence of these dimensions (e.g., not applying effort, giving up easily and not listening to the teacher (95).

Engagement with Physical Education

Engagement has been explored by looking at the frequency or attendance of students. This may be due to this information being readily available via school registers. Arguably, this is collecting participation rates rather than engagement as students may be present in the lesson, but this does not necessarily mean that they are engaged, especially when analysed in line

with the multifaceted definition of engagement. However, it could be argued that if students do not even attend the lesson they are not able to engage, with 18% of adolescents not engaging in PE purely for the fact they did not attend.

Self-reported data collected from the Global Students Health Survey between 2010-2015, found that 55.2% of adolescents participate in PE once to two times a week, whilst 20% of the students reported that they never participate in PE (96). Females reported lower participation rates than males and older students (15-17-year-olds) participated in fewer PE lessons than younger students (13-14-year-olds).

Measures of Engagement

Given the complex nature of engagement, many studies predominantly focus on proxy measures of engagement such as attendance or participation, as arguably if individuals do not attend, they are not able to engage. Single dimensions of engagement (29, 90, 97) or behavioural and emotional dimensions together (30, 98, 99), with a select few focusing on cognitive have also been explored but these are sparser (100). Across PE engagement literature, engagement has been measured in various ways, including PA as a proxy for engagement, psychometrics completed by students and teachers, independent observation such as observing teacher and student interactions and qualitative procedures including focus groups and one-to-one interviews with students or teachers. The following paragraphs within this section critically evaluate the different measures of engagement in PE.

Measuring Physical Activity as a Proxy for Engagement

Pedometers or accelerometers have been used as a proxy measure of students' engagement within PE (101), but this approach captures only data on movement which is a measure of PA rather than a true representation of engagement. Arguably, a student can demonstrate high levels of PA whilst not necessarily being engaged in a lesson (102). The student may produce a high relative level of PA but not be engaged in the lesson, for instance not following instructions, not focused on the task, or performing the task as instructed. Therefore, it is important to consider if the measure that is being used is measuring at least one of the constructs of engagement and not PA or movement, which pedometers, and accelerometers measure. However, within the literature pedometers or accelerometers are the two most used methods when exploring engagement in PE (see systematic reviews (103, 104).

Self-report Measures of PE Engagement

Self-reported psychometrics are widely used to investigate engagement in PE for adolescents, particularly when looking at behavioural and emotional dimensions (97-99), as they are cost-efficient and less time-consuming compared to other methods. Psychometrics, surveys, and questionnaires present a list of items that describe engagement facets and commonly require participants to record their answers on a Likert Scale (105). One psychometric measure that is used to gain insight into student engagement is The Engagement and Disaffection Scale (40). The Engagement and Disaffection Scale includes 27 items: 5 items that capture the attention, effort, and persistence of the student, 5 items that tap into the emotional dimensions of engagement (e.g., when I'm in class, I feel good), 5 items encompassing behavioural disaffection and 12 for emotional disaffection, measured on a 4-point Likert-Sale. The purpose of the psychometric is to gain insight into engagement and disaffection in traditional classroom contexts, however, the psychometric has been adapted to measure engagement in

PE by incorporating 'PE' in front of the items (99). Although the modified version produces acceptable internal validity for each of the items, the items were originally designed for a classroom setting, thus potentially less representative of the PE context itself. Despite the original psychometric including items that explore behavioural and emotional disaffection, a portion of the studies disregarded these items. A potential reason for this may be that across PE, researchers have focused on engagement from a positive outlook rather than a negative standpoint. Within the original engagement and disaffection scale (40), the items were recorded on a 1 to 4 scale made up of positively and negatively worded items, whereby individuals were required to identify the degree to which they agree with the statement. More recently the scale has been adapted to a 7-point Likert Scale (1: 'not true' to 7: 'very true': (99) or a 5-point Likert scale (1: strongly disagree to 5: strongly disagree; (98). It is not surprising that researchers have decided to incorporate more scale points as the scale outlined in the original paper of the Engagement and Disaffection Scale (40) is vague. Psychometric literature also suggests that presenting more options in a scale is better up until 11, as there is a diminishing return beyond this point (106).

Other engagement scales have also been modified to capture student engagement in PE contexts for example: The School Engagement Scale (SES) (107) and The Student Engagement Instrument (SEI) (108). The SES contains 15 items, measured on a 5-point Likert Scale that claim to capture behavioural, emotional, and cognitive aspects of engagement in students aged 5-14 years within school settings. Whilst the SEI is a 35-item measure represented on a 4-point Likert Scale that captures students' cognitive and affective engagement in education. Both the SES (107) and the SEI (108) have been modified to include the word 'PE' within the items to capture students' perceptions of their engagement in PE lessons. For example, Guo et al., (109) used a PE-modified version of SES to capture

students learning engagement in PE (cognitive and emotional psychological state e.g., concentration, dedication and vitality) (110) as a mediator factor of an empowering motivational climate. Items were modified in Guo et al., (109) studies, included the word PE (e.g., ‘I am full of energy and motivational when learning physical education’). Guo et al., (109) reported a Cronbach Alpha of 0.88, which demonstrates good reliability following minor modifications to the scale.

Aside from modifying engagement in class scales, as identified above, some studies measured effort as their construct of engagement in PE, for example Zhan et al., (111) used eight items developed within Guan et al., (112) that comprised constructs adapted from Wentzel (113) study to generate four items each assessing perception and effort in PE. Each item was measured on a 7-point Likert Scale to represent how true each statement was for them. As these items were originally designed for classroom settings, the stem “In my physical education class” was introduced. Although Zhan et al., (111) did not claim to measure engagement, the constructs defined were embedded within behavioural dimensions of engagement. It is important to be cautious when utilising measures that purely focus on the behavioural dimension of engagement as there is a presence that emotions have a tendency to fuel behaviours despite emotional and behavioural engagement being regarded as largely interindividual (40). For example, if an individual is interested in a particular activity or enjoys participating in that sport then that would fuel engaging behaviours such as effort and persistence. Therefore, not having an understanding of the emotions that underpin the behaviour makes it more difficult to suggest changes as emotions play a leading role in whether a student is dis(engaged) in their lesson (114).

Coledom and Ferraiol (115) have also simplified engagement further by having one item or a few items as their measure, such as ‘Did you participate in physical education classes?’ and “Generally, during physical education classes, how active were you, i.e., did you play, run, jump and throw balls intensely?”, which both provided pre-determined answers.

Predominately studies that aim to capture student engagement will incorporate self-report measures directed towards the students. However, Gairns, Whipp and Jackson (116) investigated teachers' perception of student engagement via the item ‘Over this week what level of engagement has this student shown in your PE class’, which requires teachers to reflect on the student’s engagement relative to their classmates. The issue with this question aside from allowing for personal interpretation of what engagement is or looks like, it requires the class’s engagement to be at a certain level in order to allow for comparison.

Like any self-report measure, a limitation of this method is that participants tend to exaggerate their responses or provide an invalid answer due to social desirability bias. Response bias is also a concern with psychometrics as individuals tend to respond in a particular way despite what the question is asking. For example, if the respondent is asked how often they engage in PA and the options are: ‘frequently, sometimes and infrequently’, they are more likely to choose ‘frequently’ or ‘sometimes’ so that they are perceived positively. Items also allow for personal interpretation, how one person may view the item, another may view it differently thus impacting participants' responses. Lastly, having predetermined items and scale prevents further understanding of what is going on, and the instructional processing that is underpinning the decisions. It only provides an understanding of ‘what’ is happening, not the ‘why’. Notwithstanding limitations, self-report measures are practical for administrative purposes as they can collect information from a large group of

people at little cost to the researcher. They also provide researchers with a unique opportunity to capture what a large group or population think which is the opposite of observations.

Observational Measures of PE Engagement

Observing participants' behaviours in their typical environment is another method by which engagement in PE has been assessed. Assessing PE engagement tends to focus on the behavioural and emotional dimensions of engagement and disregard the cognitive construct as this cannot be observed but instead captured through self-report or qualitative measures. In observational engagement literature, researchers commonly observe students and teachers interacting in their normal scheduled lessons. Observers may make a judgement on the students or a class engagement by measuring the students on- and off-task behaviours such as body language, asking questions and attentiveness (117). Thus, making it difficult to gather a complete picture of the students' or class's engagement.

Reeve et al., (94). designed an observational tool to capture students' engagement in the classroom setting. The aim was to assess two dimensions of student engagement. The first measure was designed to capture students' active involvement in the task during instruction. Active involvement was broken down into five areas: attention, effort, verbal participation, persistence and positive emotion. Each of the items were presented on a bipolar format from one to seven with engagement indicators situated below seven and disaffected indicators below one. The scores were recorded based on the observers' discretion of the percentage of students expressing the behaviours of the five areas across 10-minute intervals following the first interval which was commonly 13-15 minutes. A high score in the area, suggested that most or almost all of the students expressed the behaviour and intensely. Once the lesson was

observed and the areas scored, the 5 ratings were combined to generate an overall score. The second measure focused on students' voice and initiative in trying to take personal responsibility for their learning during the lesson (non-verbal/verbal influence attempt), which was broken down into teacher and student influence attempts to impact the other party's behaviour or decision-making in a constructive way. The frequency of these behaviours were recorded via a tally. The two tallies of frequency were then combined to calculate the proportion of students' influence attempts. The proportion score was then used as an indication of the student's engagement. The two measures were found to be significantly inter-correlated (94).

Alterman et al (90) and Gonzalez et al., (28), adopted and modified Reeves et al., (2004) classroom observational tool to measure class-level engagement in PE by observing student's active involvement (e.g., students' attention, effort, verbal participation and persistence) in class. The 5 items: 1) The students asked questions about the exercise, 2) The students put effort in the activities and exercises, 3) The students asked questions about the exercises, 4) The students don't give up easily during challenging tasks and 5) The students seem to enjoy this PE class, are awarded a single score from 0 (never) to 3 (always) to demonstrate how often those behaviours were displayed across the 5-minute intervals. The items scores were then averaged to create a single collective engagement score.

One concern with using observational measures is their ability to assess all constructs of engagement, as it is limited to behavioural dimensions. Thus, observations would need to be used in conjunction with other measures such as the Engagement and Disaffection Scale (40) to attempt to gain an understanding of the cognitive constructs. Observation is a valid tool for measuring behavioural constructs from observable behaviours.

Nonetheless, observations have the ability to rule out student's personal interpretations of the situation, this could be related to their personal engagement levels or the impact of the teacher on their engagement as answers for items on self-report measures may be influenced by past experiences in PE (29).

Qualitative Measures of Engagement

A qualitative method of collecting engagement data is via structured, semi-structured or unstructured interviews which vary from. Interviews provide an opportunity to elicit information regarding cognitive and emotional engagement. A scoping review of qualitative studies assessing engagement in a PE context were largely restricted to behavioural dimensions. (118). However, the review then goes on to propose that most of the papers elicit the idea that engaged students are the students who are actively involved in the lesson and not only demonstrate high behavioural dimensions but also exhibit positive emotions. A common theme across qualitative studies exploring engagement in PE is that there appears to be a focus on gaining an understanding of students' perceptions of influencing factors that determine students' perceptions along with their engagement (119) to identify contributing factors of dis(engagement). Interestingly, unlike quantitative studies that presented a greater emphasis on trying to predict engagement, qualitative studies appeared to be more interested in disengaged students.

Just like in quantitative studies, participants in interviews may adhere to social desirability. Participants' responses may also be influenced by the wording of the questions or the behaviours/mannerisms of the interviewer. Interviews are a great way of gaining insight as to

why something is happening, by gathering a detailed contextual understanding of a particular group or context. Unfortunately, as this method is very time-consuming, and requires judicious and systematic analysis, they predominantly only focus on a small group of people or/in a specific context. This reduces the finding's generalisability. Nevertheless, it is vitally important to conduct qualitative studies as it can provide a greater understanding as to why students are becoming disengaged, in the hope that future interventions, policy makers and teachers can look to address these issues and hopefully encourage students to become, remain or re-engage in PE.

Although there are many ways dimensions of engagement can be measured it is hard to capture the full multifaceted dimension of engagement through one measure alone.

Throughout academic and PE literature engagement has been defined in many different ways which has led to different terminology describing distinct notions or constructs. Given the heterogeneity of engagement definitions, one study may use a method of measuring emotional engagement that another researcher may use to explore behavioural engagement. Thus, creates inconsistency not only in measuring engagement but also in understanding and defining engagement. This makes it challenging to compare findings. Consequently, it is hard to identify the 'gold standard' measure of engagement in PE.

The measures most often reported in the PE engagement literature are student self-report tools and observational methods. Yet no study has combined the two. However, teacher and student self-reports have been collected and compared within one study (99). Future studies may wish to use multiple measures of engagement within one study to allow for comparison of points of view to increase the study's degree of concurrent validity (118) and to attempt to

explore all constructs of engagement. This thesis will begin to address the gap in the literature by utilising González-Peño, Franco and Coterón (28) tool of engagement which captures all three dimensions within Chapter 5.

Theoretical Frameworks Underpinnings of the PE Motivational Climate

The rationale for trying to understand student's engagement in PE is to support the design and development of PE lessons that promote long-term engagement in PA. To support the promotion of student engagement in PE it is important to consider the role of motivation, as motivation is the underlying reason for any behaviour (120, 121). Theoretical frameworks such as the Self-determination theory (SDT) (24) and Achievement goal theory (122) (AGT) explain how dispositional and contextual motivation can influence a person's engagement in PE.

Self-determination Theory

Within motivational PA literature, the perspective of SDT (24), is commonly used to encourage PA (123). SDT is a comprehensive evolving macro-theory of personality and motivational behaviours (124, 125) that comprises of six mini theories in an ambitious attempt to explain the most fundamental aspects of motivated human behaviour. SDT is best conceptualised as a continuum ranging from self-determined (autonomous) through to non-self-determined (controlled) motivation and to amotivation. SDT describes motivation as a continuum, which regards autonomous and controlled motivation as independent constructs (126).

Autonomous motivation refers to a combination of intrinsic motivation and extrinsic motivations that self-endorse a person's actions or experiences of volition (125). It proposes that if a person is autonomously motivated, they are motivated from internal sources and can include extrinsic sources if a person sees value in the behaviour and it positively aligns with their belief in who they are. The most desired and long-lasting form of autonomous motivation is intrinsic. An intrinsically motivated individual will engage in the behaviour or activity solely for themselves as it gives them a sense of accomplishment, satisfaction, and pleasure (e.g., participating in PE and extra-curricular activities because they enjoy it and deem it to be fun rather than doing it to win an award).

Controlled motivation comprises external regulations (one's behaviour is guided by external rewards or punishments e.g., incorporating forfeits into the PE lesson if a team loses) and introjected motivation (motivation that arises from partially internalized activities, values and motives such as protecting one's ego, avoiding shame or embarrassment and seeking approval from others e.g., not being picked last in PE). Behaviours of individuals driven by controlled motivation are likely to be influenced by social norms or friendship groups (47, 127, 128),

Autonomous and controlled motivation increases the intention and performance of a behaviour. In contrast, amotivation is a lack of intention or motivation to engage in an activity. Amotivation is characterized by a lack of perceived competence in and value of a behaviour (125). In relation to PE, a student may be amotivated to participate in PE purely for the fact that they are obligated to by the school.

	CONTROLLED MOTIVATION			AUTONOMOUS MOTIVATION		
	AMOTIVATION	EXTRINSIC MOTIVATION			INTRINSIC MOTIVATION	
Regulatory Style	Non-Regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Motivation source	Impersonal	External	Somewhat external	Somewhat internal	Internal	Internal
	Helplessness Lack of competence and value No intention	External rewards and avoidance of punishment Compliance	Seeking approval from others Ego/self-esteem purposes	Self-endorsed, see personal relevance and importance Valuing an activity	Congruence with personal identity (e.g., beliefs and value)	Fun and enjoyment Inherent satisfaction Interest
PE Example	Disengaged or refusal of activity participation	Avoiding detention or 'just going through the motions of the activity	A need to demonstrate skill competence to others in the class to impress them	Sees value in participating in PE as they believe it will improve their fitness	Participates in PE as it is part of their personal make-up	Participate in PE as they genuinely enjoy it

Students may move up or down the continuum due to several different factors and different contexts.

Figure 2. 1. The Self-Determination Theory Continuum with PE examples adapted from Cunningham et al., (129) and Morgan, Milton and Longville (130)

One of the six mini theories within the broader SDT framework is the three basic psychological needs theory (BPNT; (11, 131). The BPNT is key to supporting the understanding of how different contextual influences impact an individual's motivation and engagement across different domains. It proposes that psychological needs (autonomy, competence, and relatedness) are critical resources that play a universal role in the development, adjustment, and wellness of individuals, contributing to the motivation, engagement and persistence of a behaviour. According to the SDT, the three psychological needs have to be satisfied in order for autonomous forms of motivation to arise (132, 133), as well as being regarded as essential for personal growth and development. Satisfaction of autonomy needs are met when a person feels as though they are in control over tasks (e.g., choosing activities in PE), while the need for competence is satisfied when an individual believes they have the capabilities and the skill set required to overcome a task (e.g., acquired the knowledge in PE to be able to execute the task successfully). Lastly, relatedness needs are

met when a person experiences a sense of closeness and connection with others (e.g., a positive relationship with a PE teacher).

Among research in recent years, the satisfaction of psychological needs has been regarded as the ‘brighter side’, whilst recent advancements have regraded frustration or thwarting of the psychological needs as the ‘dark side’. Thwarting of psychological needs is conceptualised as *“the perception that need satisfactions are being obstructed or actively frustrated within a given context”* (134). This means that need thwarting is not the lack of psychological need satisfaction, but rather the active process, such as not offering PE students with choice and asking students to participate in activities against their will. Consequently, a low score of need-satisfaction does not necessarily indicate that an individual’s needs are being thwarted, but rather they are unsatisfied with the degree to which their needs are being met in that particular context (134).

A weakness of the SDT is that the theory does not include developmental considerations. Younger children tend to be more extrinsically motivated, due to being more focused on external factors (135, 136). The concern of this is minimized within this thesis as the focus is on adolescents, but it is important to consider.

Due to the broad nature of the SDT, it has been applied to various topics such as education (137, 138), sports (139, 140), PA (141, 142) and health care (143), which has led to the development of a range of measures. The SDT underpins measures such as the Revised Sport Motivation Scale (144) and the Intrinsic Motivation Inventory (145, 146) within sports contexts, the Perceived Locus of Causality (PLOC: (147) and the Behavioural Regulations in Exercise Questionnaire (148) in relation to PA and The Basic Psychological Needs in PE

Scale (149). Nevertheless, the SDT can explain the motivation and reasoning that lead an individual to engage in PA. SDT shows that motivation has an important influence over whether an individual will partake in regular PA or engage in PE lessons.

Achievement Goal Theory

According to Achievement Goal theory (AGT) there are two dimensions of a motivational climate that can be promoted by a teacher: task-involving/mastery-orientated or Ego-involving/performance-oriented motivational climate. Within a task-involving climate, the focus of the teachers is to develop students' perception of personal and task competence by focusing on improving a skill or the process of learning itself. Task-involving climates are created through cooperation, reinforcement of personal improvements, by viewing mistakes as part of the learning process, and valuing everyone within the lesson. Lessons should be appropriately challenging and offer students an element of choice of activities. These activities can develop intrinsic motivation and enhance learning opportunities (25).

In contrast, an ego-involving motivational climate promotes intra-team rivalry, unequal recognition, and punishment for mistakes. Emphasis is placed on success and outperforming others rather than personal development. Taking this into consideration it is not surprising that there is a link between student goal orientation and their perception of the motivational climate (150) as AGT proposes that motivation is the interaction of dispositional (personal), behavioural, social and contextual factors (motivational climate) that influence how a person views achievement. A person's perception of success or failure within the learning environment is dependent on their perceptions of competence (22). If a person bases their success on comparison to others, their goal orientation (reason for engaging in the behaviour)

is performance focus, whilst if it is self-referenced, they are motivated by means of goal mastery.

Taking into consideration how goal orientations are influenced through the promotion of self-achievement or comparison to others, it is not surprising that individuals who adopt task-orientated goals are found to be persistent at a task for longer periods of time as well as maintain PA engagement in comparison to performance-oriented goals that have been associated with dropout (151). Consequently, the application of this theory can help predict positive or potentially negative consequences on behaviour, health and well-being linked to participation in PA (152).

AGT and SDT are considered valuable theoretical frameworks contributing to the understanding of the motivational climate teachers create. SDT focuses on how a person defines success based on perceptions of competency (153), while AGT considers the social environment surrounding the individual and how it is influenced through two different interpersonal styles: autonomy support (teachers offering students meaningful choices and involving them in the decision-making process) and controlling style (teachers delivering lessons in an authoritarian way, using controlling language and rewards/punishment). In an attempt to combine facets from both theories, Duda (152) proposed that the motivational climate created by teachers and coaches can be more or less empowering or disempowering.

An empowering motivational climate is autonomy and socially supportive along with being task-involving that satisfies basic psychological needs. While an empowering motivational climate is regarded as a coach-controlled relatedness-thwarting environment that promotes performance-involving goal orientations, by fostering comparison to others.

Environmental and Interpersonal Factors Impacting Engagement in PE

Implementing change through a context is easier than challenging one's beliefs. Thus, altering the context of PE (e.g., single-sex vs co-educational (147, 148) and traditional PE vs Health-club approach (154, 155)) is widely used within research to investigate proxy changes of engagement. Aside from altering the context of PE, key individuals within the PE environment can influence student's behaviours and engagement in PE.

Within a PE context, teachers and peers are most likely to influence students' attitudes and beliefs regarding PE, impacting student engagement. Parents influence the formation of young children's attitudes but the influence of peers becomes greater during adolescence (47).

Perceived PA norms of peers and friendship groups have been found to predict intentions (156, 157) and reflect PA participation (158) of individuals, more so in boys (158). This can be achieved by enhancing the motivational climate of lessons.

One way this may be addressed is through altering perceptions of the motivational climate. The learning climate created by peers and teachers has been shown to be associated with satisfaction of the basic psychological needs (159) as well as influencing student's motivation towards PE (160).

Teacher-Created Motivational Climate in PE

Within PE literature Self-Determination Theory and Achievement Goal Theory (122) are the prominent theoretical frameworks used to explain and understand the effects of the motivational climate on student motivation and behaviour. The motivational climate in PE is the psychological environment that the PE teacher creates. This can be achieved through lesson design (e.g., instructions, choice) and providing feedback to motivate students within the lesson (22). By creating a motivational climate teachers can impact the nature and quality of student's exposure to sports (23). Positive, motivational learning experiences encourage students to take an active role in the learning process both within and outside of PE lessons (161).

The characteristics of a traditional teaching approach adopt a highly structured format that commonly adopts a sequence of introducing a technical skill(s), followed by drills that provide opportunities for repetition attempts of re-producing teacher-prescribed movement, concluding with a game or performance activity for students to execute the skills in a competitive context (162). The issue with this approach is that it fails students at a psychological level by not sufficiently satisfying their basic needs as it adopts a 'one-way-fits-all' pedagogical climate, disregarding the students' need for autonomy and choice. Thus, future studies may wish to investigate the long-term impact of motivational teaching strategies to see whether teachers continue to apply the skills acquired to promote a mastery-climate, that aids promotion of autonomous forms of motivation. Chapter 4 of this thesis begins to address this gap in research through retrospective exploration of the long-term effects of the PE motivational climate on current PA.

Teachers have reported difficulties motivating students to participate in PE lessons due to student interpersonal barriers, fitness level and peer pressure (163). Evidence of teachers success in motivating their students is scarce (164) but teachers believe they have the capabilities to motivate their students by adopting a motivational teaching strategy (165).

Of the studies that have explored the motivating role of teachers have found that if they adopt a more needs-supportive teaching style it not only nurtures the motivation of their students but also other psychological, behavioural and psychological needs (166, 167). Compared with highly structured lessons students were more physically active during PE lessons in which teachers adopted a supportive teaching style (33). Though the study may have found positive results initially after completion of the study, post-study results are not sustainable. This may be due to the fact that the motivational teaching strategies were able to change students' perceived autonomy quickly, it may take longer to impact their motivation (168). To date there is literature promoting the use of motivational teaching strategies to support the growth of students' motivations around PE (168, 169). However, they lack compliance with continuing the motivational teaching styles once the studies have commenced. This may be due to the fact that teachers potentially revert back to traditional teaching approaches in PE, as worldwide this has been regarded as the most prevalent teaching approach adopted (162, 170).

Exploration of the literature identifies the role the teachers have on shaping the PE motivational climate influencing student engagement. Yet, there is lacking evidence of whether the strategies and behaviours teachers use to promote a mastery motivational climate in the eye of the students and whether the effect of engagement are long-term. To address the research gaps chapter 4 estimates the effects between retrospective perceptions of the PE

motivational climate and current PA, whilst chapter 5 captures a true interpretation of the motivational climate from teacher, student and observer perspectives.

Exploration of Intrapersonal Factors

Aside from exploring the impact of interpersonal on engagement in PE, it is also important to consider the role of intrapersonal factors. Intrapersonal factors refer to physical (socio-economic impact e.g., age and sex) and cognitive (relevant knowledge, beliefs, and attitudes) characteristics. Cognitive characteristics are commonly a by-product of personal experiences, sociocultural influences, and intrapersonal interactions.

Incorporating an Educational Element to Encourage PE Engagement

A person's perception of their capabilities can be altered by increasing their knowledge, skills and understanding of the behaviour through workshops and educational opportunities.

Additionally, enablement by removing or adjusting their point of view on the behaviour by using role models and increasing means or removal of barriers can support the required change (171).

Hoelscher et al., (172) and Dale and Corbin (35) investigated the long-term effects of providing adolescents with educational sessions, 5 years and one and a half years post-intervention retrospectively, and identified that the behaviour changes made during both interventions were not obtained after graduation. Although it was identified that men and women who participated in the Project Active Teens intervention reported less sedentary behaviours than their counterparts (35), this was not statistically significant potentially due to the quasi-experimental design of the study.

Increasing Self-Efficacy to Promote Student Engagement in PE

One purpose of embedding an educational context within an intervention is to encourage adolescents to become more physically active and challenge their perceptions around their competence to be able to carry out the desired behaviour. Self-efficacy is defined as the belief one has in their ability to execute actions or tasks in order to achieve a specific outcome (173).

The theory of self-efficacy (174); posits that people are more likely to engage in a behaviour if they believe they have the capabilities to successfully execute the cause of action (174). In other words, it is a person's sense of competence and situation-specific confidence (174) that they can overcome barriers and carry out the task successfully. For example, in a PE lesson, a student needs to believe that they have the necessary knowledge and skills to be able to execute the task successfully. Thus, it relates to outcome expectations, which comprise perceptions of previous positive and negative outcomes related to the task at hand, in this case, PA (174). Self-efficacy expectations are theorised to influence a person's perception of activities, failures, persistence and whether they will engage in the behaviour. Consequently, self-efficacy is underpinned by the hypothesis that a person self-regulates their own motivations (174, 175) and behaviours (173), by means of what activities they engage in, affective experience and how much effort they exert. Therefore, if a student has been unsuccessful in carrying out a particular skill or activity in the PE lessons, they are less likely to want to engage.

There is good evidence for a positive association between self-efficacy and PA participation (176-179). Thus, it is not surprising that interventions have targeted increased self-efficacy to

promote PA (180, 181). As part of the 2-year Lifestyle for Education Activity Program (LEAP; (180), teachers at schools participating in the program developed skill instructional units that emphasized the use of self-regulatory behaviours (identifying and overcoming perceived barriers, self-reinforcement, goal-setting, time management) along with the acquisition. Additionally, a new PA curriculum for PE lessons was designed with the hope of providing positive and successful experiences in and outside of school, with the aim of increasing PA self-efficacy.

The findings from the LEAP intervention found a direct effect on PA, whilst self-efficacy had a subsequent effect on PA. This encourages the use of self-efficacy to be used as a mediator variable within interventions to increase participant rates of adolescents in PA (182-184). The overall effect on PA was equivalent to 4/ 100 girls becoming physically active (185). This is an effect that would make considerable changes to the population. However, a 1 year longitudinal study conducted by Molt et al., (186) found that self-efficacy did not predict change in PA.

Intervention studies investigating self-efficacy as a mediating role of PA found inconclusive results (187), despite reports of the participants being more physically active (34).

Discrepancies may be related to the low sample size, lack of uniformed definitions of self-efficacy across literature (188), wide variability in measurement used (189). This could suggest that there is a need to explore the underlying motivations for carrying out the behaviour rather than just developing one's competence.

To some degree, Dishman and colleagues (190) supported the notion that self-efficacy should be incorporated in interventions as a mediator variable but suggest that this should be

implemented by developing self-management strategies and dealing with perceived barriers. This is because they found an association between self-efficacy with PA mediated by self-management strategies and perceived barriers. Differences in findings could be attributed to extensive differences in sample size, along with the fact that it specifically explores the use of self-management strategies to increase one's self-efficacy. Nevertheless, supports the notion that self-efficacy should be integrated within improving PA in adolescent and has the potential to have lasting improvements of self-efficacy for up to 3 months, even if PA behaviour change is not maintained (191).

As identified, self-efficacy can be enhanced through the use of self-management tools (190), but there is supplementary evidence for the use of social support as a mediator of self-efficacy within PA (181, 192, 193). It is important to note that social support is a mediator of self-efficacy and not PA as a literature review conducted by Prochaska, Rodgers and Sallis (194) found inconclusive results regarding direct associations between social support and PA. Inconsistency could be attributed to variances in the methodologies used. Despite clarification, it did provide promise for the use of social support for encouraging engagement in PA.

Social support has been identified as a mediator of self-efficacy as literature postulates self-efficacy as multidimensional (195), consisting of subdimensions with support-seeking being one of these. Social support can be received from family members, members of staff within schools, peers, and friendship groups. Positive associations have been found in partaking in PA with friends (196), with statistically significant supporting evidence found nine months post-intervention (193). An alternative way to implement social support within interventions is to utilise role models.

PE teachers have the potential to take on this role and act as facilitators as findings have shown that students who partake in the lesson with their teachers had greater enjoyment during the PE lesson and participated in more PA (197). It is important to note that Dudley and associate's (197) study implemented more changes than just encouraging PE teachers to partake in the lessons. The intervention also changed the context of the session which could have resulted in greater enjoyment being recorded compared to the control group.

Nonetheless, there is a link between self-efficacy, social support and PA (198), but it is not evident whether the effects were maintained over time. The effects of self-efficacy are explored within chapter 4 of this thesis to investigate whether social support in terms of PE motivational climate, PA and dispositional motivation can predict lifelong engagement in PA.

Conclusion

Reflecting on the literature reviewed in this chapter, it is evident that several factors are contributing to participation in PE that have the potential to support the promotion of PA in adulthood. Of the factors identified, participation in sports outside is the only study that has been found to predict PA in later life (199, 200). The PE motivational climate has been evaluated post-intervention (33) but was regarded as ineffective and has not been evaluated over a substantial number of years. In line with theoretical frameworks, this was surprising as according to SDT (24) and AGT (122), dispositional and contextual motivations can be influenced by a person's motivational climate, leading to long-term behaviour change. If the PE motivational climate is need supportive it can increase one's perceptions of competence (11, 131). Consequently, aiding the development of the students' perceptions of self-efficacy which has been identified as a mediator of PA (180, 181), though the effects long term have

not been explored. Across the abundance of literature, the multifaceted dimensions of engagement have not been investigated.

To address the gaps identified in the literature review, this thesis identifies the factors associated with changes in engagement (chapter 3), provides estimations of the effect each of these variables on later-life PA engagement (chapter 4) and identifies factors that impact students' perceptions of the motivational climate (chapter 5). Findings will provide policymakers and teachers with a clear picture of the areas to target to achieve the PE national curriculum aim of supporting the long-term participation in PA.

Chapter 3: Student-level predictors of engagement and changes in engagement with physical education: a combined cross-sectional and 4-year longitudinal analysis.

Abstract

Background: Research has identified numerous physiological, psychosocial and sociodemographic determinants of ‘participation’ in school PE lessons. Studies of students’ engagement within PE lessons are more scarce, longitudinal studies scarcer still.

Aim: To identify predictors of disengagement from PE using a combined cross-sectional and 4-year longitudinal study design.

Approach: Secondary analysis of data from the East of England Healthy Heart Study (n = 5538 students, Age 12.8 [1.4] years) in Years 7-11 and 1500 students followed longitudinally over four years from Year 7 to Year 11.

Results: Cross-sectional data identified inactivity and low fitness as predictors of being disengaged from PE. Longitudinal analysis showed a fall in engagement from Year 7 to Year 11 and identified low fitness and inactivity as predictors of becoming disengaged between Year 7 and Year 11.

Conclusions: These findings confirm activity and fitness as correlates of engagement and show an overall decline in students’ engagement with PE from Year 7 to Year 11. The determinants of engagement identified here may serve as potential targets for interventions to increase and maintain engagement in secondary school PE lessons.

Introduction

Physical education (PE) is a component of the national curriculum that requires children to be active for sustained periods of time. The aims of PE includes: developing children's competence in a broad range of physical activities through engagement in competitive sports and activities, as well as encouraging a healthy and active lifestyle (62). Schools provide a unique and great opportunity to help children achieve the goals set out by the government's physical activity (PA) guidelines. Young children currently spend 635 hours, in total, in the classroom each year on all subjects with an increase of 79 hours once they reach secondary school (excluding morning and after-school clubs). Children in English schools spend more time in school than any other country (51). Consequently, children spend most of their waking hours at school. Every child in the United Kingdom (UK) is provided with the opportunity to take part in PA through compulsory PE lessons and clubs provided by their school.

Yet reviews have indicated that a significant minority of children, especially adolescents, are not meeting the health guidelines for PA requirements (57), with 23% of boys and 20% of girls in England not achieving these. The guidelines comprise a minimum of one hour of moderate PA per day (MVPA), along with activities that strengthen bones and muscles at least three times a week (201). The proportion of children meeting the requirements dropped between 2008 and 2015, with a greater decrease shown in adolescents compared to younger age groups (57). Similar figures are presented worldwide with 25% of 11-year-olds meeting PA recommendations compared to 16% of 15-year-olds, emphasising the decline in PA with age (8). In addition, just under 50% of children worldwide achieve the current guideline of 60 minutes MVPA (8) despite schools, especially within the UK, having exceptional resources

and the ability to increase the PA levels of all children regardless of race or socioeconomic background. Therefore, it is apparent that not enough is being done to ensure that children are meeting the set guidelines for PA, especially adolescents, evidenced via a decline in PA participation worldwide (202-204). This could be tackled within schools as they provide countless opportunities to promote and influence PA levels.

A survey conducted by Youth Sports Trust (69), has reported that the growing pressure to adhere to academic standards (e.g., Ofsted or STATS), has resulted in a third of schools in the United Kingdom reducing the time allocated to PE in 2017. 38% of teachers have also reported a reduction in the PE provision to allow more time for core subjects (compulsory/assessed subject), demonstrating a downtrend (70, 71), which has been continuously happening over the last five years (between 2012-2017) (69). In response to the lack of time allocated to PE, a report by the Welsh Government (72) has suggested to make PE a core subject. By doing so the hope is that PE will be valued more as an integral part of students learning (9).

Engagement in PE

Engagement and motivation in PE have been identified as key determinants of adolescents leading an active lifestyle (205). Originally engagement in school was defined as the academic and social success of students in relation to student dropout (89). However, the definition of engagement has since evolved and is now regarded as a multifaceted concept that embodies behavioural (physical involvement, high attention, and effort), emotional (enjoyment and interest in relation to teacher, classmates and activity) and cognitive dimensions (competence and self-regulatory factors associated with the activity). During a PE lesson, students are regarded as being engaged if they are actively listening to the teacher,

exhibit enjoyment and demonstrate persistence to master a task or acquire knowledge (91-94). In contrast, disengagement is the absence of these dimensions (95).

To date nationally, there is no statistical evidence of student engagement in PE from a multifaceted perspective. However, PE participation rates have been gathered over the years through information that is readily available (e.g., school registers). According to the Global Students Health Survey, 55.2% of adolescents participate in PE once to two times a day/week, whilst 20% of the students reported never participating in PE between 2010-2015 (96). Despite no national representation of student engagement, several studies have used a wide range of methods to capture students' engagement in PE (see chapter 2 for an overview of the different methods).

For the remainder of this chapter, the focus will be on the behaviour dimension of engagement by means of student participation. To an extent, participation represents a basic level of student engagement as for a student to be participating in the lesson they will be displaying some elements of engagement, even if they are very weak.

Factors Influencing Student Engagement in PE

Over the years literature has identified a number of factors that can influence an individual's engagement in PE (see chapter 2).

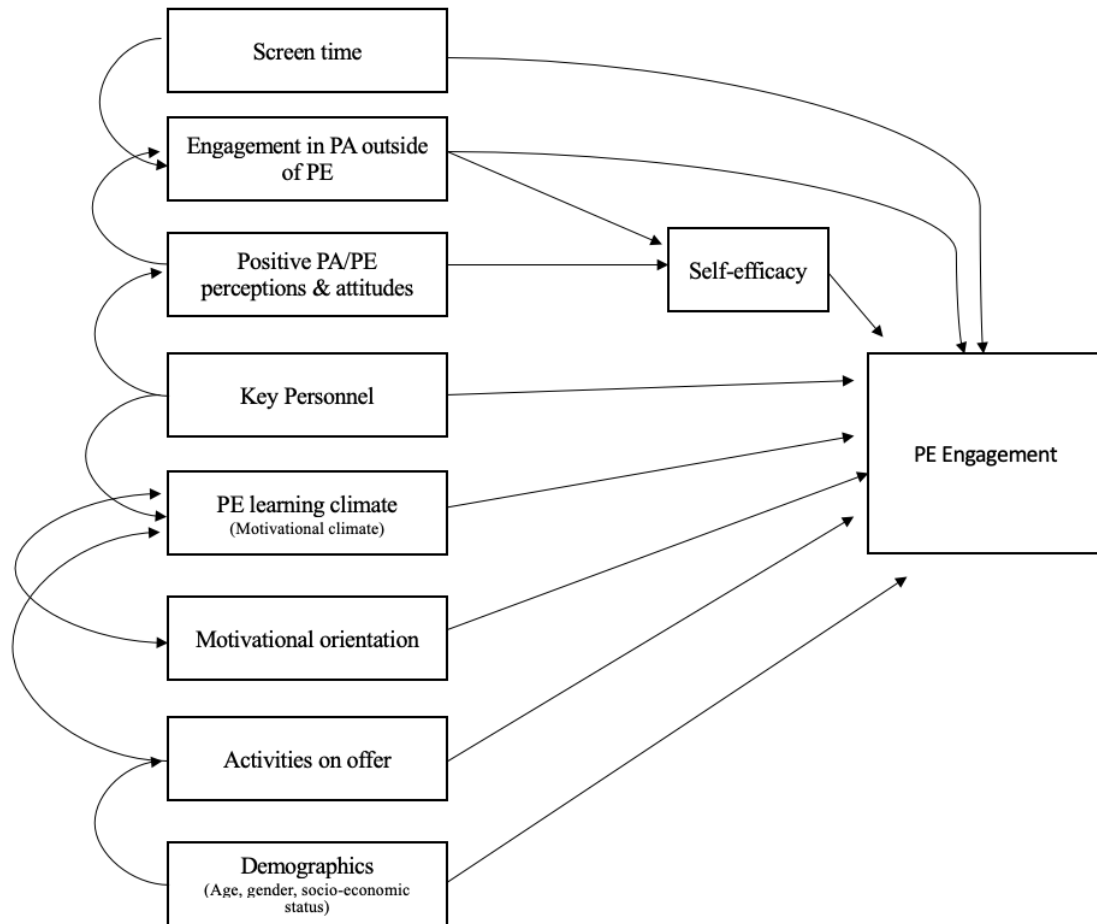


Figure 3. 1. Factors that are associated with engagement in PE based on the literature review in Chapter 2.

This chapter will focus on the sociodemographic predictors (age, sex), anthropometric (adiposity), fitness-related (CRF) and behavioural (PA, Parental PA and Screen-time) factors that are associated with engagement in PE.

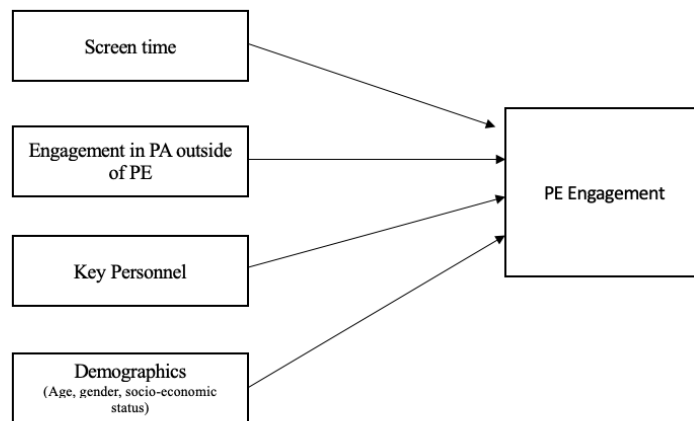


Figure 3. 2. Factors that this chapter will look at in regard to student engagement in PE

This chapter will not be exploring the following: Instructional Facilitators of Student Engagement in PE, Enjoyment, Self-Efficacy, or other Student-Level Psychological predictors these are addressed within chapters 4 and 5. It will only be assessing student-level demographic and physical factors.

The impact of the activity offered during PE lessons and how the activity is delivered

The PE national curriculum (62) is a government document that outlines the aims of PE and provides brief information on the areas PE teachers should be trying to develop within their students. Within schools, PE teachers are required to implement the curriculum. The curriculum is written in a minimalistic nature which allows teachers to assert their autonomy in the designing, implementation and assessment of their sessions, thus allowing for personal interpretation (73). With this in mind, it could be argued that teachers design sessions with predispositions that are personal to them which may unconsciously drive them to design and

deliver their lessons in a particular way (21). This may be presented by the sports or the activities that they chose for each gender along with player positions (19, 206).

For key stages 3 and 4 (secondary school children), one of the key aims of the PE national curriculum is to engage in competitive sports and activities. Teachers commonly try to address this aim by designing sessions that incorporate an element of gameplay. However, teachers need to consider how much time during the lesson is devoted to gameplay as over-reliance on gameplay can have negative effects on student engagement (30). A potential reason for this is that gameplay promotes comparison to others, interpersonal competition and personal success in the sessions based on winning (30). Instead, teachers should aim to devote the majority of the lesson to doing drills that develop the skills of the student as this is associated with increased student engagement (30). Longitudinal data has shown that enjoyment declines over time, particularly with regard to children who do not participate in team sports away from the PE lessons (207).

A variety of sports (e.g., hockey, athletics and tennis) are offered as part of their PE lesson across their school years to avoid boredom. Tidmarsh (208) found that key stage 4 (years, 7, 8 and 9) were satisfied with the variety of activities on offer, whilst key stage 5 (years 10 and 11) deemed their lesson boring and repetitive.

The type of activity offered in PE also links to situational interests and engagement (209). Literature has proposed that if an individual has high levels of interest in the activity it will result in greater cognitive engagement and achievement (92). Consequently, if the students see the value and are interested in the activity this will positively impact their levels of persistence and engagement (210). An alternative perspective argues that some students

engage in PE, not because they like the activity or lesson but rather that they feel pressured to do so, due to potential consequences from their teacher if they do not participate (90). Thus, personal beliefs and motivation also play a role in engagement in relation to activity.

Gender differences in PE

Gender has also been highlighted as a factor in determining beliefs around the perception of competence as well as attitudes (211, 212). A more recent study conducted by Scrabis-Fletcher and Silverman (213), presented conflicting findings as the self-report study found a low non-significant correlation between competence and gender. A potential reason for the low relationship may be attributed to the teacher's behaviours in the classroom. If the teacher treats males and females the same, reducing gender biases, there is a greater possibility that the students may not feel the effect of gender differences, potentially decontextualise within the session (213).

Some studies have explored the engagement of males and females in single-sex and coeducational classes. Students are reported to be more engaged and physically active in single-sex classes compared to coeducational lessons, especially females (214, 215). Using heart rate to measure exercise intensity as a proxy for engagement, adolescent girls were more engaged in the activity in single-sex lessons compared to coeducational PE lessons (216). When looking at the collective engagement of students within a coeducational PE setting, classes that had a higher percentage of boys were regarded as being more engaged (90). A potential reason for this is that boys have been shown to display similar levels of activity regardless of whether the lesson is single-sexed or coeducational (217). Unlike females who have stated that they dislike being in PE lessons where boys are present (218), and feel more comfortable without the presence of boys as they feel less conscious about

their body image and self-presentational concerns (208), for example wanting to appear feminine (219). Another contributing factor is that males and females have been found to be treated differently within coeducational lessons (220).

In coeducational classes (males and females mixed), the PE topic appeared to be inversely related to the classes' collective engagement, with rackets sports being indicated as the lowest collective engagement score when compared to other PE activities (ball games, artistic sports and fitness training; (90). Arguably this is not surprising as literature has identified several differences between gender in relation to the type of activities, they find appealing. For male students, it is proposed that they prefer competitive (77), team-focused sports which are a prominent feature within traditional PE lessons, along with sports that are deemed masculine (78), whilst team games of a competitive nature predominantly disengage girls (69, 79-82). Females on the other hand, if given the choice would select activities that tend to be non-competitive forms that are delivered at fitness clubs (78, 83). Notably, it is recognised that girls find meaning in activities that are relevant to them, such as fitness classes, unlike traditional sports which are a large component of the national curriculum. Taking this into account it is not surprising that racket sports appeared to produce the lowest collective engagement score as it is not a team-focused sport nor is it fitness training. Despite literature proposing effects of single-sex and coeducational classes along with the type of the activity on student engagement in PE, this chapter will not explore these effects as the items within the secondary data set do not capture this information.

The Influence of Peers on PA

Tidmarsh and colleague (208) propose that a peer-centred performance climate is more influential than a teacher-created climate in relation to engagement in PE. This is

unsurprising given that once an individual reaches adolescence, significant adult influences reduce whilst peer influence increases (221). This is supported by exploratory research that has found that conforming to social norms and/or peer relationships/friendships impact PA maintenance (43, 47, 128), as well as perceptions around PA or sport not appearing feminine or ‘cool’ for girls (49). This is associated with peer disapproval which is a barrier impacting girls’ engagement in sports (222). These are all factors that can influence an adolescent’s engagement in PE.

Students Attitude Towards PE

Having positive attitudes and beliefs towards PA and PE during school is an important predictor of lifelong engagement. Within a two-component model of attitude, it takes into consideration the cognitive and affective aspects, thus reflecting a person’s beliefs and feelings towards an object (223). It is not surprising that enjoyment is associated with generating positive attitudes towards PA (223, 224) as enjoyment refers to the state or process of receiving pleasure from something which in return creates positive experiences leading to the formation of positive attitudes. Studies exploring attitudes towards PE have found that students felt bored and alienated in PE lessons contributing to negative attitudes (225). It is not unforeseen that enjoyment and fun over time are central to positive attitudes (224).

Factors Influencing Student Physical Activity Outside of PE

It is evident that an individual's perception of competence and their attitude is an influential factor of engagement in PA and PE. Literature has also demonstrated that a parent can

influence a child's engagement in PA as a result of their personal views and behaviours to PA (69, 226-228) through an explicit role model (229). Similarly, family cohesion, communication and parents' PA engagement have been shown to be positively associated with PA engagement, with self-esteem as a mediating factor (230). This is not surprising as many children rely on feedback from others to inform their perceptions of their competency. A large population of studies exploring the association between parent PA and child PA have focused on children rather than adolescents. A potential reason for this is that from a developmental psychological perspective, it is known that during this stage of development, important personals shift from parents to friends and peers.

Active school travel (AST) and screen time do not directly reinforce PA behaviours; however, they have both been shown to be associated with impacting PA in adolescents. Systematic reviews have concluded that AST is a way of increasing PA within children and adolescents (231), but it is unclear the influence AST can have on engagement in PE and other forms of PA. Whilst screen time has been associated with lower PA (232); both factors have been investigated against body weight, as greater screen time has been shown to be associated with adolescent obesity (233-235).

Being overweight or obese is a barrier to PA, in most incidents, it is not due to being physically able to participate in PA but rather the feeling of being 'too fat to exercise', especially among women (236). Linking back to perceptions of competence and attitudes of PA (237), with perceived competence and body image having direct effects on PA levels (30). Thus, it is not surprising that women in particular demonstrate a decline in PA as a result of being overweight during adolescence (7).

Body image refers to a person's beliefs, perceptions, and emotional attitudes toward their own body (238) irrespective too how it actually looks (239). Negative body image has been shown to have a negative impact on PA participation, especially with regard to 14 to 16-year-olds with this being more apparent in girls (48). A study conducted in Slovakia found contradicting findings as it proclaimed that negative body image in girls did not affect PA participation but in boys having a negative body image reduced the probability of achieving PA recommendations (240). It is important to note that the design of the study was cross-sectional, consequently, it makes it near impossible to make a conclusive statement about the causality of the findings. The origins of where the data is collected is imperative to consider, due to cultural differences that may affect the generalisability of their findings, creating difficulty when comparing studies. Therefore, findings should be incorporated with caution.

Despite contradicting findings between gender's relationship with negative body image and PA, body weight, cardio-respiratory fitness (CRF) has been shown to be significantly correlated to self-reported PA participation in young people with CRF being a stronger enabling factor of engagement in PA (241). Findings have shown that individuals who have lower CRF, are more likely to be less PA and disengaged from PA during adolescents due to lower levels of PA perceptions and beliefs in their ability (242).

Demographics have also been identified as factors influencing PA. Adolescents from a higher socioeconomic status have been shown to be more physically active, however, these findings are not uniform as Stalsberg and Pedersen (243) found that just under half of the papers they included within their systematic review reported the opposite relationship or no effect at all. Schools with a high population of students from deprived areas have been identified to have the lowest levels of engaging in PE and PA out-of-school hours (68). However, lower socio-

economic status has been associated with higher levels of AST with regard to adolescent girls (244), which has been previously reported as a way of increasing PA (231).

Predicting Student Engagement in PE based on Physical Activity Literature

When predicting engagement of an individual it is important to take into consideration the factors that could increase the likelihood that they will be (dis)engaged in PE.

Aside from teacher influences, having a level of interest in the activities on offer in the PE lesson (92) as well as seeing value in the tasks is also linked to higher levels of engagement. On an individual level, if they participate in PA outside of school and are physically fit in terms of CRF, they are also more likely to be more engaged in PE compared to unfit individuals who do not engage in organised PA outside of school. These factors will contribute to greater perceptions of competence which is associated with greater engagement (30). Although not as prevalent in adolescents, the amount of PA their parent engages in positively predicts engagement in PE.

Gender itself can impact the likelihood of disengagement, as females are more likely to be disengaged in PE than males. Potential contributing factors to this are that females battle with preconceptions around PA and sport not appearing feminine (245, 246), and greater concerns about being compared to others (208) linking to increased disengagement. Weight and self-perceptions of a negative body image (247) also reduced participation rates and engagement due to fear of feeling judged and low competency.

The aim of the cross-sectional section is to explore factors that are associated with (dis)engagement in PE, whilst the longitudinal dataset will investigate student engagement from year 7 to 11 to explore which factors predict the greatest change over time. The purpose of this is to identify target populations and the contributing factors in a bid to inform future interventions aimed at engaging students in PE. The study will first look at cross-sectional data and then explore the effects over time.

Research questions:

Cross-sectional analysis:

Q1. What are the factors associated with being disengaged from PE?

Longitudinal analysis:

Q2. How does engagement within PE change from year 7 to year 11?

Q3. What factors are associated with the change in engagement from year 7 to year 11?

Methodology

Cross-Sectional Study Design

A secondary data cross-sectional approach was taken to explore the relationship between self-reported participant engagement and predictor variables, age, gender, weight category, location, fitness level and PA participation along with parent PA participation, social economic status, and screen time.

Participants

The data set was drawn from the East of England Healthy Heart Study (EoEHH). The EoEHH collected health and fitness data between 2006 and 2011 from school children in the East of England during their regular scheduled PE lessons. Participants were all volunteers and consisted of a total of 5538 pupils between the ages of 10 to 18 years old (Male N= 2929, $M_{age} = 12.86$, $SD = 1.35$, Female N= 2609, $M_{age} = 12.69$, $SD = 1.26$) at baseline. Prior to data collection ethical approval, participant and parental consent were given. Individuals who failed to report their age and/or gender were removed from the data set.

Protocols

Anthropometry measures consisted of stature reported to the nearest mm and mass to the nearest 0.1 kg. Participants wore standard physical education attire without shoes during data collection. The two measures were used to calculate an individual's body mass index (BMI: $\text{kg}\cdot\text{m}^{-2}$), which was standardised by converting to age and sex-specific z-scores based on the UK reference data (248). Obesity classification was in accordance with the International Obesity Task Force (IOTF; (248, 249). Waist circumference (WC) was measured to also categorise participants who were classified as obese. Participants were instructed to locate their umbilicus using their index finger. The researcher then placed the non-elastic anthropometric measuring tape two centimetres above the participant's identified umbilicus above their gym clothing. This procedure was repeated twice. If the two recordings were in a 0.5cm agreement, then the lowest measurement was recorded to the nearest 0.5cm. Age and sex-specific z-scores for WC were calculated based on the published national reference data (250). The WC z-score cut-offs were used to create two groups for analysis: non-obese and obese.

Cardiorespiratory fitness (CRF) was obtained using a 20-meter shuttle run test (20mSRT). The test required participants to run the 20m consecutively to the speed of a FITNESSGRAM PACER (251). Validity (252) and the feasibility of the test have been previously discussed (253). The total number of shuttles completed by each participant was recorded. Standardisation required the shuttle runs to be converted to running speed ($\text{km}\cdot\text{h}^{-1}$) and then expressed as age and gender-specific z-scores constructed on global performance indices (254). Participants were categorised as 'fit' or 'unfit' based on FITNESSGRAM cut-off points. FITNESSGRAM proposes three cut-off points, however, the middle, and upper results were combined for the purpose of this study. Consequently, if an individual scored higher than the standardised score for their age and gender they were placed in the 'fit' group, and vice versa. Participants diagnosed with a known medical condition or suffering from an illness or injury during the time of data collection were prohibited from taking part in the 20mSRT.

Physical activity questionnaire for adolescents (PAQ-A) was used to establish PA levels (255). The questionnaire required students to complete a 7-day recall across a number of activity domains including outside-of-school sports, activities during lunch break and after school along with weekend activities. Each response was recorded on a 5-point Likert scale with 1 representing low PA and 5 representing high PA. The scores recorded for each question are combined to generate an overall summary score. Overall mean PAQ-A score cut-off points were used to create two groups classified as active (moderate to high PAQ-A mean score) and inactive (low PAQ-A mean score (256). Validity and reliability for the PAQ-A has been provided (257) (internal consistency Cronbach alpha = .93).

Engagement was measured by extracting question two from the PAQ-A, which required participants to report 'In the past 7 days, how often were you very active during PE (getting

sweaty, breathing hard and/or getting tired legs)’. Participants were required to report their answers on a 5-point Likert scale with 1 representing ‘I don’t do PE’ to 5 ‘Always’. It has been argued that individual items of the PAQ-A should not be investigated on their own, however, responses of individual components have been previously validated (258). Participants who reported that they were, ‘hardly ever’ or ‘sometimes’ active in PE, were collapsed to create the disengaged in PE group (1603 students), whilst the engaged group collapsed the students who reported they were often or always active during PE (3935 students).

To gain an insight into parents' PA engagement, students were asked ‘How often in a week do you normally do physical activity (e.g., sports, games, walking or cycling) with the adults in your family?’. The participants were required to provide their answer on a 5-point Likert scale ranging from 1 representing never to 5 representing every day. For analysis purposes, the responses were grouped accordingly: responses 1 and 2 were combined to make the ‘rarely’ group, response 3 became ‘sometimes’ and responses 4 and 5 represented the ‘often’ group.

Cross-Sectional Data analysis

Data computed from the EEHH study was converted into IBM SPSS Statistics 25 to be analysed. A binary regression analysis was run to explore the odds ratios (ORs) for being classified as disengaged in PE. Using disengagement as a reference, ORs for fitness, activity and weight category predicating disengagement in PE was determined (model 1). The analyses were repeated and adjusted for age, sex, location, and socioeconomic status (model 2) and lastly adjusted for parent PA levels, mode of transport and screen time (model 3).

Longitudinal Study Design

All protocols were repeated at year 9 and year 11.

Longitudinal data analysis

With regard to the longitudinal data, an engagement difference score was generated for year 7 to year 11. The engagement difference scores were then split into 4 categories; remained engaged (engaged in PE at year 7 and year 11), became engaged (students who were disengaged at year 7 but became engaged in year 11), became disengaged (students who were engaged at year 7 but became disengaged at year 11), and remained disengaged (students that were disengaged at year 7 and year 11). A binary regression was run to explore the ORs for the four engagement difference categories in relation to model 3, with social-economic status as a covariate.

Results

Descriptive statistics of the participant characteristics, fitness and activity levels at the three test points are displayed in Table 1. As you can see the number of inactive students increased from year 7 to year 11. However, the number of unfit students decreased. Changes were also evident with the amount of PA with parents decreasing whilst the average hours of screen time increased across the 3 testing points.

Table 3. 1. Descriptive statistics of participant characteristics at three test points.

Variable	Year 7		Year 9		Year 11	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Weight Status						
Obese		19.9		16.3		13.3
Non-Obese						
PA						
Active		67.9		63.7		53.1
Inactive		33.1		36.3		46.9
Fitness Level						
Fit		72.8		76.3		82.4
Unfit		27.2		23.7		17.6
PA with Parent						
Often	1263	89.01	283	20.33	143	15.56
Sometimes	75	5.29	461	33.12	231	25.14
Rarely	81	5.71	648	46.55	545	59.30
Screen Time						
<2	576	40.51	104	7.31	52	3.66
2-4	736	51.76	1081	76.02	1196	84.11
>4	110	7.74	237	16.67	174	12.24

n: number of participants.

%: Percentage of participants in each group.

Obesity: Waist Circumference classification z-scores (250)

Physical Activity: PAQA mean score calculated to create an overall mean score (Active: moderate to high PAQA mean score; Inactive: Low PAQA mean score(256).

FITNESSGRAM PACER cut-offs based on age and gender (Fit: Upper and middle cut-offs combined; Unfit: Lower cut-offs: (254). (251)

Cross-sectional Results

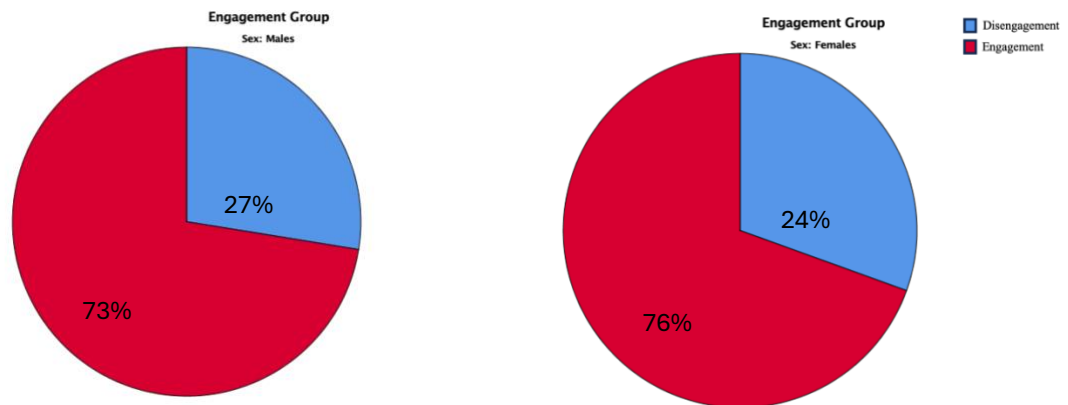


Figure 3. 3. Percentage of male (left) and female (right) who are classified as either engaged or disengaged in physical education lessons with regards to the cross-sectional data.

Table 3. 2. Cross-sectional predictors being disengaged from PE.

	Unadjusted OR (95% CI)	Model 2 Adjusted OR (95% CI)	Model 3 Adjusted OR (95% CI)
Unfit	1.39 (1.16-1.68)**	1.41 (1.16-1.70)**	1.41 (1.16-1.71)**
Inactive	3.87 (3.28-4.56)**	3.84 (3.25-4.54)**	3.75 (3.15-4.46)**
Obese (WC)*	0.81 (0.66-1.00)	0.89 (0.76-0.99)	0.79 (0.65-0.98)
Age		0.97 (0.91-1.04)	0.98 (0.91-1.05)
Females		0.89 (0.76-1.04)	0.90 (0.77-1.06)
Location			
Suburban		0.85 (0.69-1.04)	0.86 (0.68-1.08)
Rural		1.03 (0.81-1.31)	1.03 (0.81-1.31)
IMD		1.00 (0.99-1.01)	1.00 (0.99-1.01)
PA with Parent			
Sometimes			1.16 (0.94-1.44)
Rarely			1.24 (0.99-1.54)
Screen time (h)			
2-4			0.83 (0.63-1.09)
>4			1.01 (0.84-1.21)

*p<0.05 ** p<0.0

CI, confidence interval; OR, odds ratio;

IMD, Index of multiple deprivations; α , Continuous variable

Obesity: Waist Circumference classification z-scores (250)

Physical Activity: PAQA mean score calculated to create an overall mean score (Active: moderate to high PAQA mean score; Inactive: Low PAQA mean score: (256).

FITNESSGRAM PACER cut-offs based on age and gender (Fit: Upper and middle cut-offs combined; Unfit: Lower cut-offs: (251, 254).

Reference categories: unfit = fit, inactive = active, obese = not obese, females = males, Suburban, rural = urban, Parent PA sometimes, rarely = often, t, screen time 2-4h, >4h = <2h.

A binary logistic regression was performed on cross-sectional data to investigate the likelihood that an adolescent would be disengaged in PE. After adjusting for age, sex, location, and socioeconomic status, model 2 explained 13.7% (Nagelkerke r^2) of the variance of PE engagement and correctly classified 69.8% of all cases. Further adjustments (model 3) for physical activity with a parent, mode of transport and screen time, explained 13.9% (Nagelkerke r^2) of the variance of PE engagement and correctly classified 69.7% of all cases.

Within the unadjusted model, unfit adolescents were more likely (OR 1.39 [CI: 1.16-1.68]) to be disengaged in PE compared to fit adolescents. The likelihood of an unfit adolescent being disengaged in PE, compared to a fit adolescent, increased when adjusted for age, sex, location and socioeconomic status in model 2 (OR 1.41 [CI: 1.16-1.70]) and parent PA levels, mode of transport and screen time in model 3 (OR 1.41 [CI: 1.16-1.71]). Inactive adolescents were more likely to be disengaged in PE compared to active adolescents (3.87 [CI: 3.28-4.56]). The likelihood decreased in model 2 when adjusted for age, sex, location, and socioeconomic status (OR 3.84 [CI: 3.25-4.54]) and again in model 3 when further adjusted for parent PA levels, mode of transport and screen time (OR 3.75 [CI: 3.15-4.46]). Obese adolescents were less likely (OR 0.81 [CI: 0.66-1.00]) to be disengaged in PE than non-obese adolescents.

Findings show that there is no association between the location in which an adolescent lives and their engagement in PE (Model 2: suburban OR 0.85 [CI: 0.69-1.04], rural OR 1.03 [CI: 0.81-1.31], Model 3: suburban OR 0.86 [CI: 0.68-1.08], rural OR 1.03 [CI: 0.81-1.31]). Similarly, no association was found between the frequency of participating in physical activity with a parent (sometimes OR 1.16 [CI: 0.94-1.44], rarely OR 1.24 [CI: 0.99-1.54])

and adolescent engagement in PE. The number of hours in front of a screen also had no association with the likelihood (2-4h OR 0.83 [CI: 0.63-1.09], >4h OR 1.01 [CI: 0.84-1.21]) an adolescent would be engaged in PE. Results also indicate that with each year of age, from the age of 11, the likelihood of being disengaged in PE increased by 2%.

Longitudinal Results

Table 3. 3. Change in frequency and percentage from year 7 to year 11 for males and females within the four engagement groups.

		Remained Engaged	Became Engaged	Became Disengaged	Remained Disengaged
Males	%	57.2	17.8	16.1	8.9
	n	441	137	124	69
Females	%	59.0	16.3	17.2	7.5
	n	384	106	112	49

Remained engaged (Engaged in PE in year 7 and engaged in PE year 11)

Became engaged (In year 7 students were disengaged but became engaged in year 11)

Became disengaged (students who were engaged in year 7 but were disengaged in PE, by Year 11)

Remained disengaged (disengaged in PE in Year 7 and year 11)

Changes in the numbers and percentages of participants in each of the engagement groups are reported in Table 3.3. Over 50% of students remained engaged in PE, the most interesting changes were in the became disengaged in PE and the remained engaged in PE groups for both males and females. Tables 3.4 and 3.5 show the ORs for the predictor variables of males and females respectively.

Table 3. 4. Factors associated with changes in male students' engagement with PE from Year 7-11.

<i>Males</i>	Remained Engaged (Ref)	Became Engaged OR (95% CI)	Became Disengaged OR (95% CI)	Remained Disengaged OR (95% CI)
Demographics				
IMD	1.00 (Ref)	1.01 (0.98-1.03)	0.97 (0.94-1.00)	1.00 (0.95-1.03)
Location				
Rural	1.00 (Ref)	1.00	1.00	1.00
Suburban		2.33 (1.25-3.53)*	0.88 (0.59-1.51)	0.98 (0.45-1.99)
Urban		1.88 (1.09-1.22)	1.26 (0.80-1.57)	0.92 (0.43-1.97)
Fit	1.00 (Ref)	1.00	1.00	1.00
Unfit		2.14 (1.20-3.61)*	1.29 (0.83-2.00)	1.22 (0.74-2.24)
Non-Obese	1.00 (Ref)	1.00	1.00	1.00
Obese		0.81 (0.49-1.29)	1.62 (0.90-3.01)	1.47 (0.70-3.12)
Active	1.00 (Ref)	1.00	1.00	1.00
Inactive		0.96 (0.67-1.29)	8.32 (6.03-11.91)*	11.49 (6.4-25.21)*
Parental PA				
Often	1.0 (Ref)	1.00	1.00	1.00
Sometimes		0.87 (0.50-1.51)	1.87 (1.13-3.08)	0.91 (0.43-1.91)
Rarely		1.20 (0.61-2.34)	8.08 (2.30-11.64)*	0.37 (0.13-1.07)
Screen Time (h)				
<2	1.00 (Ref)	1.00	1.00	1.00
2-4		0.89 (0.56-1.39)	1.47 (0.93-2.33)	1.33 (0.73-2.44)
>4		1.04 (0.50-2.19)	1.01 (0.42-2.43)	0.99 (0.35-2.80)

* $p < 0.05$ ** $p < 0.001$

CI, confidence interval; OR, odds ratio; IMD, Index of multiple deprivations.

Remained engaged (Engaged in PE in year 7 and engaged in PE year 11)

Became engaged (In year 7 students were disengaged but became engaged in year 11)

Became disengaged (students who were engaged in year 7 but were disengaged in PE, by Year 11)

Remained disengaged (disengaged in PE in Year 7 and year 11)

Obesity: Waist Circumference classification z-scores (250)

Physical Activity: PAQA mean score calculated to create an overall mean score (Active: moderate to high PAQA mean score; Inactive: Low PAQA mean score(256).
FITNESSGRAM PACER cut-offs based on age and gender (Fit: Upper and middle cut-offs combined; Unfit: Lower cut-offs: (254). (251)

Inactivity and PA with parent rarely were significant predictors of males becoming disengaged from PE. Compared to active males, those who were inactive at year 7 were 8.32 (6.03-11.91) times more likely to become disengaged from PE by year 11. Year 7 who rarely did PA with a parent were 8.08 (2.30-11.64) times more likely to become disengaged by year 11.

Inactivity was also predictive of remaining disengaged. Compared to active year 7 males, males who were inactive in year 7, were 11.49 (6.4-25.21) times more likely to remain disengaged at year 11.

Unfit males in year 7 were 2.14 (1.20-3.61) times more likely to become engaged in PE by year 11 when compared to active year 7 males who remained engaged in PE. Males were also more likely to become engaged in PE by year 11 if they lived in the suburbs in year 7 (2.33 [1.25-3.53]).

Table 3. 5. Longitudinal predictors of change in engagement with PE.

Factors associated with changes in female students' engagement in PE from Year 7-11.

<i>Females</i>	Remained Engaged	Became Engaged OR (95% CI)	Became Disengaged OR (95% CI)	Remained Disengaged OR (95% CI)
IMD	1.00 (Ref)	1.00 (0.97-1.03)	1.00 (0.97-1.03)	1.01 (0.96-1.05)
Location				
Rural	1.00 (Ref)	1.00	1.00	1.00
Suburban		1.33 (0.82-2.31)	0.71 (0.46-1.35)	1.18 (0.59-2.39)
Urban		1.48 (0.82-2.67)	0.89 (0.50-1.59)	1.12 (0.53-2.47)
Fit	1.00 (Ref)	1.00	1.00	1.00
Unfit		0.95 (0.49-1.87)*	2.42 (1.15-4.80)	1.52 (0.57-2.54)
Non-Obese	1.00 (Ref)	1.00	1.00	1.00
Obese		0.95 (0.56-3.15)	1.69 (0.95-3.15)	1.77 (0.75-4.16)
Active	1.00 (Ref)	1.00	1.00	1.00
Inactive		1.36 (0.80-2.24)*	12.03 (7.45-20.4)	9.92 (5.60-14.86)*
Parental PA				
Often	1.00 (Ref)	1.00	1.00	1.00
Sometimes		1.46 (0.36-1.38)	1.90 (0.94-3.86)	1.04 (0.39-2.06)
Rarely		1.06 (0.32-1.70)	1.74 (0.76-3.99)	1.24 (0.43-3.59)
Screen Time (h)				
<4	1.00 (Ref)	1.00	1.00	1.00
2-4		0.85 (0.53-1.37)	0.95 (0.51-1.25)	1.32 (0.65-2.71)
>4		0.55 (0.19-1.58)	0.65 (0.29-1.76)	2.57 (0.87-4.84)

* $p < 0.05$ ** $p < 0.001$

CI, confidence interval; OR, odds ratio; IMD, Index of multiple deprivations

Remained engaged (Engaged in PE in year 7 and engaged in PE year 11)

Became engaged (In year 7 students were disengaged but became engaged in year 11)

Became disengaged (students who were engaged in year 7 but were disengaged in PE, by Year 11)

Remained disengaged (disengaged in PE in Year 7 and year 11)

Obesity: Waist Circumference classification z-scores (250)

Physical Activity: PAQA mean score calculated to create an overall mean score (Active: moderate to high PAQA mean score; Inactive: Low PAQA mean score: (256).

FITNESSGRAM PACER cut-offs based on age and gender (Fit: Upper and middle cut-offs combined; Unfit: Lower cut-offs: (254). (251)

Reference categories: became disengaged, always disengaged, were disengaged = always engaged, unfit = fit, inactive = active, obese = not obese, Suburban, rural = urban, Parent PA sometimes, rarely = often, screen time 2-4h, >4h = <2h.

Compared to active females, those who were inactive in year 7 are 1.36 (0.80-2.24) times more likely to become engaged in PE by year 11. Females in year 7 who were unfit were 0.95 (0.49-1.87) times more likely than fit females to become engaged in PE in year 11.

In Females, no significant predictor was found for becoming disengaged from year 7 to year 11.

The odds ratio for females remaining disengaged in PE in year 11 was 9.92 (5.60-14.86) times higher if they were inactive in year 7.

Discussion

Cross-sectional

The cross-sectional study aimed to ascertain what factors are associated with being disengaged in PE. The results indicated that being unfit or inactive increases the likelihood that an individual will be disengaged in PE.

Nationwide there is a consensus that individuals, in particular adolescents, are not meeting daily PA requirements for health (8, 57, 259). Among policymakers, researchers, and lifestyle practitioners, it has been argued that adolescence is an influencing time point in a person's life whereby engagement in PA is likely to decline, particularly for girls (8, 260).

Consequently, interventions that are aimed at increasing lifelong engagement and overall participation in PA have targeted adolescents and been delivered through schools. Findings argue that decline in PA occurs from as young as 5 and 7 years old and that there is no evidence to suggest that the decline is any greater in adolescents than in childhood (261, 262). As this study only focuses on adolescents it is unable to comment on whether this point in a person's age, is a critical point in the engagement of PA.

Inactivity as a predictor of disengagement in PE

The findings of this cross-sectional study agree that disengagement in PE is a growing concern, as over 60% of males and females were disengaged in PE, with inactivity being the greatest predictor. It is not unsurprising that individuals who are classified as inactive are also disengaged in PE as PA experiences outside of school can impact an individual's motivation during PE by shaping the value they place on the subject (263). These external PA experiences provide the foundation for extensive cognitive and affective foundations that allow the students to comprehend, interpret and internalise movements that allow them to feel competent (263) and generate specific motivational characteristics that are utilised within PE (91). It is postulated that the experiences a person gains through participation in PA and sport outside of school increase perceptions of competence which in turn act as a foundation for developing competence during PE (91). Although it is evident that engaging in PA and sports outside of school increases the likelihood of individuals engaging in PE, these studies categorise their outside-of-school PA groups based on participants who engaged in organised sessions. Arguably, an individual can engage in regular PA away from organised sessions and meet recommended daily PA by going for a run, a bike ride, or the gym. Thus, it raises the question do students need to participate in organised PA sessions for them to build the foundation for developing competence in PE or does unorganised PA suffice?

To a broad extent, this study attempts to address this as it includes all means of PA and sports outside of school. However, this is based on a self-report measure, so should be interpreted with caution. Despite the use of the self-report measure, this study supports the notion that if a person engages in PA outside of school, they are more likely to engage during a PE lesson compared to students who do not engage in PA outside of school. Future studies may wish to expand on the current literature by investigating if the type of PA they participate in and outside of school (e.g., teamed/individual, or organised/unorganised), plays an influencing role in their engagement and motivation to different types of PE lessons.

Obesity is not a predictor of disengagement in PE

Despite a large body of research, a limited few have explored the impact obesity has on PE engagement. Instead, it has predominately focused on the impact being obese or overweight has on teacher's perceptions (264), students' fitness levels (265) and students' competence perceptions (266). Studies proposed that the weight classification of a person does not impact the time they spend active during PE (267, 268). However, it is important to note that the studies used self-report measures to gauge PA participation during PE (267, 268). This reduces the reliability of the findings as Prince and colleagues (269) have highlighted that self-report measures either overestimate or underestimate the amount of PA of a person. It could also be argued that the relationship between PE and weight was found as students may have been referring to their timetabled PE lessons and not whether they attended the PE lesson or how much effort they exerted during it.

Hannon (270) objectively measured the quantity of movement during a PE lesson through the method of step count and proposed that overweight and non-overweight students accumulated similar amounts of PA during gameplay in PE. Although step count can provide

an indication of the quantity a person is moving it fails to assess the nature of movement, the quality of that movement and does not allow assessment of movement intensity.

For all these studies body mass index (BMI) was used as their classification tool for obesity. BMI is a non-invasive measure that is easy to calculate through a person's weight and height, then standardised for age and gender. Despite BMI being a validated tool for BW classification, researchers have questioned the appropriateness of using BMI as a tool to classify the weight status of adolescents, as it is known that during puberty it is healthy and normal for an individual's body weight to increase. One study has found that after adjusting BMI for maturity, 32% of girls and 15% of boys who were originally classified as overweight were reclassified to normal weight, and 11% of boys and 8% of girls who were classified as obese were reclassified as overweight. This highlights the importance of taking maturity levels into account.

When looking at the wider literature on BW and general PA engagement, contradicting findings have been presented, which has led to the debate of, does fatness lead to inactivity or inactivity leads to fatness. Although this debate has not been addressed in detail within the PE literature, it is worthy to note as it may help future studies understand why a population of students are disengaged in PE. Going forward, it is important to consider multiple methods of weight classifications to explore variances between them, as well as utilising multiple measures of PA to explore the quality and quantity of engagement.

Longitudinal

Supporting the cross-sectional findings, the longitudinal dataset also found that being classified as inactive was the greatest predictor of changes in engagement from year 7 to 11.

For males, this was evident across becoming disengaged and remained engaged engagement categories, and females remained engaged only, when compared to the remained engaged group. Thus, it could be argued that one of the main aims of PE is not being met, which is to facilitate and promote long-term active lifestyles and healthy living (271, 272). Being classified as unfit also increased the likelihood that males would become engaged in PE. Whilst females, it increased the likelihood of becoming disengaged in PE. Males presented an additional predictor of changes in engagement from year 7 to year 11 with engaging in PA sometimes with a parent increasing the probability that they would remain disengaged in PE in year 11.

The most prominent information brought to light from these results was the number of students becoming engaged (M=17.8%, F=16.3%) or becoming disengaged (M=16.1%, F=17.2%) in PE from year 7 to year 11. This raises the question, what are the contributing factors that are influencing the predictors of engagement, causing these students to experience shifts in their engagement over their time at school?

Exploration of why students ‘became disengaged in PE’

From Year 7 to Year 11, 17.2% of females and 16.1% of males became disengaged in PE. This suggests that something happened between year 7 and year 11 that resulted in them no longer being engaged in PE. Due to the nature of this study, the reasons for the shift in engagement cannot be inferred, nor can causal relationships be explored. However, in accordance with past research, it is not unforeseen that habits of engagement in PE change from year 7 to year 11, as ‘middle school’ years (ages between 9-14) have been regarded as a critical time to foster PA attitudes, behaviours, and enjoyment (273). During these years,

adolescents, in particular females, tend to drop out of organised sports and show a decrease in their general engagement (202, 223, 273) and enjoyment (207). These findings support those presented within this study but do not explain what is causing this shift in PA attitudes, behaviours and enjoyment.

When looking at a child's journey through secondary school, there is a notion that the latter years are the important years from an academic perspective as this is when they start to focus on their exams, in order to move onto the next stage of their life. The emphasis academia placed on students during these years has left students feeling confused as teachers are encouraging them to stay physically active, whilst increasing their homework and reducing their opportunities to be physically active within the curriculum (274) and extra-curricular activities (275). Thus, it could be proposed that it is not surprising that some students became disengaged in PE during the latter years of their studies as they may have placed value on external priorities.

Perceptions of competence

According to Dismore and Bailey (224), there appears to be a shift in PE from KS2 to KS3. Participants within their qualitative study reported PE in KS2 focused on 'fun' whilst KS3 students referred to PE as being more focused on challenging and developing skills. This shift in perception could be associated too drops in engagement at secondary school as year 7 students may hold onto their previous perceptions of PE from primary school, which over time change due to new experiences gained through secondary. For some students, the shift towards developing skills and challenging themselves within the lesson may lead to increased motivation through the development of competency. Having high perceptions of PA competency during year 7 is critical for increasing the likelihood of long term-engagement in

PA (276). Thus, it could be inferred that a potential contributing factor for those students within this study who became disengaged in PE lacked the perceived competency to meet the demands of the task, which continued to decrease through their school years. This corresponds with Harter's competence motivation theory (277) which suggests that individuals with a high perceived PA competence will persist in PA longer than those who do not. Although competence over the years has been highlighted as a barrier to lack of engagement in PE (30, 278, 279), especially with regard to girls (280), others have argued that disengagement is not a result of lack of competence but rather that the lessons were not challenging enough for them, leading to boredom, resulting in disengagement (225, 281). This could also be a feasible alternative explanation for some of the students who became disengaged in PE within this study, which raises the question: are PE teachers considering different competency levels to not overstretch those with low perceived PA competence, but also make it challenging enough for high perceived PA competence students to not become bored and disengaged?

Social Perception: the Desire to Appear Feminine

Aside from competency, intrapersonal factors (e.g., lack of confidence and a change in priorities; (263) and interpersonal factors (e.g., social pressures and support) have also been identified as contributing factors to disengagement. With regards to girls specifically, once they reach their adolescent years, there is a perceived pressure to appear feminine, which is associated with stereotypical ideas around PA and PE. Past literature has argued that the traditional design of PE promotes masculine characteristics (282), which can leave some females feeling side-lined (283). For many young females, the ideologies they have around being feminine do not correspond to the behaviours that they are required to display during PE (219). This results in females having to choose whether they adhere to the pressures of femineity or appear musicalized (219). Depending on the choice they make, will influence

their engagement within PE. Yes, some females continue to engage and enjoy PE, but they have reported that they are faced with having to demonstrate their femininity and heterosexuality in other aspects of their lives because of participating in PE. Unfortunately, this pressure of having to prove themselves to be feminine, despite having the competency and confidence to engage in PA and sports outside of PE, leads to some female students feeling as though they cannot try their best during lessons for fear of being called 'strong' or a 'man', as they do not adhere to feminine characteristics (245).

Teachers report that students who are regarded as 'strong girls', in the sense that they demonstrate confidence through their academic abilities, social skills and confidence in other lessons, tend to reduce these characteristics and move towards the norm of what is expected of them by behaving in a more feminine way which to some extent contradicts their otherwise 'strong' behaviours (284). Consequently, many females see PE lessons as an opportunity to demonstrate their femininity through refusing to participate, not engaging or underperforming (285-287). Thus, demonstrating the influence of peer pressure to conform to gender-appropriate PA and stereotypes leading to dropping out of sport and PA (288, 289).

As the measure of engagement within this study was determined by how out of breath and sweaty one perceived themselves to be during PE lessons, it is not surprising that unfit females were more likely to become disengaged in PE, given the perceived importance of displaying feminine characteristics which being sweaty does not correspond with. This is supported by previous studies, whereby adolescent girls' PA levels decrease when they were sweaty, smelly and experienced shortness of breath (290, 291). Aside from shortness of breath, the timing of the PE lesson impacted the engagement of girls, as they were less likely to engage if it was delivered in the morning or the middle of the day as they felt

uncomfortable going to other lessons without showering (274). It is unclear when PE lessons were delivered in relation to this study as this was not recorded in the original data.

Environmental factors such as not having showering facilities, changing rooms and the presence of the opposite sex have all been identified as barriers of engagement (39, 279).

Evidence suggests that single-sex PE lessons resulted in more enjoyment and engagement for female students (215, 292) as well as positively influencing students' intrinsic motivation, perceived competence and performance (217, 292). Without knowledge of the nature of the lessons, it is impossible to determine if this was a contributing factor, despite previous studies implying that it could be the case. To a degree, it could be suggested that issues around femininity and not wanting to put the effort in during PE could have contributed to the number of the girls becoming disengaged in PE from year 7 to year 11 as female students within the 'became disengaged' group were classified as unfit, were 2.35 (1.15-4.80) times as likely to become disengaged compared to the remaining engaged group. This could be associated with femininity and not wanting to demonstrate their true abilities, as fitness levels were gauged through the 20-meter shuttle run test. This measure of fitness requires the individual to be motivated to complete as many shuttle runs as they possibly could which would most likely lead to someone becoming sweaty, smelly and out of breath. This also links back to competence as expectancy-related beliefs around how well they will perform in PE has also been shown as a positive predictor of successful performance in the 20mSRT (92, 242). Doing well on 20mSRT, despite gender, has been associated with positive attitudes towards PE, high perceptions of competence and more engagement in PE (293, 294). Findings of this nature have been allied with the notion that fitness testing encourages one's competence in that particular area, as it offers a more challenging task than everyday PE lessons (295). Therefore, it requires females to put aside concerns about femininity and perform to the best of their ability. Evidently, there are more reasons to suggest why some females become

disengaged in PE than males, but this may be due to the fact that a majority of studies looking at disengagement within PE have focused on females, as they are regarded as a ‘problem group’.

Male students’ participation in PA with a parent/guardian

In the present study, when looking at the predictors of the likelihood of becoming disengaged in PE, an additional predictor variable for males was identified, engaging in PA sometimes with a parent. Boys receive more parental support for physical activity than girls (226), but this does not explain why only ‘sometimes’ was a predictor of becoming disengaged and not ‘rarely’.

Parents play a vital role in encouraging children to engage in PA, but as adolescents age, the shift of importance moves away from parents towards friends and peers (47). During childhood, parents can transfer their attitudes and behaviours towards PA onto their children to influence their engagement in PA (69, 226-228). This is dependent on the relationship between the parent and the child. In line with the Attachment Theory, it postulates that early psychological and behavioural interactions within the parent-child relationship will influence the foundation of the child's personality and shape the development of future relationships (296). A secure relationship between a parent and child means that the child welcomes their involvement in their life, continuing into adolescents. Taking into consideration the theory and the findings from this study, that at year 7 ‘sometimes’ engaging in PA with a parent predicted the likelihood that a student would become disengaged in PE, it may be inferred that the child and parent relationship was not strong enough to transfer into adolescents, resulting in the adolescent no longer welcoming parental involvement. This would contribute to the explanation of why ‘sometimes’ was a predictor and ‘rarely’ was not as it is likely that parents who rarely engaged in PA with their child did not demonstrate strong positive views

and behaviours towards PA from the outlook. While the sometimes group may have had positive attitudes and behaviours to start with, but as the shift of vital role changes from parents to peers so does their perceptions of PA.

Gender differences may have occurred as Lisinskiene and Juskelien (296), study postulates that a father is more influential in enhancing PA engagement, due to being seen as the more active role model. The Social Learning theory (174) proposes that children have an inborn tendency to imitate the behaviours which they see around them, learning via observation rather than experience. In doing so a child learns what is appropriate for their gender and culture. The notion that the father is seen as the more PA role model and that children imitate the behaviours of a role model who is adhering to gender stereotypes explains the reason that engaging in PA with a parent is an influential factor for males and not females.

Although no conclusion can be drawn as to why students become disengaged in PE during their time at secondary school, it highlights the need for future studies to explore the predictors to see what the underlying reasons are for students becoming disengaged in PE by year 11.

Exploration of why students ‘became engaged in PE’

17.2% of females and 16.1% of males became disengaged in PE from year 7 to year 11, but also during this time period 16.3% of females and 17.8% of males became engaged in PE by year 11. Predictors from the study suggests that for both sexes’ higher activity level increased the likelihood of becoming engaged in PE, along with higher fitness levels for males.

However, conclusions cannot be drawn as to why this group of individuals became engaged.

Looking at past research, some logical explanations for this could be attributed to competence (30, 278, 279), social support and choice.

Competence

Competence has been highlighted as a key predictor of engagement within PE (30, 278, 279). From a developmental perspective, some of the boys who became engaged in PE may have physically developed later in their school years, making them stronger and quicker than they may have previously been in year 7. Development of these physical attributes may have contributed to an increase in competence, leading them to be more engaged in PE, as literature has found positive associations between PA motor competence and physical fitness with age (297).

Aside from physical development of maturation, through their school years, their perceptions of competence and attitudes towards PE may have been positively influenced by the environment the PE teacher creates (298). Noticeable, PE teachers have the capabilities to influence and shape students' attitudes through formative feedback (299), positive reinforcement and attention (300). This is associated with the motivational climate they create. Evidence suggests that a PE lesson should adopt a climate that is mastery orientated rather than competitive (301). It is not surprising that a mastery-orientated climate is favoured, as it places emphasis on the learning process (22), effort and cooperation. Qualitative data has shown that students of lower capabilities avoid participating when the emphasis is placed on competition, as they do not believe they will succeed, contributing to the formation of negative experiences and attitudes towards PA and PE (85). Instead, a mastery climate provides students with the opportunity to understand the process and develop the skills required to carry out a task, consequently increasing a person's perceptions of competence. It could be argued that the motivational climate was not a contributing factor of

engagement within this study as some students became engaged, whilst others became disengaged unless they had different teachers, or the teachers behaviours varied between students. Teachers' attitudes can differ towards individual students within the same class based on the student's grades and capabilities (298, 302), which could in turn impact interactions between teacher and student as well as the students' perceptions of the motivational climate.

Autonomy

Aside from teachers supporting the development of competence, it is also important that the teachers allow the students to develop a sense of autonomy. Autonomy refers to a sense of feeling free from pressure and having the ability to make choices with regard to their behaviour (24). Providing students with choices, not just in relation to activities but also in what they wear in PE (299) and in whom they participate with (279), has been shown to have a positive impact on student engagement. By consulting students and providing them with the opportunity to decide which activities they would like to do in PE, students, in particular females (279), participated more as they wanted to improve in their chosen activities (303). Engaging in new activities allows students to display previously hidden physical abilities (299).

The results from this study, cannot provide reasoning as to why some students became engaged. Some potential reasons have been explored, but there is a need for further investigation as to what is influencing the shift from being disengaged in PE to becoming engaged in PE and vice versa. It is also important not to forget the students who have stayed engaged in PE from year 7 to year 11, as these students predominately get disregarded in research. Taking a positive approach and exploring contributing factors as to why some

students remain engaged throughout the duration of the school years, may provide supporting evidence of what is needed to encourage students to become or remain engaged.

Limitations

When inferring the findings of the study it is important to take into consideration its limitations. The PAQA is a self-report measure that depends on recall of how physically active individuals have been over the course of the week. Despite the normal limitations that are associated with self-report data, the PAQA has been shown as a valid and reliable measurement tool for discovering how much PA an individual participates in over the course of a week (257). It is also widely used in research and practical settings.

The question used to assess 'engagement' in fact assessed effort in PE, which is an area identified within the behavioural dimension of engagement. Effort in PE varies not only by 'how hard you try' but also by the design and content of the lesson provided. The design of the lesson, in regard to how much PA the lesson contains and the intensity of the activity, can impact whether a person is going to experience breathlessness, redness or soreness of muscles. The complexity of the skill needed to participate fully in the lesson along with their capabilities and fitness levels could also influence the students perception of effort exerted when reflecting on the responses presented within the question. Consequently, resulting in some students who are engaged in PE self-reporting themselves as disengaged in PE due to not experiencing the responses described within the question.

Due to the complexity of engagement, it is difficult for one question to capture all three dimensions. Previous studies have attempted to address two dimensions of engagement

within their studies, but there is yet to be one that has captured all three. Taking into the magnitude of the study and the ages of the participants involved, it would have not been feasible to address all three constructs of engagement. However, it would have been beneficial to explore at least two dimensions to reduce the possibility of those students who are capable and 'fit' regarding themselves as disengaged in PE, due to the representation of effort within the question.

The 20mSTR was used to measure the fitness levels of participants, which requires the individual to be motivated, to push themselves, to do as many runs as they could until they could no longer continue. This suggests that some form of motivation must be present to drive the individual to keep going. It could be advocated that due to the nature of the 20mSTR, sub-maximal efforts may result in inaccurate scores. Notwithstanding its limitations, the 20mSTR has been shown to elicit maximum effort in most children (253), thus arguably is a valid measure of fitness level for adolescents.

Lastly, the secondary data set used is over a decade old, thus it is possible that findings may have changed as it is evident that there is a decrease in PA levels of adolescents since the data was collected (57). Suggesting there is a potential need to collect new data that would provide a better representation of PA levels, fitness levels and engagement levels of adolescents today.

Conclusion

Disengagement in PE has been identified as a growing concern over the years as it has been associated with the increasing number of adolescents not being physically active. The findings of this study have demonstrated that there are groups of students whose engagement

levels had reversed from the beginning to the end of their secondary school years. Both indicating that a shift in engagement is possible. Yet, what is causing this shift is unknown. Past research has decorated several interpersonal and intrapersonal predictors, but these collectively have not been explored. Future studies should consider what influencing factors can have a positive impact on long-term engagement in PE, by investigating past experiences and the role they have played in their PA attitudes and behaviours today. By doing so they will hopefully be able to identify which factors are the greatest predictors of engagement in PA. Arguably, it is important not just to focus on those individuals who are physically inactive, but rather those individuals that are, as this group appear to be regularly looked over, when in fact they are the population of individuals who could be holding the secret to long term engagement in PA.

Chapter Summary

To address the first aim of this thesis, a secondary analysis was carried out on the East of England Healthy Heart study which collected data between 2006-2011. The cross-sectional findings agreed with those of previous studies (8, 57, 259), showing students who were habitually inactive and those with low fitness levels were more likely to be disengaged in PE. The longitudinal data, illustrates changes in engagement in PE over time and the factors associated with these changes. There was an overall trend toward becoming disengaged from PE between Year 7 and Year 11. The key predictors of changes in engagement were inactive and low fitness level.

These are some of the first data to describe changes in student engagement with PE during secondary school. They offer potential targets for intervention to increase and maintain

engagement. Promoting engagement is an important area to consider, as it has the potential to influence lifelong PA habits.

To investigate this potential influence of PE, in later life Chapter 4 employed a retrospective analysis, to investigate whether positive perceptions of secondary school PE predicted engagement PA during adulthood. This is a stated aim of the PE National Curriculum in England (62).

Chapter 4: The association of Extracurricular Activities and Physical Education at School with Adults' Physical Activity

Abstract

Background: Childhood and adolescent physical activity predicts adult physical activity levels. Despite anecdotal claims that childhood experiences during PE have affected adult perceptions of sports, exercise, and physical activity empirical evidence is lacking.

Aim: To investigate the longitudinal impact of engagement in school PE on adult's physical activity engagement.

Approach: Retrospective perceptions and current physical activity participation rates were collected in ($N = 167$) and analysed via structural equational modelling.

Results: Motivation toward school PE had a significant direct effect on adult physical activity and a positive indirect effect (mediated by higher self-efficacy). Current self-efficacy was also found to have a significant direct effect on adult physical activity, whilst PE motivational climate had an effect on current PA mediated by self-efficacy.

Conclusion: The motivation climate of PE lessons is associated with developing self-determined forms of motivation and may even help promote lifelong engagement in physical activity.

Introduction

Physical Education (PE) is compulsory for all children across the United Kingdom between the ages of 4 to 16 years. For many individuals, the school environment provides them with their first and potentially only experience of organised sport, exercise, and physical activity (PA) through PE and extracurricular activities. It is known that a person's life is an accumulation of experiences, which in turn shape and form behaviours and attitudes that individuals attach feelings to. As PE is an experience that individuals go through during their childhood and adolescence, it could be argued that it is important that individuals have positive experiences that shape and form positive behaviours and attitudes around sport, exercise, and PA that they take into later life. Thus, it is not surprising that studies have proposed that child and adolescent participation in PA significantly predicts engagement in physical activities and sports into adulthood (304, 305).

Longitudinal data show a positive association between participating in sports during childhood and adolescence, at least once a week for females and twice a week for males, and later life engagement in PA (200). However, the definition of sports participation across the three waves of data collection lacked clarity, which could have increased the likelihood of measurement error, along with data collected through self-reported measures. Nevertheless, supporting literature proposes that high engagement in PA, especially if it is continuous, during an individual's school years (9 to 18 years), is associated with higher levels of engagement during adulthood (199). Despite the supporting literature for active school-aged engagement in PA influencing life-long PA engagement (65, 304-308), there is a lack of evidence to show that PE itself is a significant contributing factor. Arguably, adults' past experiences during PE lessons have harmed their perceptions of sport, exercise, and PA. Adults have reported 'negative experiences' during their time in PE, such as regularly being

picked last in PE along with other situations which they deemed humiliating and difficult (309), generating negative attitudes and emotions towards sport and PA. These negative experiences increase the likelihood of an individual becoming less active later in life.

Supporting evidence of adults who struggled during PE lessons due to self-identified problems of motor development or low motor competence, also had a damaging experience within PE which led to an inactive adult lifestyle (310). The negative memories that the participants experienced in this study were not due to their poor coordination, but rather the fact they lacked the capabilities to meet the demands of the tasks and felt that they had limited, if any support from their teachers and fellow students. Among PE participation literature, minimal research has explored the relationship between PE engagement, youth sport, and adult participation.

Investigating from a socioecological standpoint along with exploring psycho-social factors (motivation, competence, and enjoyment), one study found that adolescents' participation in PE, as well as extra-curricular PE, were significantly related to gender and the school in which they attended. Especially when the sports were largely dominated by competitive team sports, which typically adhered to gender-stereotypical, resulting in more males than females participating in sports in their leisure time (311).

Aside from the competitive nature of sport in PE and gender-stereotypical barriers, it has been proposed that a contributing factor for adolescent dropout in later life, is a lack of role models (312). Highlighting the need to consider the tasks and the objectives of the lessons but also the motivational climate (the psychological environment that teachers create through the instructions and feedback they provide: (22). Conversely, it is important to note that

although negative experiences may increase the likelihood of being inactive in later life, participants who reported positive experiences during their PE lessons were more likely to lead a healthy, active lifestyle (309). Supporting the argument that PE is still supposedly a crucial contributor to long-term participation in PA (313, 314). This argument is particularly important when it comes to females as a 10-year longitudinal study found that the strongest positive predictor for PA at aged 23 for females was having a positive attitude towards PE during adolescents, whereas males were participating in competitive sport (315).

The Role of the PE Teachers

Ladwig, Vazou and Ekkekakis (10) found that childhood experiences during PE are associated with an individual's attitude and intention towards PA in later life. According to Bandura's Social Learning theory (316), adolescents form their attitudes from influences around them including significant others (e.g., teachers, coaches and peers). Figley (317) proposed that teachers influence their student's attitudes towards the subject they teach, as attitudes are the product of heredity and environmental factors. Thus, PE teachers have an important influence on the experience an individual has in PE and the development of students' attitudes towards PA.

One role of PE teachers is to enhance the student's knowledge and understanding of PA (318) by promoting continued participation (319) and developing competencies (298). Student-teacher interactions in PE can shape, form, and modify attitudes through positive reinforcement, attention, and formative feedback (300). This can be influenced by teachers' behaviours, tone of voice (320), facial expressions and gestures (320). The delivery of the content is as important as the content itself. Jung and Choi (320) proposed that when teachers deliver a lesson, they are not only teaching the content but are also teaching themselves. This

means that unconsciously they transfer their beliefs and disposition about PE (321, 322); leaving lasting impressions on their students that they will take with them into later life. Not all students taught by a single PE teacher report the same experience, as teachers' attitudes towards students may be influenced by their grades and capabilities (298, 302). Therefore, if the teacher has a negative attitude toward students, the attitude of the students themselves is likely to be negatively impacted (323).

PE teachers may also act as role models that influence students' perception of PE and PA, (324) and teachers may convey important messages about the value of PE and PA, consciously or unconsciously (325). Teachers who use physical disciplining ('no pain, no gain' approach), have been highlighted as a potential deterrent to PA (325). Teachers who are physically inactive (302), and those adopting a 'do as I say, not what I do' attitude may also create a negative environment and promote negative perceptions of PA (71,72).

In contrast, PE teachers who display positive PA habits (63) and those who focus on supporting and promoting students' motivation to be physically active (326), can foster the development of more positive attitudes toward PA. Consequently, it can be proposed that PE teachers serve an important role in developing motivation to be physically active inside and outside of school, in the hope that these behaviours continue in later life. Teachers can meet their responsibility to enrich students' understanding, knowledge, and skills by promoting an active lifestyle whilst taking into consideration student's psychological needs (318) and by developing competencies (298).

Self-Determination Theory

The basic psychological needs theory (BPNT) (11, 131) is one of the six mini-theories within the self-determination theory (SDT) (24). Centred around self-actualization, life goals, basic psychological needs (competence, autonomy, and relatedness) and the impact of social environments on motivation, the SDT proposes that an individual's motivation is situated on a continuum from amotivated to intrinsically motivated (see chapter 2 for more information surrounding the SDT). The SDT focuses on types of motivation rather than just amount (125, 132). Within motivational PA literature, the perspective of SDT is most commonly used to encourage PA (327).

	CONTROLLED MOTIVATION			AUTONOMOUS MOTIVATION		
	AMOTIVATION	EXTRINSIC MOTIVATION			INTRINSIC MOTIVATION	
Regulatory Style	Non-Regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Motivation source	Impersonal	External	Somewhat external	Somewhat internal	Internal	Internal
	Helplessness Lack of competence and value No intention	External rewards and avoidance of punishment Compliance	Seeking approval from others Ego/self-esteem purposes	Self-endorsed, see personal relevance and importance Valuing an activity	Congruence with personal identity (e.g., beliefs and value)	Fun and enjoyment Inherent satisfaction Interest
PE Example	Disengaged or refusal of activity participation	Avoiding detention or 'just going through the motions of the activity	A need to demonstrate skill competence to others in the class to impress them	Sees value in participating in PE as they believe it will improve their fitness	Participates in PE as it is part of their personal make-up	Participate in PE as they genuinely enjoy it

Students may move up or down the continuum due to several different factors and different contexts.

Figure 4. 1. The Self-Determination Theory Continuum with PE examples adapted from Cunningham et al., (129) and Morgan, Milton and Longville (130).

An individual is more likely to remain engaged in PA and exercise long-term if they are intrinsically motivated (141). Students perceived competence in PE is positively associated with intrinsic motivation (328-330) and intentions to be physically active in years to come (331), more so in females (332, 333). Investigating the impact of being intrinsically

motivated during PE and long-term engagement in PA, structural equational modelling on participants aged 14-18 years demonstrated that intrinsic motivation in the form of experience (engage in the activity to obtain a stimulating experience: e.g., the feeling of being totally immersed in the activity) and accomplishment (engaging in the activity due to the pleasure of achieving or creating something: e.g., personal satisfaction of mastering certain difficult tasks) significantly predicted the likelihood that an individual would be engaged in PA once graduating (334). This is not surprising as it has been demonstrated that intentions to be physically active are formed on autonomous motives (e.g., intrinsic motivation) rather than controlling motives (301).

Whilst constructs of the SDT have been extensively explored within PE contexts to gain an understanding of motivational intentions of participation and learning (25, 335, 336), the evidence concerning students' motivational intentions to engage in PE and the impact on later-life engagement in PA is limited. It is known that positive PE experiences contribute to the formation of positive attitudes towards exercise and PA in adulthood (10), but the association between student PE motivation and later life engagement in exercise and PA is limited. Considering that a person's reasoning for engaging in any activity is underpinned by their motivational intentions, with higher quality motivation associated with more positive and affective outcomes it is important to further investigate the association between student motivation in PE and life-long engagement in PA.

Teachers' Role in Developing Student's Self-determination

One of the central tenets of SDT is that social factors can shape an individual's motivation toward an activity by means of fulfilling their psychological needs. Within the PE context, teachers have the capability to influence the development of an individual's psychological

needs (141, 337) and motivation through two very different interpersonal styles; autonomy-supportive or highly controlling (338)

Teachers who are perceived to be high-controlling use strategies to ensure that students comply (339) by using externally or internally controlling behaviours (340). Behaviours that involve external contingencies (e.g., punishment/reward) and intimidation (341) are just some ways in which a teacher may exhibit externally controlling behaviours to foster external regulation for students to behave in a certain way. Internal controlling behaviours are more subtle and aim to encourage students to behave in a particular way using guilt, shame and the student's feelings of anxiety. For example, using negative conditioning is regarded as paying less attention to those students who are not behaving in the desired way or performing poorly (341, 342). Teachers who utilise and engage in controlling behaviours have been shown to decrease students' trust, enjoyment of the lesson and motivation (340), whilst positively predicting frustration of the three basic psychological needs (338, 343) and student disaffection (344). In contrast, teachers who engaged in autonomy-supportive behaviours have been positively associated with student's development of psychological needs (345). This raises concern as to what impact these experiences may have on later-life perceptions of PA.

Autonomy supportive behaviours of a teacher include acknowledging a student's feelings and providing opportunities for choice within the lesson (168), whilst avoiding the use of punishment and diminishing demands (345, 346). It requires the teacher to be understanding of how individual students engage in an exercise and how they can provide support to help the students achieve their goals whilst fostering the fulfilment of their psychological needs. Students who regard their teacher as being autonomy-supportive have been shown to

typically report high psychological need satisfaction, which in turn increases student's autonomous motivation towards PE (343, 346, 347). Unsurprisingly, autonomy-supportive teachers encourage the development of autonomous forms of motivation (348) as they create a lesson that students participate in due to enjoyment, relating to intrinsic motivation, and that they see value in developing new skills, reflecting identified regulation. Consequently, teachers have the ability to facilitate the development of students' intrinsic motivation and psychological needs by creating a need-supportive environment (349). Creating a need-supportive environment allows for needs satisfaction where teachers can positively impact student's PA engagement and intentions (350). Providing a stable foundation for intentions to be physically active in later-life.

Motivational Climate

One way a teacher can influence a student's motivation is through the motivational climate they create. The achievement goal theory (122) proposes that there are two dimensions of a motivational climate that can be created by teachers; task-involving/mastery-orientated and ego-involving/performance-oriented motivational climate. A teacher who adopts a cooperation approach that reinforces personal improvement, whilst viewing mistakes as part of the learning process will promote a task-involving motivational climate. A task-involving motivational climate develops students' perception of competence by placing an emphasis on the learning processes of the skill through appropriately challenging activities, providing students with enhanced learning opportunities leading to the development of intrinsic motivation (25). Alternatively, an ego-involving motivational climate places emphasis on success and outperforming others through intra-team rivalry, unequal recognition, and punishment for mistakes. For example, the teacher emphasises the ability of a fellow student and compares other students to them.

PE lessons should promote a motivational climate that is focused on mastery (task-involving) rather than competition (ego-involving: (301). Empirical studies have highlighted the negative impact and excluding tendencies that competitive environments can have on students (75, 351, 352), especially adolescent girls (353). Competitive environments promote opportunities for comparisons with others. For less capable students, this may result in them wanting to avoid participating in the lesson, consequently leading to negative experiences and attitudes (85) that may lead to PA avoidance in later life. Whereas PE task-involving motivational climates have been shown to have a positive effect on the development of autonomous forms of motivation (354-356), enjoyment of lessons (357) and the formation of positive attitudes (358).

Literature highlights the positive outcomes of a task-involving motivational climate, over an ego-involving motivational climate, yet one of the PE national curriculum's aims is to promote engagement in competitive sports and activities, which results in the heavy use of team games (359). Gameplay promotes comparison to others, interpersonal competition and personal success in the sessions based on winning (30), which are in line with the characteristics of an ego-involving motivational climate. Despite clear evidence that competitiveness within PE creates a negative experience for those students of lower abilities and excluding certain students rather than including them (75); this remains one of the key aims of the PE national curriculum in England.

Individuals who recall having negative experiences during PE, such as being picked last, had a significant reduction in their PA engagement in later life (309). It is no wonder that an individual who had negative experiences during PE goes on to be disengaged in PA in later

life as according to Wu et al., (360), individuals create motivational schemas based on previous motivational experiences. In other words, when an individual encounters a similar or related context, such as considering going to the gym or joining a sports team, these schemas can promote or inhibit one's motivation to engage in the behaviour. Consequently, motivational experiences in PE could impact later-life motivations for PA (361). Suggesting that the curriculum promoting engagement in competitive sports and activities, could, in turn, prevent the development of a fellow curriculum aim which is the promotion of lifelong engagement in PA.

The Role of Self-efficacy on Engagement

Self-efficacy is a person's belief that they have the ability to succeed in a particular situation (362). If an individual believes they have the capabilities to successfully execute the cause of action they are more likely to engage in a behaviour (174). Perception of successfully achieving the task is underpinned by the individual's expected outcomes, which comprise perceptions of previous positive and negative experiences related to the task at hand, in this case, PA (174).

Self-efficacy's Role in PA Engagement

Self-efficacy has been shown to be particularly influential in the adaption (363), prediction (364) and maintenance (365) of PA behaviours in adults, especially females (366, 367). As Self-efficacy mediates the association of initial positive experiences in PA with later life engagement (368) this is associated with PA, whether this be via a direct link or mediated/facilitated by other factors such as motivation (326). What is known, is that undoubtedly a person must possess a certain degree of PA self-efficacy to engage in the behaviour initially. For example, an individual with high PA self-efficacy perceptions is more

likely to engage in PA behaviours and activities (369, 370), as well as enjoy it more (211), compared to an individual with low PA self-efficacy perceptions. Aside from initiating the behaviour, continued participation in PA can influence one's self-efficacy by acting as one of the principal sources of efficacy information. Successfully participating in PA provides the individual with performance accomplishments and mastery experiences. These experiences can be obtained within PE if the motivational climate is need supportive. However, it is important to note that positive past experiences will not support the development of self-efficacy beliefs leading to PA for everyone. Williams and French (371) conducted a systematic review on interventional techniques used in PA intervention to investigate changes in self-efficacy and physical activity behaviours. Results indicated that focusing on past successes was not one of the strongest techniques that increased an individual's PA self-efficacy. This implies that the accuracy of the theory varies depending on a person's behaviour and circumstances.

Source of Increasing One's Self-efficacy

Mastery experiences refer to past endeavours, thus constitute an authentic indicator of one's ability to successfully carry out similar tasks in the future. Building successful experiences supports the development of robust beliefs in one's abilities to overcome barriers and be persistent in future activities as it provides observable evidence for goal achievement (173). If a person's early PA experiences during PE result in numerous failures, this will decrease and discourage one's self-efficacy, resulting in them unlikely to want to engage in similar behaviours in the future. Mastery experiences are regarded as one of the strongest sources of self-efficacy beliefs (173), and that has been shown to positively influence PA participation (372-374).

Three further sources of information that may influence self-efficacy include vicarious experiences, social/verbal persuasion, and emotional and physiological states (173).

Vicarious experiences portray the act of observing social models take on difficult tasks and be successful in performing them. Influential social (role) models are someone who is perceived as worthy of replication. This may take the form of older siblings, friends, parents, grandparents, teachers, coaches etc (375). The self-efficacy theory suggests that identifying with a role model can positively influence one's perception through means of vicarious experiences (362). Experimental studies have found that providing individuals with vicarious experiences can improve PA self-efficacy (372). As individuals grow older, the lack of role models (vicarious experiences) is considered a barrier to PA (376). This highlights the importance of developing self-efficacy during childhood and adolescence PE lessons when individuals are more-often exposed to vicarious experiences because these opportunities decrease with age.

Verbal persuasion entails the act of trying to persuade individuals of their own abilities that will allow them to successfully perform a task. An example of this is a PE teacher praising a student for their effort and success of mastering a skill. Despite verbal persuasion commonly used in sporting, exercise, and physical activities it is deemed to be far less successful at positively influencing one's perception of self-efficacy compared to mastery and vicarious experiences. Miller and colleagues (377) proposed that persuasion by others could be interpreted in a negative form such as control or pressure. When exploring the use of verbal persuasion in relation to PA it has been found to have had a negative or no impact on a person's perception of self-efficacy (372) or PA levels. However, verbal persuasion has been regarded as effective when applied in conjunction with mastery experiences (378). Thus, PE teachers need to ensure that not only are they verbally persuading students of their PA

abilities, but they also provide task/activities that are appropriately challenging to allow students to successfully accomplish.

Lastly, physiological and affective states. This source of self-efficacy is based on appraisal processes. A person's well-being, in terms of emotions, physical and psychological state, can impact how they feel about their own abilities in each situation. Bandura (379) proposes that it is not the degree of the emotional, physical or psychological reaction that is influential, it is rather how the individuals interpret and perceives them. It takes into consideration how a person is feeling, which can impact how competent they feel at that moment in time to successfully carry out the task.

Self-efficacy theory proposes that the individual's perception of their capabilities to successfully carry out a task will influence how they act, but it does not effectively account for environmental factors. The theory evaluates an individual's behaviours in isolation, often failing to consider or identify external factors that may have come into play when determining perceptions of self-efficacy. Broadly it could be interpreted that sources of physiological and affective states start to address this as an individual's emotional, physical, and psychological well-being would be impacted by external factors. However, the influential factors are not considered, only the consequences of those factors on the individual themselves. Nevertheless, the literature demonstrates that self-efficacy can predict a person's future behaviours, but it also reflects the outcomes of prior experiences in regard to a particular behaviour.

To demonstrate the link between motivational climate, the three basic psychological needs and self-efficacy's role in supporting PA participants, figure 4.2 was created.

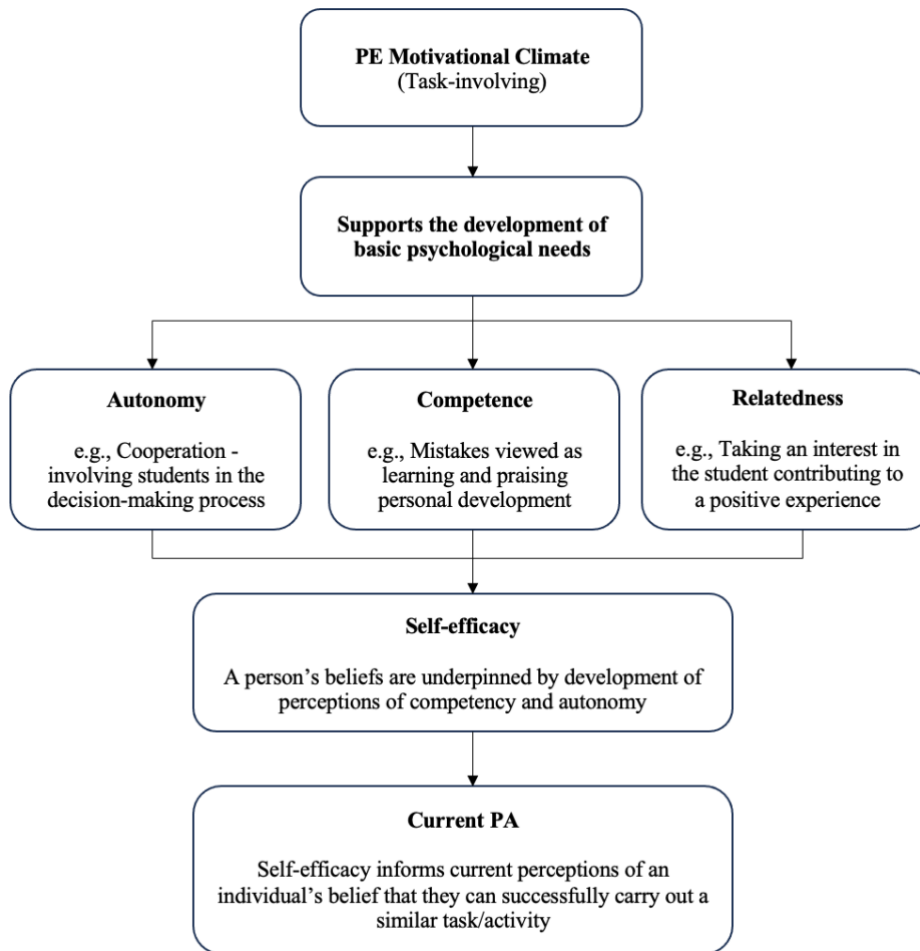


Figure 4. 2. Demonstrates how the motivational climate can satisfy an individual's basic psychological needs, supporting the development of positive perceptions of PA self-efficacy, and contributing to current PA participation.

The Link Between Self-Efficacy Theory and the Self-Determination Theory

Stemming from the same meta-theoretical concept of agency, individuals are deemed to be active contributors to their own behaviour. Both theories embody the idea that a person's perception of their capabilities (competence) impacts their engagement in an activity, though the role of self-efficacy/competence on behaviours is different. Self-efficacy theorists believe that self-efficacy has a direct influence on one's behaviours, whereas the SDT proposes that self-efficacy is a more distal factor as it impacts one self-determination rather than the behaviour itself (362). Nonetheless, the theory of self-efficacy and the self-determination theory have both been extensively explored and supported within PE, PA, sport, and exercise literature, which has led to some researchers integrating concepts from both theories to explain behaviour and promote behaviour change. For example, self-efficacy has been found to be a positive predictor of autonomous forms of motivation (380), as well as a mediator between PA and intrinsic motivation (381).

The Effectiveness of PE Promoting Life-long PA

Adopting a social-ecological approach to exploring the current literature has provided insight into the key issues that may be contributing to the ineffectiveness of PE lessons promoting engagement in the hope that it develops adolescents that become physically active adults.

Firstly, some of the aims of the PE national curriculum contradict themselves. For example, one of the aims of the PE national curriculum in the UK is to 'utilise tactics to engage in competitive sport and activities' (67). From a theoretical perspective and literature, it is known that the use of competition promotes comparison to others, supporting the development of an ego-involving motivational climate that is associated with dropout (52). Thus, cancelling out the curricular aim of 'leading a healthy and active lifestyle' (67).

Another contributing issue to the curriculum is the lack of consideration for gender differences. Male students may prefer competition (141), whilst competition has been shown to disengage girls (69, 79-82), yet the curriculum stipulates that both genders must engage in competition. To reduce competition and consider gender differences, studies have utilised health club approaches to increase participation (32, 299, 382). Moving away from traditional PE sports and activities increased engagement in the short-term, but there is a lack of evidence of the long-term effect. This may be due to a lack of activities on offer by the school.

To an extent, the teachers also play a role in the activities on offer and the motivational climate they create through their lesson design and teaching style. It is important that teachers disregard their predispositions and create a task-involving environment that satisfies basic psychological needs. Studies have demonstrated that through creating a task-involving motivational climate, by providing choice and adopting an autonomy-supportive style, they can promote autonomous forms of motivation and PE participation, yet exploration of the long-term effect is limited (33).

Across the literature reviewed in chapter 2, it is evident that there are several factors that are contributing to engagement in PE that have the potential to support the promotion of PA in adulthood as outlined in Chapter 2, figure 2.2. Of the factors identified, participation in sports outside of PE is the only factor that has been found to predict PA in later life (199, 200), especially for boys (315). Other factors identified within the model have been evaluated post-intervention such as the motivational climate (33) which was regarded ineffective, but they have not been evaluated over a substantial number of years. Similarly, the use of educational lessons was found to be ineffective in long-term (35, 172). Despite both factors lacking

evidence to support the effectiveness long-term, motivational climate has remained in the proposed model due to its capabilities to support the development of autonomous forms of motivation, which increases the likelihood of a person continuing with a behaviour in line with SDT (24).

Despite the critical lens on the PE national curriculum and its delivery through the motivational climate that teachers create, PA literature highlights the influence past experiences can have on future behaviours around PA. PA studies have demonstrated a positive link between child and adolescent participation in PA predicting later life engagement (199, 200, 304, 305). As PE is an experience that is compulsory within England, and potentially the only experience for many of PA during childhood or adolescence it is important to understand the role that PE has in shaping and influencing a person's attitudes and beliefs around PA. Although only a few academics have explored this relationship, positive experiences in PE have been linked to increasing the likelihood that it contributes to the development of an active, healthy lifestyle in adulthood (309). Whereas, those who had negative experiences were less likely to be physically active adults (309).

PE experiences can be manipulated through the environment that is created by the teacher and other influential individuals within the setting. Mastery climates that favour individual development, whilst fostering autonomous forms of motivation (352), increase the likelihood that an individual will engage in and sustain a particular behaviour for a longer period. As the emphasis is on developing competencies within a mastery climate this will in turn positively impact a person's perception of one's belief that they can succeed in a particular situation increasing their self-efficacy. One's self-efficacy is influential in the adoption (383), prediction (30) and maintenance of PE. Mastery experiences have been identified as one of

the main sources of increasing perceptions of self-efficacy. Thus, if an individual has had a positive experience in PE, whilst successfully completing challenging tasks, their perception of their capabilities in a similar setting such as PA is much greater, increasing the likelihood of engagement.

Consideration of previous literature and theoretical frameworks has led to the development of the model presented in figure 4.4. The model proposes that recollection of engagement in PA outside of school, represented via engagement in PA extra-curricular, along with retrospective perceptions of the PE motivational climate and motivational orientations will impact current PA participants, mediated by current perceptions of self-efficacy.

Research questions:

Q1. Is there an association between prior experience of PE and current PA?

Q2. Is the association of current PA stronger with PE experiences or Extra Curricular Activities?

Q3. Are associations independent/direct?

Q4. What are the mediating factors between self-determination, PE motivational climate, ECA and adult PA?

Hypothesis: A person's perception of their PE motivational climate, involvement in PE extra-curricular activities and self-determination whilst at school will influence the likelihood a person will be physically active when they are older, with SE playing a mediating role.

1. PE motivational climate during adolescence will be associated with current PA in adults.
2. Participation in extra-curricular activities will be a stronger predictor of current PA engagement than PE motivational climate.
3. Current self-efficacy will mediate between self-determination, PE motivational climate, extracurricular activities, and adult PA.

Method

A questionnaire exploring ex-student's perceptions of their relationship with their PE teachers, motivation in PE as well as, their current engagement in PA and current self-efficacy was delivered on the survey platform Qualtrics. The link for the questionnaire was distributed across social media sites and chat forums for individuals to complete at their own discretion. Snowball sampling was used as known individuals to the research team were asked to share the link on their social pages. The questionnaire link remained open for 72 days. Prior to data collection, ethical approval was obtained.

Participants

The sample consisted of 37 males ($M_{age} = 21.27$, $SD = 2.434$, 32.43% self-reported as PA) and 140 females ($M_{age} = 21.86$, $SD = 2.494$, 34.29% self-reported as PA), one person who identified as 'other'. To be eligible to participate in the survey, individuals were required to adhere to the following criteria: 1) attended a state secondary school within England 2) be between the ages of 18 to 28 years as individuals older than this may have had a different PE experience as the curriculum changed in 2011 and has remained the same since. A total of 318 responses were collected from the survey, however, 140 of those responses were ineligible (see figure 4.3 of the breakdown participant exclusion).



Figure 4. 3. Breakdown of participation exclusion

Theory and Relevant Research that Supports Model Specifications

Underpinned by the self-determination theory (24) and self-efficacy theory (174) it is proposed that there will be an association between a person's prior experience of PE and their current PA participation. The reason for this is that both theories embody the idea that a person's experiences can influence the belief they hold about an individual's ability to successfully complete the task/activity in turn influencing their behaviour. Childhood and adolescent PA experiences have also been identified as a predictor of later life engagement (199, 200, 304, 305), with negative PE experiences decreasing the likelihood of adult PA (309). The role of the teacher was included, as teachers play a role in shaping the PE motivational climate contributing to students' experiences along with their motivation (352). Thus, it is proposed that retrospective perceptions of the PE motivational climate and the

form of motivation will be associated with current PA. Extra-curricular activities were also included in the proposed model due to the fact that if a person is engaging in activities outside of PE they are more likely to enjoy PA. Self-efficacy was included within the model as an mediating factor as this corresponds with previous literature (384).

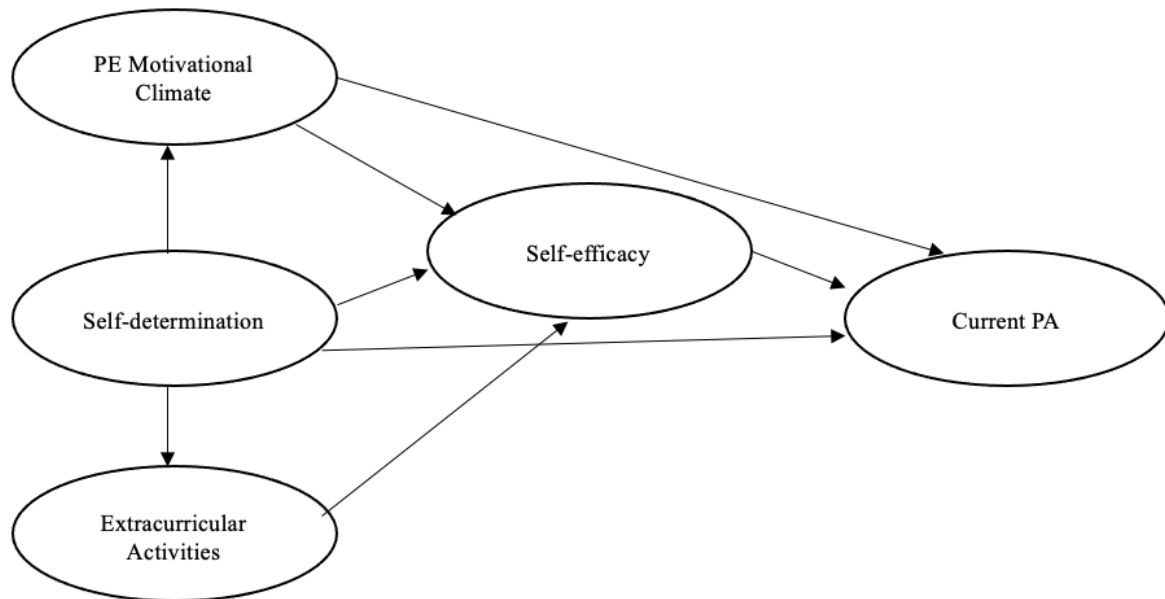


Figure 4. 4. The hypothesised model underpinned by the SDT (24) and self-efficacy theory (174).

Consideration of previous literature and theoretical frameworks has led to the development of the hypothesised model, as shown in Figure 4.3. The model proposes that recollection of engagement in PA outside of school, represented via engagement in PA extra-curricular, along with retrospective perceptions of the PE motivational climate and motivational orientations will impact current PA participants, mediated by current perceptions of self-efficacy.

Measures

The questionnaire was designed to gather information across five key areas:

1. Retrospective perception of the individual's motivation towards PE,
2. Retrospective participation in extracurricular activities,
3. Historical perceptions of the individual's relationship with their PE teacher and the PE motivational climate,
4. Contemporary perceptions of PA Self-Efficacy,
5. Contemporary PA participation.

The five key areas aim to gain insight into how PE experiences could potentially influence a person's engagement in PA in later life as well as their self-efficacy. Questions that required participants to recall past experiences during their time at secondary school were clearly identifiable to participants as they included statements such as 'Please think back to your time at school' or 'Thinking back to your time at school' at the start of the section of questions.

Retrospective perception of the individual's motivation towards PE: The Perceived Locus of Causality (PLOC) scaled devised by Goudas, Biddle, and Fox (147), based on the work of Ryan and Connel (385) was used to capture students' motivation (degree of self-determination) whilst at secondary school. 16-items from PLOC were used (internal consistency Cronbach's alpha = .741). The 16 items are broken down into 4 sub-categories containing 4-items each: external regulation (because it is what I am supposed to do), introjected regulation (because I would feel bad if I did not), identification regulation (because its important to do well in PE) and intrinsic motivation (because PE is fun). Each of the items was scored on a 7-point Likert scale from 1 (strongly disagree) through to 7

(strongly agree). Overall self-determination scores were calculated by multiplying each answer by the relative weight as follows; external regulation (-2), introjection regulation (-1), identification regulation (+1), and Intrinsic motivation (+2). The relative weighted scores of motivations were then added together to make an overall motivation score. A higher positive score indicates greater relative autonomy. Based on collective participant mean, participants who scored 5 or more were regarded as having high perceptions of relative autonomy, whilst those who reported 4 or less had low perceptions of relative autonomy.

Retrospective perceptions of participation in extracurricular activities: A single item measure was taken from the Active Lives Study (386). The single item '*I participated in extracurricular sport and physical activities that were facilitated/organised by the school (including before school, breaks and after school)*' was used to measure students' engagement in extracurricular activities. Response to the item was collected via a frequency scale ranging from never (1) to 5 or more times per week (5). Responses were grouped based on how often they engaged in extracurricular activities; never, once a week, 2-3 times per week, 4-5 times per week and more than 5 times per week.

Historical perceptions of PE teachers and the PE motivational climate teachers created: A PE modified version of the Learning Climate Questionnaire (347) based on Williams and Deci (387) original learning climate questionnaire was used. The questionnaire consists of 16 items (internal consistency Cronbach alpha = .957). Each item was modified by replacing coaches with PE teacher for example: 'I felt understood by my coach' became 'I felt understood by my PE teacher'. Each item was measured via a 7-point Likert scale (1 strongly agree to 7 strongly disagree). The scoring of this measure is calculated by averaging the individual item scores, with one item reverse scored ("I don't feel very good about the way

the coaches talked to us"). Higher average scores represent higher levels of perceived needs support which suggests a positive relationship (4 or less: low levels of perceived need support and 5 or more: high levels of perceived need support).

One question within the questionnaire required participants to 'In 3 words, describe the characteristics of your PE teachers'. The purpose of this question was to explore whether females tend to reflect more negatively on their experiences within PE compared to males. At the researcher's discretion, the characteristics were deemed positive or negative based on the understanding of the words used and in the context in which they were written. For example, words such as loving, trusting, respectful, motivating, and energetic were regarded as positive (see figure 4.5). Whilst unfriendly, condescending, arrogant, boring, and favouritism were considered negative characteristics (see figure 4.6). The words/phrases were converted into numerical data to represent 0 for positive characteristics and 1 for negative characteristics.

Contemporary perceptions of PA Self-Efficacy: The Exercise Self-efficacy Scale (388) is a 9-item scale (e.g., I can accomplish my physical activity and exercise goals that I set) that captures beliefs or confidence that they can perform various physical activities and exercise (internal consistency Cronbach alpha = .913). Responses to each item are recorded from not true (1) to always true (5). Items scores are then combined to create a self-efficacy for exercise and PA total score. The higher the score the greater the perception of self-efficacy. Self-efficacy groups for descriptive purposes were created using mean score as cut-offs = high >39 low <38 Based on collective participant mean, participants who scored 39 or more were regarded as having high perceptions of self-efficacy, whilst those who reported 38 or less had low perceptions of self-efficacy.

Current PA participation: Milton's (389) single item measure, "In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate?" was used. Responses were recorded on a frequency scale from never (1) to 7 days per week (8). Participants were grouped into active (5 or more days per week) and inactive (4 or less days per week).

It could be argued that this measure of PA is outdated as the UK national guidelines suggest that 19 to 64-year-olds should do at least 150 minutes of moderate-intensity activity per week. However, 150 minutes of moderate intensity does not show the representation of a participant's habit formation as an individual could part take in 150 minutes of moderate intensity on one day which may not counteract their sedentary behaviour across the rest of the week. It was decided that Milton's (389) single item measure was an acceptable measure of self-report PA engagement per week as research has confirmed its reliability and validity (389, 390).

Data Analysis

Participant descriptive statistics are presented in table 4.1. All statistical analysis was performed using SPSS and SPSS Amos with a statistical significance set at $p < .05$. Overall, nine data points were missing within the data set. A non-significant Little's MCAR revealed that data was missing completely at random ($\chi^2 = 340.16$, $DF = 321$, $p = .221$) (391). When random data is missing completely at random and only a very small portion of data is missing (e.g., less than 5% overall), a single imputation using the expectation maximisation algorithm provides unbiased parameter estimates and improves the statistical power of analyses (392, 393). Missing data was imputed using EM Missing Values Analysis in SPSS 25.

A chi-squared test was completed to explore the association between gender and perceived PE teachers' perspectives to identify whether females tend to reflect negatively on their PE experience. Due to the model including latent variables from validated questionnaires, there was no need to perform a confirmatory factor analysis of the observable variables. A cross correlational matrix was run to determine the strength and direction of univariate correlations between potential factors within the model. Those that were non-significant were not included in the initial model for mediation analysis (Table 4.2). Structural equation modelling (SEM) was used to investigate the relationships between retrospective perceptions of the PE motivational climate, self-determination, extracurricular activity participation and current self-efficacy to current PA engagement. To assess the model fit Comparative fit index (CFI), Goodness of fit index (GFI), Incremental fit index (IFI) and Root mean square error of approximation were used. A CFI, GFI and IFI of $>.09$ and an RMSEA of $<.05$ indicate a good fit at global level (394, 395).

Results

Table 4. 1. Descriptive statistics

	Total	Males	Females
	(<i>n</i>)	(<i>n</i>)	(<i>n</i>)
Gender		37	140
Age			
18 – 20 Years	59	16	43
21 – 25 Years	104	19	85
26 - 28 Years	14	2	12
Ethnicity			
White	163	33	129
Non-white	15	4	11
Current PA			
Low PA	115	25	91
High PA	61	12	48
Current Self-efficacy			
Low Self-efficacy	73	12	61
High Self-efficacy	101	25	76
Retrospective Self-determination Motivation during PE			
Low motivation	76	12	64
High motivation	101	25	76
Retrospective PE Motivational Climate			
Low Autonomy Supportive	63	7	56

High Autonomy	114	30	84
Supportive			
Retrospective Engagement in Extracurricular Activities			
Never	48	3	45
Once per week	32	5	27
2-3 times per week	55	13	42
4-5 times per week	31	12	19
>5 times per week	11	4	7

n: number of participants

Current PA: Milton's (389) single item measure, "In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate?"

Current Self-efficacy: The Exercise Self-efficacy (388)

Self-determination: The Perceived Locus of Causality (PLOC) (147, 385)

Engagement in Extracurricular activities: A single item measure was taken from the Active Lives Study (386).

The single item '*I participated in extracurricular sport and physical activities that were facilitated/organised by the school (including before school, breaks and after school)*

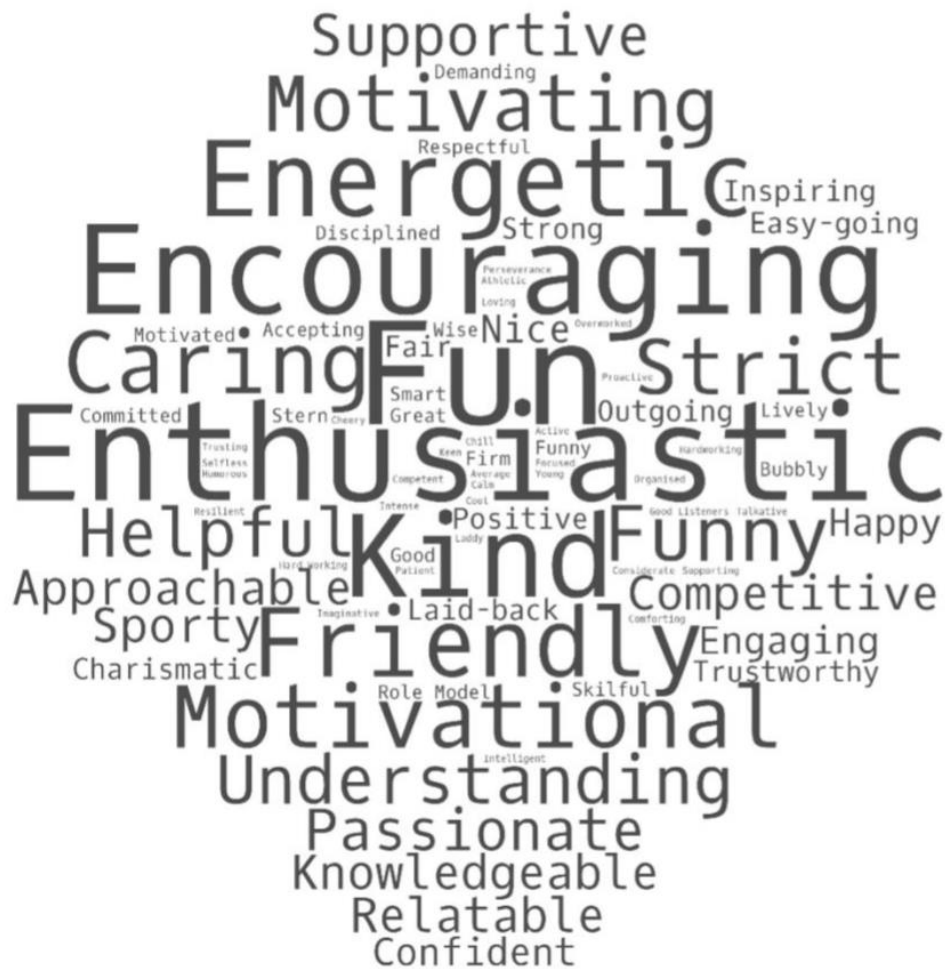


Figure 4. 5. Word cloud showing *positive* responses to item: ‘In 3 words, describe the characteristics of your PE teachers’ (Size of words shows frequency of reporting)



Figure 4. **6F** Word cloud showing *negative* responses to item: 'In 3 words, describe the characteristics of your PE teachers' (Size of words shows frequency of reporting)

Chi-square analysis revealed that the percentage of male participants (85.3%) who reported positive characteristics about their PE teacher was greater than female participants (59.1%), although this was not significant, $\chi^2(2) = 8.64$, $p = 0.013$.

Table 4. 2. Shows the association between extracurricular activities, motivation, PE motivational climate during adolescence and current perceptions of self-efficacy on current PA.

Variable		ECA	SDM	PMC	CSE	CPA
Extracurricular Activities (ECA)	Pearson' r	-				
	p-value	-				
Self-determination Motivation (SDM)	Pearson' r	.54	-			
	p-value	<.001	-			
PE Motivational Climate (PMC)	Pearson' r	.56	.36	-		
	p-value	<.001	<.001	-		
Current Self-Efficacy (CSE)	Pearson' r	.25	.35	.36	-	
	p-value	.001	<.001	<.001	-	
Current PA (CPA)	Pearson' r	.22	.33	.24	.49	-
	p-value	.003	<.001	.001	<.001	-

n: number of participants

Current PA: Milton's (389) single item measure, "In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate?"

Current Self-efficacy: The Exercise Self-efficacy (388)

Self-determination Motivation: The Perceived Locus of Causality (PLOC) (147, 385)

Engagement in Extracurricular activities: A single item measure was taken from the Active Lives Study (386).

The single item '*I participated in extracurricular sport and physical activities that were facilitated/organised by the school (including before school, breaks and after school)*

Pe motivational climate: PE modified version of the Learning Climate Questionnaire (347) based on Williams and Deci (387)

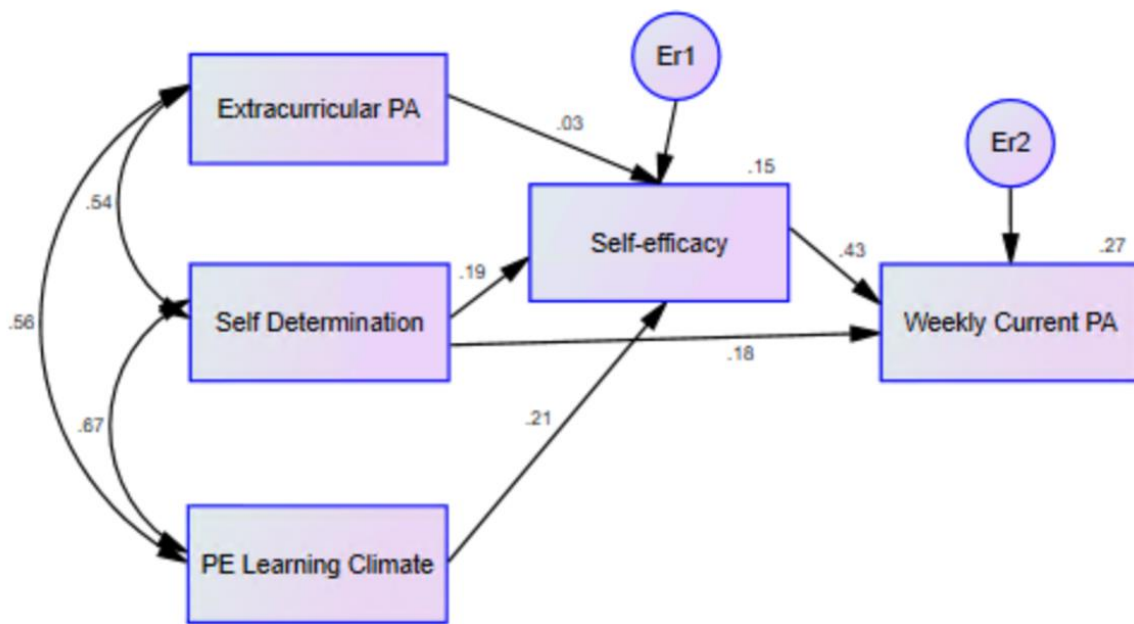


Figure 4. 7. Final SEM evaluating the relationship between retrospective perspectives of the PE motivational climate, self-determination, extracurricular activities, current self-efficacy and PA participation.

The hypothesised model fit was poor ($\chi^2(4) = 12.89$, $p = .012$, CFI = .96, TLI = .9, RMSEA = .11). The model was improved by removing the direct effect between PE motivational climate and current PA based on modification indices. The final model fit (outlined in Figure 4.7) was very good model fit ($\chi^2(.46) = .92$, $p = .63$, CFI = 1.00, TLI = 1.021, RMSEA = .000).

All the correlation pathways within the model were of a positive significant direction as expected. Self-efficacy was significantly explained by the direct effects of self-determination ($\beta = -.19$, $p = .05$) and PE learning climate ($\beta = .21$, $p = .033$). The direct effects of participation in extracurricular PA whilst at school and self-efficacy was non-significant ($\beta = .03$, $p = .73$). An indirect relationship from extracurricular activity to current PA via self-efficacy was significantly found ($\beta = .65$, $p = .022$). A significant indirect effect was found between PE learning climate and current PA via self-efficacy. The indirect effect from self-determination

to current PA via self-efficacy was also significant ($\beta = .45$, $p = .01$). In turn, current PA was related to higher levels of self-efficacy ($r^2 = .14$). Whilst self-determination ($\beta = .18$, $p = .01$) and self-efficacy ($\beta = .43^{***}$) were associated with greater current PA ($r^2 = .27$).

Discussion

This study aimed to see if experiences in secondary school PE were related to physical activity in adults. Findings from the structural equational modelling suggest that a person's PE motivational climate and self-determination has an impact on a person current self-efficacy which in turn impacts their current PA. A direct effect was also found between self-determination and self-efficacy with current PA.

The discussion of this chapter will look at the predictors of adult engagement in PA.

Perceptions of PE Experiences

Aside from a rare few, every individual within the United Kingdom would have had some form of experience of PE. When adults are asked to recall and reflect on their past experiences in PE males tend to use more positive words when recalling perceptions of their PE teachers than females (396). In general, females reported more negative experiences (397) and attitudes (396) towards PE. The negative experiences were attributed to being uninterested in the activities and competitive nature of the environment (397).

In support of previous research, 85% of male participants within this study reported having a positive perception of the PE teacher, compared to 60% of females. A demonstration of the words used to describe their teachers is presented in Figure 4.6, with the larger, bold words indicating that they have been used more frequently when recalling their teachers. The top 3

words that presented a positive sentiment included encouraging, fun and enthusiastic, which are terminologies that may be used to describe a mastery-oriented motivational climate.

‘Fun’, which is associated with the word enjoyment, has been shown to aid the development of intrinsic motivation (362, 398), whilst encouragement (verbal persuasion) has been identified as a source of building self-efficacy (174). The words utilised by participants to describe their teachers provided an indication of their experiences in PE. Based on this interpretation it would be assumed that males tend to have more positive memories of PE than females.

The words used to formulate an initial picture of the participant's experiences in PE align with the proposed variables within this chapter. Motivational climate, motivation, and engagement in extracurricular activities (to represent PA behaviours during adolescence) during adolescence, along with current self-efficacy were identified as being associated with current PA. The proposal of each of these variables is underpinned by the SDT (24) which suggests that the key social constructs within your surrounding climate (38), can support the formation of autonomous motivation and positive attitudes, influencing a person intention to be physically active in later life (331). A simple correlational analysis outlined a significant association between the identified variables and current PA. This contributes to the current body of literature that proposes links between adolescent experiences and adult PA.

Perceptions of the PE Motivational Climate During Adolescents

When a person reflects on their past experiences of PE, it would be assumed that a core component shaping their memories of PE would be underpinned by the motivational climate created by teachers. Motivational climates have been evaluated and utilised extensively in PE to encourage student participation. The premise of the motivational climate is to support and

provide fulfilment of the three basic psychological needs through manipulating elements within the environment. This may include opportunities of choice and providing appropriately challenging tasks, that in turn lead to the development of intrinsic motivation and enhanced learning opportunities (25). Teachers are at the forefront of creating this environment through lesson design and structure but also their interactions with pupils. The interaction and messages the teachers convey within the environment can shape the formation of students' attitudes using positive reinforcement, attention, and formative feedback (300).

It could be argued that it was anticipated that motivational climate would be the strongest predictor of the three covariates investigated within this study, as it could be interpreted that self-determination and engagement in extra-curricular activities are by-products of being in a climate that promotes mastery experiences. The reason for this is that being a part of a need-supporting environment, that fulfils an individual's basic psychological needs should result in higher perceptions of need satisfaction leading to the development of more autonomous forms of motivation towards PE (343, 346, 347, 354-356). Particularly, by increasing one's perceptions of competence in PE it can lead to intrinsic motivations (328-330), which in turn has been associated with persistence and engagement over longer periods of time.

However, the findings of this study showed that motivational climate did not have a direct effect on current PA but did on current self-efficacy. Reflecting on the literature and the fact that no direct association between PE motivational climate and current PA was found, it could suggest that PE motivational climate is just the foundation of building and shaping positive attitudes towards PA (300). Motivational climate therefore will not make physically active adults but alternately provide students with the foundations and opportunities to

develop autonomous forms of motivation and positive perceptions of competence that they can hold in later life.

PE Motivational Climates Association with Current Self-efficacy

As aforementioned in the previous subsection, PE motivational climate is directly associated with current perceptions of self-efficacy.

Self-efficacy is defined as the belief one has in their ability to execute actions or tasks in order to achieve a specific outcome (173). The theory of self-efficacy (174); posits that people are more likely to engage in a behaviour if they believe they have the capabilities to successfully execute the cause of action (174). A person can develop a perception of competency through a task-involving motivational climate (25).

To the awareness of the key research, PE motivational climate and adult PA participation has not been explored. There is evidence that demonstrates the link between the two variables, whilst at school with self-efficacy commonly regarded as a mediator between PE motivational climate and goal orientations (399) or PA (180, 400, 401). Despite the lack of evidence to compare to, the SDT underpinning PE motivational climate and the self-efficacy theory, both embody the idea that a person's perception of their capabilities (competence) impacts their engagement in an activity, though the role of self-efficacy/competence on behaviours is different. Self-efficacy theorists believe that self-efficacy has a direct influence on one's behaviours, whereas the SDT proposes that self-efficacy is a more distal factor as it impacts one self-determination rather than the behaviour itself (362). When interpreting the findings (direct association between PE motivational climate and current PE) in line with each of the variables in relation to theoretical frameworks, it is not surprising that PE

motivational climate is indirectly associated with current PA by current self-efficacy, as the motivational climate fosters self-determination motivation that forms a person's intention to engage in a behaviour. A person's intention to engage in the behaviour is then evaluated through perceptions of one's capability to successfully carry out the behaviour, e.g., their self-efficacy.

Even though direct links were not found between a person's experiences in PE (perceptions of the PE motivational climate) and current PA, it is still important for teachers to consider the motivational climate they are creating as this can directly impact a person's perception of their self-efficacy in later life. Thus, having a positive perception of self-efficacy plays a role in positive PA behaviours in adulthood (402, 403).

Participation in PA outside of PE During Adolescents and Current PA

Within this chapter engagement in extracurricular activities was used to gain an insight into how physically active participants were outside of PE during their adolescent years. Several longitudinal studies have demonstrated a positive association between participation in PA at adolescence and adulthood PA (199, 200, 304, 305, 308, 315). Although these studies are not directly comparable with the findings of this study as this study uses a SEM to predict future PA engagement, it would be assumed that a direct association would be found between past participation in extracurricular activities and current PA. However, for this study, this was not true as no direct effect was found on current PA ($r = .07$). A discrepancy with findings may be related to the fact that this study specifically looked at extracurricular activities whilst previous studies focused on PA in general. Kjønniksen, L., Fjørtoft, I., & Wold (315) study found that organised sports was the greatest predictor of adult PA for males, whilst females was their attitude towards PE. Extracurricular activities are an organised form of sport, PA, or

exercise, it could be inferred that if this study looked at gender differences in relation to extracurricular activities and current PA, a direct effect may occur for males. Unfortunately, due to low sample size and distribution, it was not possible to run this analysis and draw conclusions on the comparison.

The final model proposed in this chapter suggests that engagement in extracurricular activities does not influence adult PA engagement, even when mediated by self-efficacy as this was small and non-significant.

Self-determination Motivation During Adolescents and Current PA

Out of the three measures within this study that collected retrospective data, self-determination was the only variable that was directly associated with adult PA levels. Self-determination was also indirectly associated with adult PA via self-efficacy. This has been evident in a fellow SEM study (334), which found that having intrinsic motivation in the forms of experience and accomplishment, during PE lessons, significantly predicted PA engagement after graduation. This is not unforeseen as according to self-determination literature; a person is more likely to remain engaged in PA and exercise long-term if they are intrinsically motivated (141) as individuals engaged in the activity for themselves (24). Behaviours that are underpinned by autonomous motives are more likely to display intentions to be physically active compared to controlling motives (301). While this finding does not bring any new information to light, it does support previous findings that highlight the need to develop students' PA intentions at school to support the development of active adults.

Perceptions of a mastery climate, along with the perceived competence and task orientations of an individual have also been recognised as a positive predictor of self-determined styles of

motivation (404). Demonstrating that a person's perception of the motivational climate can influence an individual's motivational orientation. Suggesting that not only does the mastery climate have the capabilities to provide positive experiences and formation of attitudes but can also impact an individual's intentions to be PA in later life (331), through means of developing behaviours that are underpinned by autonomous forms of motivation.

Although recognised that motivational climate can influence a person's motivation, a contradicting view is that the motivational climate of an individual is influenced by perceptions of their own ability, goal orientation and personal motivation (150). Thus, implies that an individual's motivational orientations towards PE and perceptions of competence can influence how they interpret the PE environment.

Retrospective Perceptions of PE Motivational Climate, Extracurricular Activities and Self-determination, Mediated by Self-efficacy Impacts Adulthood Engagement in PA

The different paths have been evaluated individually on their direct and indirect effects on adult PA. Overall the final model designed in this chapter was a very good fit and was able to explain 46% of adult PA. The final model within this chapter was underpinned by SDT (24) and self-efficacy theory (174). The self-efficacy theory (174) emphasises the importance of a person's perception of their capabilities to successfully carry out a behaviour. It postulates that's self-efficacy has a direct influence on one behaviour, in this case PA. This aligns with the direct effect between current PA and self-efficacy ($\beta = .43^{***}$) represented in the final model within this chapter. However, this model also takes into consideration the self-determination theory whereby self-efficacy is also considered as distal factor that impacts one self-determination rather than the behaviour itself as this was replicated within the final

model through PE motivational climate ($\beta = .21, p. 033$) and self-determination ($\beta = .19, p .05$) by presenting indirect effects on current PA, mediated by current self-efficacy. Both the final model and SDT suggest that a person's motivational climate and self-determination can impact current PA. However, within the final model of this chapter the effect is only found when mediated by self-efficacy, whilst SDT proposes a direct effect can be found. In regard to extra-curricular activities, the final model disagrees with SDT, as it would be assumed that participating in extracurricular activities would increase perceptions of competence, supporting a link with self-efficacy. This was not found in the final model of this chapter.

Limitations

Whilst this study successfully formulated a model that predicts future engagement in PA from PE experiences, there were some limitations. The first issue was related to data collection. Despite a good interaction rate with the survey, over 44% of the participants had to be excluded due to not submitting their answers or meeting the studies criteria. Gender discrepancies were unable to be explored due to low numbers. Across PE literature it is apparent that differences in gender occur in relation to perceptions of motivational climate (405), engagement (311) and motivational orientations (405), suggesting that the model for predicting engagement may change when looking at genders individually. This raises concerns with the development of this model as it generalises the information to both genders. In order to understand differences in predicting future engagement in PA across genders, a greater sample size is required. It may also be useful to include a measure that investigates the role of peers within perceptions of PE motivational climate as peers along with teachers have been identified as primary influences in shaping an individual PE experience (38, 39, 406).

Methodical issues also rose when evaluating the psychometrics. The data was collected as a dual study with an undergraduate student. Miss communications between the two researchers resulted in the final survey incorporating an incorrect Likert-Scale for self-efficacy. The validated version includes a 4-point Likert-Scale whilst this study included 5-point Likert-Scale. Though it is not advisable to change the design of a validated questionnaire, 5-point-Likert- Scales have been regarded to produce better distribution of data (407).

Lastly, three of the psychometrics required participants to recall their experiences. The concern with recalling PE experiences is that the individual's schemas may have been influenced by preconceptions of what PE is like. A person's schemas may be informed by their personal experience, the experiences of others as well as what is observed within the media (e.g., movies and TV programs). It is also uncertain whether perceptions of PE recalled by participants were regarding primary school or secondary school experiences. However, it would be assumed that secondary school experiences would be most prominent as they occurred more recently. Thus, old memories are altered when new memories are made (408). To reduce this limitation future studies may wish to conduct a longitudinal study that gathers information on participants experiences when they are at school and then again in 5-10 years after graduating.

Conclusion

The findings of this study demonstrate a positive association between perceptions of the PE motivational climate, self-determination motivational orientations and engagement in extra-curricular activities at predicting future engagement in PA. Interpreting the findings of the study, emphasises the importance of the lesson design and delivery of PE to promote a

mastery-climate that promotes the fulfilment of SDT basic psychological needs which in turn promotes PA. It is important that a person's experience in PE is positive, and competencies are developed as it supports the promotion of high positive self-efficacy, which is needed to promote the long-term adaptation of an active healthy lifestyle. However, this study does not explore whether a person's goal orientation, personal motivations, and attitudes towards PA influences perceptions of motivational climate or vice versa. It is vital to explore this in order to inform future interventions aimed at addressing physical inactivity issues in adolescents and older adults.

Chapter Summary

To gain an understanding of the role PE plays in the promotion of PA, a retrospective study was carried out to capture retrospective perceptions of participants' motivation towards PE, past involvement in extracurricular activities and their memory of their PE motivational climate, along with participant's current perceptions of sport self-efficacy against the outcome current PA. Models generated through path analysis showed that an individual's motivation towards PE directly influences adult PA participation and an indirect effect via current self-efficacy. This was not surprising as the SDT suggests that you are more likely to continue participation if you are autonomously motivated (24).

Unlike previous studies exploring past experiences in PE influence on adulthood PA engagement, this chapter provides an estimation of the effect each of these variables may have on engagement in PA rather than just an exploration of what their experiences were like and how their experiences have shaped their current attitudes towards PA.

Within Chapter 4, motivation towards PE during adolescence was identified as a key influencing factor for adult PA engagement. According to SDT (24) and previous literature (26, 101, 357) autonomous forms of motivation can be supported through a mastery-orientated motivational climate that satisfies the three basic psychological needs (11). Thus, it is important to investigate the dispositional and contextual motivation of the students within the PE environment to ensure that the PE motivational climate supports lifelong engagement in PA. Stemming from Chapter 4, Chapter 5 investigates the motivational climate from three different perspectives and analyses the direct and mediated relationships between the motivational climate and engagement in PE to predict lifelong PA habits.

Chapter 5: Charting Perspectives of Motivational Climate in PE: Triangulation of Teacher, Pupil, and Observer Perceptions

Abstract

Background: Creating an empowering motivational climate in lessons may positively influence student engagement in PE. Motivational climate is a perceived construct which varies according to the individual's perspective, and which may be mediated by extraneous factors.

Aim: To assess the PE motivational climate from three different perspectives: Teacher, Student, and Observer. Then to investigate the direct and mediated relationships between the motivational climate and engagement in PE.

Method: Motivational Climate was measured in teacher's ($n=2$) student's ($n = 99$) perceptions of the motivational climate using the Teacher-created Empowering and Disempowering scale and was assessed by independent observation (via the Multidimensional Motivational Climate Observation System). Students' mood, basic psychological needs and motivation orientation were also assessed.

Results: An empowering motivational climate was positively associated with engagement in PE. This relationship was partly mediated by Students' Mood and basic psychological needs, both of which also had significant direct effects on the engagement in PE.

Conclusions: Teachers can influence students' engagement in PE lessons by creating an empowering motivational climate. Factors that might mediate this association include

students' mood and satisfaction of basic psychological needs. These findings provide two areas of focus for teachers wishing to increase students' engagement in PE.

Introduction

Student engagement (a multifaceted concept that embodies behavioural, emotional and cognitive dimensions, see Chapter 2 for further information) has been explored from different lenses over the years. For example, the use of proxy measures to gain an understanding of students' engagement (101). Along with the role of motivational constructs and non-institutional influences (e.g., friends and family) (409, 410). The purpose of investigating factors associated with engagement in PE is to help gain an understanding of how to promote PE engagement and its association with life-long PA participation. Across the literature, there appears to be a lack of consensus on how engagement is measured, partially due to the complexity of defining and capturing all three dimensions of engagement (see Chapter 2 for more information). However, from an ecological framework perspective, it is suggested that intra-individual (person) and extra-individual (environment) factors can shape and shift a person's PE engagement as discussed in this thesis's literature review.

It is recognised that a person's motivational orientation can influence their engagement and perception of the motivational climate which in turn can impact student engagement.

Underpinned by constructs from the achievement goal theory (AGT: (411) and the self-determination theory (SDT: (24), the PE motivational climate is defined as the psychological environment induced by significant others (teachers) by the way in which they design, organise, deliver, and evaluate the lesson (153). The motivational climate is influenced by the attitudes and behaviours of key personnel involved in the environment, which in turn can shape perceptions of success and direct individuals' task orientations (task/learning or

ego/performance). Thus, the environment has the capability to influence an individual's composite view on goal structures and measures of achievement within a specific context (22). Two theoretical frameworks have been proposed to understand the association between the motivational climate surrounding the individual and their motivation: AGT and SDT.

Achievement Goal Theory and the PE Motivational Climate

AGT (411) is a motivational viewpoint that has been extensively applied within PE settings (412-415). Stemming from a social-cognitive perspective and interactionist approaches, motivation within the AGT is viewed as the interaction of dispositional (personal factors), behavioural, social and contextual factors (motivational climate) (416) that influence a person's perceptions of achievement (417). AGT suggests that individuals will approach learning tasks within the environment in two different ways depending on their perceptions of competence (418). Thus, success or failure within the environment will be dependent on whether success is self-referenced (mastery goals) or based on the comparison to others (performance goals). At an intra-individual level (motivational orientation), individuals whose goals are mastery-oriented will focus their efforts towards improving personal skills. Their perception of competence will also be derived from their commitment, effort and persistence towards tasks undertaken in PE (417). Thus, success in mastery-goal orientation is self-referenced, with 'failure' being viewed as helpful information that can aid the learning process (419). In contrast, those who are performance-goal orientated focus their perceptions of competence, success, and failure on comparisons with others (418), for example winning a 200m race in PE.

Goal-orientation is specific to the individual, but may also be influenced by environmental cues and instructional demands presented within a specific context; for example, within a PE lesson. The PE motivational climate and the goal structures presented in PE lessons can affect individual outcomes (e.g., enjoyment, perception of success and perceived competence) through their achievement goals (predetermined within the surrounding goal climate). Implying that not only do individual internal attributes influence their goal-setting process, but also classroom structures and how the success of the task is outlined (418), can influence the salience of a particular goal orientation. For example, if the lesson provides numerous opportunities for comparison, it is likely that performance-goal orientations will be adopted, whilst if the lesson is learning focused mastery-goal orientations would be more likely. This is supported by a review conducted by Jaitner et al., (420), which found that across 70 observational studies exploring AGT in PE, mastery goals were often positively related to perceptions of a mastery climate, whilst performance goals were positively associated with a performance climate. Surprisingly, when participants of Bakirtzoglou and Ioannou (405) were asked to determine their perception of the motivational climate, males and females perceived the environment in different ways. Males were more likely to perceive the lesson as ego-involving, whilst females perceived it to be mastery. This may be due to the influence of their own motivational orientations as males showcased characteristics of ego-goal orientations, whereas females favoured mastery-goal orientations (405). Achievement goal orientations, personal motivation and perception of ability can influence perceptions of the motivational climate (150). This could provide reasoning as to why differences between gender in Bakirtzoglou and Ioannou (405) study were found.

Evidently, there is a link between student goal orientation and their perception of the motivational climate (150), but it is unclear the direction of causality. Thus, it would be

beneficial to explore students' perceptions of the climate vs. teacher's perceptions and observed perceptions to identify the degree to which an individual's motivational orientations impact perceptions of the motivational climate.

Self-determination Theory and the PE Motivational Climate

The motivational climate can influence a person's goal orientation, but according to Nicholl, (417) the motivational outcomes of goal orientation are mediated by a person's perceived competence. SDT (24) states there are three basic psychological needs (competence, autonomy, and relatedness) that determine how a person regulates their behaviour between less or more self-determined forms. Several different forms of motivation exist that could influence a student's reasoning for engaging in the behaviour based on their Perceived Locus of Control (PLOC), referring to one's perception of felt autonomy for the behaviour (421). PLOC measures a person's reason for engaging in the activity or behaviours and ranges along a continuum of intrinsic (for knowledge, stimulation, enjoyment and self-improvement) to extrinsic (integrated, identified, introjected, and external regulation) and amotivated (students feel incapable to engage or have no idea why they should participate) (90) behaviours. For more information surrounding SDT please refer to the literature reviewed in Chapter 2.

Autonomous forms of motivation are associated with greater student engagement (422), enjoyment (169, 423), better concentration (169), more effort (169, 329, 424) and greater persistence (11, 425) within PE. The reason for this is that autonomously motivated children are more likely to engage in self-initiated PA (164). In contrast, controlled motivation and amotivation have been linked with boredom (422) and dropout in PE.

When motivation is targeted within PE through structural design and feedback, PA levels have been shown to increase (426) as well as a person's intentions to be physically active outside of school (427). Consequently, supporting the development of autonomous forms of motivation would be beneficial for increasing student engagement and the promotion of long-term PA (141, 334).

Traditionally investigating self-determination within the PE context has tended to focus more on autonomy (428, 429), failing to observe the remaining two basic psychological needs (competence and relatedness. See Chapter 2 for more information). However, the extent to which the environment is 'structured' and 'interpersonally involving' (or relatedness supportive: teachers encourage cooperative learning, using a warm approach to promote an inclusive learning environment to support the development of healthy relationships with others (205) has been linked to athletes' and students' psychological need satisfaction (94, 430).

In line with the central tenets of the SDT, PE contexts can support the fulfilment of the students' basic psychological needs (141, 337) through the motivational climate teachers create. PE teachers, as a social agent, can exert motivational influences through the interactions they have with their students. This can be achieved through teachers adopting an autonomy-supportive (interpersonal tone that validates the students' psychological needs and motivation through nurturing behaviour; 28) or a highly controlling (adopting an authoritarian approach ignoring students' perspectives to impose a specific preconceived way of behaving; 28) teaching style, that is conceptualised along a behavioural continuum (11).

A teacher who is autonomy-supportive will use strategies to promote a task-involving motivational climate (value is placed on learning, self-improvement, effort and viewing mistakes as opportunities to learn)(431). Some of these strategies include acknowledging students' feelings and providing them with choices (168), whilst avoiding the use of punishment and diminishing demands (345, 346). By adopting this approach teachers are supporting students to achieve their goals whilst fostering basic psychological need fulfilment (345). Task-involving motivational climates have not only been shown to support autonomous forms of motivation (26, 101, 357), but also higher psychological need satisfaction (343, 346, 347). Task-involving climates have been associated with the development of autonomous forms of motivation as the emphasis on learning and skill development promotes student enjoyment relating to intrinsic motivation (348).

In contrast, teachers who adopt a controlling teaching approach have frustrated the basic psychological needs (338, 343) and student disaffection (344). A teacher is regarded as high-controlling when they use external (e.g., punishment, rewards or intimidation) (341) or internal (e.g., guilt, shame, utilising students' anxiety or paying less attention to those who are not behaving in a desired way) (341, 342) controlling behaviours (340). This teaching style promotes an ego-involving motivational climate, whereby competition and comparison to others are empathised (417). This raises concern as to what impact these experiences may have on later-life perceptions of PA.

Teacher's Role in Shaping the PE Motivation Climate

Arguably, when dealing with larger issues that are demonstrated across different populations it is more efficient to work on improving the environment around the individuals, rather than trying to change individuals themselves (432) as more people can be targeted. Peers and

teachers have been identified as key social constructs that play a vital role in shaping an adolescent experience in PE (38, 39, 433). Highlighting the important impact that teachers can have on shaping students' PE experiences and environment.

Jang, Reeve and Deci (434) have suggested that student engagement is affected by the structure and design provided by the teacher influencing the type of motivational climate they create. In accordance with AGT and SDT, the environment (motivational climate) could promote adaptive motivational patterns that can support the development of the three basic psychological needs as well as persistence in various behaviours (150, 152, 435). From an AGT perspective, the motivational climate teachers create (either task-involving or performance-involving) influences how a person views their competency as well as defines success (436). Whilst the SDT in contrast propose that the social environment surrounding a person can influence their motivation through one of two different interpersonal styles: autonomy supportive (teachers offering students meaningful choices and involving them in the decision-making process) vs controlling style (teachers delivering lessons in an authoritarian way, using controlling language and rewards/punishment). Consequently, teachers have the ability to promote an environment that is based on learning and corporation or rivalry and social comparison (437).

As both theories are valued within motivational climate research, Duda (152) attempted to combine facets from the AGT and the SDT and proposed that the motivational climate created by teachers and coaches can be more or less empowering or disempowering.



Figure 5. 1. Constructs of an empowering and disempowering motivational climate (438).

Constructs of an Empowering Motivational Climate Created by Teachers

An empowering PE motivational climate is an integrated approach that promotes a social environment that is characterised to be task-involving as well as autonomy and socially supportive (for example teachers care and respect their students despite their performance abilities or engagement) (152). The premise of an empowering motivational climate is that the basic psychological needs are satisfied, hopefully encouraging students to feel more autonomously motivated to engage in PE.

The role of the PE teacher is to provide students with a positive experience that a) promotes learning, b) fosters cognitive development c) satisfies the psychological needs of the students.

PE teachers can support student learning through the feedback they provide. Students require clear direction with step-by-step instructions (439, 440) on how to achieve desired outcomes, along with opportunities to practise. Short and focused explanations are associated with motor learning (86) and how *people acquire motor skills* (441). Constructive feedback helps to develop the required competencies of a skill or activity (442, 443) more effectively than just participating in an activity without any guidance or feedback (444). Thus, teachers should focus on what students are doing well, as well as provide one or two comments that help students improve (445). It is important that teachers recognise and determine the essential aspects of feedback to avoid overloading students with information. Opportunities to ask questions should also be provided to promote self-learning. The use of this type of instructional design along with teacher interactions has been shown to positively influence students' attitudes towards PE (85, 446).

Students need to have time to practise basic skills or movements to develop motor skill abilities (86) and perceived competence before undertaking more complex tasks in game situations. It is important not to move into game situations too quickly as this does not allow for motor learning to take place (86). Moving students too quickly into competitive situations without the required knowledge to execute the skill under pressure may be detrimental to their progress and perceptions of competence (85), which may result in cognitive overload. Putting students in game situations too early may also impact students' perception of the motivational climate to be seen as less empowering. Consequently, teachers should monitor

students' development and make timely adjustments to provide additional support or challenge where required.

Empowering climates also place importance on autonomy and relatedness-supportive teaching behaviours. Autonomy-supportive strategies used by PE teachers may include offering choice (447, 448), providing students with encouragement and welcoming student input (439). A positive association has been found between task-involving and need-supportive motivational climate and students' perception of autonomy and relatedness (449). No association between autonomy and relatedness-support was found (449). However, Cox and Williams (450) and Haerens et al., (205) found that teachers can be autonomy and relatedness-supportive by showing noticeable interest in their students, supporting them not just from an applied perspective, but also emotionally by being empathic, caring, and understanding of their students. By showing an interest, being caring, supportive and empathic students feel comfortable asking questions, supporting their development. Relatedness-supportive teaching styles have been shown to be positively related to students' confidence in their teachers' ability and enjoyment (451). Adopting a relatedness-supportive teaching style has been identified as being associated with behavioural and emotional engagement through relatedness need satisfaction and autonomous motivation (452).

The structure of the lesson is linked to both autonomy and relatedness support as the structure of the lesson can impact the students' opportunities to learn and develop. For example, before engagement in an activity, teachers should provide students with clear objectives that are achievable. During the activity, the teachers should then consider offering effective feedback and information to support the students (205). Developing need-supportive environments not only increases needs satisfaction leading to increased engagement in PE

(453), but it is also positively associated with the intention to practice sport in the future (454), which is one of the main aims of PE. Thus, it is important to ensure that an empowering motivational climate is created, to foster student's development of competencies and encourage long-term engagement in PA. Lessons that are task-involving, promote autonomy, and support relatedness-supportive structures can be empowering.

Constructs of a Disempowering Motivation Climate Created by Teachers

Lessons that are task-involving, promote autonomy, and support relatedness tend to be empowering motivational climate. In contrast, lessons that are ego-involving, coach-controlled and thwart relatedness tend to be disempowering.

An ego-involving PE environment fosters social comparison by encouraging students to outperform one another, with teachers engaging in controlling behaviours, resulting in thwarting of the basic psychological needs (449). Pickup et al., (455) explained that the promotion of competition in PE increases pressure on students to perform. Resulting in less time for them to acquire the foundations to be able to process the information and make decisions appropriately within game contexts. Encouraging competition too early may result in students developing low domain-specific self-efficacy, resulting in the potential avoidance of similar activities in the future. Chapter 2 showed how the motivational climate can impact later life self-efficacy, which is an important contributor to encouraging engagement in PA in later life. Consequently, it is important that the environment supports the development of positive perceptions of self-efficacy at adolescents to provide strong foundations for adulthood.

Aside from promoting social comparison, controlling teacher styles are a key contributing factor within a disempowering motivational climate. A PE teacher will demonstrate controlling behaviours when they ignore the students' perspective and interest, and apply pressure on the students to behave, think and feel in a particular way (339, 456-458). It is also likely that they will use reward and punishment (e.g., 10 press-ups) to gain the desired outcomes from their students. Controlling teachers have been regarded as chaotic and cold, in the way in which they are unclear about the goal of the lesson, appear unfriendly and reject certain students (459). These types of controlling styles have been associated with thwarting satisfaction and creating frustration of the three basic psychological needs (460), and negative effects on self-determined motivation (343). Students' perceptions of their teachers' controlling behaviours have also been shown to have a negative impact on students' PA engagement away from PE (461), all of which could be detrimental to promoting long-term engagement in PA.

Measuring Constructs of an Empowering and Disempowering Motivational Climate

The SDT proposes that students' subjective experiences ultimately determine engagement and motivation. The effects of teachers' in-class behaviours on empowering or disempowering motivational climates have been investigated by assessing how students perceive these behaviours during PE lessons (40, 41). For example, Taylor, Ntoumanis, and Standage (462) used self-report measures to compare teachers' perceptions to students' reports.

When assessing perceptions of the motivational climate or specific constructs that underpin the motivational climate, studies have compared teachers' observed or self-report perceptions with students self-report data.

To gain an insight into students' perception of the motivational climate Morgan et al (463), collected observational data from 8 teachers within the United Kingdom and 10 in Singapore and their respective students (n=338). Observational data was gathered through Behavioural Evaluation Strategies and Taxonomies software that focused on the TARGET principles (22), whilst students' self-report measures were obtained through the Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ) (464). Findings revealed that the behaviours teachers displayed within the motivational climate were interpreted the same way by their respective students. Although the alignment of perceptions of motivational climate was found within Morgan et al., (463) study, it is worth noting that the items within the LAPOPECQ primarily focus on motivational orientations and, thus do not directly align with constructs within the TARGET framework (e.g., task design, authority, and time) which informed the observational data. However, personal goal orientations and motivations have been seen to impact perceptions of the motivational climate (150). Thus, goal orientation is an important area to consider.

Deliligka, Sympas and Bekiari (161), also used the LAPOPECQ-short version to gain students' perception (n=899) of the PE motivational climate created by teachers. Unlike Morgans et al., (463), Deliligka et al., (161) obtained 15 teachers' perceptions of the motivational climate through interviews. Findings revealed that a majority of students perceived the motivational climate that the PE teachers created to be task-involving. Students' perception of teachers promoting a task-involving motivational climate aligned with nine of

the teachers' perceptions of the environment (161). However, there were five PE teachers who had a different perception of the motivational climate to their students. One teacher even regarded the climate they created as performance-orientated, whilst the students in the class believed a task-involving motivational climate was fostered. Nevertheless, most of the student's perception of the motivational climate agreed with what the teachers believed they were promoting, coinciding with the earlier work of Morgan et al (463) observational study. De Meyer et al., (41), is another study that compared teachers' behaviours with student perceptions to assess convergence between teacher behaviours and student perceptions in terms of controlling teaching behaviours and students motivational orientations.

Observational data was collected on 56 teachers using the controlling items of the need-thwarting teacher behaviour scale developed by Van den Berghe et al., (458). Student data (n=702) was reported on the Psychologically Controlling Teaching (PCT) scale (457), and two items were from the Teacher As Social Context Questionnaire (TASCQ) (459). De Meyer et al., (41) study, found that students reported a higher frequency of controlling teaching behaviours than observes. Thus, concluded that even sporadic exposure to controlling teacher behaviours may lead to more controlled forms of motivation.

De Meyer et al., (41) only explored congruency between student and observer perceptions of controlling teaching styles. Thus, differences in findings with Morgan et al. (463) and Deliligka et al., (161), maybe attributed to the fact that they focused on more 'positive' teaching behaviours, whilst De Meyer et al., (41) paid attention to 'negative' teaching behaviours. Nonetheless, findings from all three studies emphasise the need to investigate different perceptions of the motivational climate to see the impact different teaching styles may have on students' motivational orientations, that they could hold moving forward into later life.

There is a paucity of studies investigating teachers' perceptions of the climate they create. Previous research has revealed the determinant role teachers play in creating the PE motivational climate, and that teachers teaching a specific class (465), along with members in the class (466) may influence a student's perception of the motivational climate, but little is known about teachers' perceptions of the climate they create and promote. Identifying the degree to which teachers are aware of the climate they promote, maybe a useful starting point to help teachers recognise the empowering and disempowering teaching styles they use, so that they make a conscious effort to utilise empowering teaching styles instead. It is greatly important that teachers are aware of the climate they are creating as the motivational climate created by teachers is a determinant factor in developing students' awareness of the importance of PE and promoting long-term engagement in PA (199).

In educational settings it is standard practice to review the behaviours teachers display and the motivational climate they create from three perspectives: teacher reflections, student, and outside observer feedback. However, to the understanding of the key researcher only a maximum of two views have been considered simultaneously to gain an understanding of the PE motivational climate (161, 463) and the teachers' behaviours (41). Consequently, this study aims to address this gap in research by adopting a triangulation approach (student, teacher, and outsider observer perspective) to investigate the behavioural strategies and the environment teachers to see if there is consistency in perceptions.

Study Aims:

The aim of this study is to investigate the motivational climate fully by comparing teacher and student perceptions alongside researcher observation to measure the (mis)alignment (Qs

1-2). The students data will then be used to identify factors that may impact the student's perceptions of the environment based on their engagement in PA outside of PE, the type of activity delivered in the lesson and their motivation orientations (Q3).

Research Questions:

Q1: Do teachers' perceptions of the motivational climate they create match the student's perceptions of the motivational climate?

Q2: Is there a discrepancy between the observed behaviours of the teachers and the student's perceptions?

Q3a: Is there an association between an empowering environment and student engagement in PE?

Q3b: What factors mediate the association between an empowering environment and student engagement in PE?

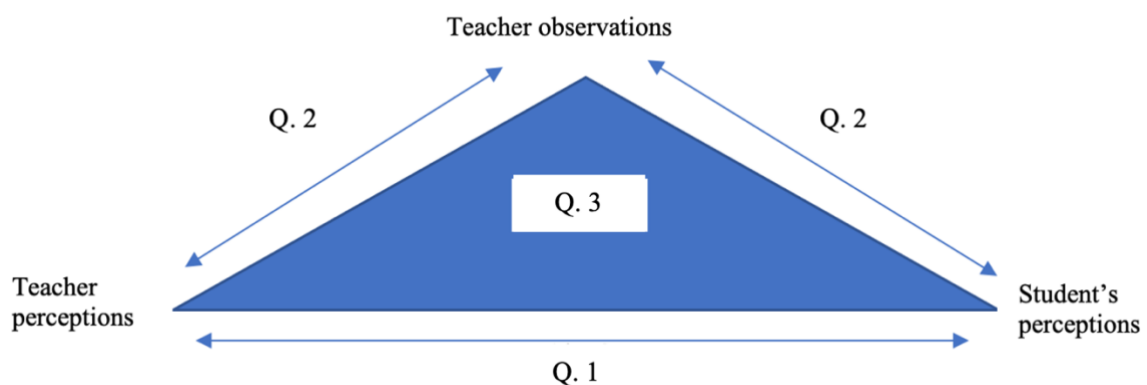


Figure 5. 2. Visual representation of the questions this study aims to address.

Each question will be examined to assess the differences observed in terms of the interaction between students' gender and age group (year 7, year 8 and Year 9).

Method

Participants

PE students ($n = 99$) and two teachers, from a Kent Secondary school, who are part of the Swale Academies Trust volunteered to participate. Of the 99 participants who engaged in the study, 6 were removed due to incomplete questionnaires. The participants in this study were split into two groups. The first group consisted of pupils from the selected school, which was broken down into subgroups based on their school year and gender (Year 7: F = 8, M = 12, Year 8: F=19, M = 21, Year 9: F = 20, M= 13). The second group was made up of one female PE teacher (Age = 32, 7 years of experience, 4 years at current school) and a male PE teacher (Age = 26 years, 2 years of teaching experience and 2 years at current school), with the female teacher teaching the female participants in each of the year groups and the male teacher the male students.

The students were sampled from their mandatory PE lesson that was delivered during the second to last week of the school year in 2022.

Protocols

Students' perceptions of their teacher: The students were required to complete the Teacher-created Empowering and Disempowering scale (EDMCQ-PE; (467). The scale includes 34 items on a 5-point Likert scale (i.e., 1 = strongly disagree to 5 = strongly agree), capturing

students' perceptions of their teachers' behaviours (e.g., 'my teacher only praised pupils who performed best during a class') (internal consistency Cronbach alpha = .93). An overarching statement of 'In this session...' was presented at the start of the EDMCQ-PE items to encourage students to respond based on this lesson, so direct comparisons could be made between observations and teachers' perceptions. To generate an overarching score for empowering, the mean for each construct was found. Empowering constructs were then combined and divided by the number of constructs to create a single score for empowering. The same procedure was carried out for disempowering. Using the EDMCQ-PE allowed for a comparison between the student's perceptions and the teachers' observed behaviours based on constructs within the SDT and AGT.

Teachers' perceptions of their own behaviours: The teachers were also required to complete the EDMCQ-PE scale, but the wording was reframed to gain teacher's perceptions of their own behaviours (e.g., original wording of 'My teacher encouraged pupils to try new skills' to 'I encouraged my pupils to try new skills') (internal consistency Cronbach alpha = .88). This has been reciprocated in a coaching context in past research (468). Their responses to the 34 items were reported on a 5-point Likert scale (i.e., 1 = strongly disagree to 5 = strongly agree). The same procedure as the students' EDMCQ-PE scale was conducted to create teachers' perceptions of the empowering and disempowering environment they create.

Teacher observations: The validated observational tool, Multidimensional Motivational Climate Observation System (MMCOS) ((469), was used to collect observational data on the teacher's behaviours by the key researcher. The MMCOS focuses on the three basic psychological, along with constructs of the AGT (122). The observations were recorded on a scale 0 to 3 based on potency (0 = not at all, 1 = weak potency, 2 = moderate potency and 3 =

strong potency). However, to allow for comparison with teachers' and students' perceptions of the environment, the observations were recorded on a 5-point Likert scale looking at the frequency (i.e., 1 = never to 5 = always). The key researcher was present during the PE sessions and made initial observational notes. The lesson was video recorded with the consent of the teachers and the students involved in the lesson. This aligns with the validated procedure of the MMCOS, as it is designed to rate a specific time period of footage of individuals in action (e.g., 5-minute intervals). After at least 7 days the key researcher repeated the procedure on some of the footage to check for consistency. Intraclass correlation covariance (ICC) analysis was run to test the reliability of the observations for each of the 5-minute intervals for year 7 boys and girls (ICC [2,1] .99 [.98-.99], $p = <.001$), year 8 girls (ICC [2,1] .91 [.89-.96], $p = <.001$), year 8 boys (ICC [2,1] .99 [.98-1], $p = <.001$) and year 9 boys (ICC [2,1] .97 [.94-.99], $p = <.001$). The results from the observations were deemed reliable based on the 95% confidence interval of the ICC estimates with values greater than .9 indicating excellent reliability (470). Once the whole session had been reviewed the observer was required to provide an overall rating of the extent to which the environment was empowering and disempowering using the same scale. To be consistent across the different lessons, scores of frequencies for each construct were combined to create an overall frequency score for empowering and disempowering.

Students' measure of motivation: To gain an insight into participants' self-determination during their PE lessons the Perceived Locus of Causality (PLOC) scale devised by Goudas, Biddle, and Fox (303), based on the work of Ryan and Connel (385) was used. PLOC is a 20-item questionnaire, measured on a 7-point Likert scale with 1 strongly disagree to 7 strongly agree (internal consistency Cronbach alpha = .89). Items ask the respondent to rate the extent to which their actions result from internal and external resources. The statement 'I take part

in PE lessons...’ was situated at the start of each page above the 20-items to remind the students that the items are in relation to their reason for participating in PE. There are 5 factors (each subscale is composed of 4 items), measuring external regulation (e.g., ‘because that’s the rule’), introjection regulation (e.g., ‘because it would bother me if I didn’t’), identification regulation (e.g., ‘because it is important to me to do well in PE’), intrinsic motivation (e.g., ‘because PE is fun’) and amotivation (e.g., ‘but I really don’t know why’). The self-determination score is calculated by multiplying each answer by the relative weight as followed; external regulation (-2), introjection regulation (-1), amotivation (0), identification regulation (+1), and Intrinsic motivation (+2) and then summed. A higher positive score indicates greater relative autonomy.

Students’ perceptions of their basic psychological needs: The Basic Psychological Needs in Physical Education Scale (BPN-PE) (149) was used to collect self-report data around the student’s perceptions of their basic psychological needs. The scale includes 12 items with 4 items for each factor (internal consistency Cronbach alpha = .97). For example, autonomy, ‘We do things that are of interest to me’, competence, ‘I feel that improve even in the tasks considered difficult by most of my classmates’ and relatedness, ‘I feel like I have a close bond with my classmates’. Within Vlachopoulos et al., (149) study it includes a 7-point Likert scale ranging from 1 (don’t agree at all) to 7 (I completely agree), with a midpoint of 4 using the verbal anchor (I moderately agree) to increase response variability. However, studies that have used this scale have reported it on a 5-point Likert scale. For the purpose of this study, a 7-point Likert scale was used to coincide with the original format of the BPN-PE. To identify the degree of students’ perceptions of autonomy, competence and relatedness each such item associated with each of the factors was added to give an overall score (e.g., to gain a score for the factor autonomy, items 3, 6, 9 and 12 were combined to provide an overall score). The

higher the score represented higher perceptions of each of the factors. Participants mean scores were created and grouped into high (57 or above) and low (56 or below) perceptions of basic psychological needs.

Students' perception of their engagement: Items were taken from González-Peño, Franco and Coterón (28) tool of engagement to capture all three dimensions. The tool includes 5 items, for example 'I paid attention during this PE lesson', that are scored on a 4-point Likert scale that ranges from never (1) to all the lesson (4) (internal consistency Cronbach alpha = .79). The mean of the individual item scores was generated to represent how engaged students were within the lessons and grouped according never to all of the lessons.

Sports enjoyment: Students' perceptions of sports enjoyment were measured using one item, 'In general how much do you enjoy participating in sport?', on a 4-point-likert scale from 1 (not at all) to 4 (a lot).

Student's PA engagement outside of school: To measure current engagement in physical activity (PA) Milton, Bull and Bauman (389) measure of PA was used. It is a one-item measure that asks the participant "In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate?". One to 7 days was presented for students to record the number of days they had been active.

Participation in extracurricular activities: A single item measure was taken from the Active Lives Study (386). The single item '*I participate in extracurricular sport and physical activities that were facilitated/organised by the school (including before school, breaks and after school)*' was used to measure students' engagement in extracurricular activities.

Response to the item was collected via a frequency scale ranging from never (1) to 5 or more times per week (5). Responses were grouped based on how often they engaged in extracurricular activities; never, once a week, 2-3 times per week, 4-5 times per week and more than 5 times per week.

Participants Mood: Students mood was measured using the Feeling Scale (FS: (471) and the Felt Arousal Scale (FAS)(472). The FS requires the participants to record their feelings on an 11-point bipolar scale ranging from +5 (very good) to -5 (very bad). Whereas the FAS is a 6-point scale ranging from 1 'low arousal' to 6 'high arousal. The term arousal was replaced with attention given the age of the students potentially interpreting the word 'arousal' in the wrong way. Consequently, the question read as followed: 'On the scale below, record your level of attention in todays lesson'. The two scales allow for the affective response to be assessed from the perspective of the circumplex model (473), whereby the circumplex is broken down into 4 sections each representing a different characteristic. 1) unactivated/pleasant affect (calmness/relaxation 2) unactivated/unpleasant affect (boredom/fatigue) 3) activated unpleasant affect (nervous/tense) 4) activated/pleasant (enjoyment/happiness). By combining the score from the FS and FAS it provides a two-dimensional picture of the mood of the students (internal consistency Cronbach alpha = .66). For example, the students who score between -5 to 0 on the FS and 1 to 3.5 on the FAS are regarded as low activation displeasure so maybe feeling calm and relaxed.

Procedure

This study adopts a triangulation approach to explore different perspectives of the PE motivational climate to support long-term engagement in PA. Following ethical approval from the University of Essex, 6 lessons were observed across two consecutive days at the end

of the school year, delivered by 2 teachers. The lessons were recorded to allow the key researcher to conduct observations in 5-minute intervals once all the data was collected. Onsite observations were also noted at the observer's (key researcher) discretion. Teachers were encouraged to deliver their scheduled lessons as normal but to finish 10 minutes earlier to allow time for the students to complete printed versions of the questionnaires. Once students had been dismissed, teachers were required to complete their own version of the questionnaire. Unfortunately, the teachers only completed one version of the questionnaire due to time constrictions. Each teacher took approximately 5 minutes to complete the questionnaire, but this was broken down into 5 separate minutes as they completed sections of the questionnaire while waiting for students to change to and from their PE kits.

Data Analysis

All data was computed and converted into IBM SPSS Statistics 25 to be analysed. An Independent T-test was run to compare the difference in means between student's and teachers' perceptions of the motivational climate in terms of empowering or disempowering. To compare the means of individual student year groups against teacher perceptions of (dis)empowering motivational climate a One-way Anova (Dunnett T3) was conducted. A Pearson correlation was then run to explore the correlation between teacher, student, and observer perspectives of a (dis)empowering motivational climate in PE.

A univariate analysis was conducted to explore how each of the identified variables within Table 5.2 are associated with engagement in PE. The variables were then inputted into a forward correlation regression to generate models that explain variance in student engagement in PE.

A multiple regression was conducted to explore the relationship between independent variables sports enjoyment, daily PA, engagement in extracurricular activities, motivation, basic psychological needs, and an empowering motivational climate.

To explain the process of how an empowering environment affects engagement in PE a mediation analysis in JASP 0.18 (intel) was run. Three models were created based on the coefficient's findings from this study. Model 1 proposes that an empowering motivational climate mediated by how much an individual enjoys sports will impact PE engagement. Model 2 infers that an empowering motivational climate and students' engagement in PE, whilst model 3 is mediated by basic psychological needs. Standardised scores of each of the latent variables were included in the model and robust self-efficacy scores were created.

Results

Table 5. 1. Descriptive statistics for each year group.

	Males			Females		
	Year 7 (<i>n</i>)	Year 8 (<i>n</i>)	Year 9 (<i>n</i>)	Year 7 (<i>n</i>)	Year 8 (<i>n</i>)	Year 9 (<i>n</i>)
Members in each class	12	21	13	8	19	20
Ethnicity						
White	10	12	10	5	16	16
Non-white	2	9	3	3	3	4
Daily physical activity per week						
Never	0	3	0	0	1	0
Once a week	0	1	0	1	1	3
2-3 times	2	4	4	0	10	4
4-5 times	3	8	5	5	6	8
6-7 times	7	5	4	2	1	5
Extra-curricular physical activity per week						
Never	1	5	1	3	5	11
Once a week	2	6	4	3	2	1
2-3 times	5	4	4	2	5	3
4-5 times	1	1	2	0	5	4
>5 times	3	5	2	0	2	1
Enjoy Sports						
Not at all	0	2	1	0	1	2
Somewhat	0	1	1	0	7	5
A little	1	5	2	4	5	3
A lot	11	13	9	4	6	10

Students Perception of PE

Engagement						
Never	0	2	0	0	1	1
Some of the lesson	1	1	1	1	7	10
Most of the lesson	5	11	7	7	10	9
All the lesson	6	7	5	0	1	0

Basic Psychological Needs

High	9	15	10	4	6	5
Low	3	6	3	4	13	15

n: number of participants

Daily PA: Milton, Bull and Bauman (389)

Extracurricular activities: A single item measure was taken from the Active Lives Study (386).

Enjoy sports: One item, 'In general how much do you enjoy participating in sport?'

Student engagement: González-Peño, Franco and Coterón (28) tool of engagement

Basic psychological needs: The Basic Psychological Needs in Physical Education Scale (BPN-PE)

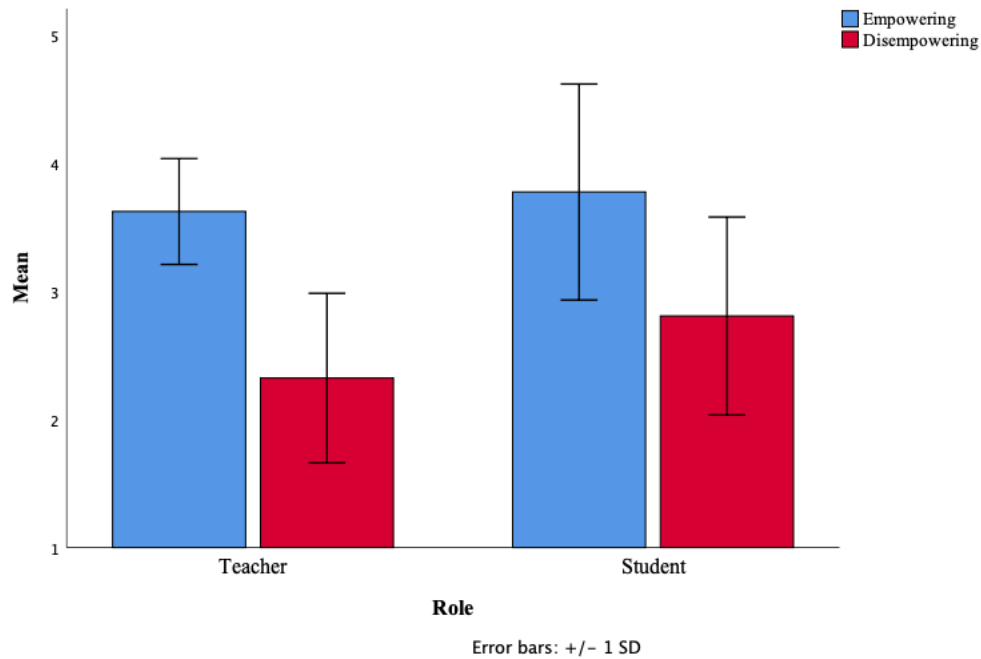


Figure 5. 3. Shows the teacher and students' perception of the PE motivational climate.

Figure 5.3 shows that the students' perceptions of the empowering motivational climate were higher than teachers. Statistical analysis revealed that the difference was non-significant ($t(92)=.46, p=.65$).

Perceptions of a disempowering motivational climate were higher for students than for teachers. However, this was non-significant ($t(92)=.54, p=.59$).

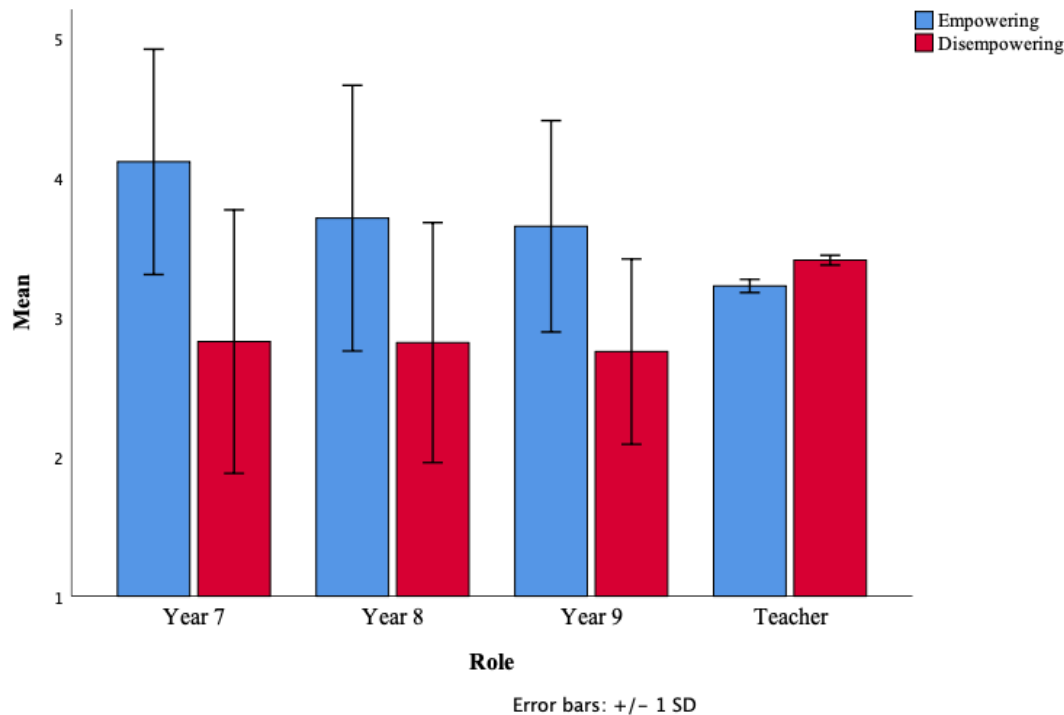
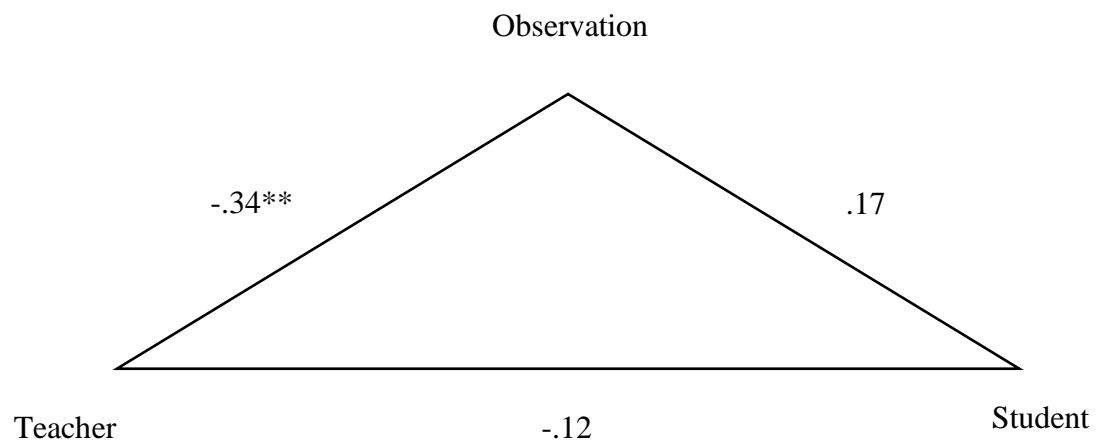


Figure 5. 4. Shows year 7, year 8, and year 9 and teachers' perceptions of the PE motivational climate.

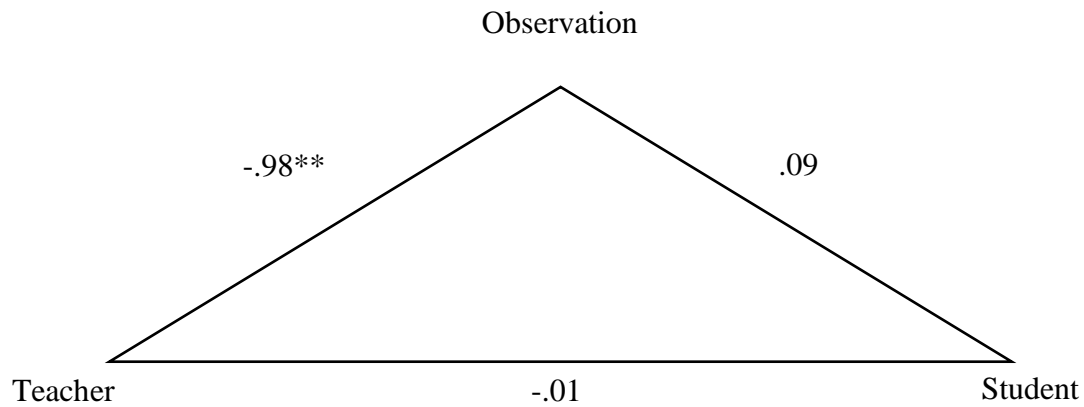
Figure 5.4 shows the mean perceptions of an empowering motivational climate for year 7, year 8, and year 9 against teachers. The main effect for the One-way Anova was non-significant ($F(3,90) = 2.134, p = .101$). A Dunnett T3 post hoc test revealed that there were no statistical differences between year 7 ($p = .825$), year 8 ($p = .944$), year 9 ($p = 1$) and teachers.

The mean perceptions for a disempowering motivational climate for year 7, year 8, year 9 and teachers are presented in figure 5.4. The main effect for the One-way Anova was non-significant ($F(3,90) = 1.27, p = .29$). A Dunnett T3 post hoc test revealed that there were no statistical differences between year 7 ($p = .997$), year 8 ($p = .891$), year 9 ($p = .999$) and teachers.



** Correlation significant at the 0.01 level

Figure 5. 5. Correlations for teacher, observer, and student perception of an empowering motivational climate.



** Correlation significant at the 0.01 level

Figure 5. 6. Correlations for teacher, observer, and student perception of a disempowering motivational climate.

Findings from figures 5.5 and 5.6 demonstrate that no relationship was found across the three different perspectives of the motivational climate, with students and teachers perceiving the opposite in both an empowering and disempowering motivational climate. Due to no relationships found across the data set analysis at this level could not continue. Consequently, the remainder of the analysis is carried out on student data only.

Table 5. 2. Shows the associations between each of the variables.

		Daily PA	ECA	ES	MA	SD	BPN	EMC	ENG
Extracurricular Activities (ECA)	r	.36**	-						
	p	.00							
Enjoy Sport (ES)	r	.58**	.5**	-					
	p	.00	0.00						
Mood (MA)	r	.28**	.18	.37**	-				
	p	.001	.09	.00					
Self- determination (SD)	r	.34**	.14	.35**	.24*	-			
	p	.001	.18	.00	.02				
Basic Psychological needs (BPN)	r	.53**	.26*	.61**	.47**	.46**	-		
	p	.00	.01	.00	.00	.00			
Empowering Climate (EMC)	r	.15	.12	.16	.37**	.31	.5**	-	-
	p	.16	.26	.12	.00	.00	.00		
Engagement (ENG)	r	.42**	.39**	.52**	.68	.36**	.59**	.46**	-
	p	.00	.00	.00	.00	.00	.00	.00	

n: number of participants, *correlation is significant at .05 level.

Daily PA: Milton, Bull and Bauman (389)

Extracurricular activities: A single item measure was taken from the Active Lives Study (386).

Enjoy sports: One item, 'In general how much do you enjoy participating in sport?'

Student engagement: González-Peño, Franco and Coterón (28) tool of engagement

Basic psychological needs: The Basic Psychological Needs in Physical Education Scale (BPN-PE) (149)

Empowering climate: Teacher-created Empowering and Disempowering scale (EDMCQ-PE; (467)

Table 5. 3. Relationship between sport enjoyment, mood, basic psychological needs, and an empowering motivational climate on predicting students' engagement in PE.

	Model 1	Model 2	Model 3	Model 4
	β	β	β	β
	(95% CI)	(95% CI)	(95% CI)	(95% CI)
Enjoy Sport	.54	.32	.19	.24
	(.36-.73)	(.16-.48)	(.01-.37)	(.06-.42)
Mood		.57	.50	.46
		(.42-.72)	(.34-.65)	(.32-.62)
Basic Psychological Needs			.25	.15
			(.07-.43)	(-.05-.35)
Empowering climate				.18
				(.02-.34)
Constant	-1.79	-1.06	-.63	-.78
	(-2.42 - -1.15)	(-1.6 - -.52)	(-1.24 - -.03)	(-1.39 - -.17)

Model 1 = sports enjoyment, PA, extracurricular activities

Model 2 = self-determination, mood

Model 3 = basic psych needs

Model 4 = empowering motivational climate

CFI; confidence intervals

Daily PA: Milton, Bull and Bauman (389)

Extracurricular activities: A single item measure was taken from the Active Lives Study (386).

Enjoy sports: One item, 'In general how much do you enjoy participating in sport?'

Student engagement: González-Peño, Franco and Coterón (28) tool of engagement

Basic psychological needs: The Basic Psychological Needs in Physical Education Scale (BPN-PE) (149)

Empowering climate: Teacher-created Empowering and Disempowering scale (EDMCQ-PE; (467)

Table 5.3 shows the three models that were subsequently developed to predict engagement in PE. Predictors within the final model (model 4) explained 61% of students' engagement in PE.

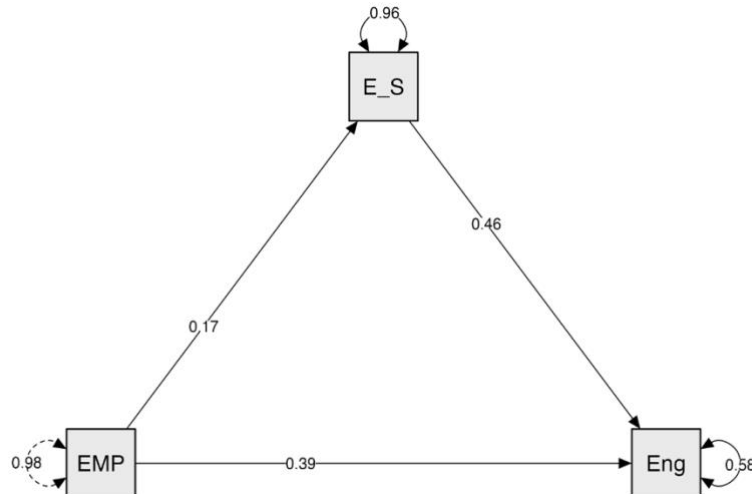


Figure 5. 7. Model 1: Path plots of the enjoyment of the sports as a mediator of empowering motivational climate and engagement.

Model 1 shows a significant total effect between an empowering motivational climate and PE engagement ($B = 5.36$, $SE: .09$, $p < .001$), and path a (i.e., enjoy sports) ($B = 1.29$, $SE: .06$ p .2). When enjoyment in sport entered the relationship between empowering motivational climate and PE engagement, the direct effect ($B = 5.28$, $SE: .07$, $p < .001$) was significant. Within model 1, an empowering motivational climate explains 41% of the variance ($\chi^2 = 0.41$) with 3% of that explained by enjoyment in sport ($\chi^2 = 0.03$).

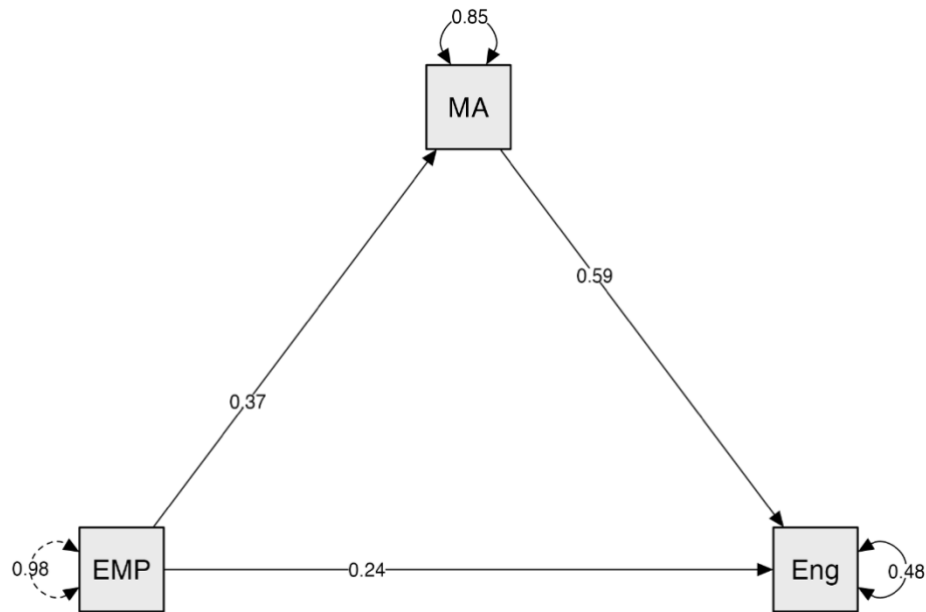


Figure 5. 8. Model 2: Path plots of mood as a mediator of empowering motivational climate and engagement.

Model 2 shows a significant total effect between an empowering motivational climate and PE engagement ($B = 5.37$, $SE: .09$, $p < .001$), and path a (i.e., mood) ($B = 2.87$, $SE: .08$, $p = .004$).

When enjoyment in sport entered the relationship between empowering motivational climate and PE engagement, the direct effect ($B = 2.2$, $SE: .1$, $p = .03$) was significant. Within model 2, an empowering motivational climate explains 52% of the variance ($\chi^2 = 0.52$) with 14% of that explained by mood ($\chi^2 = 0.14$).

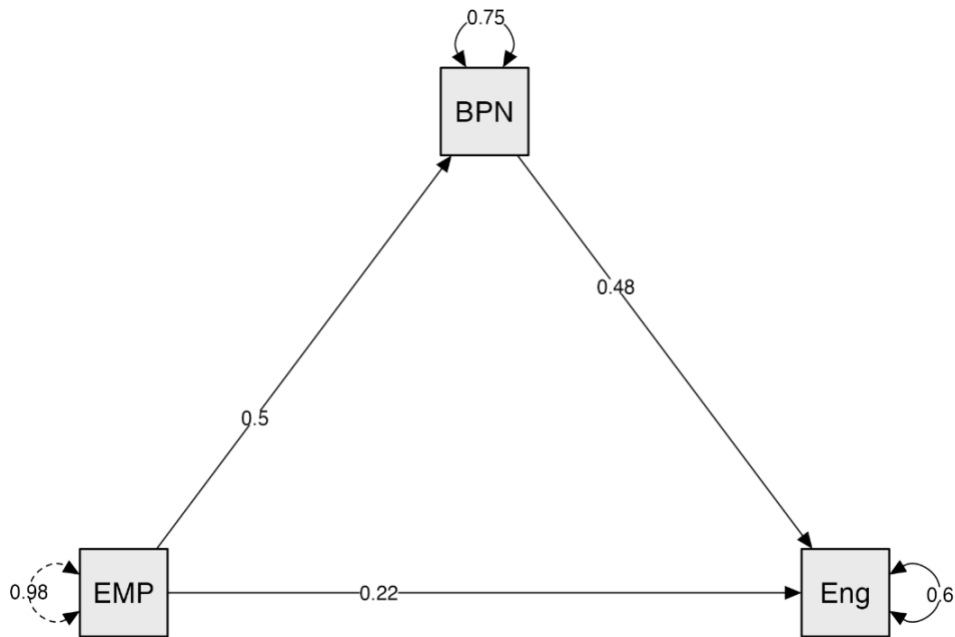


Figure 5. 9. Path plots of basic psychological needs as a mediator of empowering motivational climate and engagement.

Model 3 shows a significant total effect between an empowering motivational climate and PE engagement ($B = 5.36$, $SE: .09$, $p < .001$), and path a (i.e., basic psychological needs) ($B = 2.87$, $SE: .24$, $p .004$). When enjoyment in sport entered the relationship between empowering motivational climate and PE engagement, the direct effect ($B = 2.2$, $SE: .03$, $p .03$) was significant. Within model 3, an empowering motivational climate explains 39% of the variance ($\chi^2 = 0.39$) with 25% of that explained by basic psychological needs ($\chi^2 = 0.25$).

As enjoyment in sports has a direct effect on engagement in PE but does not have a mediating effect on students' perceptions of an empowering motivational climate and engagement in PE, enjoyment in sports was adjusted for in the following two models. The purpose of this is to see which predictor (mood or basic psychological needs) has the strongest mediating effect on the association between an empowering environment and students' engagement in PE when adjusted for sports enjoyment.

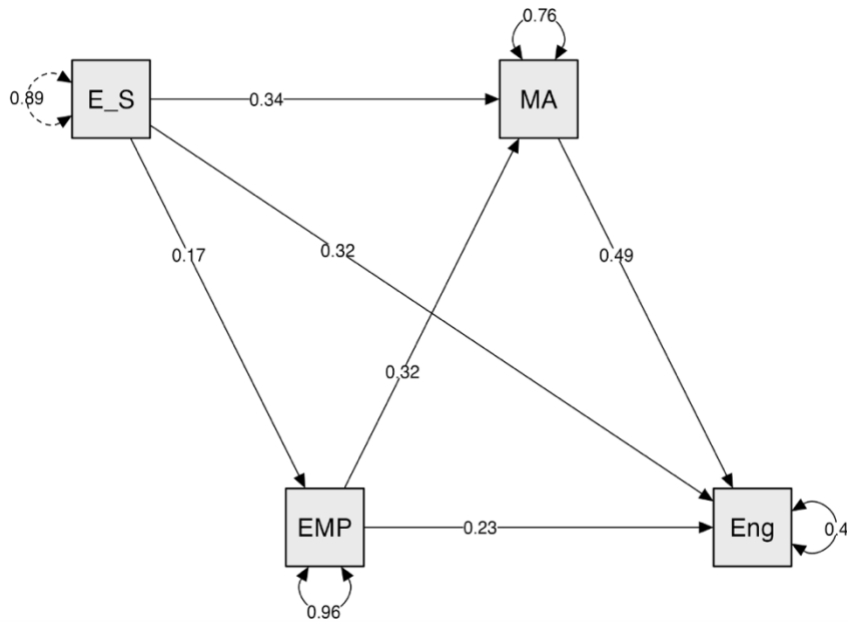


Figure 5. 10. Model 4: Path plots of the mood as a mediator of empowering motivational climate and engagement when adjusted for sports enjoyment.

When adjusted for enjoyment in sport, Model 4 shows a significant total effect between an empowering motivational climate and PE engagement ($B = 5.28$, $SE: .07$, $p < .001$), and path a (i.e., mood) ($B = 2.38$, $SE: .07$, $p .02$). When mood entered the relationship between empowering motivational climate and PE engagement after adjusting for sports enjoyment, the direct effect ($B = 3$, $SE: .08$, $p .003$) was significant. Within model 4, an empowering motivational climate explains 59% of the variance ($\chi^2 = 0.59$) with 24% of that explained by mood ($\chi^2 = 0.25$).

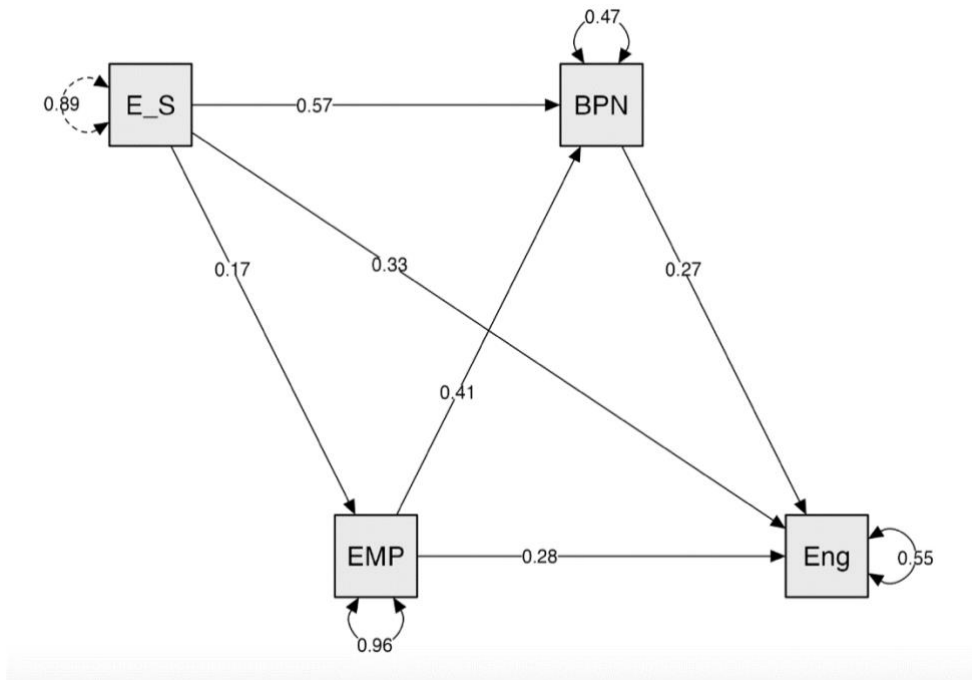


Figure 5. 11. Path plots of basic psychological needs as a mediator of empowering motivational climate and engagement when adjusted for sports enjoyment.

When adjusted for enjoyment in sport, Model 5 shows a significant total effect between an empowering motivational climate and PE engagement ($B = 5.28$, $SE: .07$, $p < .001$), and path a (i.e., basic psychological needs) ($B = 1.99$, $SE: .06$, $p .05$). When basic psychological needs entered the relationship between empowering motivational climate and PE engagement after adjusting for sports enjoyment, the direct effect ($B = 2.95$, $SE: .09$, $p .003$) was significant. Within model 5, an empowering motivational climate explains 45% of the variance ($\chi^2 = 0.44$) with 53% of that explained by basic psychological needs ($\chi^2 = 0.53$).

Discussion

Using three different perspectives, the aim of the study was to capture the PE motivational climate and its impact on predicting student engagement in PE. Findings showed that as teachers perceived the PE motivational climate to be more (dis)empowering, the less students perceived the PE motivational climate to be (dis)empowering. However, this was not statistically significant. Observational reports were aligned with the perceptions of the students. Discrepancies in perceptions of the PE motivational climate led to the exploration of predictors of engagement in PE with sport enjoyment, basic psychological needs, and mood as mediating factors of an empowering PE motivational climate. Mood was identified as having the largest mediating effect.

A Comparison of Teacher and Student Perception of The Motivational Climate

The PE motivational climate was explored from three different perspectives. When analysing the data from a surface level students and teachers agreed on the degree to which they believed the motivational climate was (dis)empowering as the mean differences were non-significant. The agreement between teachers' and students' perspectives across all three age groups aligned with the findings of Deliligka et al (161). However, in relation to age this study found contradicting findings to Deliligka et al., (161) as they proposed that as students grew older, they perceive the PE motivational climate to be less performance-orientated (ego-involving). Younger students in this study (year 7) perceived the motivational climate to be the most empowering, whilst disempowering perceptions were consistent across the three-year groups. Discrepancies in findings may be attributed to the fact that the students within this study had the same PE teachers across the three-year groups. Having the same teacher may have reduced discrepancies across the age groups as it is likely that the teachers adopted

the same styles and methods regardless of age. Nevertheless, the findings of this study support the previous work of Barkoukis et al., (415), that perceptions of a mastery (ego-involving) climate decrease with age.

Despite congruence at student-teacher level, when comparing across year groups, teachers perceive the motivational climate to be less empowering but more disempowering across all groups. A potential rationale for this is that teachers tend to promote a mastery-motivational climate that also demonstrates ego-involving constructs as they view performance and accomplishment as an essential part of PE (161). The fact that teachers reported a higher perception of a disempowering motivational climate is a concern as it could be suggested that these types of teaching practices, especially when used for low-skilled students, may result in student withdrawal (27). Breaking the two environments down further by examining perceptions of the individual constructs that create a (dis)empowering, revealed that across all constructs students reported higher perceptions. In terms of an empowering environment, this is exceptional news for the teachers as it suggests that teachers are having a positive impact on students' perception of their competence and how they view success (436) as well as satisfying their basic psychological needs).

Unfortunately, the same cannot be said for perceptions of a disempowering motivational climate. Students reported higher perceptions of constructs within a disempowering motivational climate which supports the observational findings of De Meyer (41), who suggested that even sporadic exposure to controlling teachers' behaviours may result in increased student perceptions. This suggests that teachers need to consider that even the slightest display of disempowering behaviours may result in changes in students'

motivational orientations that have been shown to influence perceptions of the motivational climate (405, 410, 411).

Despite item reports averages suggesting some coherence between teachers and students' perception of a (dis)empowering motivational, correlational analysis revealed that the more empowering the teachers perceive the environment to be, the less empowering students perceive it to be ($r = -.12$). Similar findings were found in relation to a disempowering motivational climate though the variance was not as strong ($r = -.01$).

A Comparison of Teacher and Student Perception of The Motivational Climate Compared with Observers Perspective

To the researchers understanding this is the first study that has considered all three perspectives when reviewing perceptions of the PE motivational climate. Findings revealed that observational results concurred with the direction of the student's perception (empowering: $r = .017$ and disempowering: $r = .09$) and significantly disagreed with the perceptions of the teachers (empowering: $r = .34$ and disempowering: $r = .98$). It is not surprising that observational perceptions of the motivational climate and students' exceptions aligned as this had been replicated in Morgan et al., (463) study whereby both parties perceived higher levels of ego-involving motivational climate. Morgan et al., (463) study did not obtain teachers perceptions within their study. To date, this is the only study that has examined all three perspectives of an (dis)empowering motivational climate. Although it would be ideal for all three perspectives of the motivational climate to align, the students' perception is the one that is most valuable. To an extent, the students' perception of the motivational climate is the only one that matters, as how they interpret it has the ability to influence their enjoyment in PE (423), basic psychological needs and their motivation (101).

Mediating Factors that Influence Students' perception of an empowering motivational climate and Engagement in PE

Unfortunately, due to no correlations found between the three perspectives, only student data will be discussed for the remainder of this chapter.

Due to the importance of how students interpret the motivational climate, this study aimed to firstly identify if there was an association between an empowering motivational climate and student engagement. Secondly, explore the factors that mediate students' perception of an empowering climate and their engagement in PE.

In accordance with literature, it was assumed that an empowering motivational climate would be associated with engagement in PE as need-supportive environments have been shown to support need satisfaction leading to increased engagement in PE (453) as well as being more physically active in PE (33). In support of previous literature, results demonstrated a positive association between an empowering motivational climate and student engagement in PE ($r = .46$).

To ascertain the potential mediating factors between an empowering motivational climate, it was important to identify the key factors contributing to engagement. Underpinned by theoretical frameworks (24, 122), along with previous research, sport (daily PA, sport enjoyment and engagement in extracurricular activities), personal (motivation, basic psychological needs and mood) and motivational climate (empowering) factors were inputted into a forward correlational regression model. The final model explained 61% of students' engagement in PE. Taking into consideration previous research and findings aforementioned in chapter 4, it was anticipated that basic psychological needs would be identified as a contributing factor of student engagement in PE. However, mood was not expected to be the

greatest predictor across the models (Model 2: β .57, Model 3: β .5 and Model 4: β .46).

Within PA literature mood has been investigated as an outcome of PA (474), but never considered as predicting factor. However, mood and arousal have been extensively researched within sport, with theories such as The Inverted U Theory (475) being developed to help understand the degree to which mood arousal can impact a person's performance and engagement. Therefore, future studies may wish to investigate the impact mood may have on students' engagement in PE as well as the impact PE has on students' mood.

Interestingly, how autonomously motivated a person was within this study did not predict student engagement in PE. Based on the idea that motivation represents a crucial aspect that underpins almost all behaviours and actions, along with autonomous forms of motivation in PE supporting long-term engagement in PA it would have been anticipated that motivation would have been identified as a contributing factor. However, in accordance with the SDT (24), it could be insinuated that autonomous forms of motivation are present within the model as enjoyment in sport has been associated with autonomous forms of motivation (169, 329) as well as engagement in PE (423). Similarly, the basic psychological needs are a micro-theory within the SDT that also impacts a person's motivation.

Mediation analysis was conducted to explore the effect the predicting factors had on the interaction between students' perception of the motivational climate and engagement in PE. Initially, three path models were created to explore the impact of enjoyment in sports, mood and basic psychological needs as mediating predictors between empowering motivational climate and engagement in PE.

From theories (SDT) (24), PE literature (348, 423) and general stereotyping, it would be assumed that a student's enjoyment in sports would play a mediating role between an empowering motivational climate and engagement in PE. Findings from this study suggest otherwise, as enjoyment in sport was found to have no mediating effect on empowering motivational climate and engagement in PE. For teachers, this is great news as it implies that regardless of whether a student enjoys sports or not, teachers have the capability to support a student's engagement in PE by developing students' positive perceptions of the motivational climate. In contrast, it could be proposed that enjoyment in sport could become an outcome of an empowering motivational climate and engagement in PE as an empowering motivational climate has been shown to support the development of autonomous forms of motivation which promotes enjoyment (348).

In addition to promoting autonomous forms of motivation, an empowering motivational climate key characteristic is need supportive. Satisfying and developing students' basic psychological needs is a core component of an empowering motivational climate. Thus, it would be presumed that basic psychological needs would have a mediating effect between empowering motivational climate and engagement. This assumption was proven as basic psychological needs was found to partially mediate between an empowering motivational climate and engagement in PE. The promise of this finding is that adopting an empowering motivational climate supports need satisfaction and development, which in turn will not only support the mediating effect of the empowering climate itself on engagement but also perceptions of basic psychological needs. Consequently, teachers promoting an empowering motivational climate should naturally find that their students are more engaged in PE.

Unlike, predictors of enjoyment in sports and basic psychological needs, it was surprising to find that mood was a predictor of engagement. However, mood was identified as a partially mediating factor between an empowering motivational climate and engagement in PE.

Suggesting that an empowering motivational climate promotes engagement in PE and part of this is supported by an individual's mood. Thus, teachers should consider how they could increase a person's mood within their lesson.

Due to the rising concerns about the lack of participation in PE and PA (476) during adolescence, there is a need to identify the most effective way to increase students' engagement in PE. As basic psychological needs and mood were both identified as significant mediating factors between perceptions of empowering motivational climate and engagement in PE, it raised the question of which mediator factor should teachers focus on within an empowering motivational climate. Literature and theories (24, 122) would propose that basic psychological needs would be the one to focus on as by developing a person's needs can support positive perceptions of competence and autonomous motivation. Both of which have been associated with participation in PE. The same cannot be said for mood, but this is because it is an under-evaluated area.

As the mediational analysis found no mediating effect for enjoyment in sports, but a significant direct effect was found in relation to engagement in PE, enjoyment in sports was included as a confounding variable. After adjusting for enjoyment in sports, both basic psychological needs and mood significantly continued to mediate between empowering motivational climate and engagement in PE. However, mood was identified as the more significant partial mediator ($z = 2.38, p .02$) between empowering climate and engagement in PE compared to basic psychological needs ($z = 1.99, p. 05$). As the difference between the

two is marginal, it would be encouraged for teachers to continue focusing on the mechanism that supports basic psychological need development in PE such as formative feedback offering choice and being need supportive, alongside an emphasis on increasing student general mood.

Limitations

The findings from this study are predominantly obtained through self-report measures, thus holding the same limitations as any self-report measures. One of the issues with self-report measures is that participants responses to questionnaires are often guided by what they perceive to be socially acceptable. This is referred to as social desirability bias. Social desirability bias can be influenced by data collection settings (477). This influenced is likely to have occurred concerning the students responses as they completed the questionnaires alongside their peers. Thus, they are more likely to want to present themselves in a more favourable light to enhance their self-presentation (478) and potentially falsify their responses to create a socially desirable image (479). Studies have shown that social desirability is likely to have influence on self-report measures of PA (480, 481). Reflecting on the questionnaires used within this study it is possible that social bias's were presented for students as they would want there responses to be regarded as socially acceptable. This may have also be present in teachers as they may have a desirability to portray themselves in a positive light to be presented as a 'good' teacher. Aside from social desirability, questionnaires are also presented with the disadvantage of potentially not representing the person's true perception of the environment (e.g., PE motivational climate within this study). This is associated with reference bias as how an individual evaluates behaviours, is driven from implicit standards (482). Lastly, some of the wording of the questionnaire may be ambiguous or be open to

different interpretations. This limitation was reduced by ensuring that the key researcher was available to clarify any of the questions presented in the questionnaire.

Data was collected at the end of the summer term before the school was due to break up for the summer. As a result, the lesson may not have been a true representation of the teachers' behaviours. This could explain why there was a large variance found between observed behaviours and teachers' perceptions, as it is likely that teachers responded to the items to represent their usual behaviours rather than the behaviours they displayed on the day.

Therefore, it is important to not only consider the time of the year data is collected but also the sport within the lesson as different sports are favoured over others, which could influence students' perception of the motivational climate. The data was also only collected at one school across 2 days thus reducing the generalisability of the findings. All of these factors raise the concern of whether the findings within this study a true representative of the sample and the motivational climate across the school year. Thus, reducing the generalisability of the findings.

Observational data was collected across three of the lessons as year 9 girls refused to participate if the session was being recorded. Only having obtained observable data from three lessons, one of which had boys and girls mixed on this occasion, reduces the reliability of these findings. Within the mixed lesson the male teacher predominantly took the lead. As a result, it is unclear if the female students' perceptions are based on the motivational climate created in that lesson or the usual motivational climate they experience within PE. This raises reliability concerns as it is likely that the teacher and students' results are underpinned by previous experiences, whilst observations were based on what was presented in front of them

on the day. On reflection, providing a potential rationale for inconsistency of perceptions of the motivational climate.

Lastly, it is evident that there is a lack of variance within the sample as there is limited reports from teachers, students, and observers. Consequently, not allowing the research questions to be addressed fully. Future studies may wish to rectify this limitation by collecting data from a larger number of teachers, students, and observer across multiple schools at different times of the years. This would allow a true representation of perspectives of the motivational climate and mediating factors.

Conclusion

Teachers can impact a student's engagement in PE through the motivational climate they create. Findings from this study revealed that there appears to be an inconsistency between the behaviours teachers believe they display, supporting and empowering motivational climate, and students' perceptions and observed behaviours. This is concerning as it is students' perceptions of the climate that will impact their engagement in PE contributing to life-long participation in PA. This is not all bad news though as students perceptions of an empowering motivational climate and engagement in PE were shown to be mediated by an individual's mood and their perception of their basic psychological needs. This is promising for teachers as it highlights two areas (mood and basic psychological needs) for teachers to focus on if they wish to improve students' engagement in PE. Future studies may wish to test this notion by creating a PE motivational climate that emphasises developing students' mood against a traditionally empowering environment to see which is more effective at supporting student engagement in PE. The concern with this finding is that it raises issues for teachers as well as the long-term impact of PA as it could be suggested that despite how empowering the

motivational climate is, it is down to the students' mood on the day whether they will engage in PE or not.

Chapter Summary

This chapter investigates the PE motivational climate from three perspectives (student, teacher and observer). The mediating effects of enjoyment in sport, basic psychological needs and mood arousal has on students' perception of an empowering motivational climate and PE engagement are also explored. No statistically significant relationships were found between the three perceptions of the PE motivational climate. Path analysis of the student data revealed that BPN and mood were significant partial mediators between empowering motivational climate and engagement in PE. It was not surprising that BPN was identified as a mediating factor as satisfying BPN is one of the main premises of an empowering motivational climate. However, interestingly students' mood could also influence students' engagement in PE. Overall, this thesis supports current literature on the predictors of disengagement in PE as well as highlighting the importance of satisfying BPN in an empowering motivational climate to aid autonomous forms of motivation to support lifelong PA.

The three empirical studies within this thesis demonstrate a progression of ideas as longitudinal data in Chapter 3 identified positive and negative changes in PE engagement across year 7 to year 11, but did not identify the impact PE engagement had on life-long PA. To address this, Chapter 4's retrospective study revealed that adolescents' motivation during PE directly influenced adult PA participation. Immersion in the current literature and the SDT (24) suggested that the PE motivational climate can support the promotion of self-determination in PE. Consequently, Chapter 5 investigated the PE motivational climate and

the mediating factors between an empowering motivational climate and student engagement in PE. Findings revealed that to support long-term PA engagement, PE teachers are required to create an empowering motivational climate that satisfies students' basic psychological needs and increases students' mood.

Chapter 6: Discussion

The initial purpose of this concluding chapter is to revisit the aims of this research along with the research questions. Following reflection on the aims of the thesis, the chapter will then highlight the contributions that this body of research has to understanding the dispositional and contextual motivations of engagement in physical education (PE) and predicting life psychological activity (PA). In drawing this process to a conclusion, some limitations of this research will be discussed. Finally, the chapter will identify future research needs and make recommendations in an effect to support the promotion of life-long engagement in PA through PE.

Research Aims and Questions

To date, there appears to be a lack of understanding of the place of engagement in PE and the impact it has on PA in young people's lives beyond school. Underpinned by a social-ecological framework that has been substantially used in health programs (60), the aim of this thesis was to examine the factors associated with engagement in PE and determine whether an individual's PE experience is associated with PA in adulthood. Specifically, this thesis sought to answer the following research questions:

- 1) Describe students' engagement in PE
- 2) Determine the association between engaging in PE at school and being active as an adult
- 3) Identify predictors of engagement in physical education (child, environment, and teacher)

Research Question 1: Describe students' engagement in PE

It is acknowledged that PE can support the development of a physically active lifestyle (64, 65, 483) and has been regarded as a crucial vehicle in engagement in PA over a person's life course (64). However, in recent years PE has been proposed to be in 'crisis' as children are bored and disaffected in lessons (66).

An extensive body of literature has tried to identify determinants of engagement in PE, using proxy measures of engagement (e.g., accelerometers and pedometers (103, 104) and attendance), to explain why engagement in PE is decreasing. Despite factors being identified, very few have investigated the factors that predict engagement, especially over time. This thesis aligns with the current trends of PA participation of 55% of 5-16-year-olds not meeting guidelines for PA (6), as over 60% of the students were disengaged in the lesson, with inactivity being the greatest predictor as identified within Chapter 3.

Contributing to the literature's current understanding of the association between being active outside of school, inactivity was regarded as the greatest predictor of increasing the likelihood of an individual being disengaged in PE. This is unsurprising as PA experiences outside of school can impact a person's motivation within PE by the value they place on the subject (263). The PA experiences that an individual obtains therefore act as a foundation for students to comprehend, interpret and internalise movements that allow them to feel competent to execute skills and activities in PE successfully (263). Consequently, external PA experiences outside of PE may provide the foundation for developing competency within PE (91). Exploration of the literature suggests that there is a lack of understanding of the type

of PA (e.g., sport, organised, individual or team) outside of PE that contributes to engagement.

To a degree it is concerning that participation in PA outside of PE was identified as the strongest predictor of engagement in PE within Chapter 3. This implies that regardless of the opportunities, structure, and motivational climate surrounding PE, that unless individuals participate in PA outside of school to build those positive foundations, they are not going to engage in PE. However, when exploring predictors of engagement in PE from a multifaceted perspective within Chapter 5, participation in PA outside of PE was not a predictor of student engagement, but sports enjoyment was. This is promising news for teachers and future studies as it suggests that a person is not required to participate in PA outside of school and that emphasising sport and PA enjoyment, whether in or away from the school, can effectively support student engagement in PE.

In line with the self-determination theory, it is not surprising that enjoyment in sports was identified as a key predicting factor of engagement as it postulates that if an individual enjoys something they are more likely to be intrinsically motivated (24, 484). Intrinsic motivation has been associated with increased participation over time (484). Consequently, if a person is intrinsically motivated, they are more likely to be engaged in PE, supporting the foundations of developing a positive relationship with PA (15, 16).

In addition to identifying predictors of engagement in PE, the longitudinal data within Chapter 3 found changes in engagement in PE from year 7 to year 11 with a group of students becoming engaged in PE whilst another group became disengaged. Over the years it is recognised that participation in PA declines across a person's school years (6, 8), but the

identification of a group of individuals who have become engaged by year 11, provides promise as it highlights that students' engagement can be positively influenced during their adolescents. However, due to the nature of the study, it was impossible to draw conclusions about the factors that supported changes in engagement. Though literature would imply that perceptions of competence developed over the years as students were exposed to more PE (297) through an autonomy-supportive motivational climate (279, 299) may have contributed to the positive shift in engagement. Whilst negative shifts in engagement were unsurprising in relation to the current trend of adolescents' participation in PE (8), the proposed reason for the decline in participation is associated too intrapersonal factors (e.g., lack of confidence and a change in priorities) (263) and interpersonal factors (e.g., social pressures) (219).

Research Question 2: Determine the association between engaging in PE at school and being active as an adult

Addressing the first research question provided a foundation for the second research question of this thesis, as it highlighted the importance of PA and enjoyment outside of school.

Chapter 4 was designed to predominantly address this research question through the collection of retrospective experiences. Unfortunately, Chapter 4 was designed without the knowledge of the importance of enjoyment in sports as this was not identified as a key predictor until Chapter 5. Consequently, participation in extracurricular activities was used to represent participants PA levels during adolescents as this was the greatest predictor captured within chapter 3.

Evaluating the longitudinal studies that investigated childhood experiences' impact on later life PA participation, demonstrated a positive association between childhood and adolescent participation in PA and sport and PA in adulthood (199, 200, 315). However, none of these

studies considered other influential factors that could have impacted lifelong engagement in PA.

Taking into consideration the lack of longitudinal evidence of PE and its association with life-long PA, despite claims of the association between the two (485), Chapter 4 aimed to provide an estimation of the effects of engagement in PA outside of school as well as considering other potential predictors.

Using the literature surrounding engagement in PA and sports outside of PE, along with adopting a social-ecological approach, individual motivation in PE and the PE motivational climate (10) were considered predictors of long-term engagement. Analysis revealed that the PE motivational climate was the strongest predictor of adulthood PA. Along with a positive association between retrospective perception of self-determination motivation in PE and current PA self-efficacy. Supporting the link between initial positive experiences in PA and PE (368). Consequently, this thesis supports the notion that positive experiences in PE developed through a task-involving PE motivational climate and self-determined motivation, along with engagement in PA outside of PE, mediated by current self-efficacy perceptions will support life-long PA participation.

Research Question 3: Identify predictors of engagement in physical education (child, environment, and teacher)

Taking into consideration the importance of the motivational climate and the promotion of life-long PA, it was important to gain a true representation of the motivational climate. A triangulation approach was adopted in Chapter 5 to evaluate the PE motivational climate from three perspectives to see if the perceptions of the motivational climate teachers created were reflected in the student's perceptions but also the behaviours they displayed. This was

an advancement of the previous work of Morgan et al., (463) which compared teachers' and students' perceptions and Deliligka et al., (161) which evaluated the observed behaviours against teachers' perceptions of the motivational climate. In contrast to previous findings (161, 463), analysis of the triangulation data found no correlation between the three different perspectives. What the findings did highlight was the importance of student's perception of the motivational climate, as further analysis revealed that perceptions of their basic psychological needs, enjoyment in sports and mood arousal mediate the effect of an empowering environment predicting student engagement.

As aforementioned when addressing the previous research question, it was anticipated that enjoyment in sports would play a mediating role in engagement. The most surprising and novel predictor of engagement that came to light within this thesis was mood arousal. Mood arousal has been explored within PA literature and identified as an outcome of PA. Though to the researcher's knowledge, there is no study that has considered the mediating effect a person's mood arousal can have on their engagement in PE. On reflection, it is astounding that this has not been explored before as a person's negative mood can influence a person's judgement and perception of events around them (486) directing their behaviour.

Original Contribution to Knowledge

The thesis contributes to the current literature by providing evidence of the degree to which predictors will increase the likelihood somebody will be engaged in PE rather than just identifying them. Previous research has focused on testing factors that influence participation in PE (33, 158, 279), but failed to report the degree to which these factors predict student engagement. In relation to predictors of engagement in PE, this thesis brings novel findings as it has measured the impact predictors may have on engagement in PE across a person's

adolescent years. This is advanced further by providing an estimation effects of PE experiences and life-long engagement in PA, which has not been reported in previous studies. Highlighting the importance of a task-involving motivational climate.

Adopting a triangulation approach to investigate the PE motivational climate provided an alternative examination to the literature's current perception (161, 463). To date this is the only study to compare three different perspectives of the PE motivational climate within one study. The exploration of the motivational climate in chapter 4 and chapter 5 of this thesis also highlighted the importance of student's perception of the motivational climate as their perception of the motivational climate was the greatest predictor of lifelong engagement in PA as represented in Chapter 4.

Reflecting on the literature also highlighted the lack of studies measuring dimensions of engagement. Across the literature, studies predominantly use accelerometers or pedometers (103, 104) to capture students' engagement. Although a proxy measure was used in the first study of the thesis, the remaining two sought to capture the true multifaceted concept of engagement. This may have contributed to variance in findings from previous studies, highlighting the need to capture the multifaceted dimension of engagement in order to identify predictors of long-term engagement. This thesis presents the first steps into understanding influential factors of engagement in PE from a behavioural, emotional and cognitive perspective.

Lastly, the biggest contribution to sport and exercise psychology and the PE field is considering mood arousal as a mediator of engagement rather than an outcome of PA. To the researcher's knowledge, this is the only study that has identified mood arousal as the biggest

predictor and mediator to perceptions of an empowering motivational climate and engagement in PE. Consequently, the findings of chapter 5 have provided new avenues for researchers, teachers and PA interventions to consider promoting PE engagement.

Although not explored within this thesis, it would be beneficial to examine the preconceptions teachers hold about certain groups as it was evident when collecting data for Chapter 5 that before the lessons had even started, they were making predictions on the lack of engagement from students. If this was recognisable in the body language that was observed, surely students would respond in a similar manner if you take into consideration the social learning theory (316). Subsequently, it may be beneficial for teachers to regularly reflect on their predispositions and challenge their underlying beliefs prior to delivering lessons, this notion is underpinned by the work of Stromquist (21) who acknowledges that unconscious bias may influence what teachers do and the choices they make.

Limitations of Research

The fact that Chapter 3 used secondary data, predetermined the measures and information collected. As a result, an item that was designed to capture students' effort within the lesson was used to reflect students' engagement as it is an area identified within the behavioural dimension of engagement (40, 90). The main concern of using effort as a measure of engagement is that effort in PE varies not only by 'how hard you try' but also by the design and content of the lesson provided. Individual differences such as fitness and body weight may also influence the degree to which students experience the sensations outlined in the measures of effort. Consequently, not providing a true representation of their engagement in PE. This was rectified in the later chapters as measures of the multifaceted dimensions of engagement were used.

Aside from Chapter 3, it was difficult to evaluate gender discrepancies due to low numbers. Within PE it is acknowledged that differences in gender occur in relation to perceptions of motivational climate (487), engagement (311) and motivational orientations (357), suggesting that the model for predicting engagement in chapter 4 and mediators of perceptions of an empowering motivational climate and engagement may change when looking at genders individually. This raises concerns with the development of these models as it generalises the information to both genders. Data collection was also highlighted as an issue within Chapter 4 as a large number of the responses were unusable due to various reasons. The issues with the participant's responses are outlined in figure 4.3.

Collecting data in Chapter 5 highlighted the challenges researchers are faced with collecting data in schools. Firstly, the researcher's presence disrupted the focus of the lessons, in particular the female students, as they reported being conscious of the camera to the extent that year 9 girls refused to participate if the lesson was filmed. Consequently, the responses from year 9 girls were not included in the studies analysis. Teachers also brought to life new challenges that had not been considered. The plan was to capture teachers' perception of the PE motivational climate after each lesson, when in fact both teachers only completed one version of the questionnaire over the course of the day. Thus, their perceptions of the motivational climate may be a mixture of their lessons or just a reflection of the motivational climate they would usually create. From a methodological point of view, the rationale for collecting three different motivational climate questionnaires from the two seems logical, but practically this was not possible due to teachers' time constraints in between lessons.

The generalisability of the findings of Chapter 5 are limited as the data was collected from one school across two days and only obtained results from 6 classes and two teachers in total. The time of year also affected the findings as on this occasion two girls' classes were combined into one, along with a male and female class. Both lessons had two teachers; thus, it is hard to identify which teacher the student's responses were based on. Additionally, it raises the question of whether responses were based on a true representation of the motivational climate created in that lesson or underpinned by their normal perceptions.

Future Research and Recommendations

Recommendations for Policy Makers

The PE National Curriculum (62) provides the foundation of PE experiences as it outlines a set of aims that teachers need to address within their lessons. Based on the findings of this thesis and review of the literature, it is suggested that a potential reason for PE not being as effective as it could be is the conflicting purpose of two of the aims outlined in the curriculum. It is not feasible to promote 'a healthy and active lifestyle', whilst also supporting the use of 'utilise tactics to engage in competitive sports and activities' (62) as the use of competition elicits an ego-involving motivational climate that has been shown to be associated with student dropout (52, 151).

The emphasis on competition is also reflected in the School of Sport Action Plan 2023 (SSAP) (488). The SSAP aims to promote PA and sport in school by focusing on increasing students' opportunities for PA whilst ensuring high-quality PE and encouraging sports competition. The concern with the focus on competition in PE and the SSAP is that the lines between sport, PA and PE have become blurred beyond recognition over the years, demonstrated through students' dislike of PE due to not 'feeling sporty'. Literature has

recognised the positive effects of adopting a healthy approach (31, 32, 489), yet PE is still being delivered in traditional ways and progressively reverting its focus back towards traditional sports (490, 491). This is concerning as it means that the current curriculum is not aligning with the changing interests of adolescents today (64). Therefore, there is a need for a postmodern curriculum (66), that supports PE and leading a healthy active lifestyle.

Although not explored within this thesis, engagement in the literature raises a concern with the national curriculum the lack of consideration for gender differences. Male students may prefer competition (reference 36), whilst competition has been shown to disengage girls (69, 79-82). Yet the curriculum stipulates that both genders must engage in competition. Therefore, future policymakers may wish to consider generating gender sub-categories within the PE national curriculum.

The findings of this thesis are only a starting point to addressing the concerns with the curriculum but what the findings do suggest is there needs be to an emphasis on creating positivity, which promoting competition to less able students will not do. Instead, the aim of the national curriculum needs to be updated to reflect an emphasis on developing competencies, enjoyment in sports and PA and increasing students' mood arousal through the generation of positive experiences.

When re-evaluating the PE national curriculum, policymakers should consider underpinning the framework with the COM-B model (492). COM-B proposes that the beliefs about physical and psychological capabilities, and opportunities, interact with one another to predict the behaviour that is reflected through a person's behaviour (B: occurs as the result of interaction between three necessary conditions) capabilities (C: physical and psychological)

opportunities (O: by physical [e.g., environment] and social [e.g. the impact of others]), and motivation (M: autonomy referring to impulses and emotions that arise from associative learning and/or innate dispositions and reflective process which involve planning and evaluating).

Recommendations for Teachers

Teachers are at the forefront of shaping the PE motivational climate, which was highlighted as the greatest predictor of long-term engagement in PA within this thesis. Based on the findings from this thesis, it would be encouraged for teachers to promote an empowering motivational climate that is need-supportive. Teachers can promote an empowering motivational climate through clear step-by-step feedback (439, 440), that is concise and focused (86) whilst also being constructive (442, 443). Ideally, this information would be presented in one or two comments that help students improve (445) so they are not cognitively overloaded. Aside from the interactions with students, teachers can support an empowering motivational climate by allowing time for the students to learn the skill (86), avoiding competitive (e.g., game) situations too quickly (85),

The conclusion from the thesis also highlights the importance of being cautious about using some of the characteristics of a disempowering motivational climate as minimal sporadic exposure to a disempowering motivational climate may impact students' perceptions of the environment resulting in changes in students' engagement and perceptions of PE.

Lastly, it is important for teachers to consider the individual students' mood arousal as this may largely impact their perception of the motivational climate influencing their engagement within the lesson. Therefore, it may be suggested that in relation to certain students,

developing competencies may not be the focus but rather increasing their mood arousal so they have a positive PE experience. A positive PE experience is essential for life-long PA participation. Teachers may wish to consider factors that may affect an adolescent's mood in PE such as the time of the PE lesson as an adolescent's mood tends to improve as the day goes on (493). Thus, PE lessons would benefit from being timetabled later on in the school day. Mood also links into relatedness within basic psychological needs theory (BPN) (11, 440), that was also identified as a predictor of engagement, as being able to have personal conversations with students will help increase their mood. It will also allow you to recognise changes in their mood and provide them with the social support they may require, in turn promoting positive experiences within PE. Lastly, the teacher's mood can impact students mood as studies have found that within classroom settings the teachers emotional state is directly related to the students emotional state (494), suggesting that teachers have the capability to improve student mood through a reflection of their own. This in turn would have a positive impact on the PE motivational climate, further supporting the promotion of long-life PA.

Recommendations for Future Research

Drawing on the conclusion from the outcomes of this thesis it is apparent that mood arousal needs to be explored further as a mediating effect of PE engagement as this may result in a shift of focus for PE teachers. One-way future studies may wish to explore the role of mood arousal is to look at the relationship over time, as mood arousal is an acute effect and thus can fluctuate daily. Alternatively, it may be beneficial to conduct an experimental study that compares a traditional empowering motivational climate against a motivational climate that emphasises positive mood arousal to investigate the mediating effect on engagement in PE.

In line with increasing mood, satisfaction of the BPN (11, 440), was highlighted as a key predictor of engagement in PE. PE literature places emphasis on ensuring that students have choice (autonomy) and develop positive beliefs that they can successfully carry out the desired behaviour (competency) with minimal attention placed on relatedness. PA literature on the other hand has identified that perceived relatedness can shape an adolescent's motivation for participating in PA (495), the effects in regard to PE and long-term PA engagement are under reported. Thus, it is proposed that future studies should consider the role of developing relatedness within the PE motivational climate by recognising individual differences, supporting the promotion of positive mood and experiences in PE to promote engagement in PE and life-long PA participation.

Secondly, the literature review highlighted the lack of data capturing the multifaceted concept of engagement in PE. There is a need to better understand the association between identified predictors of engagement and the different dimensions within engagement as it may be that some predictors only promote certain dimensions of engagement. Interventions commonly target the identified predictors of engagement, but a majority of these are identified as being unsuccessfully long-term. A contributing reason for this is that only one dimension of engagement has been targeted. Thus, future studies may wish to look at the association between predicted variables and the different dimensions of engagement. However, in order to do this there is a need for more studies to use measures that capture the multifaceted concept of engagement rather than using proxy measures of engagement.

Conclusion

This thesis reiterates the current state of student engagement in PE, whilst also providing an estimation of the effects of pre-determined predictors explored through prospective and

retrospective studies. The findings support the notion that positive PE experiences can support the promotion of long-term engagement. However, the extent of this is constricted due to the current aims of PE creating conflicting motivational climates. Alignment and modifications need to occur if PE is going to be more effective and promote life-long PA in adults. However, a positive takeaway message from this thesis findings is that teachers do have the ability to influence students' engagement in PE through the motivational climate they create, supporting the development of the foundations contributing to leading a healthy and active lifestyle long-term.

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Appendix 1: Physical activity of adolescents during Covid-19 Epidemic

This work is given to highlight the work that was carried out during Covid-19. It does not directly relate to the flow of my thesis but is included here for the completeness of the work undertaken during my PhD.

Introduction

A large proportion of physical activity (PA) literature has focused on identifying potential determinants and barriers of why a large proportion of adolescents are not regularly engaging in PA or physical education (PE) lessons (1-4). The COVID-19 pandemic changed PE provision in schools for nearly 2 years, potentially changing the determinants and barriers to taking part in PE and/or PA for adolescents.

On the 11th of March 2020, the World Health Organisation declared the coronavirus disease 2019 (COVID-19) as a global pandemic (5). In a bid to curb the spread of the virus, the government enforced a national lockdown whereby individuals were recommended to isolate in the premises of their own homes, resulting in businesses (including leisure centres and sporting facilities) and schools closing for a substantial period of time. On occasions, the severity of the lockdown was eased but social distancing measures remained in place.

Although some PA barriers, such as concerns around self-preservation (3), may be reduced due to being unable to partake in physical activities together, it could be suggested that new

barriers occurred due to the government restrictions that were put in place to keep the wider population safe.

The closure of schools across the United Kingdom (UK) inevitably resulted in the removal of the opportunity for adolescents to be physically active through PE lessons, sporting clubs and other forms of organised physical activities. Unlike most subjects, PE teachers faced more challenges converting to delivering their lessons online. Consequently, it would be assumed that participation in PA during lockdown would decrease as adolescents' opportunities to be physically active and the activities they could engage in were limited. As a result, this potentially required adolescents to seek alternative ways to be physically active, thus changing their normal PA behaviour. In line with the COM-B behaviour change model, in order for someone to engage in a behaviour they must perceive that they have the capabilities and opportunity to participate in the behaviour as well as being motivated to enact that behaviour over alternative behaviours (6). It could be argued that aside from the elimination of opportunities, their perception of their capabilities to be physically active, along with their motivation may be negatively impacted due to various contributing factors.

As the population of the UK has never experienced a situation like this before, literature exploring PA participation during this period is mainly descriptive, thus the understanding of the impact COVID-19 has had on individuals' perceptions of their opportunities, capabilities, and motivation towards PA during this time period is limited. Nevertheless, PA participation decreased in the period after March 2020 as shown in a number of studies. Studies explored the differences in recorded step count pre and during lockdown through the use of data collected on Garmin watches or on smart mobile phones (7). Although smartphones were unable to collect non-stepping data (8), the average person's step count by day 17 of

lockdown decreased by 15% (9). This finding could be attributed to a number of changes in daily physical activities such as commuting or shopping. Despite a decrease in daily steps, Garmin reported an increase in 'walking' and virtual workouts, along with virtual cycling and running, using services like Peloton and Zwift (10, 11). However, this data was collected worldwide during March, which means PA and exercise restrictions during this time period may have varied within each country. Thus, findings should be interpreted with caution. Additionally, the data was collected from a Garmin watch which is designed to measure physical activity, commonly purchased by individuals who are already physically active and motivated to partake in PA or have the intention to do so. Therefore, the findings may differ in individuals who were already inactive pre-lockdown. Nonetheless, the data suggests that activity habits changed, and people were embracing home workouts and using the chance to explore new opportunities to engage in PA, whilst abiding by the government's guidelines.

Although there appears to be data to support a positive shift to find alternative ways to be physically active during this time period, this may not be replicated in a majority of adolescents. To date, there are no studies exploring PA of adolescents during this time period within the UK. However, descriptive data across the world has found that PA participation of adolescents is down when comparing activity levels pre- and during the pandemic (12-14).

It is evident that COVID-19 has had a substantial impact on PA participation of adolescents by creating a number of new challenges that may have tested the perception of their capabilities to be able to continue engaging in physical activities as well as seeking new opportunities, which in return would have tested their motivation. Subsequently, this descriptive study aims to explore the impact COVID-19 has had on PA participation with a focus on adolescent girls, as well as identify factors that may influence the type of activity or

sport that they have been engaging in. Aside from the engagement and the type of PA, this study aims to identify the role schools played in encouraging adolescents to be active and how this information could inform PE lessons once schools return.

Method

A questionnaire was designed and sent out to all the state schools in Essex (75 schools) via Active Essex delivered on the survey platform Qualtrics. Prior to data collection, ethical favourable opinion was granted by the University of Essex. Parental and participant informed consent was gained prior to the completion of the survey.

Participants

Participants were secondary school-aged children who were enrolled at a school, but due to COVID-19 restrictions unable to attend. Some data was obtained from 207 adolescents. However, unfortunately, not all participants completed the whole survey including the final submit button agreeing for their data to be used and were therefore removed from the data analysis.

N=84 (females N =21) completed the whole survey, and all were between the ages of **11 and 16** years old.

Measures

A 36-question questionnaire was designed based on the COM-B Behaviour Change Model. The first part of the questionnaire was to explore physical activity levels before and during lockdown and the type of activities students engaged in (questions 1 – 13). The second part of

the questionnaire focused on the school's involvement in the activities they engaged in as well as whether or not students would be interested in partaking in similar physical activities once schools returned (questions 14 – 25).

Findings and discussion

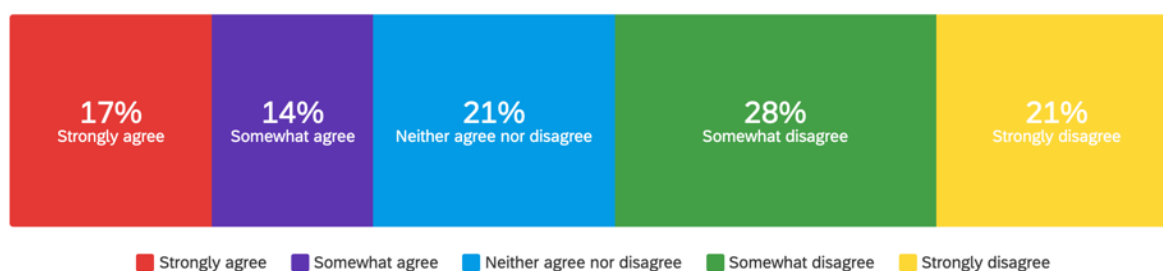


Figure 1. Shows the percentage of students who believe they have the capabilities and the opportunity to partake in the PA they enjoyed while in lockdown.

The data suggests that nearly half of the students (49%) identified the lockdown as preventing them from partaking in physical activities they enjoy (see Figure 1). Despite a large percentage of the participants expressing that they are unable to participate in the activities they enjoy, activity levels pre- and during lockdown showed no change. This supports the potential low levels of participation in PA.

Literature has shown that adolescents are a population that are regularly reported to be failing to meet government recommended guidelines for PA (15), and with the current restrictions this concern is heightened (12, 13). The purpose of the study is to contribute to the current COVID-19 literature on adolescent engagement in PA during this time period but also to explore the impact this has had on the perceptions of their capabilities and opportunities.

31% implied that they strongly agreed or somewhat agreed with having the capability and opportunity to take part in PA they enjoyed. According to the SDT (16), it could be proposed that the students may have acquired the three basic psychological needs (autonomy, relatedness and competence) to be able to carry out the desired behaviours despite facing adversity. However, this does not explain why a greater percentage of females (22% strongly agreed and 20% somewhat agreed) believed they had the capabilities and opportunities to be physically active compared to males (9% strongly agreed and 20% somewhat agreed).

The highest reported form of PA during lockdown was made up themselves (44%), followed by videos (27%) and live streams (26%). Girls in particular favoured following activities in 'real time' workouts whether these be live or pre-recorded. It is not surprising that girls are engaged in these forms of activities as intervention literature has highlighted that 'health club' (17) forms of exercise are appealing to adolescent girls. This could contribute to understanding why a greater percentage of girls believed they had the capabilities and opportunities to be physically active compared to males. In consensus with the COM-B model (6), the students who are more motivated to be physically active have sought new opportunities to be physically active with 44% reporting that they have made exercises or physical activities up themselves closely followed by using videos.

The data does not enable the reasons to be determined as to why students who performed no form of PA or exercise and whether this was due to the lack of opportunities, their motivation or the fact that they did not have capabilities to carry out the behaviour or awareness of the resources available to them.

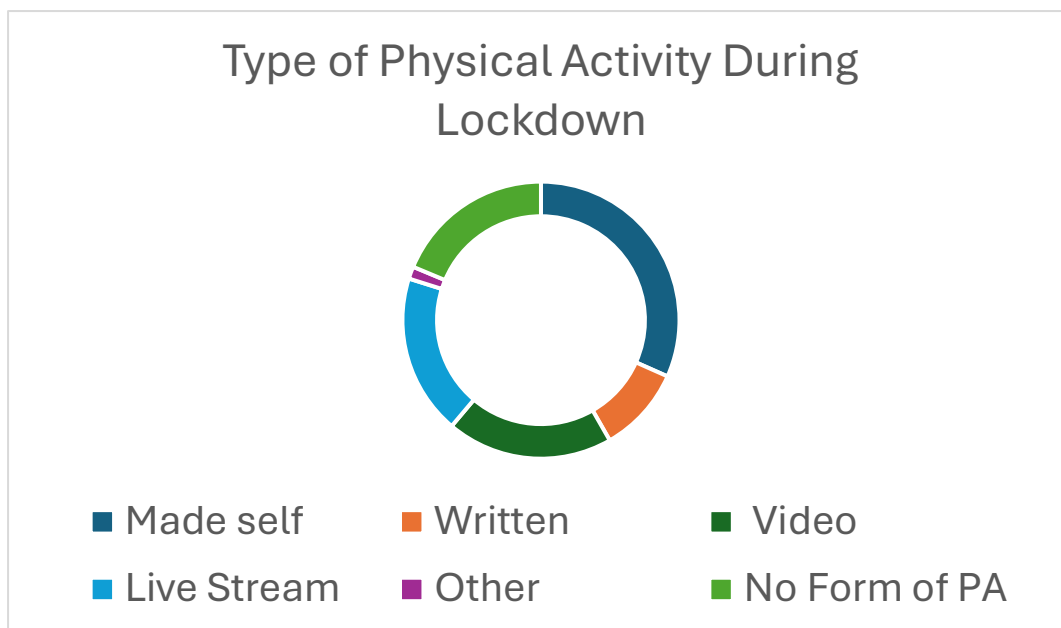


Figure 2. Shows the type of physical activity that adolescents engaged in during the first national lockdown.

With regards to schools, only 10 students reported that their school offered them some form of at home physical activity to do, despite 54.76% of the remaining 74 students reporting that they might or would be interested in partaking in at home activities delivered by their school during this time period. Out of the 46 students who said they would be interested in partaking in at home physical activity classes delivered by the school, 33 of these students were classified inactive based on physical activity guidelines. This highlights a potentially new way of reaching out to inactive students and encouraging them to partake in physical activity as well as highlighting missed opportunities for PE teachers to engage their students whilst in lockdown. Although it is not evident why home-based physical activities were more appealing to inactive compared to active students, determinants of PA and PE literature would propose it is due to the removal of concerns around self-preservation (2, 3). Surprisingly, only 50% of those students stated that they would be interested in this once school returned. This should be explored further.

Limitations

The findings from this study should be interpreted within the premises of the following limitations. The descriptive nature of the research is unhelpful at identifying underlying factors contributing to the recorded behaviour engagements. However, it does help to identify that there is an opportunity to explore alternative ways of engaging adolescents in PA whilst in lockdown and once they return to school. The low sample size also limits the validity of the data, and comparisons between boys and girls is difficult. A potential reason for this may have been that students did not complete the survey including the demographic section and did not complete the final submit section enabling the data to be used. In future it could be clearly stated that as they complete a page and go on to the next that the data from the previous page will be saved and used.

Conclusion

It is evident that there is a need to further understand why adolescents are not engaging in physical activity, especially girls, as a large proportion did not even engage in the study. Additionally, it would be beneficial to explore how schools, especially the role teachers can play in this behaviour change. Findings highlighted that 50% may be interested in participating in online physical activity, with a high majority of these students classified as inactive. Further exploration of what elements of participating in PA online appealed to inactive students maybe a useful contribution to broadening opportunities for adolescents to be physical active during PE lessons as it is likely that even once school returns after the COVID-19 pandemic PE lessons will not be the same as they once were.

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