SPORT AND HEALTH SCIENCES

Thesis

Exploring the acceptability and feasibility of implementing physical activity in primary school classrooms – A Somerset Activity and Sport Partnership Scheme.

Submitted by Rebecca Anne Chorlton to the University of Exeter

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I certify that all material in this thesis which is not my own work has been identified and that any material that has previously been submitted for the award of a degree by this or any other university has been acknowledged.

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Abstract

Purpose: The purpose of this study was: 1) to explore the perceptions of primary school staff members, pupils and governors in regard to classroom based physical activity (CBPA); 2) to understand the multiple levels of factors impacting these stakeholder's acceptability of interventions and 3) to collaboratively design a successful classroom movement intervention that is accepted by the school governors, feasible for teachers and enjoyable for the pupils, with the main aim of breaking up continuous uninterrupted classroom sedentary time.

Methods: Sixty-four staff members and twenty governors completed a questionnaire and 7 participants (n=5 staff and n=2 governors) took part in a further follow up semi structured telephone interview. Thirty-four Key Stage (KS) 1 and KS2 pupils from one federated village school in Somerset took part in a focus group discussion.

Results: All staff members, governors and pupils were aware of the value of PA and had similar barriers for implementation within the classroom environment. Two main barriers that were reported by the majority of staff members are time and transitioning back to work following movement. In addition, suggestions for increasing adoption and implementation were identified, for example, short and simple breaks, pupil guided choice and performed at the teacher's discretion. Furthermore, the need for more sufficient evidence regarding pupil cognition following a movement break were requested by both governors and staff.

Key words: qualitative research, classroom, movement breaks, stakeholders, prolonged sedentary time

Abbreviations: Physical activity (PA), Key Stage 1 (KS1), Key Stage 2 (KS2)

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CHAPTER ONE

Chapter One – Introduction

1.1 General Introduction

This thesis explores how the incorporation of classroom based movement breaks can be feasibly and successfully carried out from a multi-stakeholder perspective. In the present chapter, I have outlined the problem under investigation including the argumentative thread that runs through this thesis. This chapter concludes with a formal statement of the problem this qualitative research project addresses with accompanying research questions.

1.2 Background and Context

Physical activity (PA) is defined as 'any bodily movement produced by skeletal muscles that results in caloric expenditure above resting levels' (Caspersen et al., 1985). Sedentary behaviour refers to any behaviour performed in a sitting or lying position with energy expenditure ≤ 1.5 times resting levels (Tremblay et al., 2017).

Regular participation in PA is essential for children's healthy growth and development (Chalkley et al., 2015). The physiological and psychological health benefits for school aged children are extensive (Janssen & LeBlanc, 2010) and this understanding has driven the development of current PA guidelines. The current PA guidelines for children and young people state that they should (1) engage in moderate to vigorous physical activity (MVPA) for an average of at least 60 minutes per day across the week, (2) engage in a variety of types of intensities of PA and (3) minimise the amount of time spent being sedentary and when possible should break up long periods of not moving with at least light PA (World Health Organization, 2020).

Despite the physical, mental and social benefits of PA, fewer than two-thirds of all young people report meeting the first guideline (World Health Organization, 2004). This is further supported with more recent evidence as only 17.5% of children and young

people reported meeting the current UK PA guidelines and took part in PA for at least 60 minutes a day every day of the week (Chalkley & Milton, 2020).

This thesis, and the research within is aimed at targeting the third guideline to minimise sedentary time by breaking up long periods of not moving with PA.

Prolonged uninterrupted sitting in childhood is negatively associated with cardio-metabolic health and developmental outcomes in children (Saunders et al., 2013). For example, it has been shown that TV viewing time is negatively associated with cardiometabolic health independent of the amount of time spent performing MVPA (Barker et al., 2018). This is further supported by McManus et al. (2015) who found that prolonged sitting in young girls caused a 33% reduction in vascular function. Early deterioration in vascular function are significant in the development of cardio-vascular disease (Aggoun et al., 2005).

Breaking up prolonged sitting time has consistently shown positive associations with time on task and student behaviour (Goh et al., 2016; Mahar et al., 2006). However data is conflicted regarding the associations with cognitive function with some studies observing improvements in focus and attention (Donnelly & Lambourne, 2011; Mazzoli et al., 2019) whilst other studies have failed to find significant associations between sitting time and cognitive outcomes (Penning et al., 2017). A more recent study by Mazzoli et al. (2021) found that active breaks interrupting sitting time within the classroom showed a significant effect on working memory, however did not significantly impact other areas of cognition or on-task behaviour.

Worryingly children are becoming increasingly less active and more sedentary as they age throughout childhood (Janssen et al., 2016; Jones et al., 2013), therefore interventions targeted at children to break up prolonged sitting by replacing it with PA are important. The World Health Organization has identified the school environment as crucial to promoting the habitual activity patterns of children (World Health

Organization, 2008). Targeting the school environment allows interventions to maximise reach, utilise existing resources and benefit from appropriate infrastructure (Fairclough et al., 2013). A school day largely consists of seated lessons, with children spending approximately 50-70% of their time engaging in sustained uninterrupted sitting (Clemes et al., 2016). The possible benefits of interrupting sitting time in regards to cognition and behaviour might be most beneficial in the classroom environment. This outcome may also resonate with teachers, who might be disconnected or disinterested with the future cardio-vascular disease (CVD) risk of their pupils, and become instead more incentivised to pursue interventions that promote classroom behavior and learning. Therefore, introducing activity during this time offers an attractive opportunity for an intervention.

Recent meta-analyses established that school based interventions focusing on increasing children's and adolescents (6-18y) PA levels have had little to no effect on school time or daily MVPA levels (Love et al., 2019). These effects may be due to the inability to significantly increase daily MVPA as the margins for improvement are small and the effects cannot be maintained outside of the school environment. This is further supported by Metcalf et al. (2012) who provides strong evidence that PA interventions have only a small effect (approximately 4 minutes) on children's overall activity levels. Instead, targeting pupils prolonged sitting time inside the classroom by interrupting it with PA may be a more practical, feasible and acceptable approach for future intervention success. Whilst this increase in PA might not be significant, it will still be in line with the WHO recommendations as continuous sitting will be minimised. The feasibility of this approach will be explored within this thesis.

Knowledge surrounding the effectiveness and sustainability of current school-based interventions is limited and it still remains unclear what makes an intervention acceptable and feasible for all stakeholders in a primary school classroom setting. This stresses the importance of the collection of qualitative data from a multi stakeholder

perspective prior to the design or implementation of any intervention (Daly-Smith et al., 2020). If ineffective interventions lacking success or longevity continue, new practices cannot reach wider populations and investments in time, people and resources to implement interventions may be wasted (Schell et al., 2013).

Poor success rates of previous school based interventions have been attributed to the 'top-down' approach utilised, whereby researchers and external stakeholders drive intervention design with limited input from key internal school stakeholders (Rütten et al., 2017). This leads to a disconnect between what is provided and what pupils and teacher actually need/want. Research shows that involving participants and those expected to deliver the intervention aids the development of a strong intervention and increases the likelihood of effectiveness and sustainability (Howie et al., 2014; van Sluijs & Kriemler, 2016). The co-production of interventions by all stakeholders is therefore essential, which remains poorly explored at present.

Previous research surrounding the collection of prior qualitative data has consisted of mainly head teacher and teacher perceptions only (McMullen et al., 2016; Quarmby et al., 2019; Routen et al., 2018), this may present a limited understanding of the wider factors beyond the classroom that may affect the incorporation of movement. To provide insights into the broader contexts required to create the most effective classroom based movement intervention there is a need to capture the perspectives of a variety of school stakeholders i.e. head teachers, teachers, teaching assistants, members of senior leadership, policy makers such as governors and even pupils, all of whom are in a position to support classroom movement integration. The senior leadership team take care of daily planning and management of a school and include the head teacher, assistant head teacher and deputy heads. Governors are responsible for overseeing the management of a school, including strategy, policy, budgeting and staffing, they work alongside the

senior leadership team to take on the role as an independent voice to challenge and support the school.

1.3 Summary and significance of thesis

The overarching theme of this research is to better understand the range of perspectives from key primary school stakeholders in regards to the feasible and successful incorporation of classroom movement breaks. The overall goal is to generate evidence to inform the design of a classroom movement intervention, which could be used in a future study to displace prolonged uninterrupted sitting with PA in primary school classrooms.

The results of this thesis will therefore identify the modifiable factors and barriers that differ among primary school stakeholders in the implementation and sustainability of classroom movement breaks. This is in accordance with Daly-Smith et al. (2019) who recommended that future research should involve the views of head teachers, governors and pupils for effective intervention design. It is important that these perspectives are produced collaboratively to allow the co-design of a feasible and acceptable movement intervention from all stakeholder levels.

1.4 Aims, Objectives and Research Questions

1.4.1 Overall aim of thesis

The primary aim of this thesis is to capture the perspectives of each stakeholder group deemed important for the successful implementation and adoption of classroom movement breaks. The secondary aim of this thesis is to use these perspectives to collaboratively design a classroom movement break intervention to interrupt prolonged sitting that can be feasibly and successfully incorporated into primary school classrooms in a future study.

The specific research objectives for each study within this project are:

1.4.2 Study 1: Primary school internal staff questionnaire and interview

To understand and record the perspectives of internal primary school stakeholders including head teachers, KS1(ages 5-7 years) teachers, KS2 (ages 7-11 years) teachers, teaching assistants and PE teachers to inform the design of an acceptable and feasible classroom movement intervention.

1.4.3 Study 2: Pupil focus groups

To collate the perspectives of primary school pupils regarding the incorporation of movement into their classrooms.

To present the ideas gathered in study 1 in order to begin to collaboratively design a classroom movement intervention from a teacher and pupil perspective.

1.4.4 Study 3: Governor questionnaire and interviews

To capture the perspectives of primary school governors regarding the successful incorporation of classroom movement interventions and initiatives into primary schools.

CHAPTER TWO

Chapter Two – Literature Review

2.1 Introduction

The following literature review describes the benefits children attain when being physically active and the implications of prolonged sitting on various outcomes. The unique opportunity for increasing activity among children inside the primary school classroom and the views of all key stakeholders are identified and explored. This link will be considered as a rationale for introducing interventions to promote PA within the primary school classroom as a means to acutely break up prolonged sitting time in order to improve the health of future populations. The current recommended PA guidelines are outlined and children's PA patterns are considered. Current school stakeholder perceptions and previous school based PA interventions within the classroom setting are examined. The rationale and hypothesis for this work appear at the end of this chapter.

2.2 Characterising physical activity, inactivity and sedentary behaviors

PA is defined as 'any bodily movement produced by skeletal muscles that results in caloric expenditure above resting levels' (Caspersen et al., 1985). Sedentary behaviour refers to any behaviour performed in a sitting or lying position with energy expenditure ≤ 1.5 times resting levels (Tremblay et al., 2017). If an individual is 'physically inactive' it indicates that they are not undertaking sufficient MVPA to meet the PA guidelines (Tremblay et al., 2017), however being sedentary means sitting or lying down for long periods. Therefore, an individual can be both physically active and highly sedentary.

2.3 Physical Activity Guidelines

2.3.1 Current guidelines

PA guidelines are developed to encourage individuals to achieve the health benefits associated with PA. In 1998, two recommendations for PA were made for young people aged 5-18 years. The basic recommendation within these guidelines was that young people should take part in at least 60 minutes of moderate intensity PA daily (Biddle et al., 1998).

Over the past few years there has been a shift within the UK and globally for more uniform guidelines. The 2011 PA guidelines made no reference to breaking up prolonged sitting time, but our understanding regarding the potential health consequences of this exposure has grown. This has led to the refinement of these 2011 guidelines to include an average time recommendation and adding a statement to reduce periods of inactivity by replacing it with activity, which is the main focus of this thesis. The UK Chief Medical Officers' recent report on PA (Department of Health & Social care, 2019a) outlines a minimum recommended level: 'children and young people should engage in MVPA for an average of at least 60 minutes per day across the week, this activity should aim to develop movement skills, muscular fitness and bone strength. Activities of a moderate to vigorous intensity is interpreted as when the heart is beating faster and the child is breathing harder' (Department of Health & Social care, 2019a).

This thesis specifically focuses on the third guideline for children and young people. This guideline regarding sedentary behavior and states that children should 'minimise the amount of time spent in prolonged periods of sedentary behavior by breaking up periods of not moving with at least light PA' (Department of Health & Social care, 2019a). For example, time spent sitting at a desk, watching television, using a computer or playing video games should be reduced and extended periods of sedentary time should be interrupted with PA.

2.3.2 Prevalence of children meeting the guidelines

According to the latest self reported data from the Health Behaviour in School-aged Children (HBSC) study, less than two-thirds of all young people report meeting the current guidelines (Brooks et al., 2020). According to objective accelerometer data time spent in MVPA decreases and sedentary time increases between ages 6-11. The study found that children in year 1 did at least an hour of MVPA per day but by year 6, only 41% achieved the target (Jago et al., 2020). According to the active lives survey 2019, 29% (2.1million) of children and young people are failing to undertake at least 30 min of PA a day and another 24.2% (1.7 million) of children and young people are regarded as 'fairly active' meaning they take part in an average of 30-59 min a day (Sport England, 2020). Thus the majority of children are failing to achieve the recommended minimum amounts of PA.

The incorporation of PA is a national curriculum requirement and recommended by the Office for Standards in Education, Children's Services and Skills (Ofsted) "Physical activity will be a key part of the new healthy schools rating scheme…schools will have the opportunity to demonstrate what they're doing to make their pupils more active...for example after school clubs, initiatives such as the daily mile, creating an active playground or having an active lesson"– Ofsted (HM Government, 2016, pp. 7-8). Despite this, opportunities for children to be active within the classroom setting are lacking. The energize project (a long term through-school PA and nutrition programme) states that 20 minutes of MVPA should be accumulated at school (Rush et al., 2012). The childhood obesity plan set out guidelines that children should achieve at least 30 min of their daily PA through the school day and at least 30 min outside of school. A minimum of 30 minutes of MVPA at school is the most commonly cited school day target (Fox, 2004) despite this, only 40.4% of children are active at school for an average of 30 minutes per day (Sport England, 2020).

Despite the fact that few children achieve the school-day guidelines, schools

appear to play a valuable role in accumulating total daily PA and offer an attractive opportunity to interrupt the prolonged sitting time experienced within this environment. Schools are therefore an important setting to implement interventions to reduce prolonged sitting time by displacing it with short bursts of PA allowing a greater proportion of children to meet the recommended PA guidelines due to a school's large reach and equal access to all at-risk sub groups.

In view of the gap between current and recommended PA levels of children (Griffiths et al., 2013) it is clear that what is currently being conducted to support PA and break up prolonged sitting in children and young people is not enough and change is required.

2.4 Health benefits of physical activity during childhood

The importance of PA among children for favorable physical and mental development is well established. The notion of a lack of PA as a risk factor for children's health began in the 1960s (Armstrong et al., 1990). Since then there has been strong and consistent evidence from experimental studies indicating that participating in as little as 2-3 hours of MVPA per week is associated with health benefits in school aged children and youth (Janssen & LeBlanc, 2010). Engagement in PA benefits every aspect of health including the physiological, psychological and social wellbeing (Chalkley et al., 2015) of children, adolescents and adults (Deflandre et al., 2004).

The physiological health benefits associated with PA engagement in children include, improved cardio-metabolic health (Krekoukia et al., 2007; Ondrak & Morgan, 2007; Raitakari et al., 1997), muscular strength, bone development and cardiorespiratory fitness and affects precursors of various lifestyle diseases (Beurden et al., 2003). PA was found to improve cardio-metabolic health in school aged children, lowering the risk of developing type 2 diabetes, hypertension and obesity (Janssen & LeBlanc, 2010) .

PA plays a vital role in optimising peak bone mass and bone health which is important for the prevention of conditions such as osteoporosis later in life (Macdonald et al., 2007). A randomised controlled trial has found beneficial bone mass effects through increasing PA by 140 minutes per week in children (Cöster et al., 2016). A theoretical analysis suggests that the effect of increasing childhood bone mass by 10% would be to delay postmenopausal osteoporosis by approximately 13 years (Hernandez et al., 2003).

The development of motor skills and neuromuscular awareness with PA has been emphasized in the paediatric population (Logan et al., 2015). It has been shown that PA has a positive relationship with motor skill acquisition in children (Laukkanen et al., 2014). Motor skills is a term used to describe the ability of the body to perform tasks such as walking, balancing, catching and throwing. It is essential that fundamental motor skills are mastered before the development of more sport-specific skills (Haubenstricker & Seefeldt, 1986), as it is vital to the development of higher skills and should ideally be mastered by the time children complete year 4 and 5 (Booth & Chey, 2004).

Regular PA during childhood is not only important to maintain physiological health but also brings an abundance of other psycho-social benefits (Strong et al., 2005). It has been suggested among educators that contemporary challenges to pupil mental health is a serious concern to paediatric wellbeing (Rothì et al., 2008). The period of childhood and adolescence is critical for mental health due to neuronal plasticity and the establishment of behavioural patterns (Sisk & Zehr, 2005). Regular moderate exercise helps the body produce endorphins which improves mood, energy levels and even sleep (Dishman et al., 2010). Together these positive effects may help to improve self-confidence and resilience to physical and emotional challenges (Ekeland et al., 2005). More positive psycho-social well-being indicators in early childhood have been shown to be inversely associated with later depression, hostile behavior and aggressive interpersonal behavior (Meagher et al., 2009). Therefore supporting the development of

healthy psycho-social wellbeing during early childhood through the participation of recommended levels of PA is important for mental health in later childhood.

Besides the physiological and psycho-social benefits of PA, there is also emerging positive associations of PAwith cognition in childhood. This relationship can be explained through two broad mechanisms – physiological mechanisms and learning/developmental mechanisms. The physiological mechanisms such as increased cerebral blood flow and alterations in brain neurotransmitters are based on physical changes in the body brought about during PA. The learning/developmental mechanisms state that PA provides learning experiences necessary for development of the paediatric brain. Educators have suggested that movement, particularly in young children, stimulates cognitive development (Pica, 1997), although a strong relationship between PA and cognitive performance is yet to be established. Research findings have been equivocal, with some studies showing PA to have a facilitative effect (Sibley & Etnier, 2003) and others showing no significant differences (Chaddock-Heyman et al., 2013).

A review of 17 studies by Trudeau and Shepherd on the impact of PA on academic performance of children in primary and secondary school also found a positive relationship between PA and school results (Trudeau & Shephard, 2008). They found increased fitness and PA improved cognitive function, with higher-fit children demonstrating attributes such as greater attention, faster information processing and higher scores in standardized achievement tests. It is possible that PA before, during and after school promotes academic performance in children and youth, with even a single bout of PA having an acute benefit to cognition and academic performance (Bangsbo et al., 2016). This is further supported as 15 minutes of aerobic PA has also been shown to increase concentration and on task behaviour in fourth grade children (Caterino & Polak, 1999), and the latter is likely to be a desirable outcome for teaching staff. A structured classroom movement activity immediately prior to a concentration task was not

detrimental to children in grades 2 and 3, whilst 4th grade children performed significantly better on a test of concentration after engaging in PA. These findings support the notion that classroom PA seems to have no detrimental effect, and potentially a significant positive effect on concentration in primary school aged children. PA also provides cognitive benefits for children with disabilities and those with ADHD by stimulating the attentional system (Ziereis & Jansen, 2015).

In summary PA is fundamental for the enhancement of mental wellbeing, motor skill development, psychosocial and cardio metabolic health in children alongside an emerging association with academic achievement, improved concentration and attention (Scholes & Mindell, 2016). Physically active young people are also more likely to adopt other healthy behaviors such as avoidance of tobacco and alcohol (World Health Organization, 2019). Summatively, regular participation in PA is associated with important short and long term health benefits for children in physical, cognitive, emotional and social domains (Sallis et al., 2000; Yang et al., 2006).

2.4.1 Accumulated physical activity v continuous physical activity

Recommended daily PA accumulated in short bouts (e.g. <10 minutes) may be more feasible and beneficial to the relatively sedentary population (Macfarlane et al., 2006). Research relating to individual's PA patterns is becoming increasingly popular, whether short bouts of PA confer similar benefits to longer durations remains unclear and available evidence is lacking in the younger population (Willis et al., 2015). Data shows that time spent performing PA is favourably associated with cardio metabolic risk markers in youth irrespective of bout-duration. Greater magnitude of associations were observed with higher intensities. It has therefore been suggested that, in children and adolescents, PA, preferably at higher intensities, of any bout-duration should be promoted (Tarp et al., 2018). Regular PA breaks during prolonged sitting have also been shown to

be more effective than one continuous bout of exercise on post-prandial blood glucose (Loh et al., 2020). Children typically do not achieve many sustained bouts of activity, as the natural tempo of their activity is characterised by frequent short bursts lasting just seconds (Riddoch et al., 2007). There is weak evidence for the effectiveness of acute bouts of PA on attention in children (Janssen et al., 2014) but no evidence that it is detrimental to children's attention. More experimental studies, especially in the school setting, are needed to strengthen this evidence. We know that children are failing to perform PA in one (or even two) large bout(s) (Hnatiuk et al., 2019). So, promotion of accumulating PA throughout the day to achieve targets is recommended and feasible (Loh et al., 2020). The shorter bouts of PA throughout the day may be also be used to aid the breaking up of continuous sitting time whilst helping to contribute to the number of children meeting the current PA guidelines.

2.5 Physical inactivity consequences

Inactive behaviors include television viewing, classroom lessons, computer games and commuting in the car (Ainsworth et al., 1993). In contrast to PA engagement, inactivity during childhood is linked to poor health (World Health Organization, 2010). Inactivity is a leading cause of mortality and morbidity in adults as identified by the World Health Organization (2010). The effects of inactivity on children's health have received less attention, due to the fact that inactivity has generally been viewed indirectly as part of a continuum of activity and not separately (Mavrovouniotis, 2012). Despite this, recent data are available which indicate that time spent inactive watching television is associated with poorer cardiometabolic health in youth, independent of MVPA (Barker et al., 2018).

The lack of movement in children's lives is one of the primary predisposing factors of chronic, degenerative diseases such as heart disease and diabetes (Chakravarthy

& Booth, 2003). Epidemiological data is available showing that inactivity and increased sedentary time contribute directly to the occurrence of at least twenty of the most dangerous chronic diseases (Booth et al., 2017). Previous research shows that PA is positively associated with executive functions whilst screen time shows negative associations (Mazzoli et al., 2019) however how school-based sitting time and therefore prolonged periods of physical inactivity relate to cognition and behaviour in children is still unclear. Haapala et al. (2017) found negative associations with objectively measured sedentary time and measures of reading and writing skills in boys aged 6-8 years. Syväoja et al. (2014) found that prolonged sedentary time was associated with better sustained attention in school aged children, however no association was found with working memory.

To summarise, inactivity is a behaviour that is associated with adverse health outcomes which originate in childhood as well as emerging negative associations with cognition and attention. Schools may be an appropriate setting to displace long periods of inactivity within the classroom setting with PA.

2.6 Health benefits of physical activity throughout life (tracking of PA and sedentary behavior)

The promotion of childhood health through PA interventions is based on the belief that PA and sedentary behaviors is habitual and tracks over time. There is evidence that habits and attitudes towards PA and sedentary time developed during childhood continue through adolescence and adult life (Telama, 2009). This may be because children at primary school age are particularly responsive to health messages and behavioral changes can hopefully be maintained into adulthood. The promotion of breaking up prolonged sitting time with activity targeted at school aged children is therefore essential for the promotion of a healthy active lifestyle.

It is likely that some sedentary behaviors such as TV viewing and recreational

computer use have a strong habitual element and are likely to track over time, therefore the practice of interrupting sitting time is important. Time spent being sedentary increases with age and children who are active are more likely to continue this habit into adult life (Bernaards et al., 2016; Jones et al., 2015). It is clear that a lifestyle of regular PA and reduced prolonged sitting starting in childhood contributes to the more efficient functioning of various systems such as weight maintenance, the reduced risk of several degenerative diseases, mortality and overall improvement of quality of life (Bouchard et al., 1994). Therefore, well designed childhood PA interventions are likely to be critical for developing healthy behaviors and preventing disease in adulthood. By providing students with knowledge and the opportunities to be more active throughout the primary school day, they will develop healthier behaviors that may track into their adolescent and adult life.

2.7 Health benefits of breaking up prolonged sitting

Prolonged sitting (a form of sedentary behaviour) is becoming an increasing issue in modern society. Accumulating evidence suggests that excessive sedentary behaviour is associated with serious health concerns (Dunstan et al., 2012). These include negative cardiometabolic outcomes such as type two diabetes (Dunstan et al., 2012) and some cancers (Schmid & Leitzmann, 2014). These relationships appear to remain in adults independent of PA levels (Hamilton et al., 2008). This finding reinforces the consideration of excessive sitting as a serious health risk, with the potential for ultimately giving consideration of too much sitting (or too few breaks from sitting) in future PA interventions.

As highlighted in section 2.2 it is important to note that an individual can be both highly active and highly sedentary. Long periods of uninterrupted prolonged sedentary time are a main concern. This is because recreational PA meeting or exceeding the current

guidelines fails to offset the negative cardiovascular effects of prolonged sitting (Hamilton et al., 2008). The effect of this is unclear in children and needs to be explored further. Evidence from 'inactivity physiological' studies in adults has identified differing underlying biological mechanisms from the 'physiology of physical activity' (Hamilton, 2018) suggesting that in adults prolonged sedentary behaviour and lack of PA should be viewed independently. Equivocal associations between sedentary behaviors and adverse health outcomes in adolescents have been highlighted (Martinez-Gomez et al., 2010; Ruiz et al., 2011) suggesting more evidence is required in the younger population.

Sedentary behaviour research is experiencing rapid growth. Papers are now showing potentially important negative health outcomes for various markers of sedentary behaviour calling for the consideration of sedentary time or physical inactivity to be viewed independent of exercise habits. A recent systematic review in adults (Peachey et al., 2020) suggested that reducing average daily sitting time by 30 min/day is clinically meaningful for observing long term health benefits independent of PA levels (Ekelund et al., 2016). In adults, reducing and breaking-up sitting time with standing and moving has been shown to be beneficial for cardio-metabolic health (Dunstan et al., 2012). More recently, breaks in sedentary time (distinct from the total volume of time spent being sedentary) were shown to have beneficial associations with metabolic biomarkers in adults (Healy et al., 2011). Further experimental and intervention studies particularly in children are required to understand the mechanisms that may underlie these findings.

There is a growing suggestion that with increasing sedentary time, cardiovascular risk in childhood also increases. Moderate evidence for a longitudinal inverse relationship between prolonged sitting, screen time and aerobic fitness during childhood has been found (Chinapaw et al., 2011). It was found by McManus et al. (2015) that prolonged sitting caused a significant vascular dysfunction in young girls. This change is similar to the adult response to uninterrupted sitting (Thosar et al., 2015) stressing the importance

of breaking up prolonged sitting to prevent this.

The primary school is an ideal setting to reduce prolonged sedentary behaviour in childhood as the majority of the primary school day is spent sitting. Many primary school children sit at a desk for an average of four and a half hours per school day (Rideout et al., 2010). In school-aged children the cognitive consequences of too much sitting are unclear, previous research shows that pupils have a higher level of on-task behaviour when given the chance to break up periods of prolonged sitting in class (Jensen, 2008; Trost, 2007). The most off task (pre-school) pupils prior to the movement break improved on task behaviour by 30% following the break (Trost, 2007). A randomised cross over study by Penning et al. (2017) found that cognitive results showed the equivalent of a 6-month improvement in effective mental-attentional capacity in adolescents who underwent MVPA interruptions and no bouts of sitting for more than 20 minutes throughout the school day. In adults evidence suggests that excessive sedentary behaviour is negatively associated with cognitive function in terms of executive function, processing speed and perceptual organisation and planning (Falck et al., 2017). More research regarding school-based sitting time and transitions from sitting to PA are required to show the effect on cognitive function and brain activity in children (Mazzoli et al., 2019).

The consequences of excessive inactivity and sedentary time are not well understood in children, however there is growing evidence that increased sedentary time is negatively associated with health and developmental outcomes in children (Cliff et al., 2016; Mitchell et al., 2013; Travis John Saunders et al., 2013).

2.8 Physical activity in primary schools

"Schools are influential places to create good habits, develop skills and help young people to sustain these in the future" – Ben Goodall Youth Sport Trust board member.

The World Health Organization has identified schools as a target setting for their pivotal role in creating a more active society and implementing health promotion strategies among children and youth in order to develop positive habits (World Health Organization, 2004). School-time may provide the greatest opportunity for children to be physically active as over 8.9 million children and young people attend state funded school in England (Department for Education, 2020). Schools are becoming important settings in the role of health promotion due to their ability to maximise reach, the availability of existing resources, appropriate infrastructure and the possibility of curricular integration and sustainability (Fairclough et al., 2013) irrespective of a child's personal circumstances outside of school (Jones et al., 2009).

Opportunities to target PA across the primary school day include travel to and from school, before and after school, PE lessons, within classroom lessons and break times. This thesis specifically focuses on the integration of PA within the classroom lesson environment. Previous PA research consistently identifies classroom lessons as the most sedentary and least active segment of a young person's day with Australian data showing that 63% of class time per school day is spent being sedentary (Ridgers et al., 2012). Moreover, children sit for longer during school hours compared with non-school hours on school days with primary school children spending an average of 50-70% of their day sitting (Abbott et al., 2013). Introducing activity during a child's most sedentary part of their day offers an attractive opportunity for an intervention.

There is a growing movement to develop and adopt classroom-based PA in an effort to increase PA and reduce prolonged sitting within the school day. According to Watson et al. (2017), there are three prominent types of classroom-based PA frequently discussed in primary schools. These include (i) activity breaks which are separate from the lesson content providing a break from academic instruction, (ii) curriculum focused active breaks which include short bouts of PA that include curriculum content, (iii)

physically active lessons which seek to integrate movement into the existing curriculum. A meta-analysis (Owen et al., 2016) showed that classroom activity breaks (PA without curriculum content) appeared to be the most effective type of intervention for improving school engagement compared with recess/lunch time activity and physically active lessons (incorporating PA into lessons with key learning areas). This thesis therefore centres around providing pupils with a pure PA break (activity that has no relation to curriculum content) rather than incorporating movement into academic learning. This short amount of movement can therefore create a release from the rigours of academic learning and give the students a chance to interrupt sitting with a small amount of exercise throughout the day.

Although schools may be an ideal setting to target PA, interventions often struggle to increase PA levels during the school day (Borde et al., 2017; Metcalf et al., 2012). An alternative approach may be to target schools in relation to prolonged periods of sitting by displacing it with PA which is the main area of focus for this thesis. The majority of systematic reviews highlight the difficulty in significantly increasing a child's total PA during school (Naylor et al., 2015). Recent literature has targeted the mostly sedentary classroom lessons by displacing prolonged periods of sitting with activity. A study by Ellis et al. (2019) in preschool children showed no significant effects of replacing sitting time with standing on executive function and musculoskeletal health. These results suggest that replacing prolonged sitting with standing is not enough and children might need to move. This is further supported by Pulsford et al. (2017) as breaking up 7 hours of sitting with 2 minutes of standing every 20 minutes did not significantly improve glycaemic control however 2 minutes of walking did. This suggests the same may be true for cardiometabolic health outcomes based on this adult data.

2.9 The importance of pre collection of qualitative data

"...developing effective interventions is only the first step toward improving the health and well-being of populations" (Durlak & DuPre, 2008) p 327).

Previous classroom based physical activity (CBPA) interventions have had mixed success and recent meta-analyses established current classroom interventions as inefficacious having little effect on PA and showing low uptake and sustainability (Jones et al., 2015; Love et al., 2019; Metcalf et al., 2012). The main aim of this thesis is to design an intervention to reduce uninterrupted sitting time rather than increasing total PA specifically, it is still important to ensure future interventions are supported by school stakeholders and show longevity.

Lack of success of previous interventions may be due to the challenge of designing and delivering feasible interventions in schools as well as the 'top down' approaches which have previously been employed (Daly-Smith et al., 2019). A 'top down' approach places the emphasis on researchers and head teachers to drive intervention design and implementation with limited input from school stakeholders such as teachers and pupils (Rütten et al., 2017). This can lead to a disconnect between what is provided and what is feasible for teachers and enjoyable to maximise pupil engagement (Christian et al., 2016). The evaluation of the practicalities of implementing classroom movement in the 'real world' context is essential to determine whether interventions can be successfully reproduced and sustained (Bauman & Nutbeam, 2013). Baker et al. (2015) expressed that it is still unclear what makes an effective intervention for increasing PA in youth, thus highlighting the need for the pre collection of qualitative data prior to the implementation of PA initiatives.

2.10 Factors that affect PA in primary school classrooms

To date, many initiatives have been used within the school environment to increase PA such as Wake and Shake, Go Noodle, Fitter Futures, Joe Wicks®, BBC Super

movers, Active Math's, Take 10! and the Golden mile®. For example, Go Noodle is a free software that allows teachers and parents to get pupils moving with short interactive videos. Wake and Shake is an initiative that takes place every morning before school and consists of movement to energise pupils prior to sitting.

Central to understanding the implementation process is a comprehensive knowledge of the numerous factors that act as barriers or facilitators to the successful implementation of PA initiatives within a classroom at a primary school level. There is strong empirical evidence to suggest that multiple factors affect the implementation of health promotion and preventative interventions, including school based PA interventions (Durlak & DuPre, 2008; Naylor et al., 2015). It is important to consider these factors from each stakeholder perspective. Barriers that have consistently been associated with movement integration in the primary school classroom are insufficient time, lack of training/teacher resistance, student resistance and space constraints (Goh et al., 2017). Factors influencing the implementation of movement at the interpersonal, community and public levels have been described less often (Michael et al., 2019; Naylor et al., 2015), which may be due to the fact that perspectives from classroom teachers, and not others, have been most frequently reported in the literature (Shannon et al., 2020).

Teachers and school administrators are being called upon to help youth become more active in school. As highlighted by Hyndman and Chancellor (2017), teachers are the ones who make decisions about children's PA during the school day. Classroom teachers, who most often have the responsibility for PA breaks, are particularly impacted by additional work commitments and inexperience teaching PA (McMullen et al., 2014). Teachers are often resistant to incorporating movement within their classrooms due to the threat of loss of classroom control both in the perceived chaos during the activity and the challenge of returning to on task behaviour following the movement (McMullen et al., 2014). Classroom teachers have extensively reported experiences that are both facilitative

and prohibitive to the inclusion of PA in their classrooms within the literature (Shannon et al., 2020).

Teachers have reported a lack of time as a main barrier to implementing the TAKE 10! (a variety of 10-minute tasks that includes an exercise, a cool down period and a series of questions related to health and nutrition) Program (Tsai et al., 2009). The barrier of time and space is repeatedly noted across various studies in the literature (Cothran et al., 2010; Gibson et al., 2008; Goh et al., 2017; McMullen et al., 2016) suggesting that simple movement breaks that are easy to implement across a shorter time period appear to be important when considering teachers existing time constraints. It has been shown that classroom teachers recognise the importance of PA in a child's day and are willing to incorporate movement for students during normal sedentary classroom lessons (Cothran et al., 2010; Parks et al., 2007). Findings report that classroom teachers are willing to include PA breaks into their classroom if they have received professional development for it and if the activity is quick and easy to implement (Stylianou et al., 2015). This is further supported by McMullen et al. (2014) whereby teachers reported an increased likelihood to implement movement breaks, if the activity is simple to adopt and yields observational outcomes such as improved concentration. Dinkel et al. (2017) highlighted that teachers noted using the Go Noodle online PA resource most frequently as an easy way to give students a PA break. Studies regarding teacher perceptions indicate that given appropriate support and alignment with their own priorities, primary school teachers are willing to incorporate PA into their classroom (Macdonald et al., 2021).

At the interpersonal level only one third of teachers reported observing disruptive pupil behaviour as a barrier to providing CBPA (Macdonald et al., 2021). This is in contrast to previous findings where behavioral challenges with primary school aged children have been reported as a major barrier for implementing short PA breaks into the school day (Mazzoli et al., 2019; Watson et al., 2019). In contrast, Macdonald et al. (2021)

highlighted that one of the strongest facilitators for providing CBPA was observing an improvement in student engagement during or following CBPA. Stylianou et al. (2015) reported that when class room teachers saw improvements in students (in the form of concentration, attention, time on task or behaviour) the teachers were more likely to feel favorable about including PA in the classroom. Dinkel et al. (2017) indicated that almost all of their 59 participant teachers agreed that they use PA breaks in the classroom when their students seemed like they needed a break. This option shows that future experimental studies should assess outcomes such as student engagement in order to increase teacher confidence.

Although several studies have examined teacher perceptions of classroom movement integration (McMullen et al., 2014; Routen et al., 2018), there is little data published from a multifaceted perspective of all primary school internal stakeholders, including pupils. Pupil voices are currently minimal in the research, representing only 10% of the articles used in Shannon et al. (2020) review. This is important as child interest towards PA and the intervention itself has been shown to be crucial mediators of PA intervention behaviour change in primary school (Eather et al., 2013) Eather et al. (2013) highlighted that classroom teachers play a key role in influencing PA behaviour outcomes in children, thus stressing the need for examining the perceptions of both stakeholders in conjunction. A qualitative study by Webster et al. (2017) noted a further challenge theme that involved pupil resistance to the PA breaks, reporting that their students have a poor attitude or lacked enthusiasm towards classroom movement integration. Students aged 9-13 years have also shared concerns that PA may interfere with academic flow (Holt et al., 2018). Listening to the 'voice of the young' can assist in understanding classroom lessons from a pupil perspective allowing maximal pupil engagement and facilitate sustained adherence (Christian et al., 2016).

To date the literature is lacking in regards to governor perceptions of classroom

movement break integration. Despite the governor role being strategic and external from the classroom, whether the incorporation of movement breaks aligns with the school development plan and the wider school culture is important for an effective and successful roll out of future interventions. The governor perception is important as teachers beliefs, values and confidence are likely to be shaped by the school culture and support from senior management at the institutional level (Allison et al., 2016). The significance of the governor perception to ensure buy in has been stressed in previous research (Quarmby et al., 2019). The role of the governor has been highlighted as an essential school stakeholder to include in future research (Daly-Smith et al., 2020).

Further exploration of teacher beliefs regarding whether they believe increasing movement or reducing sitting time during a school day may be beneficial to student learning outcomes and how this would be feasibly carried out would be a valuable addition to future studies in this area (Macdonald et al., 2021). Future studies should move beyond the current teacher views that dominate the literature to provide a co-produced perspective from all stakeholders including head teachers, governors and pupils, as recommended by Daly-Smith et al. (2019).

2.11 Considerations for future intervention designs

The majority of existing interventions tend to adopt a 'top down' approach, focusing on outcomes which attracts those who are already active and meeting the guidelines rather than focusing on what young people want and what is feasible for schools and teachers to implement (Tancred et al., 2018). In order to create a comprehensive understanding of factors that affect movement integration both within and beyond the classroom, a collaborative approach by all stakeholders is essential (Kriemler et al., 2011; van Sluijs et al., 2007) thus utilising a 'ground up' approach is recommended for future research. If the design foundations of interventions continue to be ineffective new practices cannot reach wider populations and investments in time, people and

resources may be wasted (Bumbarger & Perkins, 2008; Scheirer & Dearing, 2011; Schell et al., 2013). Although few studies have examined teacher perceptions of classroom movement integration and related issues (McMullen et al., 2014; Routen et al., 2018), there is little data published from a multifaceted perspective of all primary school internal stakeholders including pupils. NICE recommends that children should be actively involved in planning PA and researchers should listen to the 'voice' of the young by moving away from conventional methods of approaching PA interventions (Yungblut et al., 2012).

In summary, the evidence outlined in this section demonstrates that more research is needed prior to future school-based PA interventions in the developmental stages into what constitutes a fun and enjoyable PA environment for pupils and what is feasible for teachers to sustain long term. This thesis acknowledges these gaps in the literature and aims to explore staff member, pupil and governor perspectives in regards to classroom PA to collaboratively design a high quality, attractive intervention.

2.12 Conclusion

This literature reviews highlights the numerous health benefits associated with PA engagement and interrupting prolonged periods of sedentary time among primary school-aged children. However, the majority of children are failing to meet to current recommended PA and sedentary time guidelines, this is worrying as many diseases begin in these fundamental years and behaviour may track into adult life. Schools have become more of a target setting for activity promotion in recent years, however the majority of interventions only show a minimal effect at increasing total PA levels in children. A reason for this response may be due to the difficulty of implementing PA within school due to the complex interaction of factors that affects it. Therefore, more school-based classroom interventions aimed at reducing prolonged sitting time by displacing it with PA are warranted. A multi-faceted 'ground up' approach is the most promising strategy

to design an intervention to break up sitting time and increase PA across the school day. However, further research is warranted due to the lack of evidence of effective ways to increase and support the interruption of prolonged sitting with PA in primary school classrooms. Future qualitative analysis of the acceptability and feasibility of classroom PA breaks from a teacher, pupil and governor perspective would be beneficial, allowing the collaborative design of an intervention.

CHAPTER 3

Chapter 3 – Methodology

This chapter will provide a justification of the methodological decisions made throughout the studies within this thesis. Sections included in this chapter are (3.1) Ethical considerations (3.2) Study design (3.3) Sampling strategies and population (3.4) Qualitative data collection techniques utilised and (3.5) Thematic analysis.

3.1 Ethical considerations

Prior to commencement of this study, ethical approval was granted by the Sport and Health Sciences, University of Exeter Ethics Committee for all components of this research (Appendix 1, 2 and 3) (191023-A-11, 191204-B-02, 201021-A-03). Informed teacher and parental consent, and pupil assent were provided. Data was collected between November 2019 and December 2020.

3.2 Design

This thesis used a multicomponent approach to make use of a range of qualitative methods. This range of methods employed, provided the opportunity to explore a multifaceted view of the preferences, barriers and facilitators of the delivery, implementation and adoption of classroom movement breaks. The current study adopted both a quantitative and qualitative research design consisting of three methods; 1) An online questionnaire for school staff and governors, 2) An optional follow up semi structured telephone interview with staff and governors and 3) Pupil focus groups. See Table 3.1 for project outline.

Table 3.1 - Project outline and timeline.

	Nov 2019 – Jan 2020	January – Feb 2020	March 2020	Sept – Nov 2020	Nov – December 2020
Study 1 Staff member questionnaire and interviews	**Methods:** Staff member Qualtrics questionnaire **Sampling:** 64 staff members completed the questionnaire	**Methods:** Staff member telephone interviews **Sampling:** 5 staff members agreed to participate in a follow up telephone interview.			
Study 2 Pupil focus groups			**Methods:** Pupil focus groups **Sampling:** 34 pupils participated in the focus group discussions (10 boys, 24 girls). 13 pupils were from KS1 and 21 pupils were from KS2.		
Study 3 Governor questionnaire and interviews				**Methods:** Governor Qualtrics questionnaire **Sampling:** 20 governors completed the online questionnaire	**Methods:** Governor telephone interviews **Sampling:** 2 governors agreed to participate in a follow up telephone interview.

3.3 Sampling and population

A purposive sampling method was used. The Somerset Activity and Sport Partnership (SASP) and Governors for Schools assisted recruitment by initiating contact via email with 234 primary schools and 50 governors across Somerset. SASP is a charitable trust dedicated to increasing health and happiness of residents in Somerset through PA and sport. Governors for Schools finds and places volunteers on schools and academy governing boards across England and Wales, they also contribute to a variety of research with the aim of improving education for children.

Qualitative questionnaire (n=64) and follow-up interview data (n=5) was collected from current primary school staff from 41 different primary schools across Somerset. Questionnaire data (n=20) and interview data (n=2) was also obtained from governors in the South West of England. School personnel from five primary schools expressed an interest in participating in the focus group phase of this project. However, due to COVID-19 it was only possible to perform this work in one school prior to the UK lockdown. This school was a federated village school. A total of 96 pupils from Key Stage 1 (age 5-7 y) and 2 (age 7-11 y) and their parents were approached. Informed parental consent and child assent was returned by 34 pupils (10 boys, 24 girls), 13 pupils were from KS1 and 21 from KS2 who were subsequently allocated into one of five focus groups according to year group.

3.4 Qualitative data collection techniques

3.4.1 Questionnaire

An online questionnaire was selected as the initial data collection tool for staff members and governors within this study as it has the ability to produce a large amount of data in a quick manner, whilst also providing a high level of anonymity for the participants (Coomber 1997).

A draft of both questionnaires was sent to individuals from the Children's Health and Exercise Research Centre (CHERC) who were not invested in this research. This process ensured that the instructions and questions were decipherable and the completion of the questionnaire was achievable and aligned directly with the research question prior to data collection. Minor amendments to the questionnaire were made following feedback during this process. Both questionnaires were designed specifically for this study. The final version of the questionnaires is shown in Appendix 4 and 5.

Two questionnaires were utilised. Staff completed one 39-question online questionnaire (page 95) and governors (n=20) completed a different 41-question online questionnaire (page 99) (Qualtrics XM., Provo, Utah, USA). Staff members included KS1 teachers (n=10), KS2 teachers (n=12), PE teachers (n=17), teaching assistants (n=7), head teachers (n=12) members of the senior leadership team (n=5) and those who described themselves as "other" (n=6). Participants all undertook varying roles within the primary school setting allowing us to gain a multifaceted view.

The staff questionnaire primarily focused on current attitudes, preferences and barriers surrounding the feasibility and acceptability of implementing movement breaks within lessons. The questionnaire also allowed teachers and staff to specify how often and what types of classroom PA they currently, or would like to utilise. The purpose of the questionnaire was to acquire a foundation of knowledge regarding the integration of movements into the primary school classroom that would be explored further within the semi structured interviews. The governor questionnaire was primarily focused on governor's main priorities when implementing change within the school environment and how likely they would be to support the implementation of CBPA at a future governor meeting.

In the final question staff members and governors were asked to provide their contact information if they were interested in participating in a follow up in-depth telephone interview at a time that suited them.

3.4.2 Telephone interviews

Semi structured interviews were selected as an appropriate data gathering tool as it provides a flexible technique for a smaller sample size during this component of the study (Drever & Scottish Council for Research in, 1995). Interviews allow the use of probing open ended questions which provide more in depth knowledge of individual staff members and governors perceptions and prioritisation regarding the adoption and implementation of movement in primary school classrooms (Brinkmann & Kvale, 2018). Interviews were via telephone conducted by the primary investigator (RC). Telephone interviews were chosen as they can increase the respondent's perceptions of anonymity which is important for teachers and governors (Greenfield et al., 2000). Qualitative interviews can also be time consuming and mentally demanding (McCracken, 1988), therefore it was felt necessary to perform the interviews via telephone in order to maximize data quality while minimising imposition on respondents. At the beginning of each interview, the primary investigator (RC) assured participants their answers were completely confidential and their names would not be associated with the transcripts. Interviews were conducted lasting between 15-25 minutes. All the interviews were recorded using an audio recording device, which allowed the researcher to focus on the interview and keep accurate records to assist with subsequent data analysis (Al-Yateem, 2012).

Following the completion of the questionnaire the primary investigator contacted participants who had expressed an interest in further discussion to confirm their desire for a follow up interview. Of the 64 staff and 20 governors who completed the questionnaire 5 staff

and 2 governors agreed to be interviewed. Individual semi structured telephone interviews were carried out with staff (n=5) and governors (n=2) to clarify questionnaire responses and facilitate a deeper understanding of their perceptions regarding the value and feasibility of integrating movement breaks into the primary school classroom. Further exploration of emerged themes within the questionnaire was also required allowing us to probe more deeply into participant's responses and to ask follow up questions to check the researcher's interpretation of the qualitative questionnaire findings, leading to richer, more robust data.

A semi structured topic guide was developed for staff and governor interviews to ensure standardised enquiry. The topic guide for staff members with open ended questions was piloted with three PE student teachers studying at the University of Exeter. Small refinements were then made prior to use with participants and as the study progressed according to the data that was being received. The staff member topic guide (Appendix 6) covered four main areas;

1. Attitudes towards school-based PA,
2. Current incorporation and knowledge of classroom movement initiatives,
3. Barriers and facilitators of movement implementation and
4. Potential ideas for future incorporation

The governor topic guide (Appendix 7) covered three main areas including;

1. The importance of breaking up sitting time among children,
2. Feasible methods to implement this within the school classroom and
3. Potential ideas for future interventions from the strategic governor perspective. This offers an alternative viewpoint to the staff operational side also explored in this project.

The order of topics and specific wording of questions altered across interviews with the aim to achieve data saturation (Le Navenec, 2018). The researcher followed the interview guide but maximised opportunities to ask additional probing questions to allow participants to further elaborate on their answers. This gave the interviewer flexibility and freedom to explore points

as a matter of course rather than pre-empting them. This approach is consistent with recommendations and tips highlighted in McGrath et al. (2019).

During the telephone interviews, participants were encouraged to find a private area in order to speak freely with the research personnel. They were also informed that the data collected would be anonymised and their participation kept confidential, with anonymised direct quotes possibly used in publicly available reports and other outputs. At the end of the interview the key points raised were summarised back to the interviewee for clarification or further discussion.

The combination of questionnaires and interviews were selected in this study as it brings together the advantages of breadth and depth associated with these two respective data collection methods (Teddlie & Tashakkori, 2009), thus providing a more complete knowledge base that can enhance policy development and future practice (Johnson & Onwuegbuzie, 2004).

3.4.3 Focus groups

The third part of this study utilised pupil focus groups in order to establish an understanding of children's perceptions of movement within the classroom. At the close of each focus group the students were asked their thoughts on an initial design of a movement intervention created from teacher's qualitative opinions gathered in part 1 of this project. Focus groups were used to obtain the views of multiple children in a relaxed environment and were chosen to compliment the teacher questionnaire and interviews undertaken in an earlier phase. Focus groups were chosen as an appropriate data collection tool as there is evidence to suggest this is a valuable method to elicit children's views on health-related matters (Heary & Hennessy, 2002).

Five focus groups were conducted. Each focus group consisted of 6 or 7 children as recommended (Kennedy et al., 2001a). A mixture of boys and girls participated in each focus group (10 boys in total) to ensure heterogeneity within the groups. Focus groups lasted between 29 and 40 minutes with an average length of 34 minutes. This ensured that children remained engaged with the discussion topics (Gibson, 2007) as the quality of responses in this age group deteriorate after 45 minutes (Morgan et al., 2002). Two focus groups consisted of KS1 Pupils and the following three consisted of KS2 pupils. Focus groups were held at schools in vacant, quiet classrooms and were facilitated by two members of the research team. A teaching assistant was also in the room, but was unobtrusively working on other matters. School premises were chosen for convenience and to provide a familiar location to reduce any child anxieties (Kennedy et al., 2001b). Focus group discussions were audio recorded in an informal focus group setting. Children were positioned around the research personnel in a circular position to project a non-authoritarian climate (Gibson, 2007). In an attempt to reduce the power imbalance that can arise when an adult facilitates a children's focus group, it was made clear the researchers were not a teacher, there were no right, or wrong answers and the children were free to express their own opinions (Morgan et al., 2002). Such strategies contribute to the credibility of the focus group data (Shenton, 2004).

Following an ice breaker activity open discussion with the children was performed using a semi structured topic guide. The topic guide (Appendix 8) featured open ended questions exploring children's opinions regarding;

(a) the importance of PA within their school day

(b) their experiences of movement initiatives within lessons so far including problematic elements of what went well and

(c) the design of our PA intervention that will be used in primary school classrooms in a subsequent study

During discussion, no idea was dismissed or rejected as being too far-fetched. The open ended nature of this task made it extremely useful in elucidating children's emotions and ideas. To help convey their perceptions children were allowed to write or draw 'good' or 'bad' aspects about sitting down and moving in their lessons using felt tip pens and two large pieces of paper. These drawings were anonymised and used to engage the children in conversation and to clarify main concepts of the focus group as recommended by previous literature on children's focus groups (Yuen, 2004). Søndergaard and Reventlow (2019) highlighted that drawings bridged the gap of communication as the children were able to express feelings and experiences that were difficult to articulate in words.

Throughout the focus groups, the researchers made efforts to involve quieter group members and ensure all participants were asked questions and were therefore encouraged to express their opinions, even if these differed from peers. The researchers employed active listening, natural curiosity and allowed natural conversation between participants to flow in order to create a comfortable and informal focus group environment, as recommended by Finch et al. (2003).

3.5 Thematic analysis

All data from interviews and focus groups were transcribed in full within 1 week of the interviews. All data was managed and processed using the computer software QSR NVivo12 (QSR International, 2012). Transcripts were analysed using the concept of reflexive thematic analysis (Braun & Clarke, 2006, 2019). Thematic analysis is a method for identifying, analysing and reporting patterns or themes within data. Thematic analysis was chosen as the preferred analytical technique over content analysis as the analysis process allows flexibility and the use of themes can capture importance within the data in relation to the research question (Clarke et al., 2015). Reflexive thematic analysis was chosen as it is theoretically flexible and suits questions related to people's views and perceptions. Within this method a semantic

inductive approach was chosen whereby coding is directed by the content of the data and development of themes reflect the explicit content of the data. The six stages of thematic analysis are shown in Table 3.2.

Table 3.2- Process of thematic analysis (Braun & Clarke, 2006, 2019).

Step	Process
1. Familiarizing yourself with your data	Firstly, the interviews/focus groups were transcribed. The transcriptions were then read and re-read with initial ideas noted.
2. Generating initial code	Interesting stand out features of the data were highlighted and coded, relevant data was collated into codes.
3. Searching for themes	Codes were then sorted into themes, gathering all data within each transcript in isolation relevant to each theme.
4. Reviewing themes	All themes were checked to ensure they work in relation to the entire data set, generating a thematic map of the analysis.
5. Defining and naming themes	Ongoing analysis to refine the specifics of each theme and look deeper into the meaning to generate clear definitions and names for each theme.
6. Producing the report	The final opportunity for analysis, related back to the analysis of the research question and literature, producing a scholarly report of the analysis.

Firstly, the lead researcher (RC) read through the transcripts multiple times to familiarise herself with the data, analytical notes were then made to inform the coding stage. Transcripts were then read line by line and ‘codes’ were applied to each passage that reflected the meaning of the data within. For this, the researcher applied a semantic inductive coding strategy described in Braun and Clarke (2019). This approach was repeated for all interviews and focus groups and main themes emerged when comparing the transcripts codes.

CHAPTER 4

Chapter 4 - Results

The results of this project have been divided into three sections based on participants i.e. staff, pupil and governor perceptions. Tables 4.1-4.3 summarises the themes, subthemes and main quotes identified for staff, pupil and governor perceptions respectively. The number of responses to each question does not always correlate with the total number of individuals who completed the question. This is because not all participants answered every question.

4.1 Staff perceptions

Six main themes were generated following the questionnaire and interviews. Firstly, all staff members had positive perceptions of classroom based movement breaks. Secondly staff reported mostly positive pupil outcomes, with both positive and negative pupil responses to movement breaks. Thirdly, teachers across schools used common routines and initiatives, felt supported by school administration and faced similar barriers when implementing classroom movement breaks. Finally, staff provided valuable insight for future interventions.

Table 4.1 - A master list of themes, subthemes and supporting quotes from staff perceptions.

Theme	Subthemes	Supporting quotes
PA importance	Stimulate pupils and reinforce learning Physical and mental health Age critical nature School day – Sedentary	*"I believe physical activity in the classroom creates the perfect conditions for individual learning"* *"physical development is a prime area and is age critical in the development of young children"* *"physical activity is key to the health of children in schools. As health is considered to be deteriorating in young children, getting them involved in physical activity from an early age is key to future health".*
Use of initiatives	Example initiatives Resources used	*"YouTube", "videos with music/activities they can follow"*
Current PA practices	Frequency of use Timing of use Length of movement break	*"it depends on the pupils, the activity and the teacher to be most effective"* *"if you want maximum impact you have to put it into the hands of the class teacher to choose their timing"* *"in terms of breaking up lessons, 5 minutes is a realistic amount"*
Barriers to incorporation	Space/safety Time constraints Curriculum demands Sustainability of initiatives Fear of disruption/transitioning back to class work Teacher willingness	*"Ever increasing demands of the curriculum meaning time is precious"* *"space in schools as quite a big issue as well as time and expectations of lessons and fitting everything into the day"* *"some teachers are a little bit nervous about it as then you don't have as tight control over your class"* *"some staff are stuck in a traditional routine"*
Experience of incorporation	Over excitement/settling back down Concentration Energised Behaviour	*"after the PA their concentration improves and they're in a better place ready to learn, "it energizes them"* *"it can wind them up too much if it's been energetic" "can take a while to settle back down to a concentrated work level"*
Intervention ideas	Resources Pupil led	*"having these programmes is useful, they're free, easily accessible"* *"a little bank of resources that you can pull out and use each day would be useful"* *"pupil led", "semi organic", "short bursts" "still within the teachers control"*

4.1.1 Importance of PA

The majority of staff members (53/58) and all head teachers within this study valued PA for children as 'highly' or 'extremely highly' (See Figure 4.1), although they provided contrasting reasoning for their perceptions. 28% of staff members perceived PA as important to promote the day to day physical and mental wellbeing of pupils. Some staff members stressed the importance of PA within school due to its age critical nature, for example a member of the senior leadership team stated that:

"physical development is a prime area and is age critical in the development of young children",

this is further supported by a KS2 teacher as:

"physical activity is key to the health of children in schools. As health is considered to be deteriorating in young children, getting them involved in physical activity from an early age is key to future health".

Two teachers valued PA for its impact on a child's health and an active lifestyle, a KS1 teacher stated that:

"If they're more active when young, then they're more likely to be active when they get older".

One head teacher stressed that:

"the Curriculum remains overcrowded and primary schools have too many demands on what they can achieve within a working week; there is simply not enough time to deliver all subjects as the government expects. We are able to safe-guard PE lessons but regular daily activity remains crucial. The academic standards are higher than ever so I value physical activity in the classroom for the many physical and mental benefits".

This is further supported by a head teacher who identified the crucial roles that schools can play stressing:

"school increasingly has a role to play in keeping children active and educating them about the importance of it".

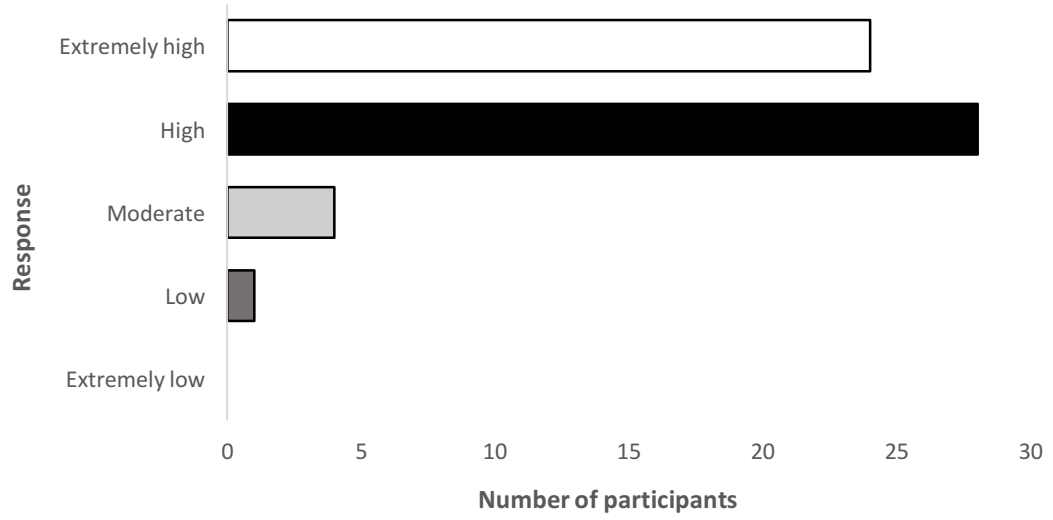

Figure 4.1 – The frequency response of primary school staff rating on the value of PA.

The most common reason given by staff (31%) for the importance of PA inside of school was to stimulate the pupils to assist and reinforce learning, improve behaviour and aid refocusing. A PE coordinator and head of department stated:

"I believe physical activity in the classroom creates the perfect conditions for individual learning"

whilst a KS2 teacher felt that:

"It is important to have a healthy lifestyle which can help them with concentration and focus which will have a positive impact in the classroom".

One PE teacher felt that:

"children sitting still for long periods of time has a negative effect on learning and being active for a minimum of 60 minutes is something we value"

Additionally, a PE teacher stressed that PA is:

"totally essential throughout the day as if we're expecting pupils to learn academic subjects in the classroom we have to also provide massive opportunities for PA".

Despite most staff members valuing PA especially within the classroom, a teaching assistant observed that:

"the majority of teachers don't do any movement during the day other than what is on the curriculum".

Five staff members including KS1 teachers (n=2), a KS2 teacher (n=1), PE teacher (n=1) and a teaching assistant (n=1) valued PA as 'low' or 'moderate'. A major theme for the lower value placed on PA was 'time'. KS1 teachers stressed that:

'curriculum time is precious and time constraints make it difficult'.

A KS2 teacher who valued PA as 'low' stated that:

"there are lots of other things that come above physical activity".

Individuals also expressed concerns over quality of learning:

"It's good for the children to be up and moving, completing practical tasks. However, it is also important they have a full understanding of what they're being taught which might consist of simply listening"

whilst a teaching assistant perceived PA importance as 'moderate' due to:

"lack of space and safety"

and many classes include children with behavioral needs who:

"can become either overexcited or distressed with such activity".

It is clear that staff perceive the primary school day as mostly sedentary as a head teacher, who is also a parent of a primary school child, identified that:

"quite often I will come home from work having done more steps than my eldest who's in year 4 and that's despite the fact he's been out at break and lunch running around. So they're definitely sat still for long periods of time".

Even teachers who regarded the need for PA inside the classroom as highly important stressed that:

"most lessons benefit from being punctuated by periods of movement and activity. These need to be used wisely as there is an equal place for sustained periods of calm and focus".

This indicates that staff members perceive that PA might be important for physical and mental health, cognitive and behavioral benefits, as well as the possible drawbacks of prolonged sedentary behaviour. However, within the school day it is not always something they can find time for or prioritise. This stresses that the feasibility of school-based PA interventions must be simple to deliver and compliment, rather than disrupt, curriculum time in order to maximise uptake and longevity.

4.1.2 Use of initiatives

The majority of responders were aware of and had used PA initiatives in their own lessons (n=50) compared to those who had not (n=8). The most popular initiatives used include: Wake and Shake, Go Noodle, Fitter Futures, Joe Wicks®, BBC Super movers, Active Math's, Take 10 and the Golden Mile®. The majority of staff members who incorporate movement breaks use resources such as YouTube utilising videos with music and activities pupils can follow. The staff members who used PA initiatives the most, reported that they were 'extremely useful' (n=23) or 'moderately useful' (n=19).

The main reasons for not using PA initiatives was a lack of training, time constraints and concern over possible class disruption. A KS1 math's teacher stated the reason they have not used any initiatives is because it is:

"too disruptive and it is not my job to do PE"

whilst a KS2 teacher felt that:

"the curriculum requirements and pressures are so high that there simply isn't time to fit these initiatives in".

One member of the SLT and a KS2 subject teacher identified the initiative they used (math's movement) as 'moderately useless' due to:

"***the class size and space – with 38 in a class there isn't much space to do movement"***.

One teaching assistant identified their PA initiative as neither useful nor useless – they said:

"my teacher does 'stand up, turn around, touch your toes' type routine now and again to give the class a 'wake up' if they are generally on a go slow. Anything more stimulating can create an over-excitement and take the children a while to settle back down to work".

4.1.3 Current PA practices

Staff members most commonly reported incorporating some form of activity 'once a week' (n=15) or '1-2 times a week' (n=14). Despite the value placed on PA by most staff members, eight stated that they 'never' incorporate PA, three of these were KS2 teachers. A head of year and a KS1 teacher stated that they 'never' incorporate PA and would not like to incorporate it as it is too disruptive. Forty-five staff members stated that they would like to incorporate more PA into their classroom or school. The reasons given for not wishing to incorporate more PA than they already do were:

"it can hinder concentration afterwards"

"I am happy with what my class already does" and

"my schools are very small".

When asked what periods of the day would be best to incorporate PA answers were varied with most staff choosing all or multiple options (see Figure 4.2). The majority of staff members answering 'end/between lessons' (n=26), 'afternoon lessons' (n=26) and 'middle of the lesson' (n=22). Main reasons given included:

"exercise in the middle of the lesson can stimulate learning",

"in-between lessons are a good time as it is a natural break allowing a refocus on a new task",

"so the children are not sitting for too long".

There was a general consensus that there should be no set time for PA as:

"it depends on the pupils, the activity and the teacher to be most effective"

and should be used:

"whenever it is beneficial"

"with the teacher's judgment of how they integrate based on how the class is performing, behaviour or well-being".

A PE teacher supported this by stating that:

"there's not one size fits all",

he advised that:

"if you want maximum impact you have to put it into the hands of the class teacher to choose their timing".

A head teacher agreed with this view, and stated that:

"letting the teacher pick the time point of the activity within their lesson would be perfectly realistic. I think as an experienced teacher you can read your class physicality…and see clearly when they may need a movement break…you reach a certain saturation point and even just standing up and focusing on something else especially if its physical can reset the clock".

These data strongly indicate that PA interventions will need to be flexible and be able to be implemented on an ad hoc basis.

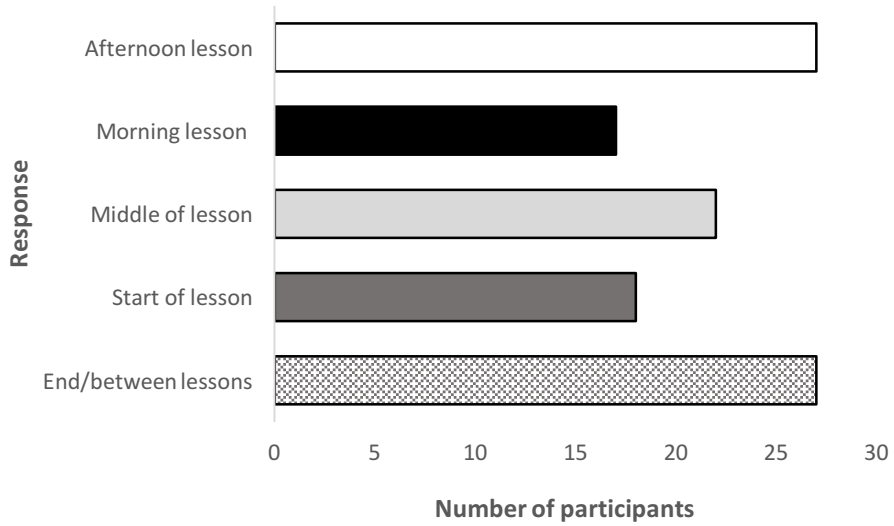

Figure 4.2 - Staff perceptions of what period of the day PA movement breaks should be incorporated.

Further discussion identified the length of activity that could feasibly be incorporated during the lesson and within the school day. Interviews indicated that the majority of teachers who have utilised classroom movement breaks felt that:

"in terms of breaking up lessons, 5 minutes is a realistic amount".

A KS1 teacher stressed that:

"5 minutes is just the perfect amount of time as it doesn't eat too much into your lesson time and you don't have to leave the classroom to do it…something you can do quickly in the classroom".

A head teacher observed that the:

"***dances usually last 4 minutes and some teachers will do one or two in a row as by the time you have the interactive white board on and found the dance on the website its taken quite a bit of time out of the lesson".***

4.1.4 Barriers to implementation

Staff members (n=22) most commonly found it 'moderately easy' to integrate movements into the classroom with thirteen staff members finding it 'neither easy nor difficult' and eleven finding it 'moderately difficult'. However only four staff members found it 'extremely easy' to implement movement into the classroom suggesting that future interventions should be kept simple and easy to implement (see Figure 4.3).

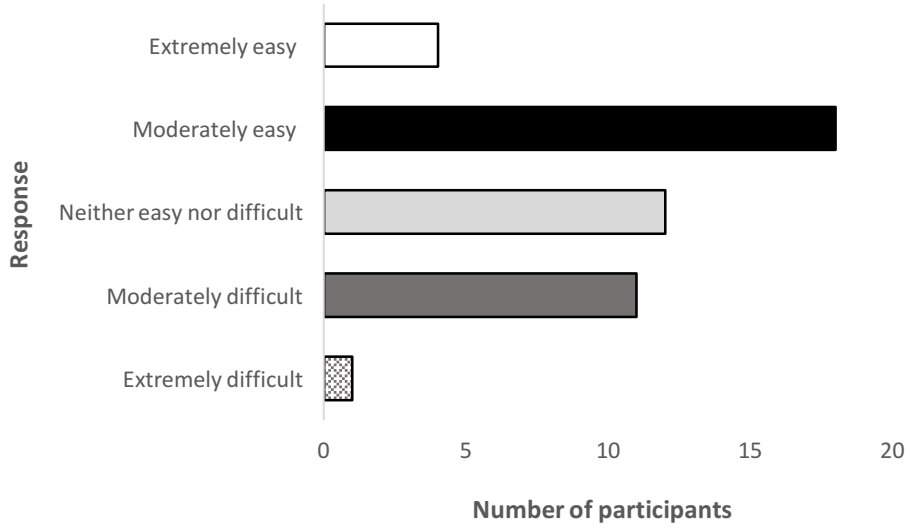

Figure 4.3 - Staff perceptions of how easy or difficult the incorporation of movement breaks are.

Six themes were generated when looking at the barriers to successfully implement PA from the questionnaire and interview data collected. Themes included:

1. space/safety,
2. time constraints,
3. curriculum demands,
4. sustainability of initiatives,
5. transitioning back to class work,
6. teacher willingness.

The three most prevalent barriers that staff members reported were time constraints, transitioning back to work following the movement breaks and curriculum demands. Of these reasons, the questionnaire identified the foremost barrier was time, and this was reinforced by several staff members in their interviews, and was directly related to curriculum pressures. A KS2 teacher who found the incorporation of PA as 'moderately difficult' stated that:

"Ever increasing demands of the curriculum mean time is precious. Having taught for 7 years, I've seen a dramatic shift towards filling every spare minute with some additional learning"

another KS1 teacher agreed:

"Time pressures, space, possible disruption to the lesson, expectations during lesson observations (if activity is not linked to the learning objective)".

Some teachers perceived movement breaks as something 'not high on the priority list'. When asked about the possible barriers of incorporating PA into the classroom one KS1 teacher shared their frustration surrounding:

"time, its always time, there's never enough time",

they also went on to add that:

"I had so many pressures of curriculum to get through…that I wouldn't really do PA or it would be once in a blue moon".

This was supported by a head teacher as:

"in an already crowded curriculum there are so many expectations on what a school should be now",

A KS1 teacher added that:

"it's a squeeze in the curriculum with the time we have. Everything is kind of competing".

A teaching assistant also identified time and curriculum pressures as a main barrier especially for year 5 and 6s. However, a head teacher disagreed with the barrier of time by stating that:

"the most effective strategies really don't take much time. This is not a massive barrier".

In relation to this issue, teachers stressed a barrier to incorporating PA into the classroom is the expectation from the school and Ofsted for ***"evidence in books"*** (PE teacher) with ***"the focus on writing and KS2 SATS"*** (KS1 teacher). One KS1 teacher added that

"It is just trying to please everyone, the balance between what you know is the right thing to do but also what you're being told to do in terms of Ofsted and the government curriculum".

A KS1 teacher identified:

"space in schools as quite a big issue as well as time and expectations of lessons and fitting everything into the day".

She added that:

"it is just space as we have 60 children in one room which makes it really difficult".

A head teacher further supported this by stating:

"we have classrooms with up to 34 learners in, the school when it was built was built with the lovely ideal of having 25 children in each class so you've got children relatively crammed into a classroom and your ability to safely do things with tables and chairs isn't there".

A KS2 teacher agreed:

"if I had 30 in my classroom that would be a lot of bodies and chairs, and that's a sort of health and safety element of it as well".

Alongside a lack of time, curriculum pressures and space, staff also identified teacher willingness and transitioning back to class work following classroom based movement breaks as a central barrier to implementation, with comments as follows:

"some teachers are a little bit nervous about it as then you don't have as tight control over your class…so if you've got some behaviour concerns in your class then you may be less likely to do it" (KS2 teacher),

"when you start the lesson and its whizzing off, if you break it somehow you can lose the whole lesson" (PE teacher).

A PE teacher advised that future PA initiatives should be simple and limit disruption to ensure buy in from all staff members by stating that:

"it has to be laid on a plate for them no matter how passionate the teacher is".

From a head teacher perspective, it was clear that

"some staff are stuck in a traditional routine"

and have to be forced to make structural decisions to lessons. A possible reason for this as described by the head teacher was that:

"they might feel an expectation because results at primary school matter, people will naturally take the safest option and sometimes that's the head teachers fault, because it is just the staff's natural response not to take risks".

Additionally, five staff members felt that their school did not provide a supportive environment to increase PA. They felt their school could do more by allocating more time for movement, utilise workshops to promote activity with core subjects and offer awards. More staff described themselves as moderately confident (n=25) than moderately unconfident (n=7) about implementing movement into the classroom.

A PE teacher and head teacher expressed the issue of classroom PA initiatives coming and going in ***"fads"*** which tends to:

"sustain for a bit and then another thing comes along which changes peoples gaze and momentum".

They did however agree that movement breaks have managed to sustain for over a year therefore:

"it must be enjoyed by the children and people must see the positive value and impact because otherwise it would have fizzled out" (Head teacher).

Experience of incorporating PA into the classroom

Pupil enjoyment of classroom movement breaks was reported by all staff members in this study and was corroborated by all three qualitative data sources. A KS1 teacher noted that:

"children are generally very excited when doing PA, they are motivated and engaged"

they particularly enjoy:

"a break from the norm"

"the spontaneity"

"the child led elements"

"the chance to dance, stretch and move away from sitting in chairs".

All staff members agreed that prior to a movement break pupils are:

"lacking in concentration",

"losing interest",

"getting chatty",

"looking sluggish" (KS1 teacher),

"lethargic" and

"less able to maintain attention" (head teacher).

The vast majority of staff within this study agreed that classroom movement breaks have a moderately positive (n=24) and extremely positive (n=20) impact on pupils (see Figure

4.4) because of its perceived benefits for pupil's attention and readiness to learn. Relevant comments included:

"after the PA their concentration improves and they're in a better place ready to learn" (KS1 teacher),

"the child I look after can listen and concentrate better for the next 10/20 minutes" (teaching assistant),

"it energizes them" (head teacher).

The head teacher highlighted that he:

"can definitely notice when a movement break has been done".

Multiple staff members including a teaching assistant and head teacher noted that CBPA seems to lead to more attentive and energised pupils**.** Finally, a teaching assistant observed that:

"from what I have seen having regular interventions throughout the day helps. I only think keeping a child in a classroom sitting and listening without any movement at all for longer than 30 minutes is too long".

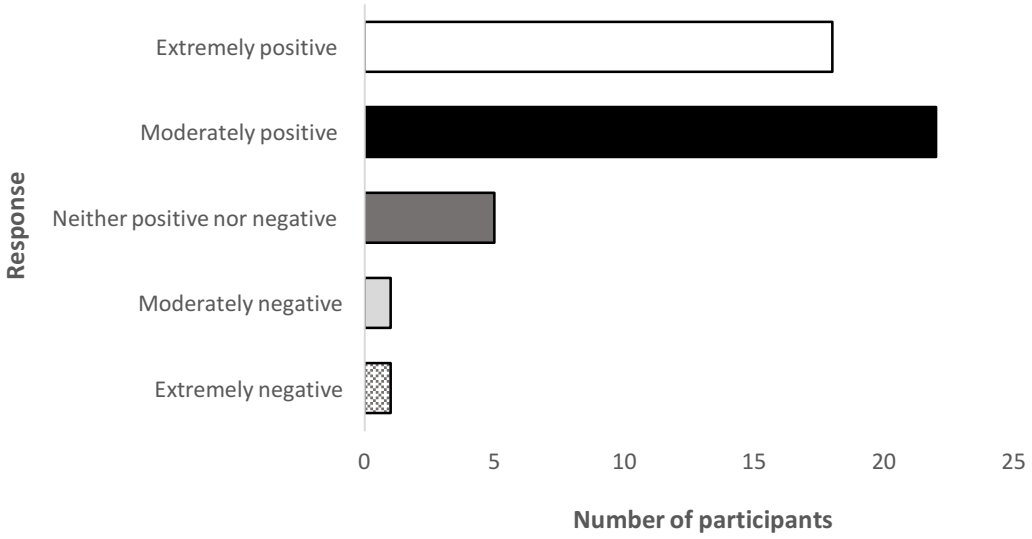

Figure 4.4 - Staff perceptions regarding the effect of incorporating movement breaks within the classroom on pupils.

Conversely, two staff members reported experiencing an overall negative experience of incorporating PA into the classroom. A KS2 teacher highlighted movement breaks as potentially negative as:

"it can wind them up too much if it's been energetic…it can make them too hyper and can be difficult to bring them back down for learning".

A teaching assistant who stated the incorporation of PA had an 'extremely negative' affect on their pupils further supported this as:

"it takes too much time for the children to settle back down to focus. Once settled, their concentration and attention is much the same as before. SEN and behavioral needs children need extra time after to calm, some need up to 30 mins before they can return to task".

These observations indicate that many teachers are reluctant to use movement breaks due to the fear of disruption and the perceived difficulty with transitioning back to learning. A general consensus among teachers was that following movement breaks:

"it can take a while to settle back down to a concentrated work level"

however, once settled it generally shows positive affects in terms of pupil's concentration, focus and behaviour. The majority of teachers agreed that time on task increased following a movement break as:

"children are able to spend longer focusing on a task".

In terms of behaviour, most staff members agreed that:

"teacher behavioral management can be the key to the success of these initiatives"

however, if this is ok:

"it's easier to regain focus immediately after the exercise"

and ***"pupils are generally more productive which leads to an improved attitude to learning and less poor behaviour".***

This indicates that if the activity is implemented well and behavioral management is controlled the level and quantity of work might increase or at worst it might have no detrimental effect. This is further supported by a head teacher who stated that:

"As a general rule, if implemented and managed properly, this kind of intervention definitely leads to a sustained period of concentration and good behaviour".

4.1.5 Intervention ideas

There was a consensus that delivery of classroom movement breaks in future interventions should occur via online platforms. For example, a head teacher stated that their school classrooms:

"had utilised Just Dance via YouTube which seemed to have longevity".

A KS1 teacher agreed:

"there's so many online things that you can whip out, it seems more interesting for the pupils to watch a video"

she further added that:

"having these programmes is useful, they're free, easily accessible as everybody has interactive whiteboards in their classrooms".

A KS2 teacher discussed the value of this method:

"before I discovered Go Noodle there were some teachers not sure of what to do and having the confidence to do it",

on the other hand, she did stress that:

"it is only useful if you have a good interactive whiteboard and screen that works as I know some classrooms don't have that".

The general agreement between staff members was that having:

"a little bank of resources that you can pull out and use each day would be useful"

(KS1 teacher).

All staff members agreed that future interventions should be student led and include the pupils in decision making process. For example, a KS1 teacher stated that:

"our kids will choose which Go Noodle video to do",

a KS2 teacher supported this:

"it is good to give them a choice and ownership so they're more interested but its still within the teachers control".

When asked to design a feasible intervention one PE teachers comments included:

"pupil led",

"semi organic",

"short bursts"

and ***"having menu there to choose from".***

A head teacher also commented on the need for more evidence from future movement interventions specifically in regards to concentration, time on task and behaviour.

4.2 Pupil perceptions

Three major themes were identified from the pupil focus group interview data. These themes are the importance of PA, movement intervention examples, effect of the movement and the subthemes timing, intervention ideas and recommendations (see Table 4.2).

Table 4.2 - A master list of themes, subthemes and supporting quotes for pupil perceptions.

Theme	Subtheme	Supporting quotes
PA importance	Physical health Mental health Learning	*"make you fit and makes me happy and healthier after"* *"Sitting down all lesson is really not good for your health".* *"I get distracted when I have to get up and move"*
Movement interventions	Variety Timing	*"need variety"* *"it can get quite repetitive on an easy video after a while"* *"3-5 minutes is a good amount of time"* *"its normally when our teacher sees us getting a little bit bored and tired"*
Effect of the movement	Concentration Behaviour Happiness Transitioning back to learning	*"more awake" "think a bit clearer"* *"I lose interest in what the teacher is saying"* *"people start flicking pens", "get distracted"* *"motivated" "feeling happier"* *"people settle down slowly if the video is too energetic"*

4.2.1 Importance of moving

All pupils felt that moving more in their life was important, reasons for this included to:

"get fitter",

"get bigger and keep growing",

"make you fit and makes me happy and healthier after"

and ***"have fun".***

The majority of pupils felt that being physically active in the classroom was important as:

"just learning can get boring if all we do is listen"

and ***"Sitting down all lesson is really not good for your health"***.

Although the majority of pupils had negative perceptions of sitting down for long periods of time, some pupils did express that they would prefer to be sat down for the entirety of the lesson. These pupils independently provided a similar rationale for this perception stating that they were happy sat down and listening to the teacher as they understood and learnt better. For example, one pupil said:

"I get distracted when I have to get up and move"

and another preferred sitting down as:

"it's calmer".

On the other hand, most pupils mentioned feeling stiff, sad, bored and tired when sat down for long periods with the small seats being:

"uncomfortable"

and spending too long just listening:

"hurts my head".

A pupil stated that they:

"learn less sat down".

One pupil felt:

"sad and stressed"

when sat down for too long as they:

"wouldn't have enough time doing exercise or any active stuff during school time".

Some pupils felt extremely frustrated when describing how they felt when sat down all lesson with one pupil stating they feel:

"limited",

whilst another drew a picture of a cage (Appendix 9) and stated they:

"feel locked away when sat down all the time".

4.2.2 Movement intervention examples

Most pupils identified "videos in the classroom" as the main form of movement they have tried in their lessons, in particular:

"Go Noodle",

"Be active"

and ***"Just Dance".***

Other pupils have tried:

"star jumps",

"jogging in one space",

"yoga/stretches",

"copying the teacher's movements"

and ***"wake and shake"***.

When asked what the drawbacks of these movement interventions were pupils had a similar consensus that they:

"need something where everyone is involved and moving the whole time"

they also stressed they:

"need variety".

For example, one pupil mentioned that:

"it can get quite repetitive on an easy video after a while"

One pupil highlighted that:

"sometimes after, people go a bit crazy and start jumping around and not listening, people settle down slowly if the video is too energetic",

on the other hand, another pupil described the opposite effect as:

“yoga made me sleepy”.

4.2.3 Timing

In terms of length of time most pupils felt that 2-7 minutes of movement would be ideal with most pupils agreeing on 5 minutes as the optimum length per lesson. One pupil felt that:

“2 minutes is enough”

another felt that:

“3-5 minutes is a good amount of time”.

This is further supported as one pupil said:

“my legs get tired when I stand up for too long…if its minutes I will do it”.

One pupil disagreed and felt that slightly more than 5 minutes may be beneficial as:

“sometimes we do 5 minutes or 2 minutes and it just doesn’t feel very long so I think maybe like 7 minutes would be better”.

In regards to the time of the day when the movement breaks should be, feelings were mixed, for example:

“I feel more tired in the afternoon”,

“I feel tired more in the morning and moving around helps”,

“I feel a bit tired after lunch so copying videos would make me feel better”.

Most pupils agreed that it depends on the day, topic and how long they have been writing/listening for. Pupils identified that:

“it’s normally when our teacher sees us getting a little bit bored and tired”,

“our teacher noticed us being tired this morning so she got us up”.

One pupil recommended that:

“if we’re doing a long lesson I would do movement like an hour or half an hour into every lesson”

this was further supported by another pupil who stressed that:

"if we have been doing work for ages then I need to move".

The general perception among the children was that the activity should be done at the teacher's discretion when he/she notices them getting tired.

4.2.4 Effect of the movement

Most pupils felt that they learnt better after a movement break as they could:

"concentrate on work",

"think a bit clearer"

and felt ***"more awake".***

One pupil felt that:

"sometimes just writing and watching the board doesn't make me remember a lot".

Most pupils also agreed that their learning was worsened when sat down for the whole lesson, comments included:

"I lose interest in what the teacher is saying",

and ***"all the numbers overwhelm me and I can't think"***

In terms of behaviour all pupils agreed that theirs, or their classmates, behaviour deteriorated when they were sat down for too long, relevant comments included:

"people start flicking pens",

"get distracted",

"I start chatting and sometimes get told off"

and ***"the noise levels are high"***.

The vast majority of pupils reported feeling happier, more awake and ready for the day following a movement break. One pupil drew a picture of a brain with the word happy in it (see Appendix 10). Pupils stated they felt:

"powerful"

"motivated"

and ***"energetic"***

following a movement break. Alternatively, some negative aspects of movement breaks were highlighted as:

"people settle down slowly if the video is too energetic",

"***energizing music might make us quite stressed out if it's too loud"***

and ***"sometimes after Just dance people are crazy and start dancing around and not listening"***.

One pupil stressed that movement breaks are an investment for teachers as:

"***it would take a bit of time afterwards but it helps you concentrate and think a bit clearer so it saves time afterwards".***

4.2.5 Intervention ideas and recommendations

When asked what they would like to see in future classroom movement breaks the pupils were positive about using videos and music chosen by them but under the control of the teacher. Relevant comments included:

"music is best",

"we can have fun copying videos",

"I would rather the teacher tell me what to do because it works better"

and ***"we could take it in turns choosing the videos"***.

One pupil wanted:

"a chart when we can do our movements so we know when we should do it"

and another pupil recommended:

"2 minutes of go noodle in the middle of the lesson would be a good idea".

Table 4.3 shows what was written/drawn by pupils in all focus groups during the activity phase of the focus group.

Table 3.3 - Written quotes from each participant within the focus group discussion task.

Focus group	Sitting down	Movement breaks
1	"Writing makes me tired" (P6) "Bored and not active" "running and playing with friends" (P4) "I am tired in the morning and want to stand up" (P3) "stiff" (P5) "I want to get up for a little bit" (P6)	"tired" "running" (P1) "jog" "jump" "happy" (P2) "I like doing exercise because it makes you fit and makes me happy. I felt healthier after" (P4) "10 seconds" "I felt tired" (P3) "happy" "wakes me up" 'outside" "enjoyed it" "tired if long amount of time" (P5)
2	"legs start to hurt" (P6) "trapped" "angry" "bored" "tired" *drew a picture of a cage* (P1) "not relaxed" "tired" (P4) "get a stiff bottom" "better and calm" (P3) "stiff and bored" "pained" "limited" "learn worse" "stressed" (P5)	"distracted if moving" "wake and shake" "I feel free" (P6) "wake and shake" "music is good" "yoga" "stretches" "relaxed" "wake and shake" "happy" (P4) "happy" "at least 2 minutes" "having fun" "music" (P3) "chilled" "5 minutes" "excited for the few minutes" "ready for the day" (P5) "enjoy myself" "make us happy" (P2) "copying videos" "I feel free" (P1)
3	"tired" "no fun" "bored" "noisy" (P4)"Chairs are boring" "get hungry" "pins and needles" "get sad" "rather be at home" (P3) "want to do something else" "boring' (P1)"I start chatting" (P2) "would like to listen to music" (P5) "hard to concentrate" "restless" "want to start chatting" (P6)	"stretch your fingers" "wake and shake" "5 minutes" "better" "lively" "just dance" "10-15mins active" "wake and shake" "5mins" (P3) "helps concentrate" "jogging" "stretches for 5 minutes" "yoga is boring" "Simon says" (P5) "after lunch" "yoga for 5mins" "energetic dance" "lively" "just dance" "enjoy it a lot" "young leaders lead wake and shake" "7-13mins" (P4) "Wake and shake" "bean bags" "go noodle" "dance powerful" (P1)
4	"bad health" "eyes sore" "zone-out" "headache" "bored" (P5) "no fun" "slouch" "dull" "want to get up and talk" (P2) "unhealthy" "own world instead of listening" "feel like you're trapped" (P3) "not good for health" "boring being silent" "neck aches" "zone out" (P4) "sounds like the teacher speaks nonsense" "lost" "day dreaming" "hard to concentrate" (P1)	"more learning" "when they saw us getting a bit tired" "motivate" "helps you learn" "music" "about 3mins" (P2) "boys get embarrassed" "go noodle" "2mins" "lessons more fun" "yoga" "smile" "happier" (P1) "it gets into my head" "5mins is the right amount" "just dance" "feel happier" (P3) "happier" "middle of the lesson" "more exciting" "helps you remember" "2mins every lesson" (P4) "just dance" "happy" "1-2mins is ok" "let others choose" (P5) "motivated" "helps you learn" "improve memory"(P6)
5	"bored" "legs ache" "I start to talk" "forget what the teacher is saying" (P1) "uncomfortable" "lose focus" "cant think" (P3) "get tired" "get distracted" (P4) "begin to fidget" (P2)"do more movement" "get bored" (P5) "I begin to fiddle and stare into space" (P6)	"every half and hour activity break" "15 min break" "variety" "copy the teacher" (P1) "go noodle" "more wake and shake" "games" (P3)"I feel excited" "it gives me more motivation to write" "I work harder" "go noodle" (P5) "13 mins" "after we feel much more energetic and ready to learn" (P4) "10 mins" "in the afternoon" (P7)

4.3 Governor perceptions

Four main themes were generated following the questionnaire and interviews with governors. Firstly, all governors had similar priorities within the school environment and placed a high degree of value on PA especially within the classroom. Secondly, governors discussed similar barriers to intervention success and thirdly provided valuable insight for future feasible intervention logistics. Finally, governors shared their desired outcomes and evidence requirements to encourage future uptake. These themes are summarised along with detailed quotes in Table 4.4.

Table 4.4 - A master list of themes, subthemes and supporting quotes for governor perceptions.

Theme	Subtheme	Supporting quotes
Priorities/ Importance of PA	Mental and physical health Behaviour Future health Personal and social development Focus and learning	*"safeguarding is the utmost"* *"I think if you aren't healthy, in the widest definition of that…then its going to get in the way of your leaning"*
Intervention logistics	Feasibility Support Timing	*"I can see that there is benefits from standing up periodically and as a Governor I'd be perfectly prepared to listen to that and hear it".* *"there is no set time for PA"*
Barriers to implementation	Time constraints Willingness of staff Disruption/control Space Lack of initiative	*"If I'm a teacher and I've got a limited amount of time I'm going to guard that teaching time profusely".* *"if you can show that actually standing up and moving periodically improves concentration and therefore helps your leaning I can get behind that argument".*
Future interventions	Evidence	*"how it improved engagement and concentration in class would be helpful"* *"the big one for us would be a positive impact on pupil behaviour, and as a bonus concentration"* *"I need to be sure that stopping my lesson to allow children to stand up, which is disruptive in itself, actually gives me some benefits in terms of better behaviour or whatever"*

4.3.1 Priorities

All governors within this study (n=20) valued PA for children both in and outside of school as high or extremely high. The main reasons given for this included perceived benefits to mental and physical health, behaviour, a positive determinant of future health, personal and social development, to aid focus and learning, and offer relief from sitting at a desk. The general agreement among governors was that time for PA is a key part of a balanced school day. Governors were generally in support of utilising classroom movement opportunities with one governor stating that:

"any corrective intervention that will help this nation reduce a tendency toward obesity and long term physical and mental health conditions needs to be integral to education at the earliest opportunity".

When asked to rank their priorities from a list of 8 options (Figure 4.5), safeguarding was in the top 2 priorities for all governors alongside pupil education or pupil development. The majority of governors agreed that:

"safeguarding is the utmost"

and

"you can't do all the other stuff such as teaching and learning the curriculum if you don't have those basic safeguards in place".

Pupil health and wellbeing was most commonly reported by most governors as being in the top 4. Academic results and Ofsted inspections featured most commonly as the governors lowest priorities alongside staff motivation. One governor who ranked academic achievements as the lowest priority did stress that:

"that's certainly not to say that I don't think that academic outcomes aren't extremely important, those qualifications are the things that give you a passport into whatever you want to go on to do next"

they further went on to add that:

"I think if you aren't healthy, in the widest definition of that…then its going to get in the way of your leaning".

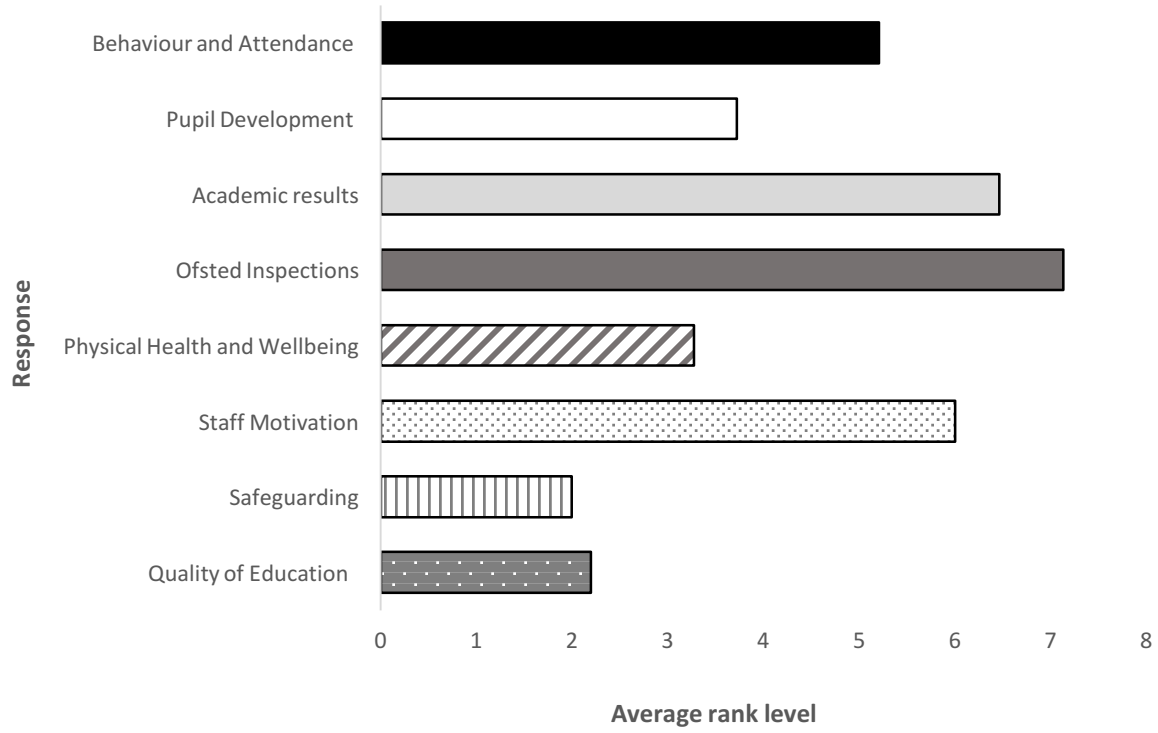

Figure 4.5 - Average governor response ranking for priorities in primary school.

4.3.2 Intervention logistics

The majority of governors were not aware of PA initiatives and did not know of any currently being used in their school, which likely reflects that the governor role is rarely involved in the day-to-day operational side of the school.

All governors felt that introducing short bouts of PA in the classroom would be moderately to extremely feasible whilst the majority of governors also stated that their fellow governors and themselves would be moderately to extremely likely to support the implementation of a movement break at a governor meeting. Despite this, two governors

disagreed by stating they would be moderately unlikely to support a CBPA intervention and would not provide funds for this as they felt that although PA had a place in the school day they were sceptical about its benefits in the classroom / curriculum. One governor was concerned that movement breaks may not be as beneficial for individuals with complex disabilities. A governor also felt that:

"I'm much more sceptical of someone who comes to me and says children are physically inactive, we need to increase their level of activity therefore we're going to make them move for 5 minutes…I can see that there is benefits from standing up periodically and as a governor I'd be perfectly prepared to listen to that and hear it".

This suggests that the issue is that 5 minutes of movement won't make a child significantly more active, however they are willing to do period of movement with the aim to break up continuous sitting.

In terms of when the movement breaks should take place governors unanimously agreed to 'let the teachers decide'. For example, one governors stated:

"there is no set time for PA, it will depend on the age of the children, their cohorts, the type of lesson, whether they have been confined to their classroom all day".

This supports and strengthens the staff member findings and highlights the need for future interventions to remain flexible.

4.3.3 Barriers to implementation

Despite their strategic role governors utilised their school experiences to share many operational barriers to possible intervention success. The most common barriers expressed included willingness of staff, disruption/control, classroom size and pupil numbers, time constraints and lack of initiative. Most governors shared teacher concerns and felt unsure

whether movement breaks would disrupt the class or enhance their learning. Both interviewed governors commented on time as a main barrier:

"If I'm a teacher and I've got a limited amount of time I'm going to guard that teaching time profusely". This was further supported as ***"you've got a finite amount of teaching time so you have to justify that…. if you can show that actually standing up and moving periodically improves concentration and therefore helps your leaning I can get behind that argument"***.

4.3.4 Evidence

Governors within this study felt that more substantial evidence is required in order to gain more support from school staff and head teachers. Benchmarking and data from schools particularly assessing outcomes such as behaviour, pupil engagement and learning may be beneficial to increase acceptance and buy in for future interventions. One governor felt that:

"a report from the class teacher detailing how the intervention impacted on the class and how it improved engagement and concentration in class would be helpful".

Finally, a finance governor also explained their desired outcomes:

"the big one for us would be a positive impact on pupil behaviour, and as a bonus concentration. Physical and mental health benefits would be helpful too. We'd probably want to see that it has worked somewhere else first as it would be quite disruptive to implement something that didn't work out".

One governor felt that:

"it is better to come absolutely clean and say these are the benefits for its own sake"

with another mentioning that:

"I need to be sure that stopping my lesson to allow children to stand up, which is disruptive in itself, actually gives me some benefits in terms of better behaviour or whatever".

4.3.5 Potential impacts of COVID-19

All governors were in agreement that despite COVID-19 exercise is still required, however the method of introducing this to the classroom environment may need to be adapted. One governor identified COVID-19 as a barrier as:

"we expect students to remain in their seats and stick to social distancing rules. Before lockdown it was a lot easier and we would be able to incorporated PA in the classroom".

To ensure future interventions are feasible and meet the government rules future interventions may require

"extra cleaning",

"social distancing",

"more control"

and

"more demand for yoga type activities to remain only around the pupil and the space they stand in".

CHAPTER 5

Chapter 5 – Discussion and Conclusion

The purpose of this thesis was (1) to examine factors that influence the provision of classroom based movement breaks from a multi stakeholder perspective and (2) to effectively inform a classroom based movement intervention that could be used in future studies. This research expands on previous research methodologies to provide a greater understanding of classroom based movement breaks through the use of in-depth qualitative research from a range of stakeholder's perspectives including pupils and governors. Many previous qualitative studies on movement breaks have focused solely on a single dimensional perspective, which is the teacher (Dinkel et al., 2017; McMullen et al., 2016; Michael et al., 2019). This is the first study that has drawn together three stakeholders and interpreted findings from a multi-dimensional approach. The current study has extended previous work by examining the governor perspective. The multi stakeholder perspective is important in order to design an acceptable and feasible intervention for all primary school stakeholders i.e. the pupils who do it, teachers and staff who a responsible for conducting it and governors who need to support it. This chapter aims to bring together the research findings and key themes from this thesis. The implications of these findings will also be outlined before a discussion of the recommendations for future PA interventions in relation to targeting pupil prolonged sitting time within the classroom. Finally, conclusions of the thesis are presented.

5.1 Discussion of key themes

A range of factors relevant to the successful implementation of classroom movement breaks were reported by all key stakeholders.

5.1.1 Current provision of movement breaks

The first major theme from the qualitative data indicated that, overall, staff members and governors placed a high value on PA for children and saw the value of classroom based

movement breaks with a focus on breaking up prolonged sitting. These perceptions were attributed to a number of factors. These factors include: a personal belief in the importance of PA, a concern for pupil physical and mental wellbeing, as well as viewing PA and breaking up continuous sitting as supportive of cognitive factors such as concentration, behaviour and learning. These findings are consistent with Cothran et al. (2010) who showed that teachers reported implementing classroom movement breaks for affective (e.g. behavioral), physical (e.g. health), and cognitive (e.g. academic) improvements, as well as student' enjoyment.

All pupils within this study perceived that PA is important for both 'happiness' and 'health', with the majority of pupils reporting that being active inside the classroom was also important to prevent boredom, for learning and cognition.

The majority of teachers within this study implemented some form of movement break or were aware of movement break initiatives and 45 staff members felt that they would like to incorporate more activity. This is contrary to previous findings in which teachers lack of interest or knowledge were major barriers to implementation (Evenson et al., 2009). Reasons behind these differing results may be due to recent social changes, for example, the increased awareness of health and PA, the advent of more accessible platforms such as Go Noodle and YouTube or equipment such as interactive whiteboards. These changes mean that the perceived knowledge and willingness barrier is experienced less.

Despite the high value placed on PA the majority of teachers within this study most commonly utilised movement breaks in their lessons 1-2 times a week with 8 staff members reporting that they never incorporate PA. This observation indicates that although teachers see the value in PA and perceive that they have the knowledge to incorporate it, the range of barriers presented could show PA, particularly inside the classroom environment has a lower degree of priority within the educational system as a whole. This means knowledge may not be enough to shift behaviors and organisational support is required.

5.1.2 Pupil Outcomes

Teachers and staff members reported mixed pupil outcomes relative to classroom based PA. The majority of staff reported positive pupil outcomes including more attentive, better behaved pupils who are ready to learn. This finding is supported by a model of teacher change (Guskey, 2002): that improvement in pupil learning outcomes is the critical element that can lead to a change in teacher's attitudes about newly introduced practices. It is clear that the class teacher is the key factor to enable the implementation and longevity of future interventions. Two governors felt that although they valued PA they were sceptical about its benefits within the classroom. This action, further supports the need for future interventions to target the outcome of prolonged continuous sitting experienced in the classroom by displacing it with activity. The teacher change model also stresses the need for more evidence in favour of classroom movement interventions from a pupil cognition and behaviour perspective to encourage governor support, teacher uptake and build confidence surrounding implementation. Despite this support both teachers and pupils were in agreement regarding the negative outcomes of classroom based movement breaks in the form of disruption and settling back down following the movement. Knowledge on this interaction is particularly important as teacher frequently report the perceived threat to classroom control as a major barrier to implementation (McMullen et al., 2016; Stylianou et al., 2015). This will be discussed further in section 5.1.3.

5.1.3 Barriers to movement breaks

Several barriers to implementation were expressed at the staff member level including: lack of time, space constraints, fear of disruption and willingness of staff.

A lack of time and the related issues of competing curricular demands was the main barrier reported within this study and is commonly reported in previous literature (McMullen

et al., 2014; Naylor et al., 2006; Stylianou et al., 2015). Although time is a finite resource there is more that can be done to design more effective shorter bouts of activity that can be feasibly and easily conducted within the classroom. For example, through the use of existing movement resources such as Go Noodle and YouTube videos. Although staff seem to value the idea of PA and hold it in high regard that is still not enough to overcome the perception of the competing demands of curriculum time. This means that the Department of Education either need to be convinced that (1) the movement time can be brief and won't disrupt too much lesson time, or (2) the movement can complement the learning either directly (active learning) or indirectly (a complete break from academic learning will improve attention/time on task thereafter). In order to convince the Department of Education to support movement breaks more cognitive and behavioural evidence from randomised controlled trials within the classroom environment are required. The findings could facilitate the development of future randomised controlled trials by utilising the data summarised in section 5.4.

Both staff and pupils within this study reported a strong preference for shorter movement breaks lasting approximately 5 minutes that is consistent with the findings of McMullen et al. (2014). Webster et al. (2015) also showed strong teacher intentions for future use following a short one-minute classroom activity. Findings are unexplored, and equivocal regarding cognitive and academic performance following activity breaks as short as 5 minutes, with one finding no effect (Ahamed et al., 2007) and another study finding a significant improvement of time on task following movement (Podnar et al., 2018). Despite this, teachers may still perceive positive changes in pupil concentration and behaviour following a shorter bout (Maeda & Randall, 2003). Staff members within this study also expressed a need for PA to be simple to implement and in a format that could be 'pulled out of the top drawer'. This is supported by Stylianou et al. (2015), who suggested that resources must be simple to implement, easy to access and developmentally appropriate. Therefore, future movement

interventions may wish to utilise pre made resources that are simple and accessible to teachers. The barrier of time also stresses the need for future interventions to shift their focus on the outcome of prolonged uninterrupted sitting rather than attempting to significantly increase pupil PA levels as this is not feasible in the time allotted within the classroom setting.

Similar to other research findings over half of teachers reported classroom management and the perceived chaos or threat to classroom control following the movement break as a barrier to implementation (McMullen et al., 2014; Stylianou et al., 2015). Teachers felt that the added time to transition back to class work was a major factor for not carrying out movement breaks. This was also identified as primary concerns in other studies (McMullen et al., 2016; Stylianou et al., 2015). This indicates that the logistics of future interventions should remain orderly, flexible and offer more control in terms of timing towards the teacher in order to make them minimally disruptive and gain the most all-round impact. If the teacher is given more control about when the movement is introduced, they may be able to read the class and implement it at a time that limits the potential disruption caused. Providing specific behavioral management techniques following movement may also be key to helping teachers overcome this barrier. It is also important to note that if movement breaks became routinely introduced and implemented, then the potential disruption caused by them may be diminished.

Despite the range of challenges that were presented, the majority of teachers and pupils reported that they enjoyed movement breaks and felt they benefitted from them. It may be the case that using the results from this study a classroom movement break can be designed that will limit classroom disruption and provide sufficient evidence for benefits to pupil cognition following the movement breaks. Future movement breaks should therefore be presented to staff members as an investment that may, if implemented properly, save time in the form of improved pupil attention and behaviour during the remainder of the lesson.

5.2 Limitations

It is important to acknowledge a number of limitations to the present thesis project. Firstly, the studies are limited in their generalisability as all of the participant schools in this thesis were located in one regional area in England. Only one federated village school was used in study 2, which may impact on the generalisability of the intervention findings to other areas of England. Although we are unable to comment on groups outside of this cohort, findings from this thesis specifically focus on schools in the Somerset area of England, thus findings from inner city schools, or schools in socio-economically deprived areas might differ. Secondly, response rates for staff member questionnaire data could be higher (64 staff members from 41 different primary schools), which may impact on the generalisability of findings to all primary school staff members. Despite this response rate, there was evidence of having achieved data saturation in open-ended responses in that no new knowledge and/or themes emerged as the number of responses analysed increased (Creswell et al., 2011). One final limitation is that the data may have been subject to interview bias and interviewees may have been providing information they thought the researchers wanted to hear. However, due to the impartial interview techniques used and the saturation of data, the researchers do not believe this significantly impacted the study findings.

5.3 Implications for practice

This study builds on the recommendations from Daly-Smith et al. (2019) and Macdonald et al. (2021) by further exploring teacher's beliefs with the addition of both pupil and governor perspectives regarding classroom based movement breaks. To the best of the authors knowledge this is the first study to examine perceptions of factors influencing both the delivery and implementation of classroom movement breaks from a staff member, pupil and governor perspective. Critically this research also adds to the very limited qualitative evidence on UK

primary school teachers and pupil's perceptions of classroom based interventions. The key findings from this study can firstly provide practical recommendations on the structural design of a movement intervention that is acceptable for teachers, supported by governors and enjoyable for pupils. Secondly, findings can inform how this movement break should feasibly be carried out within the primary school classroom environment.

5.4 Recommendations for future interventions

The pupils within this study expressed a desire for a choice of movement break activities as not all children enjoy the same things. These observations show that choice may be important for pupil's sense of competence. It was important from a teacher perspective that giving children a choice does not compromise on control of the class and therefore the learning objectives. A suggestion for compromise would be "guided choice" in which pupils vote for options from a predefined programme at the teacher's discretion.

A need for clearly communicating supporting evidence for classroom based movement breaks has been reported by both governors and staff members in order to influence teacher's adoption of them.

To summarise the findings from this study and aid future classroom intervention design we have put together the check list below:

Future interventions should therefore:

- be carried out within the lesson at the classroom teacher's discretion to encourage adoption and ensure the greatest all round impact.
- last approximately 2-7 minutes to limit the impact on the already crowded curriculum.
- assess pupil outcomes and clearly communicate the positive impact of classroom movement breaks to schools with sufficient evidence on pupil concentration and behaviour.
- be simple to implement and easily accessible to teachers.

- offer pupils a ‘guided choice’ within the teachers control to increase competence whilst limiting the disruption caused.
- offer behavioral management techniques that may aid the classroom teacher in carrying out movement breaks as well as transitioning back to work afterwards.
- focus on targeting the outcome of prolonged uninterrupted sitting within the classroom environment by displacing it with short bursts of PA.

5.5 Conclusion

Providing pupils with opportunities to break up prolonged sitting time throughout the lesson by displacing it with PA may be an effective way to optimise both health-related and education outcomes. However, the findings from the present study highlight the complexities of factors that may influence the implementation of classroom movement breaks in primary schools from a multi stakeholder perspective. In summary, staff members and governors saw the value of PA for children and thought the ‘idea’ of classroom movement breaks was worthy “in principle”. Teachers identified benefits of classroom based PA from a physical (health), cognitive (concentration) and affective (behaviour) domain. The study re-affirmed previous literature findings related to the teacher’s perceptions of classroom PA and factors that affect its implementation in primary school classrooms. Despite the value placed on PA for pupils by all participants, key barriers were identified that influence the ability to provide classroom based PA. These included a lack of time, space, fear of disruption and teacher willingness. In order to enhance the ability to design a movement intervention that is feasible for teachers, accepted by governors and enjoyable by pupils it is important to view their perceptions collaboratively. Short and simple activity breaks providing sufficient evidence regarding the benefits to cognition of breaking up prolonged classroom sitting may help overcome identified barriers. Findings from this research will contribute to the effective design of future classroom

movement breaks. Moving forward, research should utilise the checklist to design a classroom movement break to assess cognitive outcomes as well as pupil concentration and behaviour in order to show evidence for future school adoption and teacher buy in.

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Appendices

Appendix 1 – Certificate of Ethical Approval 191023/A/11

College of Life and Environmental Sciences
SPORT AND HEALTH SCIENCES

St. Luke's Campus
University of Exeter
Heavitree Road
Exeter
EX1 2LU
United Kingdom

Certificate of Ethical Approval

Proposal Ref No: 191023/A/11

Title: The acceptability and feasibility of implementing physical activity breaks into primary school classrooms

Applicants: Rebecca Chorlton (PI) Bert Bond, Craig Williams, Sarah Denford, Sam van Beurden, Dave Bullock

The proposal was reviewed by a Representative on the Committee.

Decision: This proposal has been approved until 30/07/2020

Signature:  Date: 30/10/2019

Name of Ethics Committee Reviewer: Tim Etheridge

Your attention is drawn to the attached paper which reminds the researcher of information that needs to be observed when Ethics Committee approval is given.

Appendix 2 – Certificate of Ethical Approval 191204/B/02

College of Life and Environmental Sciences
SPORT AND HEALTH SCIENCES

St. Luke's Campus
University of Exeter
Heavitree Road
Exeter
EX1 2LU
United Kingdom

Certificate of Ethical Approval

Proposal Ref No: 191204-B-02

Title: A study to understand how primary school pupils feel about making the classroom more active.

Applicants: Bert Bond, Rebecca Chorlton, Craig Williams, Sarah Denford, Samantha Van Beurden,

The proposal was reviewed by a Representative on the Committee.

Decision: This proposal has been approved until 31/03/2020

Signature:  Date: 12/02/2020

Name of Ethics Committee Reviewer: Melvyn Hillsdon

Your attention is drawn to the attached paper which reminds the researcher of information that needs to be observed when Ethics Committee approval is given.

Appendix 3 – Certificate of Ethical Approval 201021/A/03

College of Life and Environmental Sciences
SPORT AND HEALTH SCIENCES

St. Luke's Campus
University of Exeter
Heavitree Road
Exeter
EX1 2LU
United Kingdom

Certificate of Ethical Approval

Proposal Ref No: 201021- A- 03

Title: A qualitative study to explore the acceptability and feasibility of implementing physical activity interventions into primary schools: a governor and head teacher perspective.

Applicants: Rebecca Chorlton, Bert Bond

The proposal was reviewed by a Representative on the Committee.

Decision: This proposal has been approved until 31/01/2021

Signature:  Date: 27/8/2020

Name of Ethics Committee Reviewer: Richard Pulsford

Your attention is drawn to the attached paper which reminds the researcher of information that needs to be observed when Ethics Committee approval is given.

Appendix 4 – Staff member questionnaire

1. What is your job role?

*Please **also** provide details on which age group/ subject you teach.*

Physical activity strategies and initiatives

2. How highly do you value the role of physical activity in the classroom?

12345

Extremely Low, Low, Moderate High Extremely high

Please explain your answer:

3. Are you aware of any physical activity initiatives to help teachers build movement into their lessons?

YES NO

*If **YES**, please name a few:*

4. Have you used any of the above initiatives in your own lessons?

YES NO

*If **YES**, (or if you have thought of/used your own strategies) could you briefly explain what this was?*

*And if **NO** could you explain a little bit about why? **(If answered NO please go to Question 6)***

5. How useful did you find the above initiatives?

12345

Not useful at all

Slightly useful

Moderately useful

Very useful

Extremely useful

Physical activity implementation – when and how?

6. How often do you currently incorporate movement into your lessons?

12345

Never ,1-2 times a week, 3-4 times a week, Once a week, 2+ times a week

7. Would you like to incorporate more physical activity into your classroom? YES NO

*If answered **NO,** please state why?*

8. At what periods in the lesson or school day do you feel it is best to implement physical activity? Tick all that apply.

End/between lessons

Start of lesson

Middle of lesson

Morning lessons

Afternoon lessons

☐☐☐☐☐

provide detail on why you think these are best:

9. If any, what type of resources do you use to get your students to engage in movement activity?

10. How easy or difficult is it to integrate movement into the classroom (e.g. brief activity breaks to break up sitting time or classes where exercise is part of the

lesson plan)? 12345 Extremely Slightly Moderately Very Extremely Difficult Difficult Difficult Difficult easy

11. What do you think are the main barriers to increasing physical activity in the classroom or school setting? ***What is making it difficult for you to include movement in the classroom? (You may wish to comment on resources, time, other staff, parents, training, child behaviour, feasibility or curriculum time).***

12. Do you feel that your school provides a supportive environment for you to implement strategies to increase physical activity into the classroom?

YES NO

Please suggest how you feel your school could provide more support:

13. How comfortable or confident are you using movement activities in the classroom?

12345

Not confident Slightly Moderately Fairly Extremely at all confident confident confident confident

Effects on students

14. What are your experiences of how movement activities would affect your students and the classroom atmosphere?

Extremely negative

Fairly negative

Neither

Fairly positive

Extremely positive

Please provide more detail behind your rating above in terms of concentration, time on task, behaviour and any other related outcomes:

15. If you do implement physical activity into the school day what elements do you think

the children enjoy the most and/or the least?

Thank you for kindly taking the time to complete this questionnaire.

If you would be willing to participate further in this research by taking part in a phone or face to face interview to continue to discuss this topic, then please complete the following information:

Phone number: Best time to contact you:

_____ _____

Appendix 5 – Governor questionnaire

1. What is the name of the school you are a governor at?

2. What is your specific role as a governor?

*Please **also** provide details on the committee you are on.*

3. Rank these 8 categories in order of how you prioritise them within your school.

Quality of education, Safeguarding, staff motivation, Physical health and wellbeing, Ofsted inspections, academic results, Pupil development and behaviour and attendance.

4. How much do you value PA?

Extremely Low, Low, Moderate High Extremely high

Please explain why

5. Are you aware of any PA movement initiatives?

YES NO

*If **YES**, could you briefly explain what this was?*

5. Do you feel that your school provides enough opportunities for the pupils to be active?

YES, I DON'T KNOW, NO

5. How feasible do you think incorporating movement into the primary school classroom is?

Extremely unfeasible

Moderately unfeasible

Not sure

Moderately feasible

Extremely feasible

6. What do you think are the main barriers to increasing physical activity in the

classroom or school setting? ***What is making it difficult for you to include movement in the classroom? (You may wish to comment on resources, time, other staff, parents, training, child behaviour, feasibility or curriculum time).***

7. How likely are you to support the incorporation of classroom movement breaks in future governor meetings?

8. How likely are your fellow governors to support the incorporation of classroom movement breaks in future governor meetings?

Extremely likely, moderately likely, neither likely nor unlikely, moderately unlikely, Extremely unlikely

9. When do you think it would be best to incorporate movement during the school day? / within the classroom?

10. How likely are you to allocate funds to future classroom movement based initiatives?

11. Do you think COVID-19 has impacted the ability to successfully incorporate movement into the classroom?
If so, how?

Thank you for kindly taking the time to complete this questionnaire.

If you would be willing to participate further in this research by taking part in a phone interview to continue to discuss this topic, then please complete the following information:

Phone number: Best time to contact you:

Appendix 6 – Staff member semi structured telephone interview topic guide

Semi structured topic guide
(for telephone or face to face interviews)

1. **How important do you think breaking up prolonged sitting with physical activity is for children?**
   a. *Why?*
   b. *Do you feel that academic achievement is too much of a priority in your school at the expense of physical activity?*
   c. *What is do you think your head teacher's opinion is on this?*

2. **Are you aware of any Physical activity initiatives to help teachers build movement into their lessons?**
   a. *Please name a few and tell me more about them.*

3. **Have you used any physical activity initiatives in your own lessons?**
   a. *Have you thought of or used your own strategies? Could you briefly explain what this was?*
   b. *If no could you explain why you have not?*

4. **Did you find any of the initiatives you have used useful?**
   a. *If so what elements were most useful and why?*
   b. *If no, why were the initiatives not so useful to you?*

5. **If you currently incorporate movement into your lessons how often do you do this?**

6. **At what time points across the school day do you feel is best to implement the physical activity?**
   a. *Why?*
   b. *What time points do you feel it would be best to avoid and why?*

7. **If any, what type of resources do you use to get your students to engage in movement activity?**

8. **If you implement physical activity into the classroom how long does each break last for approximately?**
   a. *Is this all physical activity or do you account for time to prepare for the activity and time to refocus the students following the activity?*

9. **How easy or difficult is it to integrate movement into the classroom?**
   a. *What are the main barriers to increasing physical activity in the classroom or school setting? (You may wish to comment on resources, time, other staff, parents,*

training, child behaviour, feasibility or whether this might impair curriculum time)

b. *Have you had any personal experiences with these barriers? If so, could you explain a little bit more about what happened?*
c. *How would you help your school overcome these barriers?*

10. Do you feel that your school provides a supportive environment for you to implement strategies to increase physical activity into the classroom?

a. *Suggest how you feel your school could provide more support?*
b. *Would any organizational or cultural changes facilitate the integration of physical activity?*

11. How comfortable or confident are you using movement activities in the classroom?

a. *Is there anything you feel you need to improve your capacity/ability to incorporate physical activity into the classroom?*
b. *Do you feel you would benefit from further training?*
c. *If so, how long should the training be and what should be covered?*
d. *How confident do you feel some of your other colleagues are to incorporate movement into a lesson?*

12. What are your experiences of how these movement activities would affect or do affect your students and the classroom atmosphere?

a. *How do you feel their concentration is affected following the activity?*
b. *How do you feel their time on task is affected? Are there more distractions?*
c. *How do you feel their behaviour is affected following the activity?*
d. *If state behaviour is negative – is it only a few students who are negative which impacts the entire class?*
e. *Any other positives or negatives that are experienced following the activity?*

13. When implementing physical activity into the classroom would you benefit from a period of classroom management time following the physical activity in order to refocus students?

a. *If so, do you have any ideas about how this could be done?*

14. Do you have any specific ideas of how to incorporate physical activity into your lesson?

a. *Subject specific ideas*

15. Is there anything else you would like to say?

Appendix 7 – Governor telephone interview semi structured topic guide

Semi structured topic guide

(for telephone interviews – to be used for both head teachers and governors (will change slightly depending on their role and their responses to previous questions).

Note:
This is a draft topic guide. Semi-structured interviews (as opposed to fully structured interviews) use a schedule such as this to generally guide the interview process. However, the aim is to elicit narratives from the interviewee which may open further directions that are relevant to the research and may prompt additional questions not included in the topic guide. This topic guide may therefore change overtime, should issues be brought up which had not been anticipated in advance but that warrant further exploration.

I will begin by asking general questions such as clarifying their role and responsibilities for the recording and what their priorities within the school consist of.

16. **How important do you think breaking up prolonged sitting with physical activity is for children?**
    d. *Why?*
    e. *Do you feel that academic achievement is too much of a priority in your school at the expense of physical activity?*
    f. *What is do you think your head teacher's opinion is on this?*

17. **Are you aware of any Physical activity initiatives to help teachers build movement into their lessons?**
    b. *Please name a few and tell me more about them.*

18. **Have you used any physical activity initiatives in your school classrooms?**
    c. *Have you thought of or used your own strategies? Could you briefly explain what this was?*
    d. *If no could you explain why you have not?*

19. **Did you find any of the initiatives your school have used useful?**
    c. *If so what elements were most useful and why?*
    d. *If no, why were the initiatives not so useful to you?*

20. **If you currently incorporate movement into your school how often do you do this?**

21. **At what time points across the school day do you feel is best to implement the physical activity?**

c. *Why?*
d. *What time points do you feel it would be best to avoid and why?*

22. If any, what type of resources do you use to get your students to engage in movement activity? i.e would governors be willing to invest in these resources in the future.

23. If you implement physical activity into the classroom how long does each break last for approximately? – (we will try to keep on the topic of general acceptance rather than details about implementation with the governors).
b. *Is this all physical activity or do you account for time to prepare for the activity and time to refocus the students following the activity?*

24. How easy or difficult is it to integrate movement into the classroom?
d. *What are the main barriers to increasing physical activity in the classroom or school setting? (You may wish to comment on resources, time, other staff, parents, training, child behaviour, feasibility or whether this might impair curriculum time)*
e. *Have you had any personal experiences with these barriers? If so, could you explain a little bit more about what happened?*
f. *How would you help your school overcome these barriers?*

25. Do you feel that you and your fellow governors provides a supportive environment for you to implement strategies to increase physical activity into the classroom?
c. *Suggest how you feel your school could provide more support?*
d. *Would any organizational or cultural changes facilitate the integration of physical activity?*
e. *Is there anything you feel you need to improve your capacity/ability to incorporate physical activity into the classroom?*
f. *Do you feel you would benefit from further training?*
g. *If so, how long should the training be and what should be covered?*
h. *How confident do you feel some of your other colleagues are to incorporate movement into a lesson?*

26. What are your experiences of how these movement activities would affect or do affect your students and the classroom atmosphere?
f. *How do you feel their concentration is affected following the activity?*
g. *How do you feel their time on task is affected? Are there more distractions?*
h. *How do you feel their behaviour is affected following the activity?*
i. *If state behaviour is negative – is it only a few students who are negative which impacts the entire class?*
j. *Any other positives or negatives that are experienced following the activity?*

27. When implementing physical activity into the classroom would you benefit from a period of classroom management time following the physical activity in order to refocus students?
b. *If so, do you have any ideas about how this could be done?*

28. Do you have any specific ideas of how to incorporate physical activity into your school?

b. Subject specific ideas

29. Is there anything else you would like to say?

Appendix 8 – Focus group topic guide

Focus group topic guide

- Ask for a teaching assistant in the room to help control behaviour and supervise.

Research goals of the focus groups

- What are children's current perceptions of physical activity in primary school?
- What movement strategies or physical activity interventions have children experienced?
- What do children perceive as being negative or problematic when incorporating movement or physical activity into the classroom?
- What do children perceive as being positive or beneficial when incorporating movement or physical activity into the classroom?
- What movement strategies or physical activity interventions would work best from a child's perspective?
- **Pitch our current design of the intervention to pupils and get feedback on this**

Focus group

(a) ***Introduction (5mins)*** –

- Welcome, **introduction of researchers and children,** (make them feel as comfortable)
- Use of a fun **icebreaker activity** i.e. if you were an animal what animal would you be?, splat, age and favorite subject.
- Brief **introduction about the study** (use child friendly language), Make sure they are aware of the use of the recording device.
- Instructions regarding the focus group "**We are interested in hearing about what you think about using more body movement and getting up and moving more in your classrooms"** – stress that this does not just mean physical education lessons for example if they move to and from the whiteboard, around the room or outside etc. in math's and science or any of their other lessons.

Researcher script:
"Right… now we all know each other we would really like to ask you a few questions about how you guys move about in the class and what you think about that! So from now on I would like to turn on this digital recorder so I can listen what we all say later and type it all up. Are you all ok for me to turn this on to record?
Turn on recorder/ Address questions if anything raised.
Prompts.

**Do you guys get to move around in the classroom?*
**when*
**where*
**how*
**what do you think about that?*

- We will ask if their school or teachers have tried any physical activity initiatives in the classroom, this may require prompts such as the Daily mile, Go Noodle etc. – what resources were used?

Q: Have your teachers done anything in particular that has got you up out of your seat? For example does your teacher get you to stand up, or to move more like walking around, jumping, or other movements during in class (but outside of PE)?

Expansion Prompts:
*What sort of things were these?
*How does your teacher get you to this?
*During which lessons?
*How often?
*When? – what points in the day or lesson do you move most?
*These little movement breaks, how long do they usually last for, do you know?
*What do you think about them?

Q: Aside from PE, what lessons are the most active at the moment?

Expansion prompts:
*what does your teacher get you to do in these lessons?
*How do they get you to do it?
*How long does it last for?
*What do you think about it?
* How much movement do you think is best?

Q: How do these bits of standing up and moving during class affect you??

Expansions/ Clarification prompts:
*Does is influence how you understand lesson content? or change your concentration? Mood?
*Can you tell me a bit more about how it influences/affects these things? Good/Bad?
*Is there anything else you've noticed that is different after moving if you think about how things were in class before moving?

Q: How about the others in class?

Expansion prompts:
*How long does it take everyone to settle back down into their seats and focus on the teacher again after having moved about?
*Is there anyone that takes longer than others? Anyone who acts differently from everyone else after these movement breaks?
*Any other positives or negatives experienced after the movement?

Q. Do you enjoy this? What do you like the most and least about this?

(b) ***The following 5 mins –***

So now we've talked about what you guys already do in class. We'd love to know what you think can help make the lessons even more active.
Q:
Expansion prompts.

- How do you feel your teachers could include more movement into lessons or the school day?
- Do you have any specific ideas? – for a particular subject
- If you could design a lesson with lots of movement in it what would you do?
- Is there anything else you would like to say?
- If all avenues of possible discussion have been exhausted and we still have time left we may ask the children to draw pictures to help in their explanation. E.g. could you draw a quick picture about what your perfect 10 minutes of physical activity would look like? Or could you draw an image to show how you feel after 5 minutes of physical activity in the classroom.
- We will ask the children to explain the pictures they have drawn which will be recorded and transcribed. The researcher may also wish to use their own perceptions of the drawings to use in the analysis.

(c) Pitch our intervention

- What do you think about a 5 minute long physical activity in an hour lesson?
- Would you prefer a choice of what activity you do? – how could this be done?
- Easier for teachers to use software such as Go Noodle – do you like this?
- Do you like copying videos and dance moves in the classroom?
- At what points in the lesson do you get tired and need to move? – how many minutes in?
- How much time in a percentage do you think you spend on task in a lesson?
- Do you often get distracted in a lesson? How could this be stopped?
- Would you feel ok if researchers from the university observed your lesson or would this be too distracting to your lesson?

(b) Conclusion – about 5 minutes

- Sum up what has been discussed, mention the positive aspects – check they are all happy, compliment and thank the children.
- How did you like talking about movement in classrooms?
- Is there anything important to you we haven't mentioned?
- If you would like to follow any issues you have talked about, you can contact us (we will give the school our information and a poster with our contact details on)

Appendix 9 – Pupil cage drawing

Appendix 10 – Pupil brain drawing