ActiveChat: The feasibility of a classroom-based physical activity and sedentary behaviour programme in Scottish secondary schools

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Declaration of authenticity and author’s rights

This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination, which has led to the award of a degree.

Signed: Date:

Abstract

Introduction: Self- report data suggest 82% of Scottish adolescents are insufficiently active. Schools play a pivotal role in the promotion of physical activity (PA) and reduction in sedentary behaviour (SB). The purpose of this thesis was to develop and trial the ActiveChat programme: a classroom-based PA and SB programme implemented into Scottish secondary schools. This PhD consisted of three studies: i) a systematic review and meta-analysis of classroom-room based PA and SB programmes in adolescents; ii) an evaluative case study to explore teachers' and teacher educators' perceptions of the ActiveChat programme ; iii) a feasibility trial of the ActiveChat programme. **Methods:** The feasibility trial of the ActiveChat programme was implemented within a secondary school over eight weeks. Motivation, psychological needs, attitudes, and habitual PA and SB were assessed pre- and post-programme using subjective methods. In-class PA and SB were assessed objectively. Evaluation of the ActiveChat programme was conducted through focus groups/interviews with teachers and pupils, teacher evaluation, and observation. **Results:** The meta-analysis demonstrated non-significant results on PA and SB based on limited studies (PA, $p = 0.55$, $d = 0.05$; SB, $p = 0.16$, $d = -0.11$). Results of the case study suggested the ActiveChat programme met learning outcomes from the areas of health and wellbeing, literacy, and numeracy of the Curriculum for Excellence, and emphasised the programmes place in Personal and Social Education. Results of the feasibility study demonstrated significantly positive effects of ActiveChat on internalised forms of motivation, competence, relatedness, and attitudes towards SB. In-class PA was significantly higher in the ActiveChat class compared to control (11%). The evaluation demonstrated that pupils and teachers were positively receptive to ActiveChat, and the programme was delivered with good levels of fidelity (63%). Overall, this PhD research determined the feasibility of a teacher-led classroom-based PA and SB programme within secondary schools.

Acknowledgements

A PhD can be challenging, but for the most part, my PhD experience was a very enjoyable one. For that, I attribute this to the fantastic team of people around who provided support, shared their expertise, and made me laugh on a daily basis.

Firstly, a huge thank you to my supervisors, Ann-Marie, Dave and Fiona. To be honest, a thank you is not enough to show my gratitude for your continued support and guidance over the past four years. You were always there for me when I needed advice, listened to my concerns, and always gave encouragement. For that, I am truly grateful.

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Mum and Dad. Thank you for always believing in me and supporting me in everything I do.

Finally, to my late Grandad. Thank you for being my role model and teaching me how to be the best person I can be.

Personal Reflection

Since entering the sport and exercise science laboratory in the third year of my BSc Physiology and Sports Science degree in 2010, I knew I wanted to undertake a career in sport and exercise science research. I quickly discovered my interest was in PA for health and exercise psychology, wanting to understand why individuals participate in PA and how to enhance long-term behaviour change. In 2014, I was offered the opportunity to undertake this PhD. The PhD journey has been a thoroughly enjoyable yet challenging one. The biggest and quickest learning curve was taking research out of the laboratory and into the 'real-world' of school-based research. I have learned to be adaptable; understanding the need to be flexible when working around school schedules, and accepting certain aspects are out with your control. I have developed a number of skills over the course of four years including using qualitative methods and performing systematic reviews and meta-analyses.

In addition to undertaking the research itself, my development as a researcher has been attributed to my supervisors and colleagues who I have had the pleasure of working with. Whether this has been through informal discussion over coffee, tutorials, or attending seminars and conferences, I have continuously gained knowledge and understanding of the area of physical activity for health research. To be part of this community is a privilege, and I look forward to continuing my career in this field of research.

Author Publications and Presentations

Journal Publications

McMichan, L., Gibson, A.M., & Rowe, D.A. (2017). Classroom-Based Physical Activity and Sedentary Behaviour Interventions in Adolescents - A Systematic Review and Meta-Analysis. *Journal of Physical Activity and Health, 15*(5), 383-393.

Conference Presentations

McMichan, L., Gibson, A-M., & Rowe, D. A. (2017). The effect of an 8-week classroom-based physical activity and sedentary behaviour programme on adolescents' motivation and physical activity. *Poster presented at the British Psychological Society Division of Sport and Exercise Psychology Conference, Glasgow, U.K.*

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Conference Abstracts

Hawari, N. S. A., **McMichan, L.,** Martin, G., Wongpipit, W. & Gill, J. M. R. (2014). Determining stepping rate, speed and exercise intensity using a triaxial accelerometer: Effect of accelerometer position. *Journal of Sports Sciences. 32*(2), s28-s32.

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Abbreviations

PA = Physical Activity

LPA = Light Physical Activity

MPA = Moderate Physical Activity

MVPA = Moderate-Vigorous Physical Activity

SB = Sedentary Behaviour

SDT = Self-Determination Theory

BPNS = Basic Psychological Needs Satisfaction

TPB = Theory of Planned Behaviour

SCT = Social Cognitive Theory

CfE = Curriculum for Excellence

PSE = Personal and Social Education

PHSE = Personal, Social and Health Education

PE = Physical Education

WHO = World Health Organisation

CDC = Centre for Disease Control and Prevention

Glossary of Terms

Physical Activity – Bodily movement that results in energy expenditure.

Physically Active – Meeting the recommended physical activity guidelines of moderate to vigorous physical activity.

Sedentary Behaviour – Activities that are performed in a sitting or reclined position and with an energy expenditure of < 1.5 METs.

Light Physical Activity – Physical activity that is done when performing day to day tasks with an energy expenditure between 1.5-3.0 METs.

Moderate-Vigorous Physical Activity – Physical activity with an energy expenditure of >3.0 METs.

Autonomy – when one perceives to be in control of their own behaviour.

Competence – when one perceives they have the ability to perform the behaviour.

Relatedness – when one perceives to have a connection with others to a particular behaviour.

Amotivation – when an individual has no intention or motivation to perform the behaviour.

External Regulation – when an individual performs the behaviour because they have been told to or there is a reward.

Introjected Regulation – when an individual performs the behaviour to avoid feelings of guilt and shame.

Identified Regulation – when an individual values the behaviour and identifies it as important to them.

Integrated Regulation – when an individual believes the behaviour is part of who they are.

Intrinsic Motivation – when an individual performs the behaviour for the enjoyment of it.

Personal and Social Education – A class in secondary schools which covers a diverse range of subjects including (but not limited to) drugs and alcohol, sexual health, career advice, road safety.

Chapter 1: Introduction

1.1 Context of research

1.1.1 Physical activity and sedentary behaviour

The physiological and psychological benefits of being physically active have been well established (Biddle & Asare, 2011; Fox, 1999; Lakka & Laaksonen, 2007) yet physical inactivity is a global problem (Blair, 2009). There is also high prevalence of sedentary behaviour (SB) (Currie et al., 2015). SB is an independent risk factor to physical activity (PA) (Tremblay, Colley, Saunders, Healy, & Owen, 2010) and high levels of SB are associated with greater risk of type II diabetes and cardiovascular disease (Chrysant & Chrysant, 2015; Hu, Li, Colditz, Willett, & Manson, 2003). PA declines with age as a child transitions into adolescence (Jago, Page, & Cooper, 2012; Nader, Bradley, Houts, McRitchie, & O'Brien, 2008) while SB increases (Currie et al., 2015). This may be associated with factors such as social pressure, the increased use of electronic devices (Pawlowski, Tjornhoj-Thomsen, Schipperijn, & Troelsen, 2014) and other activities taking priority, such as homework (Knowles, Niven, & Fawkner, 2011). Promotion of PA and reducing SB within the adolescent age group is particularly important, as it is the behaviours that are developed at this age that tend to follow through to adulthood (Hallal, Victora, Azevedo, & Wells, 2006). The benefits of being physically active have been established and government statistics have reported the majority of adolescents are insufficiently active. Adolescents spend a large proportion of time in school and spend ~15-17.5 hours per week of that time sedentary (Aminian, Duncan, White, & Hinckson, 2014; Aminian, Hinckson, & Stewart, 2015). Schools can play a leading role in promoting a physically active lifestyle, and emphasise reducing SB. Limited research has explored classroom-based PA and SB programmes in secondary schools. Incorporating movement within the classroom environment has been shown to increase PA in previous research in primary schools (Martin & Murtagh, 2017a;

Norris, Dunsmuir, Duke-Williams, Stamatakis, & Shelton, 2015a), yet there has been little research in incorporating movement within the secondary school classroom.

1.1.2 School policies to promote physical activity

Adolescents spend a large proportion of their time in schools. Schools can play a pivotal role in the promotion of PA and reduction of SB. Opportunities to be physically active in the school environment are often through physical education (PE) classes or at break/recess and lunch times. More recently, government organisations have acknowledged the need to incorporate PA into all elements of the school day. The World Health Organisation (WHO) published a school policy framework (2008) which stated:

> The purpose of the Diet and Physical Activity Strategy (DPAS) School Policy Framework is to guide policy-makers at national and sub-national levels in the development and implementation of policies that promote healthy eating and physical activity in the school setting through changes in environment, behaviour and education. (WHO School Policy Framework, 2008, p.2).

The Centres for Disease Control and Prevention (CDC) in the United States published the "Youth Physical Activity: The Role for Schools" document (2009) which also emphasises the importance of promotion of PA in schools:

> Being physically active is one of the most important steps to being healthy. Schools are an ideal setting for teaching youth how to adopt and maintain a healthy, active lifestyle. Schools can help youth learn how to be physically active for a lifetime. (CDC Youth Physical Activity, 2009, p.1)

More locally, Education Scotland have incorporated the promotion of PA within their reformed national curriculum, the Curriculum for Excellence (CfE).

1.1.3 Curriculum for Excellence

The Curriculum for Excellence (CfE) has been described as, '…different in scale, scope and approach from any other kind of educational development that has been undertaken in Scotland before' (Henderson, 2010, p.40.) and was introduced into Scottish schools with the aim to provide a more enriched and flexible curriculum for children and adolescents aged 3-18 years old (Henderson, 2010). The CfE is a multi-disciplinary framework with the aims that every child and adolescent will become a "successful learner, a confident individual, a responsible citizen and an effective contributor" (Education Scotland, n.d.a, p.iii). Figure 1.1 presents the attributes and capabilities of the four key purposes.

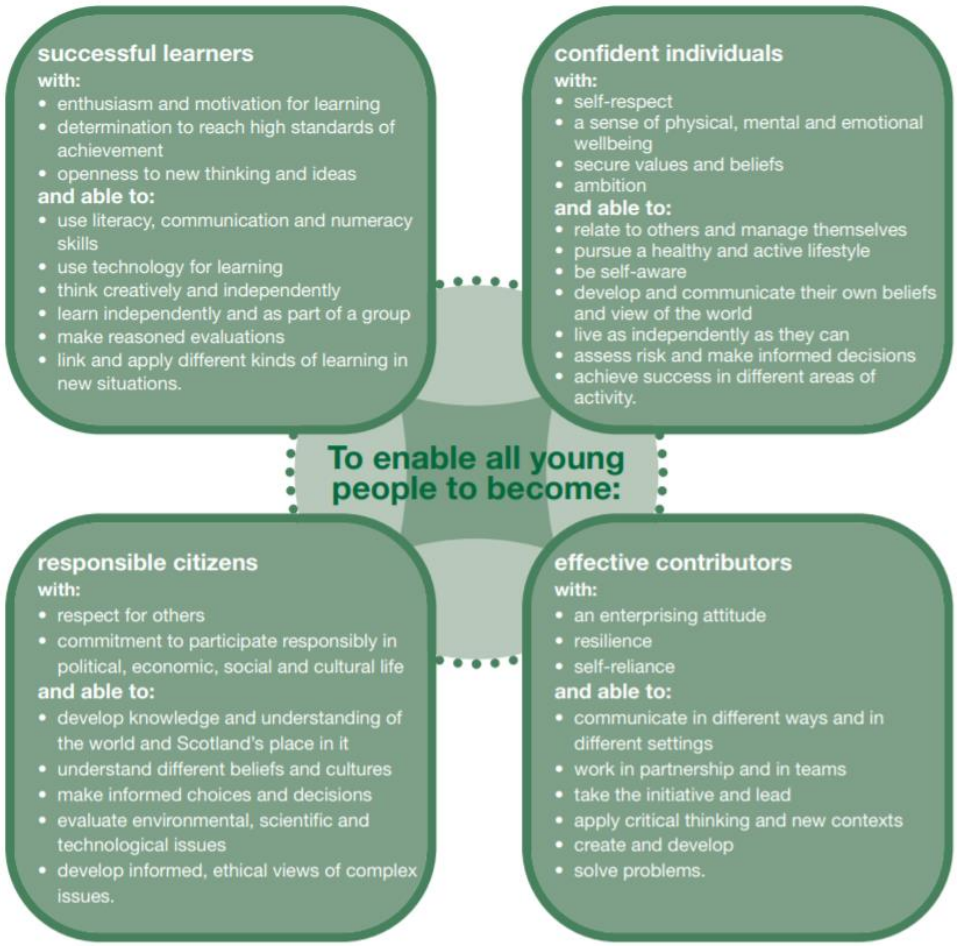

Figure 1.1 Description of the four capacities from the Curriculum for Excellence (Education Scotland, n.d.a, p.iii)

There are eight key curriculum areas in the CfE: languages, mathematics, health and wellbeing, sciences, technologies, social studies, and expressive arts. Areas of literacy, numeracy, and health and wellbeing are the responsibility of all teaching professionals and should be incorporated into each subject area (Education Scotland, n.d.b). Health and wellbeing plays an important role in child and adolescent development. The aims of health and wellbeing are to encourage a positive environment and to enhance mental, physical, social and emotional skills (Education Scotland, n.d.c). Being physically active aids in maintaining physical and mental health, therefore it is vital adolescents are sufficiently active, and in terms of the CfE, understand why they should be active.

1.1.4 ActiveChat programme

The ActiveChat programme was originally trialled as a knowledge exchange educational programme as part of the Models of University - Schools Engagement (MUSE) project at the University of Strathclyde. MUSE was a three year Research Council UK funded project, which intended on building better engagement between the University itself and schools in the Glasgow area (University of Strathclyde, n.d.). ActiveChat was designed to address key learning outcomes of the CfE, specifically from the areas of health and wellbeing, literacy, and numeracy. The programme was modelled on the Self-Determination Theory (Deci, & Ryan, 1985), with an emphasis on enhancing basic psychological needs of perceived autonomy, competence, and relatedness. The original ActiveChat programme consisted of 10 lessons, which were aimed to promote PA, educate pupils about SB, and provide pupils with an understanding and practical experience of research within sport and exercise science. The programme also aimed to incorporate movement within the classroom to increase PA and break up SB. Each lesson was designed to enhance perceived autonomy, competence and relatedness. Pupil Voice is an important part of the CfE as this encourages

pupils to be ‘confident individuals’. Aims of the ‘confident individuals’ capacity (as highlighted in Figure 1.1) include: encouraging pupils to have an understanding of physical and mental wellbeing; develop their own opinions; make informed decisions; and to undertake an active healthy lifestyle. Pupil Voice allows pupils to express their own opinions and experiences, thus enhancing autonomy over their own behaviour.

The lesson tasks were designed to challenge pupils yet ensured all could participate and successfully complete the tasks, enhancing levels of competency. Pupils within the class experienced the ActiveChat programme together, thus enhancing relatedness with their peers. ActiveChat was piloted in an S3 class (aged 13-14 years) in a local Glasgow secondary school from January to March 2015. The programme lessons and materials were delivered by three ActiveChat mentors: the primary researcher and author of this thesis, and two BSc Sport and Physical Activity undergraduate students.

1.2 Purpose of research

The purpose of this research was to explore the current literature on classroom-based PA and SB programmes in secondary schools and to further develop ActiveChat: a classroom-based PA and SB programme, through rigorous evaluation and trialling in a local secondary school.

1.3 Summary of Chapters

This chapter briefly summarises the key messages from the current research in regard to PA and SB in adolescents, and the roles schools can play in promoting PA and reducing SB. Chapter 2 provides a more in depth review of the current literature. The physiological and psychological benefits of PA and detriments of SB are highlighted, and the prevalence of these behaviours in adolescents is reported. Current literature on classroom-based PA and SB

programmes is highlighted and different types of movement within the classroom are defined. The chapter then presents psychological models used in behaviour change interventions, with more emphasis on SDT in relation to PA behaviour. The importance of evaluation of interventions is emphasised, and the gaps in the literature and the rationale for this thesis are presented.

Chapter 3 presents the first study of this PhD, a systematic review and meta-analysis of classroom-based PA and SB interventions in adolescents. This study highlighted the lack of research in this area, yielding only nine studies meeting the eligility criteria. Of these nine studies, only one was rated strong for quality assessment. The meta-analysis indicated that the interventions had no significant effects on PA and SB.

Chapter 4 presents Study 2, which was an evaluative case study of the originally designed ActiveChat programme. The first part of Study 2 qualitatively explored secondary school teachers' and teacher educators' perspectives on the ActiveChat programme's lesson plans and materials, and provided recommendations for further development and implementation. The second part explored the reflections of the researcher, as the individual who had delivered the ActiveChat programme in a secondary school classroom. This determined what worked and what did not when delivering the programme first hand in a classroom environment. These results were used to inform further development and future implementation of the ActiveChat programme (Study 3). Teachers reported that the ActiveChat programme met targeted learning outcomes of the CfE, and reported it could be integrated within Personal and Social Education (PSE). The researcher's reflections identified activities that did not work, or needed adapting for future implementation. Reflections also identified personal adaptations required when delivering the programme.

Study 3 (Chapters 5 & 6) was the feasibility trial of the adapted ActiveChat programme, which was teacher-led. Chapter 5 presents the outcome evaluation; determining the effects of the ActiveChat programme on motivations, perceived psychological needs satisfaction, attitudes towards PA and SB, habitual PA and SB, and in-class PA and SB. The results of this study suggested the ActiveChat programme had no effect on attitudes towards PA or habitual PA and SB. Internalised forms of motivation, competence, relatedness, and attitudes towards SB were maintained over time in the ActiveChat group, whilst those in the control class significantly decreased their scores. In-class PA was significantly higher in the ActiveChat classes compared to the control classes.

Chapter 6 explores the feasibility and acceptability of the ActiveChat programme through a process evaluation. Interviews with teachers and focus groups with pupils were conducted to collate perspectives of, and opinions on, the ActiveChat programme. The researcher observed all ActiveChat lessons to monitor implementation. Teachers expressed positive perceptions towards the ActiveChat programme in regards to lesson plans and materials. Teachers valued the importance of PA and emphasised that movement needs to be incorporated into the curriculum. The ActiveChat programme was positively received by pupils, who expressed their enjoyment at being active in the classroom and learning about PA and SB. Findings from the observation determined acceptable levels of fidelity.

Finally, Chapter 7 concludes the thesis. Research aims and overall conclusions from each chapter are reiterated. This is followed by key strengths and weaknesses identified as part of the thesis, and the potential implication these may have on the results. Finally, practical recommendations are suggested for future research and direction.

1.4 Contribution to knowledge

Targeting the classroom environment can be an effective way to promote PA and reduce SB, whilst incorporating movement integration. This thesis highlights the gaps in the literature in regards to classroom-based interventions incorporating movement within secondary schools. As a result, an intervention was developed that can be implemented within a classroom setting that promotes PA, whilst integrating movement and addressing key learning outcomes of the Scottish secondary curriculum.

Chapter 2: Literature Review

2.1 Preface

This chapter introduces and summarises the current literature surrounding PA and SB in adolescents. The chapter then discusses PA and SB interventions within the school environment and psychological theories of behaviour change, highlighting SDT. Finally, the chapter addresses frameworks to evaluate interventions and discusses the importance of implementation of interventions and its effects on desired outcomes.

2.2 Definitions of physical activity and sedentary behaviour

2.2.1 Physical activity

PA is defined as, 'Any bodily movement produced by skeletal muscles that results in energy expenditure' (Caspersen, Powell, & Christenson, 1985, p.126) and is commonly split into different intensities: light, moderate, and vigorous.

In adults, moderate-to-vigorous PA (MVPA) is typically defined as activity ≥ 3 Metabolic Equivalents (METs) (Tremblay et al., 2010; Trost et al., 2002). For children and adolescents, MVPA is defined as ≥ 4 METs to adjust for their greater resting energy expenditure and metabolic rate (Harrell et al., 2005). The standard 1 MET equates to resting metabolic rate of ~3.5ml O_2/kg/min in adults, the energy expended whilst sitting at rest (Jetté, Sidney, & Blumchen, 1990). Therefore, 4 METs equates to an energy expenditure approximately four times that of resting.

Light activity is defined as an activity level between 1.5 and 3 METs (Tremblay et al., 2010) based on definitions of MVPA and SB for adults (Pate, O'Neill & Lobelo, 2008; Sedentary Behaviour Research Network, 2015; Trost et al., 2002). In children and adolescents, this is defined as between 2 and 4 METs based on the MVPA definitions above and the SB definition for children and adolescents discussed below in Section 2.2.2.

2.2.2 Sedentary behaviour

SB has become a topic of interest in recent years for PA researchers. The term SB derives from the Latin word 'sedere' which means 'to sit' (Froberg & Raustorp, 2014) and is defined as "any waking activity characterized by an energy expenditure ≤ 1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture" (Tremblay et al., 2017, p.9). Examples of SB include television viewing, reading or commuting by vehicle. However, some research suggests that ≤ 1.5 METs is an inappropriate threshold for children and adolescents, and the threshold of ≤ 2 METs should be applied (Saint-Maurice, Kim, Welk, & Gaesser, 2016) to take into account children and adolescents' higher resting energy expenditure (Harrell, et al., 2005).

2.2.3 Physical activity and sedentary behaviour guidelines

Being physically active is a primary factor in leading a healthy lifestyle, and is encouraged from infancy; therefore, it is important to define what it means to be 'physically active'. Being physically active means meeting the recommended guidelines set out by the four Chief Medical Officers in the United Kingdom (Scotland, England, Wales, and Northern Ireland). These guidelines are published in the Start Active Stay Active report (2011), which recommends children and adolescents (5-18 years) participate in at least 60 minutes of MVPA daily. Vigorous activities and activities that include bone and muscle strengthening should be performed at least three days a week. These guidelines also recommend that children and adolescents should minimise prolonged sedentary time (Start Active Stay Active, 2011). Canadian and Australian published guidelines are more specific and recommend children and adolescents should limit their screen-time to < 2 hours per day (Tremblay et al., 2011; Australia Government Department of Health, 2017). These

recommendations are based on the health benefits associated with MVPA and the health detriments associated with SB. These will be discussed further in Section 2.3.

2.2.4 Physical Activity and sedentary behaviour – A continuum

Currently, PA guidelines focus on MVPA, and incorporate recommendations for reducing SB. MVPA and SB are two conceptually different constructs (Tremblay et al., 2010). As a result, those who are highly sedentary are still at increased risk of adverse health outcomes, independent of meeting PA guidelines (Healy et al., 2008; Tremblay et al., 2010). Chastin et al. (2015) reported on the compositional variation of different physical behaviours (sleep, SB, light PA, MVPA) and found the largest log-ratio variances between SB and MVPA (1.285), providing additional evidence to support the theory that the two physical behaviours are conceptually different. Although there are clear benefits of sufficient MVPA, there is criticism within the literature regarding the exclusion of other important physical behaviours, such as sleep and light PA (Chaput, Carson, Gray, & Tremblay, 2014).

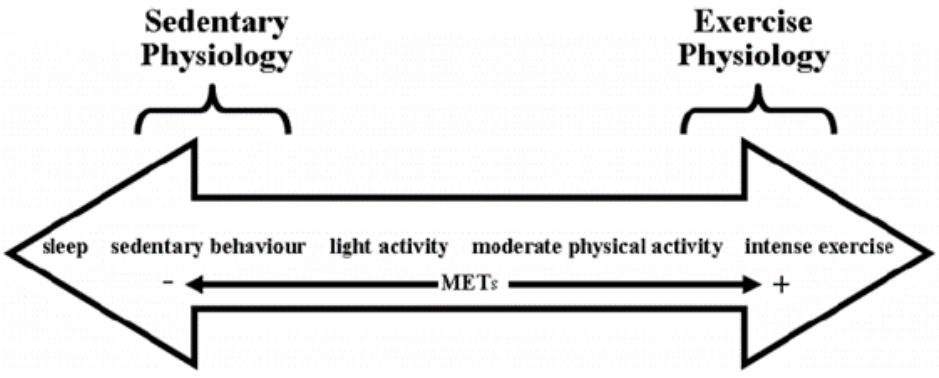

Figure 2.1. The physiological continuum (Tremblay et al., 2010, p.726).

Physical behaviours are described as being on a physiological continuum: sleep at one end to vigorous PA at the other (Kang, & Rowe, 2015; Tremblay et al., 2010) (Figure 2.1). Visual data from objectively measured activity using devices worn for 24 hours, such as, the ActivPAL, show the continuum from sleep, through SB, light PA, and MVPA (Loudon, & Granat, 2015). Spiral heatmaps (Figure 2.2) are a tool recently adopted by researchers to visually demonstrate the transitions between each activity level, suggesting that if an individual is not lying or sitting, then they are replacing this behaviour with either light PA or MVPA. Description of activity levels based on METs also suggests activity is on a continuum (SB ≤ 1.5 METs, light PA > 1.5 - < 3 METs, MVPA ≥ 3 METs). The work by Chastin and colleagues (2015) investigated the proportion of time spent in particular physical behaviours and cardio-metabolic health markers. For cardiovascular markers, they reported a negative relationship when MVPA was displaced with SB and light PA, yet there was a greater negative relationship with SB. For metabolic risk factors, SB and light PA was shown to have different relationships, suggesting displacing SB with light PA is beneficial for metabolic health. Although MVPA has been shown to have the greatest improvement on health markers, light activity is still more beneficial compared to SB.

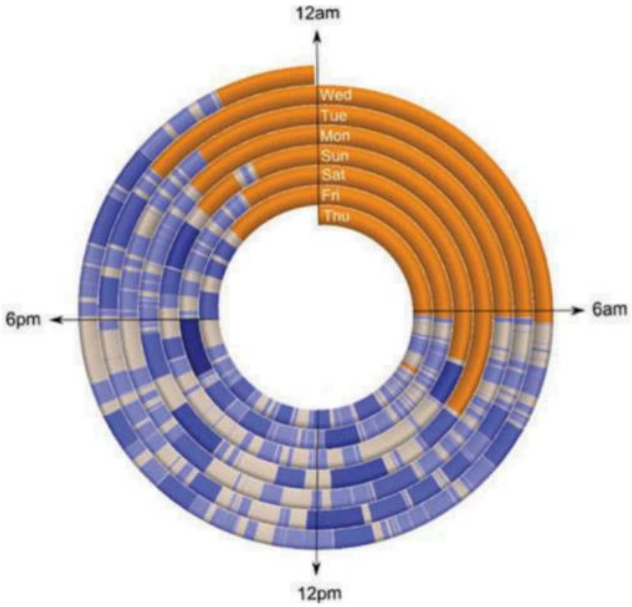

Figure 2.2 Spiral heatmaps of 7-day activity data (from Loudon & Granat, 2015, p.154)

2.3 Prevalence of physical activity and sedentary behaviour in adolescents

2.3.1 Prevalence of physical activity

As previously mentioned, physical inactivity in adolescents is a global problem, with 81% of adolescents not meeting the current PA guidelines (World Health Organisation, 2010). In Scotland, data from the HBSC survey suggests 82% of adolescents aged between 11-15 years were not meeting the recommended PA guidelines (also termed physically inactive). Girls were typically less likely to meet the guidelines (85%) compared to boys (79%) (Currie et al., 2015). Research suggests a decline in children's PA over time, specifically during the transition from primary to secondary school (Marks, Barnett, Strugnell, & Allender, 2015), although more recent evidence suggests this marked decline occurs earlier in primary school (Reilly, 2016). The reduction in PA continues throughout adolescence, with figures indicating a 12.5% decrease in those meeting the guidelines from ages 11-15 years (Currie et al., 2015). The Scottish Health Survey (2016) contradict these figures by reporting 68.5% of adolescents aged 11-15 years met the PA guidelines. A limitation with this survey is that data on intensity is very limited as no intensity data was collected in those under 13 years and those aged 13-15 years are only asked about their walking pace. Therefore, the percentage of adolescents meeting the guidelines is likely to be overestimated, as the survey likely includes light activity as well as MVPA. The HBSC survey uses the PACE+ question (Prochaska, Sallis, & Long, 2001) to assess the number of days adolescents spend at least 60 minutes in MVPA. Other published research using the PACE+ question have reported similar prevalence data of adolescents insufficiently active (92%) (Murphy, Rowe, Belton, & Woods, 2015). This question has been validated in children and adolescents against objective measures. The strongest correlation coefficient was reported for adolescents (r =0.36–0.39), establishing the questionnaire's validity in the adolescent age group (Murphy et al., 2015). The discrepancies between these figures could

have implications on health campaigns and future public policies. ‘Let’s Make Scotland More Active’ (Physical Activity Task Force, 2003) aimed to have 80% of under 16 year olds meeting the PA guidelines by 2022. Progress has been monitored using Scottish Health Survey data. Using the Scottish Health Survey data, when intensity data is not collected, could overestimate the percentage of children and adolescents meeting the recommended guidelines, thus implicating the true goal achievement.

2.3.2 Prevalence of prolonged sedentary behaviour

Technology is rapidly developing and the introduction of portable screen devices (e.g. tablets, phones and laptops) means screen activities are more accessible to children and adolescents, potentially increasing their screen time. Self-report data has shown that 64% of adolescents watch more than two hours of television per day during a weekday, and 79% watch more than two hours per day at the weekend (Currie et al., 2015). Similarly, data from the National Health and Nutrition Examination Survey cohort reported that 49.1% of children aged 6-11 years had a total screen time (television and computer) of > 2 hours per day. This increased to 56% of those aged 12-15 years (Sisson et al., 2009). Self-reports of screen time in those aged 6-11 years were provided by the parent as a proxy, whilst those aged 12-15 years reported their own screen time. Although proxy reporting for young children is often used to assess behaviour, inaccurate data may be collected through this method. High levels of parent-child agreement are found when parents are asked about set features of the child, such as eye colour (Whiteman, & Green, 1997) rather than behaviour (Sirard, & Pate, 2001; Whiteman, & Green, 1997). Parents may also exhibit desirability bias whereby they respond in a way which is perceived as positive (Grimm, 2010).

There is an inverse pattern of SB in contrast to PA when children transition into adolescence (Hardy, Dobbins, Booth, Denny-Wilson, & Oakley, 2006; Hardy, Bass & Booth, 2007; Marks et al., 2015). Hardy et al. (2006) reported boys and girls aged 11-12 years spent 57% and 52% of their leisure-time being sedentary, respectively, further increasing to 61% and 59% at age 15-16 years. Similar increases in SB were reported in a longitudinal study assessing girls' sedentary leisure-time (45% for 12.8 years and 63% for 14.9 years) (Hardy, Bass, & Booth, 2007).

The transition from primary to secondary school also appears to have an impact on adolescents' SB. Marks and colleagues (2015) reported an increase in mean sedentary time by 16 mins/day at six months post enrolment in secondary school. There were also changes in the different types of SB. Self-reported screen-time used for homework activities increased by 25 mins/day during the week and 12 mins/day on weekends. Leisure screen-time increased on both weekdays and weekends (17 mins/day and 16 mins/day, respectively). The researchers also examined whether changing schools affected SB in adolescents. Those who transitioned from primary to secondary school, and also changed schools, increased their sedentary time by 19 minutes compared to 11 minutes in those who did not change schools. This difference could have been attributed to a change in location where active travel was not possible (Marks et al., 2015).

2.4 Health impacts of physical activity and sedentary behaviour

2.4.1 Physical activity and health outcomes

Being sufficiently active has been associated with improved cardiovascular and metabolic health (Pedersen, & Saltin, 2015), yet there appears to be inconsistencies in the effects of PA on adolescent health (Biddle, Gorely, & Stensel, 2004). A systematic review by Hallal et al. (2006) investigated the short-term effects of adolescent PA and health

parameters. There were inconsistent associations between PA and cardiovascular risk factors, yet positive associations for bone health. Whilst it has been suggested it is unlikely adolescents are going to show any adverse cardiovascular markers due to their age (Biddle, Gorely, & Stensel, 2004), recent evidence suggests that children and adolescents are showing adverse health markers for metabolic syndrome, a risk factor for cardiovascular disease and type 2 diabetes (Weiss, Bremer, & Lustig, 2013).

There is emerging evidence that PA has a potentially positive effect on adolescent mental health. A review of reviews (Biddle, & Asare, 2011) reported weak-moderate inverse associations between PA and depression in adolescents (Effect Size (ES) = -.15, -.66 ((Craft & Landers, 1998; Larun, Nordheim, Ekeland, Hagen, & Heian, 2006)). Similar effect sizes were reported for anxiety (ES = -.15, -.48 (Calfas & Taylor, 1994; Larun et al., 2006)). There were greater effect differences for self-esteem ranging from weak (ES = .12, (Calfas & Taylor, 1994)) to large (ES = .89 (Ekeland, Heian, Hagen, Abbott, & Nordheim, 2004)). Aerobic PA and vigorous PA appeared to have the greatest positive effect on mental health; however, the results were based on limited studies in adolescents and some with weak methodologies (Biddle, & Asare, 2011).

There is little research on light activity and its effects on health; however, the emerging evidence suggests a beneficial impact, particularly in adults (Ekblom-Bak, Ekblom, Vikstrom, de Faire, & Hellenius, 2014; Healy et al., 2007). There is extremely limited evidence on light activity and its effects on adolescent health. This is due to the infancy of the topic and that it is difficult to assess the effects of PA on clinical health outcomes in adolescents (Biddle, Gorely, & Stensel, 2004), albeit, more recent literature has suggested adolescents exhibit adverse cardio-metabolic profiles, such as higher insulin resistance (Weiss et al., 2013). Early evidence suggests that light activity is beneficial to health (Carson et al., 2013; Sisson et al., 2013). Sisson et al. (2013) provided some evidence of the beneficial

effects of light activity on cardio-metabolic profiles in healthy adolescents. The researchers provided adolescents aged between 10-18 years (*M* =14.8, *SD* = 2.3 years) with a high fat breakfast (32% fat) and then asked them to either sit for the 3 hours following, or walk at 1.5mph for 45 minutes and sit for the remaining 2 hours 15 minutes post meal. Participants acted as their own control and repeated each condition on two separate occasions. Results suggested that performing light activity in the hours after a high fat meal significantly lowered triglycerides, insulin levels and increased High Dense Lipoprotein-Cholesterol at 3 hours post meal compared to sitting. This suggests a benefit on some cardio-metabolic profiles and aids in the reduction of cardiovascular risk factors. However, there was no difference between treatments for endothelial function, (which ensures the vessel walls are healthy, and the vasodilatation/vasoconstriction responses are working as they should (Green et al., 2004)), Low Dense Lipoprotein-Cholesterol or glucose.

Although research evidence in terms of PA and cardiovascular risk factors and mental health in adolescents is not prominent, there is a plethora of evidence regarding the benefits in adults (Elkblom-Bak et al., 2014; Fox, 1999; Healy et al., 2007; Pedersen, & Saltin, 2015). Promoting PA in adolescence is important, as behaviours developed at this stage of life are likely to be continued through to adulthood (Hallal et al., 2006), thus optimising the long-term protective benefits of increased PA and reduced SB later in life.

2.4.2 Sedentary behaviour and health outcomes

In contrast to MVPA, SB is associated with negative health outcomes. In terms of physical health, this is likely due to detrimental physiological responses (Tremblay et al., 2010). For example, lipoprotein lipase (LPL) is reduced during sedentary activities. LPL is an enzyme which hydrolyses circulating triglycerides from chylomicrons and very low dense lipoproteins into free fatty acids that can be taken up by skeletal and adipose tissues (Mead ,

Irvine, & Ramji, 2002; Tremblay et al., 2010), thus reduced LPL increases circulating triglyceride, which increases the risk of cardiovascular disease (Hamilton, Hamilton, & Zderic, 2007; Tremblay et al., 2010).

The negative physiological effects of being sedentary, independent of MVPA behaviour, have been established over the past decade in adults. High prevalence of SB is associated with a higher risk of cardiovascular disease (Chrysant & Chrysant, 2015), type II diabetes and obesity (Hu et al., 2003). Yet evidence of the negative physiological effects of SB in adolescents is inconsistent (Tanaka, Reilly, & Huang, 2014). A review article exploring SB and adiposity in children and adolescents proposed that there was no evidence to suggest prolonged sitting increased adiposity, however it is important to note that only three studies were included in the review, suggesting this area has not been extensively researched (Tanaka et al., 2014).

As previously discussed, self-report is a common measurement tool used to establish sitting time in adolescents, however depending on the age and ability of the individual, self-report might be through the parent as a proxy. Self-reported and parent-reported screen time suggests a positive correlation between screen time and cardio-metabolic risk factors (e.g. hypertension, insulin resistance) (Tremblay et al., 2011), yet objective measures appear to suggest a weaker association (Froberg & Raustorp, 2014). Froberg and Raustorp (2014) investigated the effects of objectively measured SB on cardio-metabolic risk in youth. There were no consistent associations between volume of SB and risk of obesity, blood pressure, glucose, blood lipids, or clustered cardio-metabolic risk when MVPA was adjusted for in adolescents. Although there is no clear evidence of the adverse effects of SB on health in adolescents, reducing SB at this age is important due to the adverse health effects, which have been shown in adults.

There is also emerging evidence that time spent sedentary is positively associated with higher depressive scores and was inversely associated with self-esteem scores in adolescents (Hoare, Milton, Foster, & Allender, 2016). However, the majority of these studies are largely based on cross-sectional data, making it difficult to identify directionality, for example, those who exhibit higher depressive scores may participate in higher levels of SB. (Biddle, & Asare, 2011).

2.5 Summary of physical activity and sedentary behaviour

The physiological and psychological health benefits of being physically active and reducing SB in adults are clearly documented, yet the research examining the health effects in adolescents is still in its infancy. Evidence suggests that being physically active has health benefits in adolescents, yet more research examining the effects of reducing SB and increasing light PA is needed. Research suggests patterns of behaviour formed in adolescence transfer into adulthood, therefore encouraging the promotion of PA and reducing SB in adolescence is highly important.

2.6 Physical activity, sedentary behaviour and academic performance

Schools can be the ideal target for interventions that aim to increase PA and reduce SB in adolescents as this is where they spend most of their time and large numbers can be targeted at once. It is important for teachers and pupils alike to understand the benefits of PA and reduction of SB, not just from health standpoint, but also for cognitive function. Cognitive function can be defined as "…mental processes required for both day-to-day tasks and more difficult 'higher order' functioning" (Biddle, Mutrie, & Gorely, 2015, p.121), and for adolescents, this is often assessed by academic performance (Biddle et al., 2015).

Research suggests a positive association between PA and academic performance (Singh, Uijtdewilligen, Twisk, van Mechelen, & Chinapaw, 2012; Trudeau, & Shephard, 2008).

There is also emerging evidence that certain types of SB is negatively associated with academic achievement. Corder and colleagues (2015) conducted a prospective study and assessed pupils' PA, SB, and General Certificate of Secondary Education (GCSE) exam results (standardised examinations for those in year 11 (aged 16 years) in England, Wales and Northern Ireland). They objectively and subjectively measured adolescents' PA and SB at 14.5 years and correlated the data with their GCSE results (at 16 years). There was no association between MVPA and GCSE results; however, the types of SB were positively or negatively correlated with GCSE results. Those who spent up to 4 hours performing 'non-screen' SB (homework or reading) were predicted to have higher GCSE scores by 23.1 points, whereas those who spent more time performing screen-based activity, such as TV viewing, were expected to have lower GCSE scores by 9.3 points. The Department of Education reported that the number of hours spent doing homework was positively correlated with better academic performance. Pupils with better grades reported 2-3 hours of homework per weeknight (Sammons et al., 2014), suggesting that 'non-screen sedentary time' activities are beneficial for academic performance.

However, increasing PA and breaking up sedentary time in the classroom has been associated with better class behaviour and academic performance (Martin, & Murtagh, 2017a; Trudeau & Shephard, 2008). Pupils expressed they felt more alert and focused with the introduction of standing desks, and inattention hyperactivity was not found to increase with the pupils standing (Aminian et al., 2015). This suggests that breaking up pupils' sitting time is unlikely to cause major disruption to the class, which is a perceived barrier for teachers. Time on task has also been positively associated with in class movement; however, there is no conclusive evidence of the effects of movement integration on cognitive function.

This is likely due to the limited number of studies and, the variations in methodologies and assessment of cognitive functions (Daly-Smith, Zwolinsky, McKenna, Tomporowski, Defeyter, & Manley, 2018).

Although conclusive evidence regarding the effects of classroom PA on cognitive function cannot be drawn, the published literature does suggest that being physically active and reducing screen time SB is associated with better academic performance, facilitates learning through improved on-task behaviour and can be beneficial for classroom management.

2.7 Physical activity and sedentary behaviour in adolescents at school

Schools provide excellent opportunities for adolescents to become more physically active. Compulsory PE lessons provide adolescents allocated times for which they can contribute 8-11% daily PA (Tudor-Locke, Lee, Morgan, Beighle & Pangrazi, 2006). In Scotland, 93% of secondary schools met the PE provision target set out by the Scottish Government (2017) of ensuring adolescents in S1-S4 (ages 11-15 years) participated in two periods of PE per week (Scottish Government, 2017). It has been reported that pupils spend 34.3% of PE time in MVPA, equating to 17.5 minutes in a 50.6-minute class (Fairclough, & Stratton, 2005). Recess/break and lunch times also provide adolescents the ideal opportunity to become more active (23-25% daily PA (Tudor-Locke et al., 2006)), yet there are a number of barriers, for example, weather, social conflicts, lack of space, lack of facilities and the use of electronic devices taking priority (Pawloski, Tjørnhøj-Thomsen, Schipperjin, & Troelsen, 2014). There are also other opportunities, such as after-school programmes, and more recently, movement integration (MI) within classrooms.

Sitting at a desk to learn is standard practice in schools and ingrained into children and adolescents from a young age, as it has been assumed to be the best learning environment (Lanningham-Foster & Levine, 2010). More recently, several studies have investigated the effects of standing desks or movement integration in the classroom to increase light to MVPA and reduce sedentary time (Aminian, Hinckson & Stewart, 2015; Benden, Zhoa, Jeffrey, Wendel & Blake, 2014; Carson et al., 2013; Hinckson et al., 2013). Studies have produced small to moderate effects on PA and SB (discussed in detail in section 2.8), yet many teachers voice concern over movement in the classroom and have issue with pupils moving around the class or standing up due to possible effects on behaviour and classroom management (Martin, & Murtagh, 2017b; Routen, Johnston, Glazebrook, & Sherar, 2018; Stylianou, Kulinna, & Naiman, 2015; Webster, Zarrett, Cook, Egan, Nesbitt, & Weaver, 2017).

2.8 Classroom-based physical activity and sedentary behaviour interventions

2.8.1 Movement integration

There are various types of programmes which promote PA and reduce SB in the classrooms. One example is Movement Integration (MI). MI involves PA being incorporated into standard traditional classrooms and could contribute to increasing overall PA levels and reducing SB in school. MI can be educationally driven (i.e. incorporating PA as part of the educational activities) or activity breaks which are not linked with academic content (Webster, Russ, Vazou, Goh, & Erwin, 2015).

Virtual field trips

Technology has been used to facilitate MI into the classroom. Virtual field trips have been designed and implemented into primary schools to increase PA, yet the results are mixed. Oliver, Schofield and McEvoy (2006) explored the feasibility of a walking based PA

intervention. The lessons were designed to integrate objectives of the New Zealand national curriculum, and included elements of English, Maths, Social Studies, PE and Statistics into a virtual walk. The intervention also included promotion of PA through educating pupils on measurement of PA and incorporating problem solving tasks to increase PA levels. Pupils wore pedometers for the duration of the 4-week intervention with teachers recording their step counts daily. Mean step count was *M* = 16,305, *SD* = 5938 steps/weekday (*N* = 61) at baseline. Although during the intervention, weekday step count increased by 486 steps/weekday (*M* =16,791, *SD* = 4243 steps/weekday), this was not significant. However, when pupils were split into quartiles of most active to least active, there were significant changes reported in all groups, with the greatest increase percentage change in step count seen in the least active group. This suggests the intervention is most beneficial to pupils who are least active.

Norris and colleagues (2015b) developed a virtual trip based on the London 2012 Olympic Games and objectively measured PA using accelerometers. The virtual field trip lasted 30 minutes. Those in the intervention group stood during the virtual trip and had prompts to take part in activity, whilst the control group sat throughout. Results demonstrated the intervention group significantly increased minutes of light, moderate, and vigorous PA (*M* = 14.97, *SD* = 6.18; *M* = 1.07, *SD* = 0.81; *M* = 0.79, *SD* = 0.65) during the virtual field trip compared to the control (*M* = 9.92, *SD* = 6.11; *M* = 0.61, *SD* = 0.80; *M* = 0.27, *SD* = 0.64), yet this increase was non-significant across the school day. This was a pilot study, and pupils' activity was measured for only one school day. More recently, Norris developed this into a full scale RCT (Norris, Dunsmuir, Duke-Williams, Stamatakis, & Shelton, 2018a) but adapted it to three 10-minute virtual trips per week over six weeks. They reported significant increases in LPA and MVPA, and reductions in SB in the virtual trip group compared to control.

Activity bouts

Some studies have promoted PA within the classroom using short 10 - 15 minute bouts of activity (Erwin, Beighle, Morgan & Noland, 2011; Grieco, Jowers & Bartholomew, 2009; Liu et al., 2008; Mahar et al., 2006; Martin & Murtagh, 2015; Martin & Murtagh, 2017c; Stewart, Dennison, Kohl & Doyle, 2004). The 'Take 10!' study by Stewart et al. (2004) conducted with first, third and fifth graders (approximately aged 6-10 years) was one of the first studies to introduce activities in 10-minute bouts in lessons. They found the activities provided increased step count ranging from *M* = 711, *SD* = 184 (Knee Deep in Snow) to *M* = 1376, *SD* = 284 (Math on the Run) (Stewart et al., 2004).

Similarly, Mahar et al. (2006) conducted an intervention in early school years (from kindergarten to 4th grade, approximately aged 5-10 years old) whereby the teacher would deliver one 'Energizer' activity that would last 10 minutes. Those who participated in the classroom 'Energizer' activities had a step count of *M* = 5587, *SD* = 1633 steps/day which was significantly higher than the control group who had *M* = 4805, *SD* = 1543 steps/day ($p < .05$; Effect Size = .49).

Liu and colleagues (2008) incorporated the 'Happy 10' programme. They reported an increase of subjectively measured MVPA by 36 minutes/day in the intervention group, while the control group decreased by 1 hour and 18 minutes. The authors reported the control school had higher duration of MVPA at baseline compared to the intervention school (3.7 hours per day compared to 2.3 hours per day, respectively). The schools were described as being similar and from the same neighbourhood in order to keep the results comparable; however, the control school may have had different opportunities for pupils to be active which could be a reason for the higher baseline measure. Baseline levels of MVPA were relatively high compared national figures of daily MVPA. MVPA was measured using a

validated 7-day PA questionnaire which was developed by Liu and colleagues (2003). However, this questionnaire was validated in pupils in grades 4-6 and the validity of 7-day PA estimation was only found in boys. The above study by Liu (2008) used the questionnaire for pupils in grades 1-5, with the questionnaire being delivered through interview for grades 1-2. The factors could have contributed to the relatively high levels of MVPA and highlight the overestimation of PA levels using self-reported measures (Shephard, 2003).

Erwin, Beighle, Morgan and Noland (2011) conducted a controlled trial that provided teachers with activity cards. The activity cards provided examples of activities, such as skipping, which would last 5-10 minutes. Baseline school steps/day were similar in both intervention and control group (p = .84). Results of the intervention, where teachers complied, increased mean school steps/day (M = 2476, SD = 957 to M = 3317, SD = 1592) compared to the control group whose steps/day decreased (M = 2432, SD = 955 to M = 2195, SD = 919). Three months after follow up, daily school step count for the intervention compliance group increased again to M = 4235, SD = 1759, whereas the control group remained under 3000 steps (M = 2869, SD = 981). Although the intervention appeared to have a positive impact on increasing PA, the drop-out rate was high at 50% (213 pupils gave consent, complete data were available for 106), and only five of the nine teachers adhered to the programme (implemented at least 1 activity per day). (Erwin et al., 2011).

The evidence presented above indicates the positive effect of MI on in-class PA, and in some cases, across the school day. However, evidence is limited on the effects these interventions have on overall PA due to lack of measurement out-with the school environment. Norris et al. (2018a) objectively measured PA on two school days and two weekend days, and reported their virtual trip intervention did not have a significant impact on overall PA and SB. The additional PA attained through the intervention is likely to be insufficient to affect children's overall PA and SB (Norris et al., 2018a).

The above studies are targeted towards primary aged children. There is little research into MI in secondary schools, with only one study exploring MI in this age group. However academic performance was the primary outcome and not PA behaviour, leaving a large gap in the current literature on classroom-based PA interventions in secondary schools.

2.8.2 Standing desks

Another method of increasing PA and reducing SB within the classroom includes changing the environment itself. Research into the use of standing desks in the classroom environment demonstrates the positive effects these have on SB. Hinckson and colleagues (2015) reported that current research reduced SB by up to 60 mins/day (Hinckson et al., 2013) whilst improving in-class behaviour. However, this review was based on a limited number of studies, which were largely based in primary schools (11 of the 13 studies included). Recent research in secondary schools by Silva et al. (2018) demonstrated that standing desks significantly reduced sitting time by 37.6 mins/9h during the school day. These are positive results, emphasising the potential of standing desks on pupils PA and SB behaviour, yet this method could be costly, particularly for secondary schools due to large numbers of classes.

2.9 Summary of physical activity and sedentary behaviour in schools

Schools play a predominant role in an adolescent's life since he/she can spend ~30-35 hours a week in school settings (Aminian et al., 2015) and spend approximately half of this time sitting (Aminian, Duncan, White, & Hinckson, 2014). Although there are opportunities for adolescents to be active at lunch times, break times/recess, and PE lessons, traditional lessons are mostly sedentary. Incorporating movement and breaking up sedentary time in the classroom can aid in increasing overall PA, and instil active patterns of behaviour, which are

more likely to continue into adulthood. In addition, being more active can help improve alertness and focus without promoting adverse classroom behaviour (Aminian et al., 2015; Trudeau & Shephard, 2008). Many teachers may perceive movement within the classroom as a facilitator for disruptive behaviour and could reduce pupil learning. However, published literature suggests otherwise and that movement could be more beneficial to their teaching and pupils learning. Researchers have develop interventions, which can incorporate PA into classroom lessons to increase daily PA in normal curricular lessons (Gortmaker et al., 1999; Stewart, et al., 2004; Mahar et al., 2006; Oliver, et al., 2006; Lui et al., 2008; Erwin, et al., 2011). The studies reviewed have all focused on primary aged children (5-11 years old) except for Helgeson, (2013) who based his study on young secondary school adolescents (11-14 years). Likewise, research into the use of standing desks also appears to be predominantly in primary schools rather than secondary (Hinckson et al., 2015). It would appear the majority of interventions have targeted children before they go into secondary school, likely due to the marked decline in children's PA when they transition from primary to secondary school, as discussed earlier (Currie et al., 2015; Scottish Health Survey, 2013). Another potential reason for a lack of research in secondary school may be due to the more structured nature of the secondary school curriculum (i.e. set periods for different subjects and pupils changing classes every 50-55 minutes). This highlights the clear gap in the literature concerning classroom-based PA and SB interventions in adolescents after they have made the transition from primary to secondary school.

2.10 Psychological theories of behaviour change

2.10.1 Psychological theories

Behaviour change interventions are often modelled on psychological theories. Common theories often used include:

Social Cognitive Theory (Bandura, 1986)

Social Cognitive Theory (SCT) is based on 'reciprocal determinism' by which behaviour is influenced by three main factors: personal, environmental, and behaviour. The theory is also based on that behaviour is not determined by internal factors or controlled externally (i.e. the environment) (Bandura, 1989; Biddle, & Mutrie, 2008).

Theory of Reasoned Action (Ajzen, & Fishbein, 1980, Fishbein, & Ajzen, 1975) /Theory of Planned Behaviour (Azjen, 1991)

The Theory of Reason Action (TRA) is based on the theory that an individual's attitudes and their social norms are predictors of behavioural intention, and that behavioural intention is a direct determinant of behaviour. The Theory of Planned Behaviour is an extension of TRA, but with the addition of perceived behavioural control. It is suggested that perceived behavioural control is a predictor of behavioural intention, the same as attitudes and subjective norms, yet can determine behaviour directly (Ajzen, 1991; Biddle, & Mutrie, 2008).

The Transtheoretical Model (or stages of change model) (Prochaska & DiClemente, 1983)

This theory is based on four main components:

- Stages of Change – an individual can be in one of five stages of change starting from pre-contemplation (no PA and no intention of changing PA behaviour), contemplation (no PA but has the intention of changing PA behaviour), preparation (small

adaptations in PA behaviour), action (recently physically active, < 6 months), and maintenance (physically active, > 6 months).

- Processes of Change – This is based on five cognitive processes (aware of risks; enhancing knowledge; understanding the potential benefits; acknowledging alternative ways to be active; the consequence of your behaviour on others), and five behavioural processes (commit to being physically active; seek support from others; set reminders; give yourself rewards; using alternative ways to being active if barriers are encountered) (Biddle, & Mutrie, 2008).
- Decisional Balance – identify the advantages and the disadvantages to being active.
- Self-Efficacy – an individual's belief in their ability to be physically active.

Self- Determination Theory (Deci, & Ryan, 1985)

One framework often cited is the Self Determination Theory (SDT) and will be the primary framework adopted for this PhD research. SDT is a meta-theory developed by Deci and Ryan (1985) and conceptualises that in order for individuals to be intrinsically motivated to perform a behaviour, they must feel self-determined and in control of their own behaviour (Chen, 2014). There are different degrees of motivation based on two forms – extrinsic motivation and intrinsic motivation. Intrinsic motivation is when an individual will perform a behaviour because they enjoy it and want to do it (Deci, & Ryan, 2000). Extrinsic motivation is when external factors dictate the individual's motives to perform a behaviour. SDT has been used often in classroom-based research (Deci, Vallerand, Pelletier, & Ryan, 1991). This theory appears to be most effective in controlled environments, such as PE class, where each basic need can be focussed on and enhanced. For example, teaching style can be deemed autonomy-supportive (i.e. enhance pupils' perceptions of autonomy, competence and related), which in turn can internalise pupils' motivation, while teaching styles which

promote a controlled environment (i.e. based on rewards or punishment) are unlikely to enhance internalised forms of motivation (Deci et al., 1991).

2.10.2 Self-Determination Theory

Motivation is conceptualised as being on a continuum, with no motivation at one end, and the most internalised motivation (intrinsic motivation) at the other (Figure 2.3). This is based on a sub-theory of Self-Determination Theory – the Organismic Integrated Theory (Ryan & Deci, 2000a). Amotivation is a lack of motivation to perform a behaviour (Chen, 2014). External regulation is when an individual performs a task because they have been told to and/or are doing it for some type of reward (Ryan & Deci, 2000a). Introjected regulation refers to performing a behaviour in order to avoid the feeling of guilt or shame (Biddle & Mutrie, 2008; Ryan & Deci, 2000a).

Type of Motivation	Amotivation	Extrinsic Motivation				Intrinsic Motivation
Type of Regulation	Non-regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Quality of Behaviour	Nonself-determined					Self-Determined

Figure 2.3 Organismic Integration Theory Motivation Continuum (adapted from Deci, & Ryan, 2000)

Identified regulation is when the behaviour is valued as important to an individual (Ryan & Deci, 2000a). The most autonomous or internalised form of extrinsic motivation is integrated regulation. This is where an individual will engage 'in activities for a sense of self' (Chen,

2014, p.496), therefore, they have identified the behaviour as part of who they are. Finally, intrinsic motivation is whereby the behaviour is fully internalised.

2.10.3 Psychological needs satisfaction

Basic Psychological Needs Theory (BPNS) is another sub-theory of SDT. This is conceptualised that individuals strive to satisfy three basic psychological needs: autonomy, competence and relatedness (Ryan & Deci, 2000b). Autonomy is the need to be in control over one's own behaviour; competence is the need to feel that one has the ability to do the behaviour (Chen, 2014); and relatedness is the need to feel connected to others (Ryan & Deci, 2000b). Chen (2014) found that in children (M =10 years) perceived competence, autonomy and relatedness were positively associated with intrinsic motivation (β = .51, β = .80 and β = .78, respectively), identified regulation (β = .54, β = .70 and β = .72) and introjected regulation (β = .46, β = .47 and β = .56). There were negative associations with external regulation (competence β = -.17, autonomy β = -.16 and relatedness β = -.02) and amotivation (β = -.29, β = -.41 and β = -.30, respectively). These results indicate that motivation is more internalised when there is perceived satisfaction of psychological needs (Chen, 2014).

2.10.4 Motivational regulation in adolescents

Research suggests children tend to have higher levels of intrinsic motivation than adolescents and adults do. It is unlikely children will experience introjected regulation in regards to PA since they do not tend to experience the guilt or shame associated with this type of motivation. (Sebire, Jago, Fox, Edwards & Thompson, 2013). As children transition into adolescence, this motivation moves along the continuum towards more extrinsic regulations (Sebire et al., 2013).

Adolescents who have high levels of introjected regulation still exhibit autonomous reasons for participating in PA and/or exercise. Gillison and colleagues (2009) reported the primary reason for adolescents participating in exercise was enjoyment, indicating a greater level of intrinsic motivation even though adolescents exhibited high levels of introjected regulation. However, a review and meta-analysis of the literature suggests internalised motivation is only weakly to moderately associated with leisure time PA (ρ = .26 to .38) (Owen, Smith, Lubans, Ng & Lonsdale 2014). Interestingly, results from the review suggest there was a higher association between introjected regulation and PA in PE classes (ρ = .22) than leisure time PA. This finding could be explained by the compulsory and structured nature of PE, resulting in children and adolescents feeling more compelled to participate potentially due to teacher or even peer pressure. This could be a reason for higher levels of guilt/shame if they do not participate in PE classes as opposed to being physically active in their free time. As discussed by Owen et al. (2014), there are some limitations to the meta-analysis. For example, over half the studies were cross-sectional, therefore only associations can be determined, not causality. Focusing on children and adolescents separately might affect the conclusion of results due to previous literature indicating they have different levels of motivation (Sebire, Jago, Fox, Edwards & Thompson, 2013).

2.10.5 Self-Determination Theory in school-based interventions

A number of school-based PA interventions that have incorporated SDT have been conducted in PE classes (e.g. Chatzisarantis & Hagger, 2009; Lonsdale et al., 2013) and during PE and leisure time PA (McDavid, Cox & McDonough, 2014; Owen, Astell-Burt & Lonsdale, 2013; Shen, McCaughtry & Martin, 2007). Chatzisarantis and Hagger (2009) conducted a 5-week intervention in 10 schools to investigate the effects of autonomy-supportive (enhancing perceived autonomy) teachers in increasing self-determination in 215

pupils (*M* = 14.84, *SD* = 0.48 years) in PE and leisure-time PA. Autonomy-supportive teachers were trained to adopt an inter-personal approach, using dialogue that provided positive feedback and enhanced pupils' perception of choice. The researchers found those pupils whose teachers were autonomy-supportive experienced more intrinsic motivation and enjoyment towards PE, and exhibited greater levels of leisure-time PA. This demonstrates promoting a health behaviour in one context (in this case PE) can transition to other aspects of an individuals' life (i.e. leisure time). This agrees with other published literature that motivation in PE is positively associated with leisure time PA (Owen et al., 2013).

Similarly, Lonsdale et al. (2013) investigated different teaching methods and levels of autonomy in PE. These included a control group (standard teaching practices), relevance group (emphasised the importance and relevance of the activities they would be performing), giving choices group (providing pupils with options) and free choice group (pupils chose the activities). The results suggested those in the free choice group and given choices group significantly and meaningfully (*d* = 1.32; *d* = 1) increased perceived autonomy at post-intervention (*M* = 4.46, *SD* = 0.36; *M* = 4.35, *SD* = 0.36, respectively) compared to baseline (*M* = 4.10, *SD* = 0.36; *M* = 3.88, *SD* = 0.35, respectively). This could suggest providing a more autonomous environment and allowing pupils to have some degree of choice in PE lessons is beneficial for enhancing autonomy, although this does not appear to impact levels of perceived competence and relatedness. A limitation of this intervention is that only PA in PE was measured, therefore it is difficult to generalise this teaching method to overall PA behaviour change. Another uncertainty is the practical implication of promoting classes whereby pupils are in control of their own activities. Although this would increase perceived autonomy, due to the nature of school curricula, there needs to be an element of structure. Free choice may not be practical; however, there may be scope for providing options in classes to increase pupil involvement and autonomy.

2.10.6 Summary of Self-Determination Theory

Existing literature suggests intrinsic motivation is the key to behaviour adherence. Intrinsic motivation towards engaging in a behaviour can be attained through perceived satisfaction of the three psychological needs (autonomy, competence and relatedness). Literature suggests self-determination can be increased through adaptations to teachers' pedagogical methods (Chatzisarantis & Hagger, 2009; Lonsdale et al., 2013). Creating an environment whereby adolescents can experience enhanced perceived satisfaction of the psychological needs could be important for them to feel more self-determined and thus, more likely adhere to PA behaviour. There are some discrepancies in the literature in regards to motivation regulation and the transference of increased overall PA. More research is needed particularly in addressing these psychological needs and motivational regulation in relation to increasing overall PA in adolescents.

2.11 Evaluation frameworks

2.11.1 Importance of evaluation

In relation to the above discussions regarding interventions and their impact on desired outcomes, it is important that these interventions are rigorously evaluated. Evaluation is important as it determines whether the intervention is doing as it is intended, and that it is feasible. The evaluation process also gathers evidence for potential funders (Jago & Sebire, 2012; Wight, Wimbush, Jepson, & Doi, 2016). There are different types of evaluation. Formative evaluation may be conducted prior to the intervention commencing to determine if it is acceptable (Center for Disease Control and Prevention, n.d.). Process evaluation determines whether the programme was implemented as it was originally designed. Process evaluation is also important to determine the effectiveness of the programme, for example, determining whether the learning outcomes of the activities were addressed, or whether it

successfully/poorly fitted within the environment where it was implemented. Another type of evaluation includes outcome evaluation. This determines whether there were changes to the outcomes that the programme aimed to address were achieved by analysing the outcome data collected (Center for Disease Control and Prevention, 2012).

2.11.2 Evaluation frameworks

There are different evaluation frameworks. The RE-AIM framework (Glasgow, Vogt, & Boles, 1999) is a multi-level framework commonly used to evaluate population-based public health programmes. RE-AIM is abbreviated for the following: Reach (the percentage of individuals who participated in the programme); Efficacy (programme determines the extent to which the desired outcomes are achieved under ideal conditions (Kim, 2013)); Adoption (the proportion of setting which adopt the public health policy); Implementation ("the extent to which a program is delivered as intended" (Glasgow et al., 1999, p.1323)); and Maintenance (whether the desired outcomes are sustained over the long term). The 'Implementation' definition by Glasgow et al. (1999) also defines fidelity, which in recent frameworks is only one element of implementation and will be discussed in Section 2.10.3.

2.11.3 Implementation

The construct of implementation is important as it can determine the effectiveness of a programme, for example, when the programme is conducted in 'real world' settings (Flay, 1986; Glasgow et al., 1999). Additionally, when evaluating small-scale feasibility studies, implementation is arguably the most important evaluation assessment as this has been described as a primary determinant for programme outcomes. Yet implementation is rarely reported in health promotion literature (Quested, Ntoumanis, Thøgersen-Ntoumani, Hagger, & Hancox, 2017) and particularly in school-based research (Naylor et al., 2015; van Sluijs et

al. 2007). Implementation consists of eight different constructs outlined by Durlak and DuPre (2008). These are fidelity; dosage; quality; participant responsiveness; programme differentiation; monitoring control; programme reach; and adaptation. These constructs are described in Table 2.1.

There are discrepancies amongst the literature concerning some of these constructs. Carroll and colleagues (2007) describe a similar framework to Durlak and DuPre (2008) yet describe only five elements which refer to implementation (adherence, dosage, quality, participant responsiveness, and programme differentiation). For the purpose of this PhD, the author will follow the framework outlined by Durlak and DuPre (2008), due to its inclusion of more assessment constructs.

Table 2.1

Eight constructs of implementation as described in Durlak & DuPre (2008)

Implementation	
Construct	**Meaning**
Fidelity	The extent which the programme delivered mimics that of the original design of the programme/programme.
Dosage	How much of the original programme was delivered.
Quality	How well the programme was delivered.
Programme responsiveness	How much the participants respond and engage with the programme.
Programme differentiation	The extent the theory is distinguished from other programme.
Monitoring control	Being aware of what the control group are receiving (or not receiving).
Programme reach	The responsiveness and involvement of participants
Adaptation	The changes that were made during the programme delivery.

Monitoring of the above constructs of implementation is associated with greater positive outcome measures. The review by Durlak and DuPre (2008) reported that some

studies who monitored implementation had two to three times greater benefit on outcome measures (DuBois, Holloway, Valentine, & Cooper, 2002; Smith, Schneider, Smith, & Ananidou, 2004). This emphasises the importance of rigorous evaluation of implementation of new interventions to determine the intervention's validity, thus, why this PhD has adopted to assess implementation constructs (Chapter 6).

2.11.4 Summary of evaluation

Evaluation is an important aspect of any intervention. Evaluation is undertaken for a number of reasons, for example, to ensure the intervention is doing what it was designed to do; to ensure the intervention is being implemented as intended; and to provide evidence to potential funders and investors that the intervention is worth the financial support. For small newly developed interventions, it is incredibly important to assess implementation of the intervention. Implementation is a combination of a number of different constructs as highlighted in Table 2.1. For classroom-based interventions particularly, these constructs are important to address, as it aids in determining what methods are effective within the classroom environment, and whether both teachers and pupils are responsive to the intervention.

Chapter 3 (Study 1): Classroom-based physical activity and sedentary behaviour interventions in adolescents: A systematic review and meta-analysis

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3.1 Preface

This systematic review was conducted to investigate classroom-based PA and SB interventions in early secondary school adolescents (aged 11-15 years). Previously published systematic reviews have investigated the effects of school-based interventions on PA and health in school-aged children (Dobbins et al., 2013); physically active lessons (Norris et al., 2015); school-based PA and SB interventions in older adolescents (Hynynen et al., 2015); and the effects of school-based interventions on PA and fitness (Kriemler et al., 2011). To the author's knowledge, there are no published systematic reviews that only investigate classroom-based interventions targeting early secondary school adolescents. This systematic review will present the published literature on the topic and will aim to determine which classroom-based intervention methodologies are most effective at increasing PA and reducing SB. If possible, implementation will also be investigated to determine the link between different aspects of implementation and the effectiveness of the interventions. The results of this systematic review and meta-analysis, and the conclusions drawn, will inform future developments of classroom-based PA and SB interventions that target young adolescents in early secondary school.

3.2 Introduction

3.2.1 Physical Activity in Schools

Physical activity (PA) plays an important role in adolescents' health. Being active has been shown to benefit physiological (Strong et al., 2005) and psychological (Biddle & Asare, 2011; Strong et al., 2005) health. Recent evidence shows that physical inactivity and SB are highly prevalent amongst adolescents (Currie et al., 2015). Schools can play a role in improving PA, with government organisations highlighting their importance and adding policies into their individual frameworks (Centers for Disease Control & Prevention, 2009; World Health Organization, 2008). Research into school-based PA and SB interventions has increased in recent years and a number of reviews have established the efficacy of such interventions (Dobbins, Husson, DeCorby, & LaRocca, 2013; Hynynen et al., 2015; Kriemler, Meyer, Martin, van Sluijs, Andersen, & Martin, 2011; Norris, Shelton, Dunsmuir, Duke-Williams, & Stamatakis, 2015; Pardo et al., 2013; Rafferty, Breslin, Brennan, & Hassan, 2016; Russ, Webster, Beets, & Phillips, 2015; van Sluijs, McMinn, & Griffin). School-based interventions have been shown to increase moderate-to-vigorous physical activity (MVPA) (Kriemler et al., 2011; Norris et al., 2015) and VO_{2max} (a measure of cardiovascular fitness) and have also had a positive effect on television viewing (a proxy measure of SB) (Dobbins et al., 2013), yet some reviews have found inconclusive evidence that such interventions have an effect on overall PA (Russ et al., 2016). This finding was echoed in the review by Kriemler and colleagues (2011) who found that there was an overall positive impact of school-based PA interventions on school PA yet there was not conclusive evidence that this translated into out-of-school PA.

Few reviews have looked at the effects of school-based interventions on SB. Hynynen et al. (2015) analysed four studies that measured SB and reported that only two had shown

significant decreases in SB. This indicates there is little research into school-based interventions that target reducing SB.

Classroom-based interventions to increase PA and reduce SB are fairly novel. For the purpose of this review, interventions were delimited to those conducted in traditional classrooms that were not PA specific (i.e. PE interventions were excluded).

As previously mentioned, the efficacy of school-based PA interventions has been demonstrated yet there appears to be less of a focus on reducing SB, although this research is expanding, particularly with the use of standing desks in classrooms (Hinckson et al., 2016). However, most classroom-based research has focused on primary/elementary school children rather than secondary/middle/ high school adolescents.

3.2.2 Implementation elements and their effect on intervention outcomes

In the development of interventions, evaluating the effectiveness of the intervention on the desired outcomes is important (van Sluijs et al., 2007). There are different evaluation frameworks, such as the RE-AIM framework (Glasgow, Vogt, Boles, 1999). Implementation is one of the RE-AIM factors that determines whether the intervention was delivered as intended (Glasgow et al., 1999). Outlined in Durlak and Dupre (2008) and highlighted in Chapter 2, implementation includes fidelity, dosage, quality, participant responsiveness, program differentiation, monitoring of controls, program reach and adaptation. All of these aspects of implementation are important in establishing the validity of interventions, however the reporting of implementation appears to be rare, particularly for school-based PA and SB interventions (van Sluijs et al., 2007). Naylor et al. (2015) systematically reviewed implementation in school-based PA interventions. Of the 15 studies included, 11 suggested positive associations between health outcomes and level of implementation. Implementation elements (e.g., fidelity, dosage) were measured using various measurement tools and/or

techniques. Continuous and/or categorical data were collected through the use of, for example, direct observation, surveys, focus groups, interviews, and attendance registers. The most common implementation element measured was adherence (dose received) (Naylor et al., 2015). The literature on the role of implementation and the intervention effectiveness appears scarce and it has been suggested that further research should assess implementation in relation to outcomes (Naylor et al., 2015).

3.2.3 Objectives

Several systematic reviews have examined school-based interventions, of which only one has focused on classroom-based PA interventions (Norris et al., 2015a). Only one of the original studies included in that review was based in a secondary school (Helgeson, 2013), however PA was not an outcome measure. Therefore, the aims of this systematic review were to:

i. Review classroom-based PA and SB interventions within an early secondary/ middle/ high school setting and determine the most effective methodology for increasing PA and reducing SB;
ii. Determine if implementation has an impact on the effectiveness of the interventions.

Research has indicated that psychological constructs are correlates of PA in adolescents (e.g. self-efficacy, autonomy) (Martins, Marques, Peralta, Palmeira, & da Costa, 2017) therefore a secondary aim was to determine if these interventions change any psychological constructs, and if these changes effect PA/SB behaviour.

3.3 Methods

3.3.1 Protocol & registration

This review protocol was registered and published under Prospero [CRD42015026721] in October 2015. The protocol was developed using the guidelines in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al., 2009; Moher, Liberati, Tetzlaff, & Altman, 2009).

3.3.2 Eligibility criteria

The eligibility criterion were devised from the research questions of this review. These are presented below using the PICOS framework.

Population: The target population was adolescents aged 11-15 years in secondary schools. This age group is considered adolescence based on the description by the World Health Organisation (2018) (ages 10-19 years). The starting age of this group was 11 years as this is the age at which adolescents can start secondary school in Scotland. This age group was targeted as research evidence suggests a marked decline in PA and increase in SB when a child transitions into an adolescent (Hardy, Dobbins, Booth, Denny-Wilson, & Okely, 2006), with this trend continuing throughout adolescence (Currie et al., 2015).

Intervention: Due to the aims of this thesis, classroom-based interventions that targeted increasing PA and/or decreasing SB in early secondary school were included. Interventions which were multicomponent (e.g. classroom-based but included exercise sessions, changes to the school environment or parental involvement) were excluded. Interventions that included targeting recess/break time, lunchtime or after school, were also excluded. These exclusions were justified as the aim of the review was to investigate the effects of classroom-based interventions only on PA and SB.

Control: The presence of a control group is considered 'gold standard' yet studies were included whether a control group was present or not. This was later discussed as part of the quality assessment.

Outcomes: Primary outcomes of this review were PA and SB levels. Secondary outcomes were measurements of implementation and psychosocial constructs. Objective and subjective measures were included.

Study Design: Intervention designs included were randomised controlled trials (RCT), controlled trials and, pre and post design. Randomised controlled trials (RCTs) are often considered as the "gold standard" (Akobeng, 2005) study design for interventions yet RCTs are not always possible in school-based interventions (e.g. due to class scheduling, teachers volunteering their classes, unable to randomise pupils to intervention/control groups) therefore other intervention study designs were included.

3.3.3 Information sources

The following six electronic databases were searched: Medline (OVID); EMBASE; ERIC; SportDiscus; PsycInfo; and Web of Science. The same search strategy was used for each database, with adaptations of wildcards/truncation symbols to fit the criteria for each specific database. The search strategy was conducted in October 2015 and was crosschecked in November 2015. The crosschecking involved the author's second supervisor (DAR), who conducted the search strategy for each database at the same time to ensure consistency. A search of the grey literature was performed via the Open Grey database (http://www.opengrey.eu/). In July 2017, the search strategy was conducted again. This strategy was adapted to broaden the number of articles retrieved to ensure no articles were missed. The adaptations included the addition of 'child*' and 'lesson*' to further enhance the search.

The search strategy was constructed using the PICOS framework, and is presented in Table 3.1. PE was not included in the search strategy as this review was focused on classroom-based PA and SB interventions beyond the PE setting.

Table 3.1

Search strategy used to retrieve potential articles.

Population	(Adolescen* **OR** teenage* **OR** youth **OR** pupils **OR** child*)
Search operator	**AND**
Setting	(school* **OR** class* **OR** lesson*)
Search operator	**AND**
Outcome	(Physical activity **OR** walk* **OR** mov* **OR** activity breaks **OR** exercise* **OR** stand*)
Search operator	**AND**
Outcome	(Sedentary behaviour **OR** sedentary behaviour **OR** sitting time **OR** sit*)
Search operator	**AND**
Study design	(Interventions **OR** randomised controlled trial **OR** randomized controlled trial **OR** (pre and post) **OR** quasi experimental)
Search operator	**NOT**
Exclusion	(Physical education)

3.3.4 Study selection

Following the search strategy and retrieval of references, these were exported into EndNote Reference Manager, version X6 (Thomson Reuters, Philadelphia). Duplicates were removed via the EndNote Reference Manager software. Duplicates were visually inspected to ensure the correct references were removed. References included for screening were exported into a Microsoft Excel, version 2013 (Microsoft Corp, Redmond, WA) spreadsheet. Manual inspection of duplicates was performed again to ensure that there were no duplicates.

The inclusion criteria for screening articles were:

i. Randomised controlled trials (RCTs), controlled trials (CTs), quasi-experimental, or pre- and post- study designs;
ii. Studies based in a classroom setting only, which targeted PA or SB, or both PA and SB;
iii. Non-clinical secondary/ middle/ high school adolescents between the ages of 11-15 years old.

We excluded any study based in primary/elementary schools or in high/secondary schools where interventions targeted adolescents over the age of 15 years. Primary and secondary school environments are different in terms of education and the structure of the school day, therefore are not comparable as part of this review.

The first stage of the exclusion process involved reviewing titles of the articles generated from the search strategy. Titles that did not match the criteria (e.g., clinical populations, outside school hours) were excluded. Article titles, which were potentially relevant, were reviewed at abstract level. Abstracts of articles, which appeared to meet the inclusion criteria, were reviewed at full-text. For abstracts and full-texts where there was uncertainty by the author, the author's first supervisor (AMG) crosschecked for confirmation.

Any discrepancies were subsequently discussed in consultation with the second supervisor (DAR) until a decision was agreed. Reference lists from review and summary articles that were retrieved from the search were checked to ensure that no articles were missed.

3.3.5 Data collection process and data items

The following data were extracted and entered into a standardised form in Microsoft Word, version 2013 (Micrososoft Corp, Redmond, WA): author(s); date of publication; country the study was conducted in; aim of the study; study design; population; intervention; and results of the intervention.

3.3.6 Risk of bias in individual studies

An adapted version of the Effective Public Health Practice Project (EPHPP) (Effective Public Health Practice Project, 2009) tool was used for quality assessment. The EPHPP has a rating scale of 1 to 3 (1 = strong, 2 = moderate, 3 = weak) and the quality was assessed on selection bias, study design, confounders, blinding, data collection methods, and withdrawal and drop-outs (Effective Public Health Practice Project, 2009). Selection bias was scored based on population representativeness, and percentage agreeing to take part. Study design was scored on the type of design used. Strong was awarded if the studies were a randomised control trial or control clinical trial. The authors adapted this to include group/cluster randomised control trials, as previously adapted by Chillon et al. (2011). This adaptation was made due to the nature of school-based interventions whereby schools and/or classes are often randomised rather than individuals. Confounders was scored on differences between groups at baseline, and the percentage of confounders controlled. Blinding was scored based on whether the participants were blinded to the research question, and the assessors were blinded to the group allocation. The authors added in a ‘not relevant’ option to this category.

This decision was made because blinding might not be possible within a school setting, especially if classes are randomised. Pupils are unlikely to be aware of the research question itself; however, they may have an understanding of why the study is taking place. Data collection was scored based on the evidence reported for validity and reliability of the measurement tools used. Finally, withdrawal and dropout was scored on the percentage of participants completing the study. A global rating was then determined based on the ratings of the above constructs. A strong global rating was awarded if no weak ratings were present, moderate global rating if there was only one weak rating and a weak global rating if there were two or more weak ratings (Effective Public Health Practice Project, 2009). Intervention integrity (assessed for whether the intervention consistency was measured; what percentage received the intervention; was there potential for contamination) and appropriate analysis in relation to the research question(s) (unit of analysis; unit of allocation; statistical analysis; intention to treat) were also assessed. However, the scoring of these constructs did not contribute to the overall rating score.

3.3.7 Summary of measures

The primary outcome measures were PA and SB. Where possible, pre- and post- data were extracted from both the intervention and control groups, and was inputted into Microsoft Excel, version 2013 (Microsoft Corp, Redmond, WA). Means and standard deviations (SD) were extracted from each study. If SDs were not reported directly, they were calculated based on reported standard errors and sample sizes (Higgins, & Green, 2011).

$$SD = SE * (\sqrt{N})$$

Cohen's d effect sizes were calculated from means and SDs to determine the interaction effect, and where an interaction effect could not be determined (i.e., if the study had no control condition or if the study only reported post-intervention data), the effect size

was calculated using pre- and post- intervention data only, or post-intervention data only. The effect sizes were interpreted as small (d = 0.2), medium (d = 0.5), or large (d = 0.8), following the guidelines of Cohen (Cohen, 1988). The equations used are shown below:

$$SD_{pooled} = \sqrt{\frac{(SD_1^2 \times n_1) + (SD_2^2 \times n_2)}{(n_1 + n_2)}}$$

$$Cohen's\ d = \frac{M_1 - M_2}{SD_{pooled}}$$

Meta-analysis

A meta-analysis was performed to determine the overall effect of classroom-based interventions on PA and SB. Review Manager, version 5.3 (RevMan 5.3) (The Nordic Cochrane Centre, Copenhagen, 2014) computer software was used to conduct the meta-analysis. Only studies that used a two group (intervention/control), pre-post design were included in the meta-analysis (*n* = 5). Data from baseline measures and the first measurement post-intervention were analysed. The data inputted into RevMan 5.3 were the standardised mean differences between pre- and post-intervention for the intervention group, and the control group; the pooled SD of the four cells of data (pre- and post- intervention data, pre- and post- control data); and the sample size of each group (*n*). This produced a Cohen's d for the interaction effect and 95% confidence interval (CI). The RevMan 5.3 software then pooled the effects for all studies to produce an overall effect, weighted by individual study sample size. Standardised means were calculated to take into account that each study used different measures of PA/SB. Due to the heterogeneity of the studies (I^2), a random-effects model was used for the analysis, and standardised mean differences were used to account for the different measurement outputs from the studies.

3.4 Results

3.4.1 Study selection

Initial search strategies yielded 7574 potentially relevant articles. 1767 duplicates were removed. 5556 studies were excluded during the title and abstract screening stages, 242 were excluded at full text level, leaving nine studies included for the systematic review (Contento, Koch, Lee, Sauberli, & Calabrese-Barton, 2007; Contento, Koch, Lee, & Calabrese-Barton, 2010; Cui et al., 2012; Dunton, Lagloire, & Robertson, 2009; Ghaffari, Sharifirad, Malekmakan, & Hassanzadeh, 2013; Schwarzer, Coa, & Lippke, 2010; Spruijt-Metz, Nguyen-Michel, Goran, Chou, & Huang, 2008; Tymms et al., 2016; Whittemore, Jeon, & Grey, 2013), and five included for the meta-analysis (Cui et al., 2012; Ghaffari et al., 2013; Schwarzer et al., 2010; Spruijt-Metz et al., 2008; Whittemore et al., 2013). A summary of the screening process along with reasons for full text exclusions is shown in Figure 3.1.

3.4.2 Study characteristics

Five studies were based in the USA (Contento et al., 2007; Contento et al., 2010; Dunton et al., 2009; Spruijt-Metz et al., 2008; Whittemore et al., 2013), two were based in China (Cui et al., 2012; Schwarzer et al., 2010), one was based in the UK (Tymms et al., 2016) and one was based in Iran (Ghaffari et al., 2013). Seven studies were cluster randomised control trials (Contento et al., 2010; Cui et al., 2012; Ghaffari et al., 2013; Schwarzer et al., 2010; Spruitj-Metz et al., 2008; Tymms et al., 2016; Whittemore et al., 2013) and two were pre- and post- cohort design with no control group (Contento et al., 2007; Dunton et al., 2009). Sample size ranged from $N = 85$ (Ghaffari et al., 2013) to $N = 1391$ (Tymms et al., 2016). The reported mean age of participants ranged from 11.8 to 15.3 years. Whittermore et al. (2013) included adolescents who were 16-17 years (~30% of the sample). This study was still included on the basis that ~70% of the sample met our age range criterion and the study was conducted within a secondary/high school setting. Most studies included

mixed genders except for Ghaffari et al. (2013) whose study included boys only, and Spruijt-Metz et al. (2008) whose study included girls only.

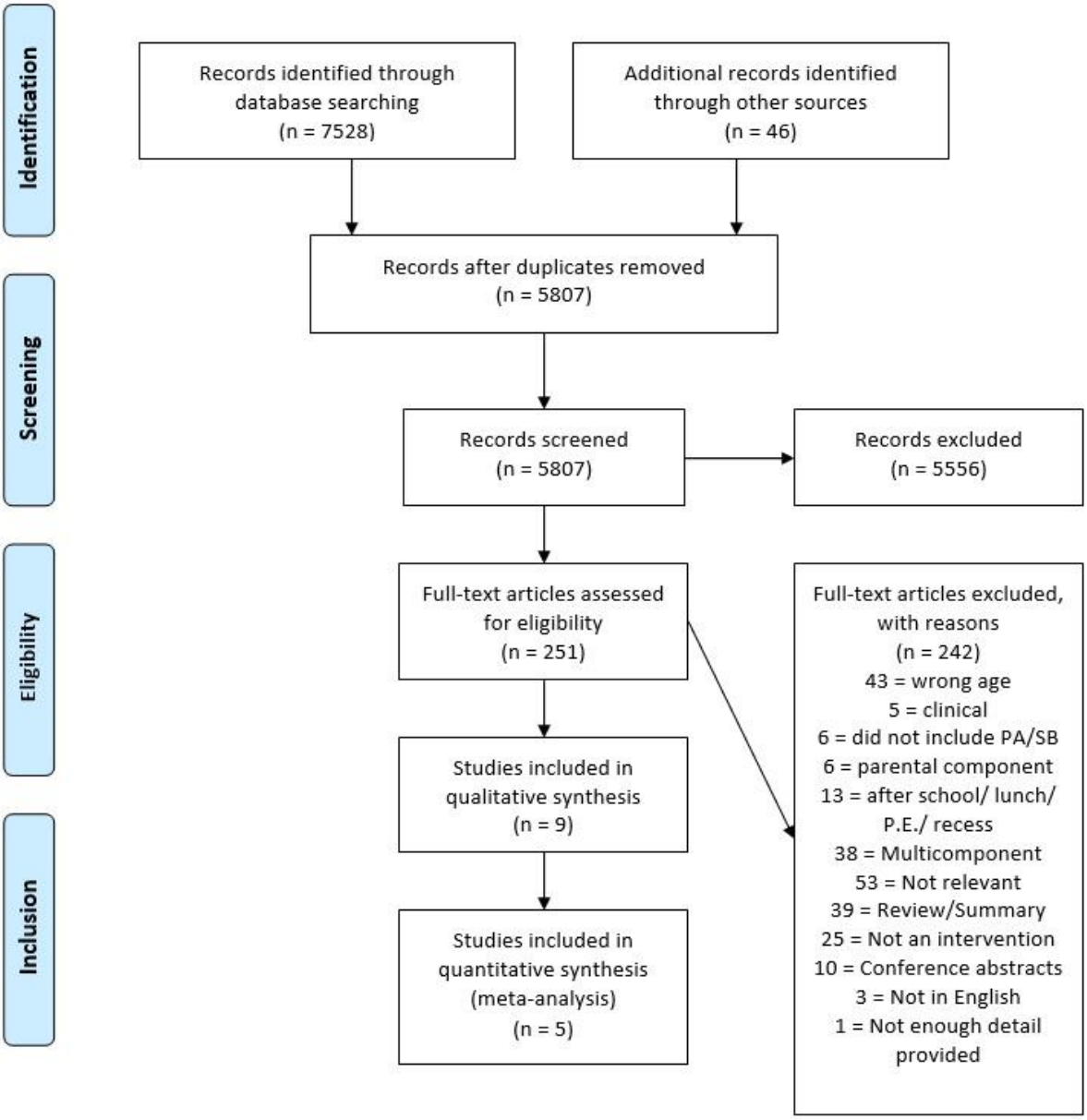

Figure 3.1 PRISMA flow diagram (Moher et al., 2009) showing study selection.

3.4.3 Interventions

The interventions included in the study were all classroom-based and were educational. Three of the studies investigated PA as an outcome (Ghaffari et al., 2013; Schwarzer et al., 2010; Tymms et al., 2016) and one study investigated both PA and SB as outcomes (Spruijt-Metz et al., 2008). Five studies had a nutritional element to the program alongside PA and SB (Contento et al., 2007; Contento et al., 2010; Cui et al., 2012; Dunton et al., 2009; Whittemore et al., 2013). The nutritional elements included, for example, education on fruit and vegetable consumption (Contento et al., 2007) and measuring these outcome variables. No studies investigated reducing SB only. Five studies measured psychological outcomes including self-efficacy, motivation, and attitudes (Contento et al., 2007; Contento et al., 2010; Ghaffari et al., 2013; Spruijt-Metz et al., 2008; Whittemore et al., 2013). Details on the interventions are presented in Table 3.2.

3.4.4 Theoretical underpinnings

Six of the nine studies reported using one or more theoretical frameworks to inform their interventions. Two used Self-Determination Theory (Contento et al., 2010; Deci, & Ryan, 1985; Spruijt-Metz et al., 2008); two used Social Cognitive Theory (Bandura, 1986; Contento et al., 2010; Cui et al., 2012); one used the Theory of Planned Behaviour (Azjen, 1991; Contento et al., 2007); one used Social Learning Theory (Bandura, 1977; Whittemore et al., 2013); one used Theory of Meanings of Behaviour (Spruijt-Metz, 1999; Spruijt-Metz et al., 2008) and one study used a version of Stages of Change model (Prochaska, & DiClemente, 1983).

3.4.5 Physical activity/ sedentary behaviour

All PA data were collected through self-reported measures, except for one study in which PA was measured objectively (Tymms et al., 2016). Varieties of PA outcome measures were reported. These included: MVPA (mins/day) (Cui et al., 2012; Tymms et al., 2016); PA performance (Ghaffari et al., 2013); PA expressed as the number of 30-minute blocks spent in each of three intensities (high, medium, light) (Spruijt-Metz et al., 2008); PA (days/week) (Dunton et al., 2009); moderate exercise (days/week for at least 30 minutes); vigorous exercise (day/week for 20 minutes) (Whittemore et al., 2013); PA frequency (presented as a score of 1-4; 1 = never, 2 = 2 times per week, 3 = 3-4 times per week, 4 = almost every day)(Schwarzer et al., 2010); walking; and stair climbing (Contento et al., 2007; Contento et al., 2010). There were varied results regarding the effects of the interventions on PA behaviour, with only three studies reporting significant results. Contento et al. (2010) found a significant increase in walking for transport and walking for exercise (0.55 days/week, p <.001, d = .26; 0.36 days/week, p = .044, d = .14, respectively) compared to control post intervention. Dunton et al. (2009) reported an increase of 0.43 days/week (p < .001, d = .2) at post intervention compared to baseline. There were no significant differences in PA frequency score reported by Schwarzer et al. (2010) when all participants were analysed together. However, when participants were split into Stages of Change (preintenders = low intention of performing PA; intenders = those who intend on performing PA; actors = those who perform PA), the highest increase in PA frequency score was found in preintenders (those least likely to take part in PA). This group had a significant increase PA frequency score of 0.84 (p < .01, d = .96), raising their score from M = 2.08, SD = 0.60 at baseline to M = *2*.92, SD = 0.76 post intervention in the resource communication group. This was higher than in the planning intervention group (M = *2*.15, SD = 0.71 vs M = 2.60, SD = 0.92, respectively) which was non-significant (p > 0.05, d = 0.42).

Six studies measured outcomes of SB, using self-report. One study measured SB (mins/day) (Cui et al., 2012); one measured SB (hours/day) (Whittemore et al., 2013); one measured screen time (television viewing/game play/internet usage) in hours/day (Dunton et al., 2009); one measured screen time in half hour blocks (Spruitj-Metz et al., 2008); two studies measured screen time in days/week (Contento et al., 2007; Contento et al., 2010). Four studies reported significant decreases in SB. Dunton et al.(2009) reported a significant decrease in time playing video games/computer use (0.31 hours/day; $p = .002$, $d = -.21$) and time watching television (0.16 hours/day; $p = .024$, $d = -.15$) post intervention. Contento et al. (2007) reported significant decreases in the number of days pupils watched television and played video games (0.33 days/week, $p = .003$, $d = -.18$; 0.60 days/week, $p < .001$, $d = -.25$, respectively). Contento et al. (2010) reported a significant ($p < .001$, $d = -.38$) decrease in leisure screen time (days/week) in the intervention group compared to control post intervention ($M = 4.85$, $SD = 1.8$; $M = 5.51$, $SD = 1.7$ days/week, respectively). Spruijt-Metz et al. (2008) reported a significant decrease in screen time in the intervention group compared to the control ($p < .05$, $d = -.28$).

Whittemore et al. (2013) reported significant differences between baseline, 3 month and 6 month follow up in vigorous PA (hours/day) in both the HEALTH[e]TEEN (control) and HEALTH[e]TEEN + Coping Skills Training (CST) groups ($p < .01$, $d = .032$; $p < .01$, $d = .031$, respectively) and, SB weekday (hours/day) ($p < .01$, $d = -.25$; $p < .01$, $d = -.31$) and SB weekends ($p < .01$, $d = -.35$; $p < .01$, $d = -.31$). Only the HEALTH[e]TEEN + CST had a significant increase on moderate PA (HEALTH[e]TEEN + CST $p < .01$, $d = .27$; HEALTH[e]TEEN $p = .06$, $d = .18$). However, the difference between the two groups were non-significant for moderate and vigorous PA.

3.4.6 Psychological outcomes

Psychological outcomes were measured in five of the studies (Contento et al., 2007; Contento et al., 2010; Ghaffari et al., 2013; Spruijt-Metz et al., 2008; Whittemore et al., 2013). Three studies measured pupils' self-efficacy (Contento et al., 2007; Contento et al., 2010; Whittemore et al., 2013). Two studies measured self-efficacy of walking and stair climbing (Contento et al., 2007; Contento et al., 2010). Contento et al. (2007) reported a significant (p = .008, d = .2) increase in self-efficacy for stair climbing from baseline to post intervention (M = 3.70, SD = 1.78; M = *4*.00; SD = 1.08, respectively) although there was no significant change in self-efficacy for walking (p = .42, d = .08). Contento et al. (2010) reported a significant difference between intervention and control post-intervention for self-efficacy for walking and stair climbing (combined) (M = 2.89, SD = 0.77; M = 2.60, SD = 0.81, p < .001, d = .37, respectively). Whittemore et al. (2013) reported that both groups (HEALTH[e]TEEN vs HEALTH[e]TEEN + CST) significantly (p < .01, d = .26; p < .01, d = .33) increased self-efficacy for exercise from baseline to follow up, yet there were no significant differences between the two groups (p = .46, d = .08).

Motivation was measured in two studies (Contento et al., 2010; Spruijt-Metz et al., 2008). Contento et al. (2010) measured pupils' autonomous motivation and reported significantly (p = 0.005) higher autonomy and competence towards PA in the intervention groups compared to the control group (autonomy: M = 3.13, SD = 0.74; M = 2.94, SD = 0.82, d = .24; competence: M = 3.13, SD = 0.77; M = 2.95, SD = 0.88, respectively, d = .22). Spruijt-Metz et al. (2008) measured the different constructs of motivation (external regulation, introjected regulation, identified regulation, and intrinsic motivation), with the exception of amotivation. Intrinsic motivation was the only form of motivation that significantly changed. The control group started off with higher scores compared to the intervention at baseline (M = 1.24, SD = 0.06; M = 1.11, SD = 0.07, respectively) yet post

intervention, there was a decrease in the control and an increase in intervention (*M* = 1.18, *SD* = 0.06; *M* = 1.16, *SD* = 0.07, respectively), corresponding to a net effect of 0.11 (*d* = .11) in favour of the intervention group.

Two studies measured attitudes towards physical activity (Ghaffari et al., 2013) and walking (Contento et al., 2007). Ghaffari et al. (2013) reported a significant ($p < .001$) increase in attitude scores from baseline to post intervention (*d* = 1.71) and follow up (*M* = 46.47, *SD* = 3.43; *M* = 53.94, *SD* = 2.11; *d* = 1.71; *M* = 52.07, *SD* = 4.06; *d* = 0.88, respectively). The post intervention and one-month follow up scores in the intervention were significantly higher than in the control group (*M* = 53.94, *SD* = 2.11; *M* = 47.58, *SD* = 5.76 for post intervention scores respectively; *M* = 52.07, *SD* = 4.06; *M* = 49.72, *SD* = 4.27 for one month follow up, respectively). Attitudes towards walking significantly increased after the intervention by Contento et al. (2007) compared to baseline scores (*M* = 4.16, *SD* = 0.73; *M* = 4.30, *SD* = 0.69, respectively, *p* = .022, *d* = .2). A full summary is presented in Table 3.2.

3.4.7 Quality assessment

Quality assessment was performed on the nine studies included. Of the nine studies, one was rated as strong (Spruijt-Metz et al., 2013), five were rated as moderate (Contento et al., 2007; Contento et al., 2010; Cui et al., 2012; Tymms et al., 2016; Whittemore et al., 2013), and three were rated as weak (Dunton et al., 2009; Ghaffari et al., 2013; Schwarzer et al., 2010). A summary of the ratings for each category is presented in Table 3.3.

Table 3.2

Summary of studies included in the review.

Author	Country	Design	Population	Intervention	Results
[d]Cui et al. (2012)	China	CRCT	12.7 years N = 682 Mixed gender	Peer-educational intervention (peers teaching educational content to those in their year on PA and SB)	No significant increases compared to control. MVPA (min/day) (p = .83, d = .01). MVPA in school (min/day) (p = .52, d = -.026) post intervention. No significant difference in SBs (p = .21, d = -.025) post intervention. Only significant reduction in SB was on weekdays & computer usage (p <. 05) at 7 month follow up.
[d]Ghaffari et al. (2013)	Iran	CRCT	14.0 years N = 85 Boys only 1st grade of High School	Educational intervention	Significant increase and large effect on knowledge & attitude scores for intervention group (p < .001, d = 1.94 and 1.71, respectively) at time point 2. No significant difference (p = .390) (d = -.38) in PA.
[d]Spruijt-Metz et al. (2008)	USA	CRCT	12.5 years N = 459 Girls only	Classroom media intervention	No significant differences (p > .05) – Light activity (d = .043), Moderate activity (d = -.07), high activity (d = .04). TV/ video game/ internet significantly decreased (p < .05, d = -.28). Significant increase in intrinsic motivation (p < .05, d = .11)
[a]Dunton et al. (2009)	USA	Cohort (pre and post design)	12.47 years N = 695 Mixed gender	"Exercise Your Options"	Significant increase in PA (p < .001, d = .2) & significant decrease in video games (hours/day) (p = .002, d = -.21) and TV viewing (hours/day) (p = .024, d = -.15).
[b]Tymms et al. (2016)	UK	CRCT	11.8 years N = 1391 Mixed Gender	Peer mentoring – Year 9 pupil mentors a Year 7 pupil, once a week for six weeks, to work through a booklet to help promote and increase PA. Participative Learning – Six lessons in Geography, which uses GPS to allow Year 7 pupils to collect data on their own PA.	No significant differences on daily MVPA between the Peer-Mentoring (p > .05, d = -.01), Participative Learning (d = .36), or a combination of both (d = -.02) compared to the control.

Author	Country	Design	Population	Intervention	Results
[d]Schwarzer et al. (2010)	China	CRCT	13.8 years N = 534 Mixed gender	Resource communication (emphasizing the importance of PA and discussing the pros and cons) Planning intervention (ways to overcome barriers to PA).	Significant increases in PA were reported between pre- and post- resource communication ($p < .01$, $d = .96$) for preintenders. This increase was non-significant in intenders and actors ($p > .05$, $d = .08$, $d = .01$). There were no significant increases in PA in the planning intervention ($p > .05$, $d = .22$).
[b]Contento et al. (2010)	USA	CRCT	12.0 years N = 1136 Mixed gender	"Choice, Control and Change" an educational intervention delivered in science/ physical education class (classroom-based)	Significant increase in walking for transportation ($p < .001$, $d = .26$), walking for exercise ($p = .044$, d = .14), stairs for exercise ($p < .001$, $d = .26$). Leisure screen time significantly decreased ($p < .001$, $d = -.38$). Significant increase in competence and autonomy ($p = .005$, $d = .22$, d .24, respectively). Significant increase in self-efficacy ($p < .001$, $d = .37$) and intentions to do more PA ($p = .012$, $d = .18$).
[a]Contento et al. (2007)	USA	Cohort (pre and post design)	12.0 years N = 278 Mixed gender	"Choice, Control and Change" an educational intervention delivered in science/ physical education class (classroom-based)	No significant difference for walking ($p = .830$, $d = .02$) or stair use ($p = .867$, $d = .01$). Significantly decreased days/week playing video games ($p < .001$, $d = -.25$), scores for minutes per day ($p < .001$, $d = -.27$). TV viewing days/week ($p = .003$, $d = -.18$), scores for hours per day TV viewing ($p < .001$, $d = -.3$).
[c,d]Whittemore et al. (2013)	USA	CRCT	15.3 years N = 384 Mixed gender	HEALTH[e]TEEN HEALTH[e]TEEN + Coping Skills Training (CST)	No significant differences between groups for moderate or vigorous PA ($p > .05$, $d = .18$), SB (weekdays or weekends) ($p > .05$, $d = -.09$, $d = .04$) or self-efficacy ($p > .05$, $d = .08$).

Abbreviations: CST, coping skills training; MVPA, moderate to vigorous physical activity; PA, physical activity; SB, sedentary behaviour.
[a] Cohort predesign and post-design study. Effect sizes presented are for pre-intervention and post-intervention. Not an interaction effect.
[b]Only data for 1 time point were presented. Effect sizes presented are for the one time point. Not an interaction effect.
[c] Both intervention and control were PA promotion programs yet one had additional CST.
[d]Effect sizes presented are interaction effect sizes.

3.4.8 Implementation

Six studies reported monitoring of implementation (Contento et al., 2007; Contento et al., 2010; Cui et al., 2012; Dunton et al., 2009; Tymms et al., 2016; Whittemore et al., 2013). To ensure fidelity, Contento et al. (2007) had a member of the research team observe a minimum of one lesson per week, provided all materials, and met weekly with teaching staff to provide guidance on how the lessons should be run. Similarly, Contento et al. (2010) had two members of the research team attend a third of lessons taught by the teachers, provided guidance on how the lessons should be run, and provided all materials. Whittemore et al. (2013) consulted with teachers prior to the intervention to try to optimise implementation. Pupil participation was also monitored by the research team bi-monthly.

Cui et al. (2012) monitored implementation through direct observation. A research member and an external figure observed the peer education classes. Immediately post intervention, a focus group was conducted with pupils and interviews were conducted with staff members of the schools. Results of the observation suggested that the material and classes delivered by the peer leaders met the content and objectives that were presented in the peer leaders' handbook. The data collected through interviews with staff members indicated that the intervention was feasible and acceptable.

Tymms et al. (2016) monitored implementation also by direct observation. Researchers were present for one or more classes and these classes were scored on how much they adhered to the program. The researchers also followed up with questionnaires (teachers and pupils) and focus groups (pupils).

Dunton et al. (2009) monitored implementation through observation and teacher surveys. Research members observed 50% of the lessons, while the surveys were used to evaluate the number of lessons delivered. Results of the observations suggested that 75% of

Table 3.3

Summary of ratings for each study under the different elements of the EPHPP tool.[1]

	Selection Bias	Study Design	Confounders	Blinding	Data Collection	Withdrawals and Dropout	Global Rating
Cui et al. (2012)	Weak	Strong	Strong	Moderate	Strong	Strong	Moderate
Spruijt-Metz et al. (2008)	Strong	Strong	Moderate	Moderate	Strong	Strong	Strong
Ghaffari et al. (2013)	Moderate	Strong	Weak	Moderate	Strong	Weak	Weak
Dunton et al. (2009)	Weak	Moderate	Moderate	Moderate	Weak	Moderate	Weak
Whittemore et al. (2013)	Weak	Strong	Strong	Moderate	Moderate	Strong	Moderate
Schwarzer et al. (2010)	Moderate	Strong	Weak	Moderate	Weak	Moderate	Weak
Contento et al. (2010)	Weak	Strong	Strong	Moderate	Strong	Moderate	Moderate
Contento et al. (2007)	Moderate	Moderate	Moderate	Moderate	Moderate	Weak	Moderate
Tymms et al. (2016)	Weak	Strong	Strong	Moderate	Strong	Moderate	Moderate

Note. Adapted version of the EPHPP tool was used. For study design, cluster randomised was added and given a strong rating. For blinding, "not relevant" was added as an option. Abbreviation: EPHPP, Effective Public Health Practice Project.

lessons were delivered in the order as designed and the teachers implemented 81−100% of the lesson plans. Results of the survey suggested that 86% of the teachers had delivered all eight lessons.

3.4.9 Meta-analysis

The results of the random-effects meta-analysis showed there were no significant individual study effects on PA or SB for the interventions included in the analysis. For PA, the overall effect of the interventions across the five included studies was non-significant (p = 0.55, d = 0.05, 95% CI [-0.11, 0.21]). For SB, the overall effect of the interventions across the three included studies was non-significant (p = 0.16, d = -0.11, 95% CI [-0.25, 0.04]). The I^2 for both meta-analyses indicated that there was substantial heterogeneity of the studies (67% and 52% for PA and SB respectively). The I^2 percentage determines the variance that could be attributed to the heterogeneity of the studies included for analysis. Forest plots of the meta-analyses are presented in Figure 3.2 and 3.3.

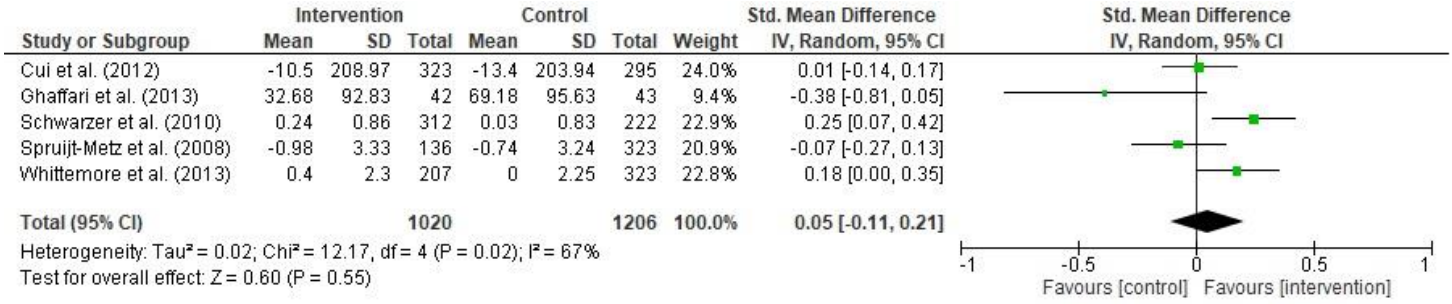

Figure 3.2. Meta-analysis of interaction effects on physical activity.

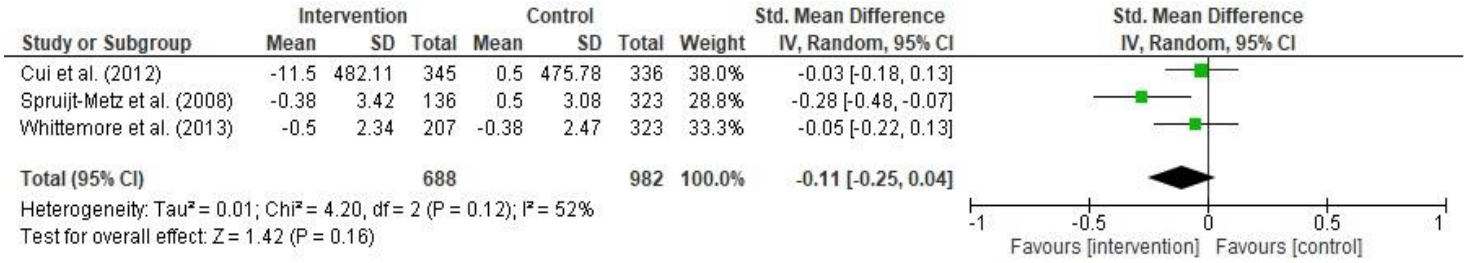

Figure 3.3. Meta-analysis of interaction effects on sedentary behaviour.

3.5 Discussion

3.5.1 Recap of aims

The aims of this systematic review were to:

i. Review classroom-based PA and SB interventions within an early secondary/ middle/ high school setting and determine the most effective methodology for increasing PA and reducing SB;
ii. Determine if implementation has an impact on the effectiveness of the interventions;
iii. Determine if these interventions have an impact on psychological constructs.

After an extensive screening process of over 7000 potential articles, nine studies were included for review based on the inclusion criteria. These studies varied considerably in design, and the interventions had varying effects on PA, SB and psychological outcomes.

3.5.2 Summary of evidence

Overall, the evidence collated from the review and meta-analysis has shown that classroom-based PA and SB interventions in early secondary schools have yielded mostly small or no effects on PA and SB. Results of both meta-analyses were non-significant. For studies that found significant effects on PA (Contento et al., 2007; Dunton et al., 2009), these effects were only small, and were based on post-intervention data only (Contento et al., 2007) and single group, pre- and post- intervention data (Dunton et al., 2009). The study by Schwarzer et al. (2010) did find a significant large effect for PA in the resource communication group for preintenders (d = 0.96) however, when all stages were analysed together, this effect was non-significant and only a small effect (d = 0.3). This stage of change is similar to the stage of 'precontemplation' in the more commonly known

Transtheoretical Model (TTM) (Prochaska & DiClemente, 1983). The authors used their own Stages of Change classifications (preintenders, intenders, and actors) instead of more traditional models such as the TTM. The resource communication intervention focused on the advantages and disadvantages of being physically active and being sedentary.

Four studies reported significant decreases in outcome measures for SB (Contento et al., 2007; Contento et al., 2010; Cui et al., 2012; Spruijt-Metz et al., 2008) but these were only small effects. Importantly, two of these studies lacked a control group (Contento et al., 2007; Dunton et al., 2009) and one study did not report baseline data, although the authors described the study as a pre/post, cluster randomised intervention-control design (Contento et al., 2010).

Five studies were included in the meta-analysis for PA as they used a two-group (intervention and control), pre-post design. This was justified so that an interaction effect of the study could be determined and these effects could be pooled together to provide an overall effect of the interventions which used a 'gold standard' study design. Of these five studies, only three were included in the meta-analysis for SB. Contento et al. (2007) and Dunton et al. (2009) were excluded from the meta-analyses, as both were a pre-post cohort design. Contento et al. (2010) and Tymms et al. (2016) were excluded from the meta-analyses, as the data presented were from one time point only (post-intervention). The results of the meta-analysis suggest that classroom-based interventions had no significant or meaningful effect on PA or SB in early secondary school adolescents.

The study by Whittemore et al. (2013) merits discussion. The 'control' class in this intervention were provided with the HEALTH[e]TEEN programme whereas the 'intervention' was the HEALTH[e]TEEN + coping skills training (CST). There were no significant differences between the two programmes in regards to PA or SB. Both

interventions appeared to have a significant effect on vigorous activity and SB (weekend and weekday) but only the HEALTH[e]TEEN + CST had a significant effect on moderate PA.

All interventions were implemented within the classroom and integrated into the school curriculum but none reported incorporating movement into the classroom. Incorporating activity and movement into the learning environment has shown positive effects on PA (Martin & Murtagh, 2015) and can enhance teaching and learning (Norris, Shelton, Dunsmuir, Duke-Williams, Stamatakis, 2015), however most of this evidence derives from primary school settings, indicating the need to expand this research into the secondary school environment.

The studies that measured psychological outcomes (Contento et al., 2007; Contento et al., 2010; Ghaffari et al., 2013; Spuijt-Metz et al., 2008; Whittemore et al., 2013) showed overall positive effects on self-efficacy, attitudes, motivation, and knowledge, however in some cases, this did not transfer into changes in PA (Ghaffari et al., 2013; Spruijt-Metz et al., 2008). Although increasing psychological constructs, such as self-efficacy, motivation and attitudes can facilitate behaviour change, the small number of studies in the review that measured psychological constructs makes it difficult to determine why changes in behaviour did not occur. However, this could be attributed to the intention-behaviour gap whereby there is a weak association between intention and behaviour (Rhodes & Dickau, 2012). As these constructs were measured by self-report, there could be an element of social desirability bias (Grimm, 2010) in that the pupils may have provided answers that they perceived would be desired by the researchers rather than answers true to them.

Implementation methods were reported in only six studies (Contento et al., 2007; Contento et al., 2010; Cui et al., 2012; Dunton et al., 2009; Tymms et al., 2016; Whittemore et al., 2013). Naylor et al. (2015) identified 22 factors that affect implementation, such as

time (which included the workload of the teacher, and other requirements), quality of resources, support of the school, teacher and pupil characteristics, pupil behaviour, and the schedule of lessons. Authors of two studies stated that to ensure fidelity, materials were supplied and researchers observed a percentage of the lessons, however the level of fidelity was not reported as part of the study (Contento et al., 2007; Contento et al., 2010). Similarly, results of the fidelity element for Tymms et al. (2016) were not reported. Whittemore et al. (2013) stated that they consulted with teachers prior to the intervention to ensure high implementation and monitored pupil attendance, but again, results of implementation were not reported. Only two studies presented results of their monitored implementation (Cui et al., 2012; Dunton et al., 2009). The results of the direct observation indicated high fidelity of the intervention. Implementation fidelity is a key component to interventions and the literature suggests that authors who report monitoring implementation of the intervention have greater impacts on the outcome measured (Durlak & Dupre, 2008). The common outcome variables measured in all six studies were PA and SB, but the results were varied. Therefore, it is difficult to determine the impact of implementation factors, such as the ones mentioned by Nayler et al. (2015) on the results, especially since the results of the implementation were not reported.

One of the quality assessment criteria was study design. Seven studies (Contento et al., 2010; Cui et al., 2012; Ghaffari et al., 2013; Schwarzer et al., 2010; Spruijt-Metz et al., 2008; Tymms et al., 2016; Whittemore et al., 2013) were rated strong for study design, as they were all randomised cluster control trials. Traditional RCT's wherein individuals are assigned to either intervention or control group are not appropriate for classroom-based studies as pupils are already in their set classes. As a result, the research group adapted the EPHPP tool to include randomised cluster control trials (Chillon et al., 2011) and agreed that this should be rated strong due to the randomisation and presence of a control group. Two

studies were rated moderate for design due to their one group pre- and post- cohort design (Contento et al., 2007; Dunton et al., 2009). Four of the studies were given a strong rating for confounders (Contento et al., 2010, Cui et al., 2012; Tymms et al., 2016; Whittemore et al., 2013). These studies reported controlling for all the primary confounding variables which were applicable to school-based interventions. Three studies (Contento et al., 2007; Dunton et al., 2009; Spruijt-Metz et al., 2008) were moderately rated for confounders. Dunton and colleagues (2009) stated they accounted for gender and grade only and did not have a control group present whilst Contento et al. (2007) were also rated moderate due to their lack of control group. Two studies (Ghaffari et al., 2013; Schwarzer et al., 2009) were rated weak due to lack of reporting of controlling for confounding variables. All studies were rated moderate for the blinding category in the EPHPP. The authors of this review agreed that the pupils may have had knowledge on what the research was, especially if the intervention classes were in the same school as the control classes, which applied to the studies by Schwarzer et al. (2010) and Whittemore et al. (2013). The authors added a 'Not Relevant' option for the item related to blinding of assessors. When working within schools, it is difficult and in some cases not possible to be blinded. Five studies were rated strong for validity and reliability of the measure used (Contento et al., 2007; Ghaffari et al., 2013; Spruijt-Metz et al., 2008; Tymms et al., 2016). The strong rating was awarded due to reporting sufficient evidence of measurement validity and reliability. Two were rated moderate (Contento et al., 2007; Whittemore et al., 2013) for reporting sufficient reliability evidence for the measurements used but not validity. Two were rated weak (Dunton et al., 2009; Schwarzer et al., 2010) due to lack of reporting of validity and reliability evidence (Schwarzer et al., 2010) or that the measurement tool used was not shown to be valid or reliable (Dunton et al., 2009). For the withdrawal section of the EPHPP, three were rated strong for having 90% or more completing the study (Cui et al., 2012; ; Spruijt-Metz et al.,

2016; Whittemore et al., 2013). Four were rated moderate for having between 60-79% of participants completing the study (Contento et al., 2010; Dunton et al., 2009; Schwarzer et al., 2010; Tymms et al., 2016) whilst two were rated weak due to reporting no data on withdrawal (Contento et al., 2007; Ghaffari et al., 2013).

3.5.3 Quality of Intervention Description

The studies varied in terms of the description detail of their interventions, with one study not providing any description of the intervention (Ghaffari et al., 2013), another study providing in-depth detail of the intervention (Spruijt-Metz et al., 2008), and another being a state-wide intervention (Dunton et al., 2009) whereby lesson plans/materials can be ordered online by teachers (Dairy Council of California, 2019). Spruitj-Metz et al. (2008) published the most detail in regards to their intervention, providing lesson by lesson descriptors and the materials used. The authors also provided examples of key messages delivered and reported the statements use to reinforce internalised motivations and emphasised that PA is positive behaviour. Although this study was the most detailed, other studies did provide a very good overview of their interventions (Contento et al., 2007; Contento et al., 2010; Cui et al., 2012; Dunton et al., 2009; Schwarzer et al., 2009; Tymms et al., 2016; Whittemore et al., 2013). However it would be very difficult to repeat these interventions based on the level of detail provided in the published studies alone. For instance, although Spruijt-Metz et al. (2008) provided examples and described the lessons, there is no specific description of the content itself (e.g., all the materials used, how the lessons were delivered) which could influence implementation and results of the study. However, as mentioned above, Spruijt-Metz et al. (2008) did provide the reader with the statements used to reinforce internalised motivation and positive associations with PA. This method was incorporated into the ActiveChat lesson plans as part of the feasibility study (Chapters 5 and 6), due the suggested positive effect on

intrinsic motivation. The study design, data collection methods, and theoretical frameworks used in the nine studies included in this review varied considerably, with mixed results in regards to PA/SB behaviour and psychological constructs. Michie et al. (2011) suggests that change in behaviour is determined on three primary factors; opportunity, motivation, and capability. The studies included in the review primarily focus on motivation, and a capability through the education of PA/SB, rather than opportunities (due to this educational nature of the interventions). Michie et al. (2013) has also identified key behaviour change techniques. Although behaviour change techniques were identified within studies (e.g. goal setting), there are no clear indications of the specific behaviour change techniques within the educational components that are effective or ineffective based on the published descriptors, and a conclusion cannot be drawn due to the variation in intervention methods and results, particularly in regards to PA behaviour.

3.5.4 Strengths and limitations

Study limitations

There were a number of limitations at the study and outcome level of this review. Three of the studies were rated as weak for risk of bias and quality reporting. Four of the studies reported using convenience sampling to access participants. Although this is rated as weak due to the low likelihood of a true representation of the target population, it should be noted that when researching within the education system, recruitment is often determined by which schools (principals and teachers) support the project proposed (Rice, Bunker, Kang, Howell, & Weaver, 2007).

Length of the nine interventions ranged from one 1-hour lesson (Schwarzer et al., 2010) to 24 lessons over 10 weeks (Contento et al., 2010). Not only is this a substantial difference in regards to exposure of the intervention, but some interventions included

nutritional elements. Some of these studies reported the number of sessions dedicated to PA/SB (Cui et al., 2012; Dunton et al., 2009) however some did not (Contento et al., 2007; Contento et al., 2010; Whittemore et al., 2013). This makes it difficult when reviewing these studies to determine the true exposure of pupils to the PA/SB elements of the intervention and, whether this could have influenced the effectiveness of the interventions.

This review has shown that targeting participants within specific Stages of Change could have the greatest positive impact on PA (Schwarzer et al., 2010). However, targeting specific Stages of Change strategies in the classroom may be difficult as pupils are already enrolled in the classes and depending on the education system, it may not be feasible to rearrange classes or target particular pupils within an existing class group setting. There was also little reporting on variables that could potentially affect implementation of the interventions, in the studies included for review.

Review limitations

This systematic review and meta-analysis has numerous strengths. To our knowledge, this is the first review to summarise and analyse classroom-based PA and SB interventions in secondary/ middle/ high school adolescents aged 11-15 years. However, this review only included articles that were published in English and did not include other sources (e.g., conference abstracts). Caution should be taken when reviewing the meta-analysis section. Findings from the meta-analysis suggest there was a degree of statistical heterogeneity for both PA and SB. This variance might be attributed to the methodological differences in design and outcome measures of PA and SB for each study included in the meta-analysis. Furthermore, only studies that had a control group were included in the analysis therefore there were no statistical analyses performed on the two pre- and post- cohort studies despite

reporting significant results. A number of difficulties arose when performing the meta-analysis. In situations where outcome measures were presented separately (moderate and vigorous PA) (Spruijt-Metz et al., 2008; Whittemore et al., 2013), only moderate PA was included. Schwarzer et al. (2010) presented two intervention groups vs. a control. Results of the two intervention groups were combined to form a single intervention group. A meta-analysis was not performed for psychological constructs due to the different constructs being measured (i.e. self-efficacy and motivation are different and therefore should not be compared within a meta-analysis).

3.6 Conclusion

Overall, there appears to be no clear classroom-based methodology for effectively increasing PA and reducing SB in early secondary school adolescents. This is likely due to the lack of research in this area. The overall findings of this review agree with Russ et al. (2015) that these interventions only produced small effects on PA and SB. The meta-analysis has shown that currently, either classroom-based PA/SB or PA only interventions have no effect on increasing PA or reducing SB, however this evidence is limited due to the lack of studies providing two group, pre- and post- data. There is still little research regarding school-based interventions on reducing SB, and the effectiveness of these interventions is still largely unknown (Hegarty, Mair, Kirby, Murtagh, & Murphy, 2016). The results of this review support this statement.

The emerging evidence shows there is a positive association between increasing PA, and reducing SB on academic attainment and on-task behaviour. Studies suggest that levels of PA decline as children enter secondary school and transition into adolescence (Marks, Barnett, Strugnell, & Allendar, 2015). Contradictory to this view, a review has suggested that PA decreases before children enter adolescence (Reilly, 2016). Regardless, physical inactivity

is a global issue for adolescents and programs that focus more on all aspects PA and SB, rather than sport and PE, could help break down barriers, increase motivation, and positive attitudes towards PA, and reduce SB, as shown in this review. More research is needed in secondary/middle/ high schools in regards to active classrooms (where movement is incorporated into the learning environment) as little has been conducted in this age group and setting, and much more rigorous reporting of implementation is vital so that researchers can understand the variables that influence the implementation of such interventions.

Chapter 4 (Study 2): A classroom-based physical activity program in adolescents: An evaluative case study of the ActiveChat programme.

4.1 Preface

This chapter presents an evaluative case study, which explores teacher and teacher educators' perceptions and opinions, and researcher's reflections of the classroom-based PA and SB programme - "ActiveChat". The findings of this study were used to address the overall aim to develop and refine the ActiveChat programme that would then be trialled as a feasibility study (Chapters 5 and 6), integrating it into S1-S3 classes in a secondary school in Glasgow.

4.2 Introduction

4.2.1 Context of research

As highlighted in Chapter 2 of this thesis, promoting PA within the school curriculum has become a priority worldwide. Due to this, and the emphasis on health and wellbeing within the Scottish education system, an educational knowledge exchange programme called "ActiveChat" was developed and implemented within a local Glasgow secondary school in January-March 2015. The aims of ActiveChat were to:

i. Raise pupil awareness of their own PA levels and SB;
ii. Increase pupils' motivation for being physically active and reducing SB;
iii. Develop pupils' understanding of scientific research and to gain experience as researchers through the opportunities provided by participating in a University programme;
iv. Give pupils a sense of what it might be like to be at University;

v. Create a programme that incorporates five key areas of the Curriculum for Excellence.

The ActiveChat programme was developed as part of the Models of University Schools Engagement (MUSE) project at the University of Strathclyde – the only MUSE project in Scotland (University of Strathclyde, n.d.). The aims of the MUSE project were to:

> Inspire the next generation by facilitating engagement between secondary school pupils and researchers to bring contemporary research into formal and informal learning contexts to enhance the curriculum and raise ambition;
>
> i. Reach secondary school pupils from a diversity of backgrounds and abilities and engage the widest possible range of teachers and schools in ways which have maximum impact on teaching quality and learning;
> ii. Provide researchers (particularly those in the early stages of their career) with opportunities and training to engage with secondary school pupils and develop their transferable skills;
> iii. Support secondary schools and Higher Education Institutions to work together to create structured, strategic, sustainable and equitable mechanisms for school-university engagement which increases the breadth and quality of interactions between researchers and pupils. (University of Strathclyde, n.d. p.1).

The ActiveChat programme was developed based on these MUSE aims and was designed as a 10-week programme consisting of 10x50-minute lessons, delivered by three ActiveChat Mentors. The ActiveChat mentors were three students from a local University, one PhD researcher (author of this thesis) and two undergraduate students. The lessons were delivered to the same S3 (aged 13-14 years) Wider Achievement class each week at the same

time. Wider Achievement is a Scottish Qualifications Authority award that is flexible and allows pupils to experience different learning practices; develop various skills; and increase confidence and motivation to be successful in their learning (Scottish Qualification Authority, n.d.). Each ActiveChat lesson addressed different topics related to PA and SB to keep it interesting and encourage pupil engagement. An overview of all lesson titles of the ActiveChat programme are shown in Table 4.1. For more details on lesson content and materials, see Appendices A and B.

Table 4.1.

Overview of the ActiveChat Programme.

Lesson Number	Lesson Title
Lesson 1	Introduction to the ActiveChat programme
Lesson 2	Physical Activity
Lesson 3	Sedentary Behaviour
Lesson 4	Pedometers
Lesson 5	ActivPAL Activity Monitor
Lesson 6	Reflective Session
Lesson 7	Data Analysis
Lesson 8	Research Presentation Topic
Lesson 9	Design PowerPoint Presentation
Lesson 10	Group PowerPoint Presentations

The ActiveChat programme was developed and based on the sub-theory of the SDT: Basic Psychological Needs Theory (Ryan & Deci, 2000b). This theory emphasises the importance of perceived satisfaction of autonomy, competence and relatedness and increasing intrinsic motivation (Chen, 2014; Schneider & Kwan, 2013). Each lesson aimed to allow pupils to experience autonomy (e.g. through the emphasis of pupil choice of the PA they can participate in); competency (through tasks which can be successfully completed, e.g. the walking tasks); and relatedness (e.g. encouraging group discussions regarding PA).

An important aspect of the ActiveChat programme was that it addressed learning outcomes from key areas of the CfE. As the ActiveChat programme was part of the school curriculum, it was important that health and wellbeing, literacy and numeracy were addressed. Twenty-nine learning outcomes from the CfE were addressed; 10 were health and wellbeing; 12 were literacy; three were numeracy; two were expressive arts, and two were technologies. Due to the educational nature of the ActiveChat programme and its emphasis on PA and SB, health and wellbeing learning outcomes were a focus of the programme. One critique is that the health and wellbeing learning outcomes focus on PA and do not directly address SB; however, the lessons on SB did still address outcomes from health and wellbeing as the pupils learned about the implications of SB on health. For a full summary of all learning outcomes addressed in the 10-week programme, see Appendix C.

The concept of the ActiveChat programme was developed prior to the author commencing the PhD research. The author took this concept, and developed it based on published research. This development included the adaptation of the lesson plans, creation of the lesson PowerPoints and materials. Some materials included in the ActiveChat programme had been developed previously and not by the author (weekly PA diary, goal setting forms).

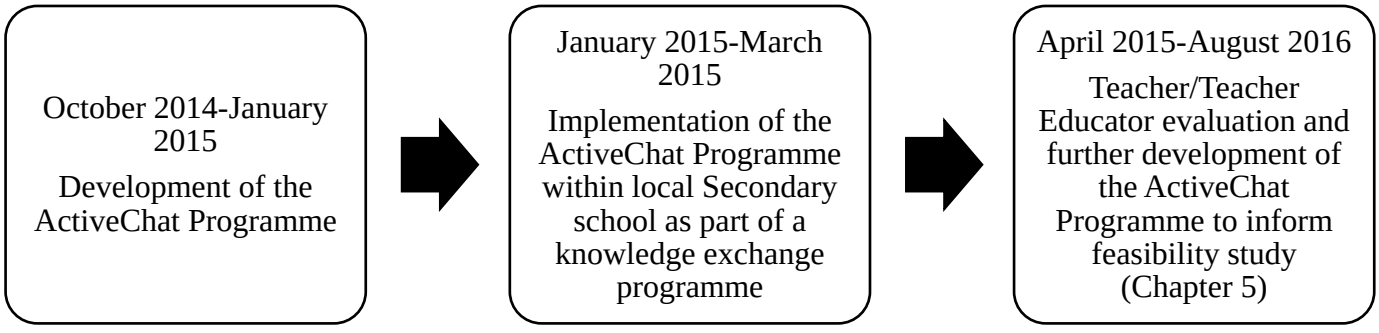

Figure 4.1 Timeline of the development of the ActiveChat programme

4.2.2 Aims of the study

For classroom-based programmes to fully integrate into the Scottish education system, it must meet the learning outcomes of the CfE and meet the needs of the school, such as, integrating it within the most suitable subject, whilst positively engaging pupils. There were two main aims of this evaluative case study:

i. To collate the opinions and expertise of secondary school teachers and teacher educators on the ActiveChat programme prior to its delivery;
ii. To analyse the primary researcher/ActiveChat mentor's personal reflections on their delivery of the ActiveChat programme.

The combination of these two aims addressed the overarching aim of developing and refining of the ActiveChat programme, which was then trialled as a feasibility study. The feasibility study is presented and discussed in Chapters 5 and 6 of this thesis.

4.3 Methods

4.3.1 Participants

Teachers/ teacher educators

Participants were secondary school teachers and teacher educators from education departments at various universities within Scotland. Teachers and teacher educators who have experience with the Scottish education system were targeted due the ActiveChat programme being implemented within Scotland, and addressing CfE learning outcomes.

The researcher

The participant was an 'ActiveChat mentor', the primary researcher of the study, and author of this thesis. The 'ActiveChat mentor' is a female who was 24 years old at the time the ActiveChat programme was first implemented as a knowledge-exchange programme. As

an ActiveChat mentor, she was one of the individuals who delivered the ActiveChat programme to the class of 13-14 year olds in the local secondary school.

4.3.2 Protocol

Teacher evaluation

The protocol was submitted to the School Ethics Committee at the University of Strathclyde in April 2015 and was given approval that same month. Target participants were qualified secondary school teachers who work within the Scottish education system and teacher educators in education departments at Scottish universities.

Prior to the development of the survey questions, a semi-structured interview schedule was created. This would have been used to guide an interview with the teacher who was present during the ActiveChat programme. However, this was made redundant due to participant dropout. The survey questions were adapted from the semi-structured interview schedule. The survey questions were reviewed by three experienced teacher educators. They provided feedback on the order of the questions, wording of the questions, survey length, and general comments on the survey. The survey questions were further adapted to ensure detailed information on specifics of the programme (e.g., does the ActiveChat programme address 3rd phase learning outcomes of the CfE) were collected. The survey was formatted using an online research software platform (Qualtrics LLC, Provo Utah, USA). Participants had access to the survey through an anonymous link, which was distributed electronically through email or social media. A detailed description of the ActiveChat programme (i.e. lesson plans, materials and CfE learning outcomes), along with an embedded copy of the information sheet was added to the survey. Implied consent was given by all participants who completed and submitted their survey answers. Demographic information was provided by

the participants. These were age range; gender; teacher educator or school teacher; years' experience in the profession; subject area; postcode of school/institution (to gather socioeconomic information) and if the school was single or mixed gender. No identifying information was collected.

To recruit teachers and teacher educators, the link was sent to various secondary schools and school of education departments across Scotland. The link was also sent directly to teachers/ teacher educators who had a personal affiliation with the researcher. Teachers and teacher educators were asked to review the ActiveChat programme lesson plans and supported materials, and provide feedback based on their professional opinions, having actively been involved within the Scottish education system at secondary level. Participants were free to contact the researcher if they had any questions regarding the survey.

Reflections of the ActiveChat programme

Throughout the implementation of the programme, a reflective evaluation of each lesson was completed by the primary researcher/ActiveChat mentor. The reflective evaluation addressed key constructs from Gibbs' (1988) reflective model. The reflections were recorded using a template consisting of 10 reflective questions/statements on a 10-point Likert Scale, allowing the researcher to reflect upon the lesson objectively (1 = *Very Bad*, 10 = *Very Good*) The Likert Scale addressed teaching elements such as pupil behaviour, teaching style and content relevance. The full Likert Scale is shown in Table 4.2. Reflection-In-Action (assessing and reflecting on the situation as it happened) and Reflection-On-Action (assessing and reflecting on the situation after the lesson) (Schon, 1983) were completed along with reflections on what worked well in the class and what needed to be changed for future implementations.

4.3.3 Data analysis

Survey data

Data collection involved a set of predetermined questions; therefore, data analysis was primarily deductive in nature, yet inductive analysis was used to identify relevant information that was not considered as part of the survey questions. A semantic approach to the data was taken and nothing beyond what the participant had written was analysed (Braun & Clark, 2006).

Researcher's personal reflections

The researcher's own personal reflections of the ActiveChat programme were reviewed to provide further evaluation on programme implementation. The information extracted included reflections on timing of activities, level of difficulty regarding lesson content and materials, and activities and/or classroom set up that worked well and that did not work well in regard to pupil engagement.

4.4 Discussion of Results

4.4.1 Teacher/ teacher educator evaluation

Demographic data

Five participants completed the evaluation survey. The sample consisted of three females and two males, aged between 25-54 years. Teaching experience ranged from three to 20 years. Four participants were school teachers and one was a university teacher educator. As the survey was aimed at teachers and teacher educators in Scotland, all participants had experience with the CfE. Three participants were experienced in teaching PE, whilst two

were experienced in other subjects including maths, psychology, computing and business education. A full summary of demographic data is shown in Table 4.3.

Table 4.2

Example of Likert Scale used in the Reflection template

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
+ve activity - talk ratio (pupils doing more activity than ActiveChat mentor talking)	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Effective use of voice (Variety) (loud, clear)	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10

Summary of data

Two PE teachers believed the programme was too simplistic for an S3 class and suggested that the graphics were too juvenile. There were some discrepancies between participants as to whether lesson plans were suitable for a 50-minute class. Ultimately, this would be difficult to determine as this would depend on a number of factors including individual class, pupil behaviour and pupil engagement. Participants commented on the

length of the ActiveChat programme as a whole. One suggested that the programme could be extended beyond 10 weeks, yet this was contradicted and suggested that 10 weeks was too long and one lesson per week for 10 weeks may lose momentum and pupil interest. Participants who suggested the programme was too long were from varying subject disciplines including maths, psychology and business, and ranged from 8-20 years' experience, while the teacher who suggested it could be longer was a relatively new teacher (3 years' experience) and in a PE discipline. This might suggest that certain programme lengths might work for different subjects. It was recommended the ActiveChat programme would fit into Personal, Social and Health Education (PSHE) class, and that PSHE topics may be more effective in shorter blocks. A full summary of teacher/teacher educator responses can be seen in Table 4.4.

4.4.2 Researcher's reflections

Summary of Likert scale evaluation

Across all teaching elements assessed by the researcher themselves, the lowest accumulated score (61) was reported for lesson 1 (introductory lesson), whilst the highest accumulated score (84) was for lesson 3 (SB lesson). When reflecting on each individual teaching element, the greatest improvement was between lessons 1 and 2 for 'appropriate use of demonstration', where the score increased from three to eight. A full summary of this evaluation for different teaching elements is shown in Table 4.5.

Table 4.3

Demographic information of participants

Gender	Age	Teacher/ Educator	Primary/ Secondary	Years of Experience	Subject Area	Gender of School	School SIMD Quintile
Female	25-34	School Teacher	Secondary	8	Maths	Mixed gender	4
Male	25-34	School Teacher	Primary/ Secondary	3	Physical Education	Mixed gender	N/A
Female	45-54	School Teacher	Not specified	20	Business/Education/ Computing/Psychology	Mixed gender	5
Male	35-44	School Teacher	Secondary	18	Physical Education	Mixed gender	5
Female	35-44	University Teacher Educator	Secondary	15	Physical Education		N/A

Table 4.4

A summary of the participants' responses from the ActiveChat evaluation survey

Question	Positive Comments	Negative Comments/ Suggestions for Improvement	Summary
Do you think the lessons delivered (from the lesson plans) were aimed at an appropriate educational level for an S3 class? Please comment.	Three of the five participants reported that the lessons delivered were aimed at an appropriate educational level for S3 pupils. One participant highlighted that the lessons allowed for pupils to express their own opinions (pupil voice).	Two of the five participants stated that all or some of the content was not age appropriate for S3 pupils. It was suggested that graphics were too young, and the content was not at an appropriate difficulty level for S3 pupils and was referred to as 'too basic'.	There were mixed opinions on whether the lessons were at an appropriate educational level for S3 pupils. If this is to be delivered to an S3 class, adaption will need to be made to make the lesson more challenging for S3 pupils. Pupil voice should still be incorporated.
Do you think the supporting materials (e.g. questionnaires) used were at an educational level appropriate for an S3 class? Please comment.	Four of the five participants reported that the materials were at an appropriate educational level for S3 pupils. Positive adjectives were used to describe the materials including 'clear', 'stimulating', and 'functional'. It was stated that the varied options available to pupils was a positive and allowed all pupils to be involved.	One participant reported that the presentations were clear and support sheets were functional yet the materials were not appropriate for S3 pupils.	The feedback from participants regarding the supporting materials used was positive. Some adaptations were suggested, such as adapting games to make them more competitive and to repeat pupil goals more often. For future implementations at this age group, materials will need to be adapted to better target S3 pupils.
Do you think the lesson plans supported the delivery of the 3rd phase learning outcomes for the Curriculum for Excellence? Please comment. (Please see attached documents).	All five participants stated that the lesson plans supported the delivery of the 3rd phase learning outcomes for the CfE. One participant emphasised that health and wellbeing outcomes were well covered and that incorporating different curricular elements was 'impressive'.	One participant reported that the 3rd phase learning outcomes for some pupils start in Primary 7 (age 11 years), therefore the lesson plans were targeted towards the lower end of the 3rd phase. S3 pupils should start to be aiming for 4th phase outcomes.	All participants stated the lesson plans supported the delivery of the 3rd phase learning outcomes of the CfE yet the 3rd phase can start from Primary 7. For future implementation for S3 pupils, outcomes may need to be tailored towards the 4th phase learning outcomes. This could be achieved through some of the suggestions participants provided, e.g., getting pupils to compare various apps and devices to measure their step count.

Question	Positive Comments	Negative Comments/ Suggestions for Improvement	Summary
Do you think the supporting materials (e.g. questionnaires) used supported the delivery of the 3rd phase learning outcomes for the Curriculum for Excellence? Please comment.	All participants stated that the supporting materials used addressed the 3rd phase learning outcomes for the CfE.	Two participants reported that the content was not age appropriate for the S3 pupils even though they addressed 3rd phase learning outcomes of the CfE. It was suggested that the images used were targeted towards younger pupils and content was not challenging enough for S3 pupils.	Overall, the materials used supported the delivery of the 3rd phase learning outcomes for the CfE. For future implementations of the ActiveChat programme, materials aimed at S3 pupils should be adapted to be more challenging.
Are there any aspects of the programme (lessons and materials) you feel did not meet the learning outcomes for the Curriculum for Excellence? Please comment.	Three participants commented that no aspects of the programme did not meet the learning outcomes for the CfE.	**N/A**	The feedback provided indicated that all aspects of the ActiveChat programme met learning outcomes for the CfE.
Are there aspects of the programme that you think would be particularly effective in an S3 class (e.g. specific activities, the content)? Please comment.	Four participants identified aspects of the programme they believed would be particularly effective. This included the pedometer lesson; the scenario tasks in the SB lesson; allowing the pupils to identify their motivations and barriers; and the active learning activities. It was also suggested this programme would be effective in a PHSE class or a PE class.	One participant suggested there are aspects of the programme which may 'exhaust' themselves and pupils might lose motivation and attention quickly.	Participants identified aspects of the programme that they believed would be particularly effective in an S3 class. Suggestions were also provided of other activities that may be effective, such as, presenting findings by making a YouTube clip rather than a PowerPoint.
Are there changes you would make to improve pupil engagement e.g. content of lessons, level of difficulty in the tasks, timing of activities? Please comment and provide as much detail as possible.	One participant stated they would not change anything.	One participant suggested the length of the block was potentially too long being 10 weeks if it were to be implemented into a PHSE class. One participant responded that this programme should be delivered to S1 instead of S3. One participant analysed the content of the programme and suggested adaptations for specific activities, for example, provide different icebreaker games, and reduce number of quizzes in one lesson.	Three of the participants suggested adaptations to improve the ActiveChat programme. Key information extracted were that the target age group should be S1 and that the programme was perhaps too long and should be reduced (6 weeks – which is a normal block in PSHE).

Question	Positive Comments	Negative Comments/ Suggestions for Improvement	Summary
Do you think the programme met the intended aims? (See below). Please comment. i. **Raise pupils' awareness of their own physical activity and SB.** ii. **Increase pupils' motivation for being physically active and reducing SB.** iii. **Develop pupils' understanding of scientific research, and to gain experience as researchers through opportunities to engage in a University programme.** iv. **Give pupils a sense of what it might be like to be at University.** v. **Create a programme that incorporates five key areas of the Curriculum for Excellence.**	Two participants stated the ActiveChat programme met the five aims. One participant stated it met aim one and another participant stated is met aims one and two.	One participant suggested that aims three to five could not be met due to the content of materials being too basic. One participant responded that the programme length may be too long and pupils could lose interest. One participant believed that the programme would not change pupils' motivation to being active.	The feedback provided suggests that the programme would increase awareness and motivation towards PA. It is inconclusive whether the programme develops pupils' understanding of scientific research or enhances their experience for what it is like to be at University. From previous comments, it would suggest that the programme does incorporate five key areas of the CfE.
Do you think the amount of content (number and type of learning activities) per lesson was suitable for a 50-minute class? Please comment.	Two participants stated the lesson and content were suitable for a 50-minute class.	One participant stated the lesson plans would take longer than 50 minutes yet another participant stated it would take less than 50 minutes.	It is difficult to determine whether or not the lessons are appropriate for a 50-minute class due to the varying opinions of the participants. As one participant stated, this would be determined on the engagement of pupils. One suggestion made was that the person delivering the programme should use a timer to guide the lessons and thus know when to move on to the next activity.

Question	Positive Comments	Negative Comments/ Suggestions for Improvement	Summary
Are there any changes that you would make to the programme in order to integrate into the school curriculum more effectively e.g. changes to content, number of activities, timings, overall length of the programme? Please comment.	N/A	There were a number of suggestions made by the participants which could improve the programme for future implementations. It was reported the programme was too long being 10 weeks and should be shortened yet another participant contradicted this response by stating that the programme should be extended. One participant suggested there are too many activities for a 50-minute class whilst another participant reported that 10 lessons once a week may lose momentum and might be more effective as half-day blocks. Finally, a participant stated the programme needed to have a higher difficulty level for the pupils.	There were a number of suggestions made to improve the programme yet some suggestions contradict each other and would be school dependent.
Do you have any other comments you would like to add?	One participant stated that teachers who deliver PSHE would 'love it'. One participant commented that the 'lesson plans, materials and links to CfE are really impressive' and that they thought pupils would be interested and engaged.	One participant stated that the majority of the content was geared towards a much younger age range.	The feedback provided was mostly positive towards the programme with some suggestions for further improvement.

The pedometer and reflective lessons were the most challenging in terms of gaining pupils' interest. Contradictory to initial thoughts by the ActiveChat mentors, the pedometer lesson was also perceived as unsuccessful. Taking the pupils out of the classroom environment resulted in a number of pupils becoming disruptive. This may have been attributed to the ActiveChat mentors' lack of experience in pupil management. A small number of pupils took an interest in the three different activities (walking normally for 5 minutes, walking at various paces, and walking up and down stairs) but most pupils were not engaged with this lesson. Timings of the lesson were also problematic. It took far longer to explain the activities and get the pupils out of the classroom, which resulted in groups having incomplete data.

The reflective lesson was designed to allow the pupils to reflect on what they had learned over the first five weeks of the ActiveChat programme, and determine if they had adapted their PA behaviour and met their goals. Pupils were reluctant to complete the questionnaires, as this was a repetition of the first lesson. Pupils' dislike of repetition has been highlighted in more recent literature (Dyrstad et al., 2018; Norris, Dunsmuir, Duke-Williams, Stamatakis & Shelton, 2018b). As this was an 'individual' activity, the class were kept together as a whole instead of separating them out into their groups. This lesson might have been more successful had the pupils been in their groups, which was an effective method in previous lessons. Pupils also did not fully complete the goal setting forms; therefore, it was difficult to discuss whether they met their intended goals. The repetitive nature of this lesson did not engage the pupils. Again, timing of the lesson was problematic, potentially due to too many activities in the one lesson, or it may have taken longer for pupils to complete activities due to disengagement. A full detailed account of the researcher's reflections are presented in Appendix D.

Table 4.5

Summary of scores on Likert scale evaluation

	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6	Lesson 7	Lesson 8	Lesson 9	Lesson 10
Pupil/ teacher cooperation/ rapport	5	7	8	6	8	6	7	6	7	6
Learning intentions achieved	5	8	8	5	7	5	6	6	7	7
Clarity of instructions	5	7	7	6	7	6	6	6	7	7
Relevance of content	7	8	8	6	6	6	7	7	7	7
Smooth transitions between lesson stages	6	8	8	6	7	6	6	6	6	5
Appropriate use of demonstration	3	8	7	7	7	6	6	6	5	5
Pupil behaviour	5	7	8	5	7	7	7	7	8	7
Teaching style helped achieve learning intentions	5	8	8	6	7	6	7	7	6	6
+ve activity – talk ratio	7	7	7	7	7	6	6	6	6	6
Effective class management	6	8	8	5	8	7	7	7	7	8
Effective use of voice (variety)	7	7	7	6	7	7	7	6	7	8
Total Scores	61	83	84	65	78	68	72	70	73	72

What activities worked in the ActiveChat programme?

There were a number of pedagogical methods that were effective when working with S3 pupils. According to the researcher's reflections, one method was short presentations. This meant that pupils were only required to listen for 2-3 minutes at a time before going into an activity. Another method which worked effectively was dividing the class into small groups to perform activities. This meant each ActiveChat mentor could work with a group individually. This allowed for more in-depth discussions with the pupils. This provided more opportunities for each pupil to express their opinions and appeared to have a positive effect on their confidence. This was an important part of the ActiveChat programme as this allowed pupils to experience autonomy. Activities which required the pupils physically moving seemed effective in engaging pupil interest. These activities included: 'Charades' – where a pupil would act out a form of PA (e.g. walking, playing golf); throwing a soft ball to pupils who had to catch the ball to answer a question and then throw it back to the ActiveChat mentor; and activities that required them to move and stand up at the board. Pupils appeared to be engaged with tasks when they were in teams. By working together in groups, this enhanced relatedness between themselves and the mentors. The pupils were also engaged in materials that were not familiar to them, for example the activPAL device and corresponding data. Pupils were successful in completing the tasks associated with the new materials, which allowed them to experience feelings of competency. Pupils were often more on-task when given a specific time to complete the activity. This may have coincided with the promise of being able to play a game at the end of class if their activities were completed within the timeframe.

What activities did not work in the ActiveChat Programme?

On reflection, there were a number of activities that did not work in the ActiveChat programme. The initial idea of arranging the classroom to mimic a meeting room style, with the aim of making the class feel 'as one', did not work due to space and time available. Reflecting on the programme as a whole, this idea would not have worked as the class worked best in small groups. Pupils did not respond well to the goal setting form and seemed to struggle with setting their own goals and knowing what they wanted out of the programme. The pedometer and reflective lessons were not as successful as anticipated by the ActiveChat mentors. Pupils lost focus and were difficult to manage out-with the classroom environment, even with the presence of an ActiveChat mentor in each group, and the repetitive nature of the reflective lesson disengaged pupils. In the data analysis lesson, pupils lost interest after completing their own data analysis as they completed this activity far quicker than anticipated by the ActiveChat mentors. This is an example of where the content did not challenge the S3 pupils. Finally, the presentation lesson where pupils presented their PowerPoint to the rest of the class was very difficult to implement due to pupil reluctance, and in one case, complete refusal to present. The pupils did express their reluctance to standing up and presenting their PowerPoint to the rest of the class, but with some encouragement from the ActiveChat mentors, all but one group presented their PowerPoint. The ActiveChat mentors were not aware of the lack of confidence pupils had when presenting to their class peers. Future adaptations to the programme should include more opportunities for pupils to speak out in front of their peers to increase levels of confidence.

Future improvements

A number of improvements could be made to the ActiveChat programme. There was a misjudgement on the number of activities that could make up a lesson. In more cases than not, there were too many activities planned for the 50-minute lesson. However, when it came to activities that incorporated mathematics and infographics, the ActiveChat mentors underestimated the pupils' ability, which resulted in pupils completing the activities far quicker than expected. This resulted in pupils losing interest and focus. Suggested improvements for future implementation would be to reduce the number of activities planned per class (or use these as back up activities) and make the activities more challenging.

The ActiveChat mentors, individually and as a team, could make improvements on their teaching and delivery of the programme, primarily focussing on smoothing out transitions between activities and working as a unit to deliver the content of the programme when in their groups. However, it is important to acknowledge that, although the mentors had experience working with children and adolescents, their experience within a teaching capacity and in a secondary school classroom environment was very limited to non-existent. This likely resulted in the disjointed transitions within the lesson, activities being made too easy for the target year group, underestimating activity timings and, not knowing how the pupils would behave in and outside the classroom. The ActiveChat mentors were successful in building up a rapport with the pupils, yet the mentors may have benefitted from exerting more authority.

4.4.3 Comparisons between teacher evaluation and researcher's reflections

There were similarities between the responses from the teacher survey and the researcher's personal reflections from delivering the programme themselves. The researcher

reflected that there were too many activities for a 50-minute lesson, which was supported by one teacher. However, most teachers disagreed with this statement. This discrepancy could be a result of different teaching styles and/or teachers' class experiences.

The researcher also reflected that some activities were not challenging enough for the S3 pupils. This was supported by some of the teachers' responses, stating they felt the content, although met 3rd phase of the CfE, did not target S3 stage of education. Further development of the ActiveChat programme and associated content should be revised to contain activities that are more challenging for S3 pupils. This may be done by targeting 4th phase learning outcomes of the CfE instead to ensure pupils are challenged, yet this may be class dependent.

As previously mentioned, pupils did not enjoy presenting their own PowerPoint presentations. One teacher suggested that pupils create their own YouTube video instead of a PowerPoint. This identifies other ways that pupils can express their opinions and communicate what they have learned over the course of the programme. Providing additional options for pupils to express their opinions and communicate to their peers may also increase perceived autonomy, competence, and relatedness. This would occur if pupils are able to choose a presentation method that they and their group members believe they could do.

4.5 Conclusion

This case study aimed to evaluate the ActiveChat programme which was delivered in a local Scottish secondary school by the researcher. The first objective of this evaluative case study was to collate the opinions and expertise of secondary school teachers and teacher educators on the ActiveChat programme prior to its delivery. The second objective was to analyse the primary researcher/ActiveChat mentor's personal reflections on their delivery of

the ActiveChat programme. The results of these two objectives were used to address the overarching aim of further developing the ActiveChat programme.

There were a number of suggestions made through the data collected to further develop and improve the ActiveChat programme, yet a key message was that when translating the programme to other schools, careful consideration of the cultural context of the school, and the age of the pupils would be required. This is to ensure every pupil can fully engage and benefit from the programme.

Chapter 5 (Study 3): The effects of the ActiveChat programme on pupils' motivation, psychological needs, attitudes, and habitual and in-class physical activity and sedentary behaviour

5.1 Preface

The results of Chapters 3 and 4 of this thesis were used to inform the development of the ActiveChat programme. This chapter presents the quantitative results of the feasibility study of the adapted ActiveChat programme, which was implemented in a local secondary school in Glasgow, Scotland. Primary aims were to determine if the ActiveChat programme could increase pupils' motivation, perceived satisfaction of psychological needs, positive attitudes towards PA, change attitudes towards SB, and to assess levels of habitual and in-class PA and SB. The results of this study will provide preliminary evidence of the ActiveChat programme's effect on psychological moderators of PA in adolescents and determining habitual and classroom PA and SB using subjective and objective measures.

5.2 Introduction

5.2.1 Theoretical framework of the ActiveChat programme

The ActiveChat programme was designed using the SDT (Deci & Ryan, 1985) as a theoretical framework. Research suggests those with greater perceived satisfaction of psychological needs are more internalised in their motivation and more likely to adhere to the behaviour (Chen, 2014). This means individuals perform the behaviour because it is either part of who they are (integrated regulation) or for the enjoyment of it (intrinsic motivation), as opposed to performing the behaviour due to external factors, such as guilt (introjected regulation) or being told to (external regulation) (Ryan & Deci, 2000b). Higher levels of perceived satisfaction of psychological needs have been found to be positively correlated

with more internalised motivation towards exercise in adolescents (Schneider, & Kwan, 2013). Research suggests internalised motivation is moderately associated with leisure time PA (ρ = 0.38) (Owen et al., 2014).

There is very limited research on classroom-based PA and SB programmes in adolescents that have been modelled on SDT, despite the research suggesting its importance in behaviour change and adherence. This could be due to limited research in this specific area. Results of these programmes reported significant increases in intrinsic motivation (net effect d = 0.11) (Spruijt-Metz et al., 2008) and significantly higher levels of autonomy and competence towards PA (Contento et al. 2010). When investigating the effects of the programmes on overall PA, only Contento et al. (2010) reported a significant increase in walking for transport and exercise, yet both studies reported significant decreases in SB. This was based on data collected using subjective measures. It is difficult to compare the two studies as both looked at different sub-theories of the SDT (organismic integration theory vs psychological needs theory).

5.2.2 Incorporating Movement within the Classroom

School time PA is usually constrained by the school timetable. Set times usually include recess/break time, lunch, and PE. For the Scottish education system, health and wellbeing documents were published as part of the Curriculum for Excellence (CfE) (Education Scotland, n.d.c), which states that “In addition to planned physical education sessions, physical activity and sport take place in the classroom...” (Education Scotland, n.d.d, p.7). This suggests that traditional pedagogical methods could be adapted to enhance in-class PA, whilst still meeting learning objectives. The curricular area of health and wellbeing has been described as the responsibility of all teaching practitioners, thus suggests incorporating movement into traditional lessons could address this objective.

Research indicates pupils can spend up to 70% of school time being sedentary (Hinckson et al., 2015). Adapting traditional classes to incorporate PA would facilitate higher levels of PA and reduce SB. A number of programmes have been developed in recent years to promote PA during traditional class time (e.g., Take 10! (Stewart, Dennison, Kohl, & Doyle, 2004), Energizers (Mahar et al., 2006), virtual learning programmes (Norris, Shelton, Dunsmuir, Duke-Williams, & Stamatakis, 2015)). These programmes have been shown to increase PA and reduce SB in primary school settings. The review conducted by McMichan et al. (2018) found a lack of studies incorporating activity within traditional classrooms in secondary schools, demonstrating the gap in this area.

5.2.3 Aims of the Study

The aims of this feasibility study were to:

i. Determine the effect of the ActiveChat programme on psychological moderators of PA and SB (motivation, psychological needs, attitudes);
ii. Objectively assess levels of in-class PA and SB;
iii. Determine the impact of the ActiveChat programme on habitual PA and SB.

5.3 Methods

5.3.1 The ActiveChat Programme

The original ActiveChat programme was designed as a 10-week classroom-based programme to promote the importance of increasing PA and reducing SB. Following the systematic review and evaluative case study (Studies 1 and 2, respectively), the programme was modified by: reducing it to 8 weeks (one lesson per week); integrating it into PSE class; adapting content to be less repetitive; and developing activities which incorporate more movement. The content of the lessons was adapted based on previous work on classroom-

based programmes in schools (specifically those modelled on SDT (Contento et al., 2010; Spruijt-Metz et al., 2008)), and on the findings of Studies 1 and 2. The adaptations included incorporating more biological components of PA and SB and allowing pupils to 'teach' their peers by developing their own lesson plan. Lessons were modelled around SDT (Deci, & Ryan, 1985) and aimed to increase internalised motivation, perceived autonomy, competence and relatedness whilst trying to change attitudes towards PA and SB. During the 8-week programme, pupils reflected on their current PA, SB levels, set goals, discussed motivations and barriers to PA, discussed solutions to reduce SB, used and learned about research equipment to monitor PA and SB, developed their own PA and SB lessons and presented them as a poster. All lesson plans and materials for the ActiveChat programme are presented in Appendix E.

5.3.2 Participants/ school

Ethical approval was granted by the University of Strathclyde, School of Psychological Sciences and Health Ethics Committee and Glasgow City Council Research Committee (Appendix F). Target participants were adolescents in Scottish secondary schools aged 11-15 years (first three years of secondary school; years S1-S3). Recruitment took place in May 2016. The author sought consultation from the University of Strathclyde, School of Education to identify individuals who worked specifically within the area of health and wellbeing in Glasgow schools. Emails were sent to these individuals to gauge the school's interest in taking part in the ActiveChat programme. Six individuals across four schools were contacted. Three individuals from two schools replied, expressing their interest in implementing the ActiveChat programme. Only one individual followed up and committed to implementing the ActiveChat programme. This individual was one of the lead PSE teachers for their year group in their school. The primary researcher met with this teacher and three

lead teachers of the PSE class (years S1-S3). All four teachers were in favour of implementing the ActiveChat programme, yet one year group was not eligible to take part (S4). Teachers discussed the logistics of implementing the programme and decided that two teachers would run the ActiveChat programme in their PSE classes (one teacher delivered S1 and the other teacher delivered S2 and S3). In parallel to the classes implementing the ActiveChat programme, teachers agreed the other PSE class, could act as a control class by continuing their normal PSE curriculum.

The researcher attended each class (both programme and control) to distribute information sheets to pupils for themselves and their parents (Example in Appendix G). 'Opt-out' forms were provided to each pupil for their parents to sign if they or the pupil declined to participate in the data collection (Appendix H). The researcher emphasised that participation in data collection was voluntary. Spare information sheets and 'opt-out' forms were given to teachers for pupils who were absent. Pupils who wished to opt-out of the data collection would still be present for their classes, therefore would still be exposed to the ActiveChat programme.

5.3.3 Questionnaires

Pupils who agreed to participate in data collection were provided with questionnaires to complete prior to the start of the ActiveChat programme. The questionnaire included demographic information (name, age, gender, class); and questions to assess motivation and psychological needs satisfaction towards PA, attitudes towards PA and SB, and habitual PA and SB. This questionnaire was adapted from previously published questionnaires. It is presented in its entirety in Appendix I.

Attitudes

Positive and negative attitudes towards PA and SB were assessed using adapted questionnaires from previously published research (Deforche et al., 2006; He et al., 2010; Motl et al., 2000; Nelson et al., 2010). Participants responded to a 5-point Likert scale (1 = *I disagree a lot*, 2 = *I disagree*, 3 = *I neither agree or disagree*, 4 = *I agree*, 5 = *I agree a lot*). Eight questions assessed positive attitudes towards PA (e.g., "It would make me feel healthier"); eight questions assessed negative attitudes towards PA (e.g., "It would be painful"); nine questions assessed attitudes towards SB (e.g., "It would make me feel bad"). Eight of the nine SB questions were negatively worded. One question was worded positively ("I would make more friends"). Scoring was adjusted for this question by reversing the scores (e.g. 1 = 5, 2 = 4, 3 = 3) to account for the positive meaning and to keep consistent with the rest of the questions. SB was defined as waking time sitting/lying to ensure pupils understood what the questions were asking. The mean score for each sub-category (positive/negative attitudes towards PA, attitudes towards SB) was calculated.

Motivation

Motivation was measured using an adapted version of the Behavioural Regulation in Exercise Questionnaire (BREQ-3) (Markland & Tobin, 2004; Wilson, Rodgers, Loitz, & Scime, 2006). The author modified the questionnaire to address PA. The anchors of scale were modified to include "for me" (e.g., *True for me*) to ensure pupils understood it was their personal feelings. The BREQ-3 consists of 24 questions where participants are required to answer on a 5-point Likert scale (1 = *Not true for me*, 2 = *Not very true for me*, 3 = *Sometimes true for me*, 4 = *True for me* 5 = *Very true for me*). The scale of 1-5 was also adapted (originally 0-4) to keep consistency with the rest of the questionnaire. Four questions are associated with each form of motivation: amotivation; external regulation; introjected

regulation; identified regulation; integrated regulation; and intrinsic motivation. Scores for each form of motivation are averaged. The relative autonomy index (RAI) was calculated using weightings (-3*Amotivation; -2*External Regulation; -1*Introjected Regulation; 1*Identified Regulation; 2*Integrated Regulation; 3*Intrinsic Motivation). The weighted subscale scores for all six forms of motivation are then summed to determine overall RAI score.

Psychological Needs

Psychological needs (autonomy, competence, relatedness) were assessed using an adapted version of the Psychological Needs Satisfaction in Exercise scale (Wilson, Rogers, Rodgers, & Wild, 2006). This questionnaire consists of 18 questions (six for each subscale). Example questions included "I feel confident I can do even the most challenging exercises" (competence); "I feel free to exercise in my own way" (autonomy); and "I feel like I get along well with other people who I interact with while we exercise together" (relatedness). The questionnaire was validated in a young adult population (M = 21.79 years) (Wilson et al. 2006). Due to the age of the pupils, some words were modified to allow them to better understand the questions (e.g. changed the word "companion" to "friend"). The word "exercise" was replaced with PA in line with previous research (Gunnell, Crocker, Wilson, Mack, & Zumbo, 2013; Gunnell, Wilson, Zumbo, Mack, & Crocker, 2012). The current study used a 7-Point Likert Scale ranging from "*Strongly disagree*" to "*Strongly agree*". The Psychological Needs Satisfaction in Exercise Scale (PSNE) used previous scales using the 7-Point Likert scale to determine reliability (for competence and autonomy) and found positive correlations between those scales and the PSNE (Wilson et al., 2006). The 7-Point Likert scale and the associated anchors of scale (*disagree/agree*) were used to keep consistency with the remainder of the questionnaire.

Physical Activity and Sedentary Behaviour

PA and SB were measured using an adapted version of the Health Behaviour in School-Aged Children (HBSC) survey (Currie et al., 2015). This survey has been used previously to assess Scottish adolescents' PA and SB by obtaining 7-day recall and cross-sectional data. The current questionnaire was adapted to assess PA and SB over the previous 7 days (e.g. "Over the past 7 days, how many hours per day, in your free time, did you spend watching TV, videos (including YouTube or similar services), DVDs, and other entertainment on a screen?"). Responses to questions were based on a series of statements, thus numbers were assigned to these responses to allow for statistical analysis. For example, the question "Over the past 7 days, how many hours did you exercise in your free time so much that you got out of breath or sweat?" had 6 possible responses. Due to the narrative nature of responses, each response was assigned a numerical score for analysis (e.g. *none* = 0; *about half an hour* = 1; *about 1 hour* = 2; *about 2 to 3 hours* = 3; *about 4 to 6 hours* = 4; *7 hours or more* = 5). The mean value presented in the results refers to the numerical scores.

5.3.4 ActiGraph

Classroom PA and SB were measured using ActiGraph GT3X+ (ActiGraph, Pensacola, FL, USA) activity monitors. Pupils in ActiveChat and control classes wore the monitor for the duration of the eight PSE lessons. Each pupil was assigned a monitor to ensure they wore the same one each week. This was to keep consistency throughout the data collection phase. Pupils collected their monitor from the researcher at the start of class and returned it at the end. A demonstration of how to put the monitors on was provided prior to the start of data collection. After pupils received their monitor and were seated, the teacher started the lesson. This was when start time was recorded. Stop time was recorded when the teacher dismissed the class and told the pupils to return their accelerometers. Time was

recorded manually by the researcher using a pen and observation sheet. The researcher's iPhone 5S was used to determine the time. A Microsoft Excel macro spreadsheet (Micrososoft Corp, Redmond, WA) was used to extract the data for minutes and percentage of time spent in SB, light PA and MVPA using cut-points of Evenson et al. (2008). A review of cut-points used in children and adolescents showed the Evenson et al. (2008) cut-points demonstrated satisfactory classification accuracy for all PA intensities when used in this population (ROC-AUC ≥ 0.70) (Trost, Loprinzi, Moore, & Pfeiffer, 2011). These cut-points have subsequently been used in other school-based programmes in adolescents (Toftager et al., 2014; Tymms et al., 2016). Epoch length was set after ActiGraph data was collected and downloaded. 15-second epochs were applied as this has been applied in previous classroom-based programmes (Norris et al., 2015), and shorter epoch lengths have been recommended in the adolescent population (e.g. compared to 60-second epochs) when investigating SB, light PA and MVPA (Edwardson & Gorely, 2010).

5.3.5 Statistical Analysis

Questionnaires

Quantitative analysis was performed using SPSS v. 24.0 (IBM Corp., Richmond, WA) statistical analysis package. Descriptive statistics were performed to establish normality of data (if skewness and kurtosis were < |2|). A mixed factorial analysis of variance (ANOVA) was performed to determine changes pre- and post-programme (time effect) and compare these changes between programme and control conditions (group comparisons). Levene's test of homogeneity was performed as part of the ANOVA. If Levene's test was significant at $p < 0.05$, it was assumed the variances of the two groups were significantly different. If this occurred, transformation of the data was performed to ensure variances were not significantly different, and the ANOVA could be performed. If pre-programme variances

were significantly heterogeneous, but post-programme variances were not, both sets of data were transformed. If the transformations did not rectify the homogeneity of variance, then the largest and smallest standard deviation was squared, and the ratio calculated. If the number was < 4 then it was assumed the variance (although significant) was small enough to perform an ANOVA.

ActiGraph Data

Data were downloaded from the ActiGraph GT3X+ monitors and converted to Microsoft Excel comma separated values (.csv) files using the ActiLife software (version 6.13.2) (ActiGraph LLC, Pensacola, FL). The Microsoft Excel .csv file and electronic wear time diary (recording the time the ActiGraphs were worn (times manually inputted by the researcher from the observation sheet)) were linked to a Microsoft Excel macro (using the hyperlinks from the folder destination). The macro extracted the data from the Microsoft Excel .csv file against the specific time set (e.g. 10:10-10:50 on day 1 for the S1 class) from the wear time diary. Cut-points and epochs were set manually into the macro prior to the start of data extraction. Output from the macro included: time in minutes that the device recorded data (e.g. 45 minutes); counts per minute (cpm); minutes and percentage time spent in SB, light, moderate, vigorous, and moderate-vigorous PA (MVPA). All participant data for each lesson were transferred into an Excel spreadsheet. A formula was created to calculate mean percentage and minutes of time spent in SB, light PA, moderate PA, vigorous PA and MVPA for all eight lessons.

For S1, there was no lesson in week 5 due to class re-scheduling; therefore, an average of all other lessons from S1 was taken. For missing ActiGraph data at the individual level (pupils absent or device malfunction), multiple imputation was performed using five multiple imputation methods in SPSS. The five predictions for missing data were averaged to

provide a more reliable predicted score. Imputation predictions were made based on group data from the specific lesson and year group (e.g. S3 programme group mean for lesson 6). Data were then imported into SPSS. An independent *t*-test was performed on the mean percentage data of all eight lessons to determine the difference between percentages of time spend sedentary, light PA, and MVPA the programme and control groups.

5.4 Results

5.4.1 Participants/ descriptive results

One hundred and one pupils consented and participated in the data collection. Age of participants who provided demographic data (N = 97) ranged from 11-14 years (M = 12.79, SD = 0.94). Only 91 of these participants completed both baseline and post-programme questionnaires, and 98 wore accelerometers. 54.9% ($n = 50$) of this sample (N = 91) were male. A flow diagram of class allocation and participant numbers is presented in Figure 5.1.

5.4.2 Motivation

Mixed factorial ANOVAs indicated significant Time x Group interaction effects for amotivation ($F(1,89) = 4.266$, $p = .042$, $\eta 2 = .046$), identified regulation ($F_{(1,89)} = 12.11$, $p = .001$, $\eta^2 = .12$), integrated regulation ($F_{(1,89)} = 4.19$, $p = .044$, $\eta^2 = .45$), and relative autonomy index (RAI) ($F_{(1,89)} = 4.47$, $p = .037$, $\eta^2 = .048$). There was no significant interaction effect for intrinsic motivation, but a significant main effect for time ($F(1,89) = 4.078$, $p = .046$, $\eta^2 = .04^{a}$) but not group ($F(1,89) = .738$, $p = .393$, $\eta^2 = .008^{b}$) (Table 5.1). Independent t-test analysis suggested no significant differences between groups pre- or post-programme for integrated regulation, intrinsic motivation, or RAI ($p > .05$). A significant difference between groups was found post-programme for identified regulation ($p = .05$). Paired t-test analysis suggested non-significant changes in the programme group over time ($p > .05$), yet

significant decreases in the control group for identified regulation, integrated regulation, intrinsic motivation, and RAI ($p < .05$). For amotivation, there were no significant differences between programme and controls groups, or within-groups, despite a significant interaction effect.

5.4.3 Psychological Needs Satisfaction

Mixed factorial ANOVAs indicated no significant interaction effect or main effects for perceived autonomy. Skewness for this data was within the normal range, yet kurtosis was reported as 2.26 for post-programme data. After reviewing literature and seeking consultation, a decision was made that this violation would not adversely affect the ANOVA and therefore, transformation of data was not performed.

There were significant interaction effects for perceived competency ($F(1,89) = 4.684$, $p = .033$, $\eta 2 = .05$) and relatedness ($F(1,89) = 10.38$, $p = .002$, $\eta 2 = .10$) (Table 5.2). Independent t-tests suggested no significant difference pre- and post-programme for relatedness ($p > .05$), but a significant difference post-programme for competency ($p = .017$). Paired t-test analyses indicated no significant change within the programme group pre- and post-programme, yet a significant decrease in the control group for scores of competency and relatedness.

The Levene's Test for perceived competency was significant for baseline scores ($p < .05$). Transformation of the data did not rectify this issue, therefore a test of the assumption of homogeneity of variance was calculated by dividing the larger variance by the smaller variance. The calculation was as followed:

$$F_{max} = 1.64/ .90 = 1.82$$

As the $F_{max} = 1.82$, it was assumed the heterogeneity of variance would not adversely affect the results of the ANOVA.

5.4.4 Attitudes towards PA and SB

Mixed factorial ANOVAs indicated no significant interaction effects or main effects (respectively) for positive or negative attitudes towards PA (Table 5.3). For positive attitudes, skewness of the data was within the normal range, yet kurtosis was reported as 2.83 for post-programme data. The same rationale for autonomy was applied.

There was a significant interaction effect found for attitudes towards SB ($F_{(1,89)} = 4.92$, $p = .029$, $\eta^2 = .052$). Further analysis suggested there were significantly higher scores in the programme group compared to the control group at baseline ($p < .05$) but not at post-programme. There were no significant differences in scores between baseline and post-programme scores within the programme group but the control group significantly decreased their scores ($p < .05$), indicating the control group viewed SB more positively.

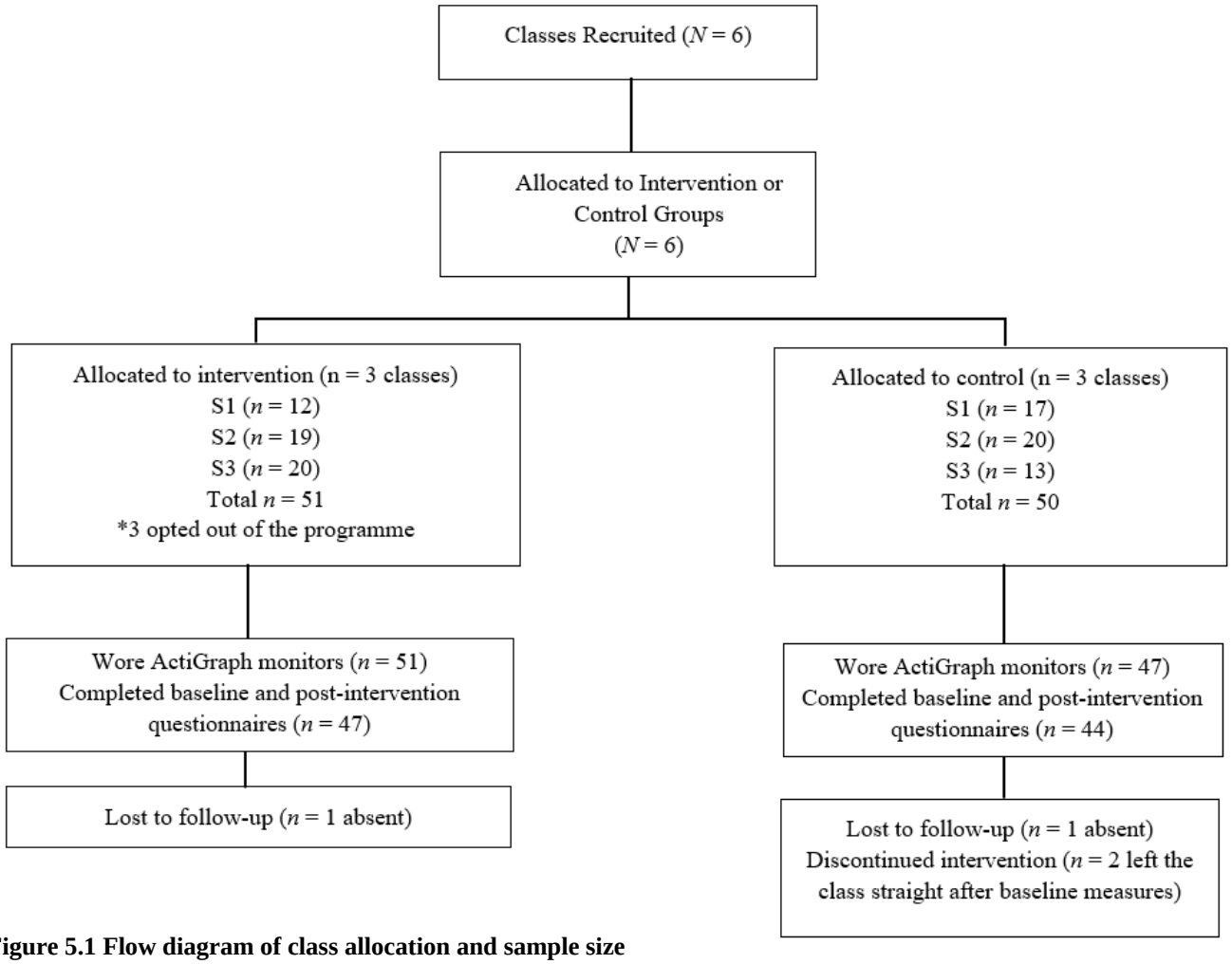

Figure 5.1 Flow diagram of class allocation and sample size

5.4.5 Physical activity

Mixed factorial ANOVAs indicated no significant interaction (Time x Group) or main effect (Time and Group) for all questionnaire measures of PA: number of days per week active, number of times per week active, and number of hours per week active. Interaction effects and main effects are presented in Table 5.4.

5.4.6 Sedentary behaviour

Analyses suggested there were no significant interactions (Time x Group) or main (time) effects for any proxy of SB (weekday or weekend). Levene's test for equality of variances for weekday television viewing was significant for post-programme scores ($p < .05$), so square root transformations were performed on both baseline and post-programme weekday television scores. Pre- and post-programme data sets were transformed to ensure the two data sets could be accurately compared (i.e. not analysing one raw data set with a transformed data set). The raw data are presented in Table 5.4.

Levene's test for equality of variance for baseline weekday computer usage (game play) was significant and transformations of the data did not rectify this. A test of the assumption of homogeneity of variance was calculated by dividing the larger variance by the smaller variance. The calculation was as followed:

$$F_{max} = 10.42/6.40 = 1.63$$

As the $F_{max} = 1.63$, it was assumed the heterogeneity of variance would not adversely affect the results of the ANOVA.

5.4.7 Classroom Physical Activity and Sedentary Behaviour

The accelerometer data were assessed for the percentage of time spent in SB, light activity, and MVPA. Skewness was normal for all intensities. Kurtosis was normal for two of

the three variables. MVPA was leptokurtic with a score of 4.63. This was one violation of the data where all other data were normal. Because of this, and to keep consistency with the methods above, it was assumed this violation would not adversely affect the use of the *t*-test.

Accelerometer data suggested pupils in the ActiveChat programme spent significantly more time in in-class light activity (8.73%), MVPA (2.26%), and significantly less time sedentary (10.9%) compared to the control class (Figure 5.2). Large effect sizes (Cohen's *d*) were calculated for the three activity levels [*d* = -1.62-1.43] (Table 5.5). For a typical 50-minute lesson, this equates to pupils in the ActiveChat group being more active by 5.5 minutes compared to the control group.

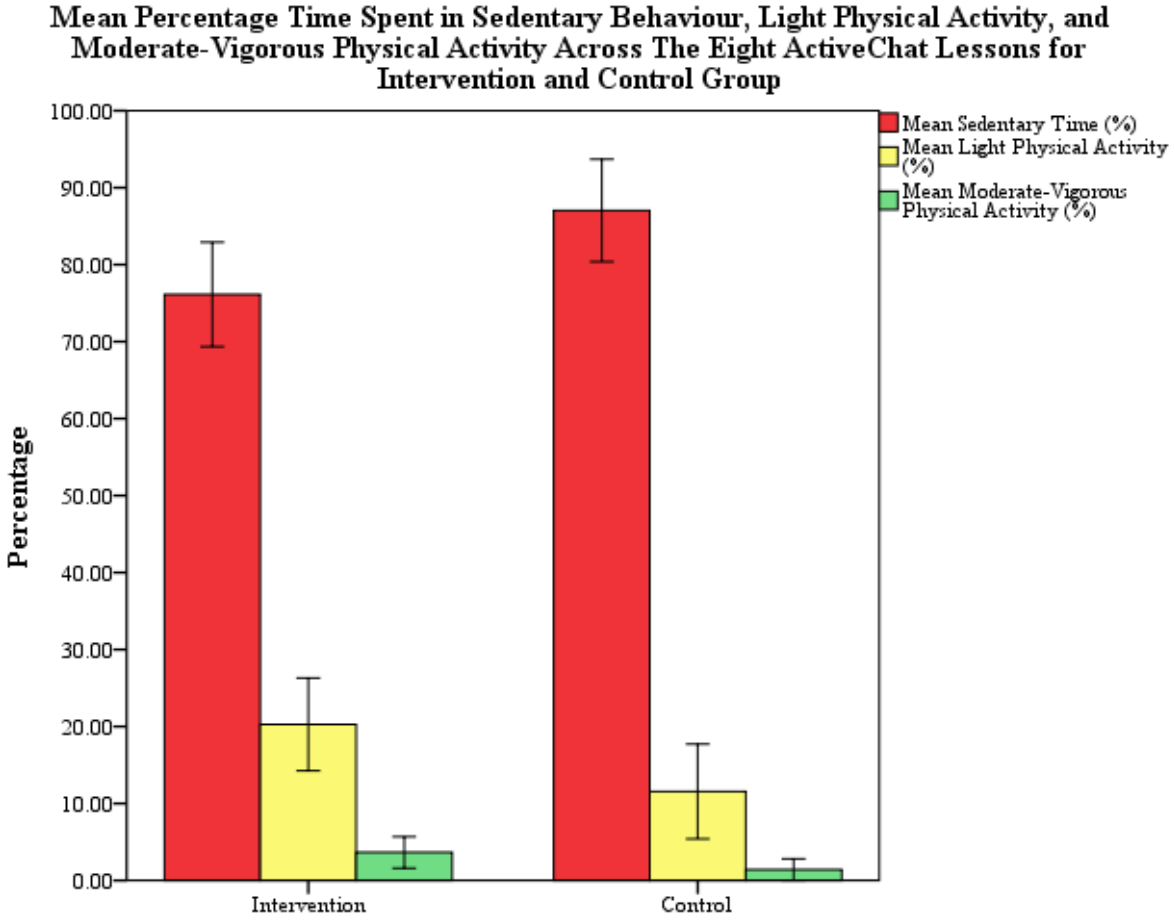

Figure 5.2 Histogram of percentage of sedentary time, light activity and MVPA across all eight ActiveChat lessons compared to the control class.

5.5 Discussion

The current study was conducted to assess the effects of a classroom-based PA and SB programme (ActiveChat) on psychological moderators of PA and SB (motivation, psychological needs, and attitudes), habitual PA and SB, and movement within the classroom. The programme was modelled on SDT (Deci & Ryan, 1985) whilst integrating key learning objectives from the CfE. To the author's knowledge, this is the first classroom-based PA and SB programme to be implemented in Scotland to assess these outcome measures.

5.5.1 Motivation/ psychological needs/ attitudes

The ActiveChat programme appeared to have a positive effect on pupils' internalised forms of motivation. For the motivation forms of identified regulation, integrated regulation, intrinsic motivation, and RAI, pupils in the ActiveChat programme maintained their levels of motivation over time, whilst those in the control classes reduced their motivation. Spruijt-Metz et al. (2008) reported a positive finding in regard to intrinsic motivation for their classroom-based PA and SB programme in adolescent girls but not for any other type of motivation. This is likely due to the programme's reinforcement of intrinsic motivation, such as, "being active is fun" (Spruijt-Metz et al., 2008, p.12). RAI score was maintained in the ActiveChat group compared to the control group. However, published research suggests the RAI scoring system is inappropriate due to the index being problematic (Chemolli, & Gagné, 2014). The RAI uses difference scores, which has been reported to be statistically less reliable, and loses the richness of information gathered from the data (Edwards, 2001). Chemolli, & Gagné (2014) also argue that motivation is not on a continuum, as individuals may experience difference forms of motivation for the same behaviour.

The ActiveChat programme had positive effects on competence and relatedness. Similar to the patterns of data reported for internalised motivation, the ActiveChat group maintained their levels of perceived competence and relatedness, whilst the control group decreased between baseline and post-programme. Contento et al. (2010) assessed perceived satisfaction of autonomy and competence towards PA. They reported higher scores for autonomy and competence in the programme group compared to the control group post-programme. However, no baseline data were presented in this study, making it difficult to determine the true effect of their classroom-based PA programme on perceived psychological needs. Autonomy levels did not change in either the ActiveChat group, which is the same pattern for competence and relatedness, or the control group. This might be due to teacher delivery of the control class whereby they may promote an autonomous environment; however, this would assume it would have a similar impact on internalised motivation as measured using the BREQ-3.

The ActiveChat programme had no effect on pupils' attitudes towards PA, yet maintained pupils' attitude scores for SB. This finding contradicts the results of the study by Ghaffari et al. (2013). They found that their classroom-based PA programme increased PA attitudes by large effect sizes (Ghaffari et al., 2013; McMichan et al., 2018). This study differed to the current study as the sample was based in adolescent boys only. The differences in the results could be explained by the educational components; however, comparisons cannot be established due to lack of information reported on the educational programme itself. The results of the current study also contradict the findings by Contento et al. (2007) who found increases in attitudes towards walking. This is likely not comparable to the present study due to the nature of the present questionnaire referring to PA as a whole rather than walking specifically. There is little research in regard to adolescents' attitudes towards SB, yet the ActiveChat programme appeared to maintain pupils' attitudes towards SB whilst the

control group decreased. The maintenance of the SB attitudes is a positive result associated with the ActiveChat programme.

Few classroom-based PA and SB programmes in secondary schools have assessed motivation and perceived satisfaction of psychological needs towards PA. The activities were designed to encourage pupils to understand the importance of PA and SB in relation to their health, whilst allowing them to share their opinions and experiences of PA and SB, and make their own choices with regards to how they can increase their PA and reduce SB. The activities appear to ensure maintenance of internalised motivation and perceived satisfaction of competency and relatedness. Adopting similar activities as presented in other published research (Contento et al., 2010; Spruijt-Metz et al., 2008) framed around SDT appeared to positively influence pupils' motivation and perceived satisfaction of psychological needs. More research with detailed information regarding programme content is required to understand how to positively affect attitudes towards PA. Attitudes towards a specific behaviour, are formed on the basis of the individuals' belief and perceived outcomes of such a behaviour (Ajzen, & Fishbein, 1980; Fishbein, & Ajzen, 1975). Although the ActiveChat programme aimed to change attitudes, it perhaps did not strongly address the individual beliefs and potential outcomes of the PA within this adolescent sample, therefore missed fundamental factors in the formation of attitudes. The results for attitudes towards PA in the current study may also be attributed to the design of the ActiveChat programme. The programme was modelled on SDT, therefore the materials and content did not directly assess PA attitudes, unlike the TRA/TPB (Ajzen, & Fishbein, 1980; Fishbein, & Ajzen, 1975; Azjen, 1991) whereby attitudes, subjective norms, and perceived behavioural control are predictors of intentions to being active. There is little research regarding attitudes towards SB, therefore it is difficult to determine why this had a significant decrease on the control's SB attitudes. This group may have declined in attitude scores (i.e. perceived SB more

positively) due to term fatigue, naturally decreased over time, or due to the season (i.e. winter).

Overall, there were no significant increases found post intervention in the ActiveChat class for any of the psychological constructs measured. Results appear to suggest that there was only maintenance of the these psychological constructs, whilst significant decreases were found in the control group for identified regulation, integrated regulation, intrinsic motivation, RAI, competence, relatedness, and attitudes towards SB. A potential reason increases in scores were not seen may have been attributed to the relatively high scores at baseline, particularly for internalised forms of motivation and psychological needs.

5.5.2 Physical activity and sedentary behaviour

The ActiveChat programme had no effect on self-report habitual PA and SB. The non-significant changes reported for levels of PA and SB are similar to the results reported in our systematic review and meta-analysis of classroom-based PA and SB programmes in secondary schools (McMichan et al., 2018). It appears changes in psychological constructs does not always result in behaviour change. This further highlights the gap between these constructs and actual behaviour. The literature in adolescents also lacks the use of objectively measured PA and SB. Tymms et al. (2016) objectively measured PA in their study of classroom-based PA and SB programme yet they too reported no differences between programme and control groups in MVPA behaviour.

Table 5.1

Pre- and post-programme results of the different forms of motivation, measured by an adapted version of BREQ-3

	ActiveChat Group (*n* = 47)				**Control Group (*n* = 44)**					
Motivation Type	**Pre**		**Post**		**Pre**		**Post**		**Interaction Effect (Time x Group)**	**Main Effects (Time[a] and Group[b])**
	M	SD	M	SD	M	SD	M	SD		
Amotivation	1.77	0.84	1.64	0.66	1.59	0.65	1.77	0.68	$F_{(1,89)} = 4.266$, $p = .042$, $\eta^2 = .046$	-
External Regulation	1.90	0.98	2.03	0.93	2.03	0.97	1.88	0.82	$F_{(1,89)} = 2.868$, $p = .094$, $\eta^2 = .031$	$F_{(1,89)} = .003$, $p = .96$, $\eta^2 = .000$[a] $F_{(1,89)} = .002$, $p = .97$, $\eta^2 = .000$[b]
Introjected Regulation	2.23	1.06	2.45	1.11	2.56	1.01	2.45	1.21	$F_{(1,89)} = 2.226$, $p = .139$, $\eta^2 = .024$	$F_{(1,89)} = .216$, $p = .644$, $\eta^2 = .002$[a] $F_{(1,89)} = .677$, $p = .413$, $\eta^2 = .008$[b]
Identified Regulation	3.34	0.82	3.49	0.82	3.55	0.81	3.15	0.81	$F_{(1,89)} = 12.105$, $p = .001$, $\eta^2 = .12$	-
Integrated Regulation	2.89	1.20	2.91	1.20	3.10	1.01	2.77	0.99	$F_{(1,89)} = 4.185$, $p = .044$, $\eta^2 = .45$	-
Intrinsic Motivation	3.50	1.11	3.47	0.96	3.49	1.04	3.20	0.89	$F_{(1,89)} = 3.006$, $p = .086$, $\eta^2 = .033$	$F_{(1,89)} = 4.078$, $p = .046$, $\eta^2 = .044$[a] $F_{(1,89)} = .738$, $p = .393$, $\eta^2 = .008$[b]
Relative Autonomy Index	8.26	6.95	8.30	6.78	8.83	7.03	6.60	5.76	$F_{(1,89)} = 4.472$, $p = .037$, $\eta^2 = .048$	-

Table 5.2

Pre- and post-programme results of psychological needs measured by an adapted version of PNSE

	ActiveChat Group (*n* = 47)				Control Group (*n* = 44)					
Psychological Need	**Pre**		**Post**		**Pre**		**Post**		**Interaction Effect (Time x Group)**	**Main Effects (Time[a] and Group[b])**
	M	SD	M	SD	M	SD	M	SD		
Autonomy	5.66	0.93	5.69	1.04	5.70	0.80	5.27	1.40	$F_{(1,89)} = 3.365$, $p = .070$, $\eta^2 = .036$	$F_{(1,89)} = 2.576$, $p = .112$, $\eta^2 = .028$[a] $F_{(1,89)} = 1.110$, $p = .295$, $\eta^2 = .012$[b]
Competence	5.15	1.28	5.28	1.14	5.04	0.95	4.69	1.33	$F(1,89) = 4.684$, $p = .033$, $\eta 2 = .050$	-
Relatedness	4.77	1.44	4.98	1.33	5.06	1.11	4.51	1.42	$F_{(1,89)} = 10.382$, $p = .002$, $\eta^2 = .104$	-

Table 5.3

Pre- and post-programme results of attitudes towards PA and SB measured by previously published questionnaires

	ActiveChat Group (*n* = 47)				Control Group (*n* = 44)					
Attitudes	**Pre**		**Post**		**Pre**		**Post**		**Interaction Effect (Time x Group)**	**Main Effects (Time[a] and Group[b])**
	M	SD	M	SD	M	SD	M	SD		
Positive Attitudes towards PA	3.81	0.53	3.88	0.59	3.88	0.56	3.69	0.84	$F_{(1,89)} = 3.372$, $p = .07$, $\eta^2 = .037$	$F_{(1,89)} = .657$, $p = .420$, $\eta^2 = .007$[a] $F_{(1,89)} = .294$, $p = .589$, $\eta^2 = .003$[b]
Negative Attitudes towards PA	2.55	0.76	2.58	0.67	2.69	0.70	2.51	0.78	$F_{(1,89)} = 2.346$, $p = .129$, $\eta^2 = .026$	$F_{(1,89)} = 1.186$, $p = .279$, $\eta^2 = .013$[a] $F_{(1,89)} = .043$, $p = .836$, $\eta^2 = .000$[b]
Attitudes towards SB	2.96	1.00	3.01	1.02	3.44	0.91	2.95	0.94	$F_{(1,89)} = 4.917$, $p = .029$, $\eta^2 = .052$	

Table 5.4

Pre- and post-programme results of subjectively measured habitual PA and SB using an adapted version of the HBSC questionnaire

	ActiveChat Group (*n* = 47)				Control Group (*n* = 44)					
	Pre		Post		Pre		Post		Interaction Effect (Time x Group)	Main Effects (Time[a] and Group[b])
	M	SD	M	SD	M	SD	M	SD		
Number of days per week active	3.85	1.99	3.96	1.96	3.82	2.08	3.59	1.86	$F_{(1,89)} = .75$, $p = .389$, $\eta^2 = .008$	$F_{(1,89)} = .10$, $p = .754$, $\eta^2 = .001$[a] $F_{(1,89)} = .30$, $p = .587$, $\eta^2 = .003$[b]
Number of times per week active	2.00	1.18	2.15	1.20	1.91	1.20	2.02	1.10	$F_{(1,89)} = .03$, $p = .876$, $\eta^2 = .000$	$F_{(1,89)} = 1.36$, $p = .246$, $\eta^2 = .015$[a] $F_{(1,89)} = .25$, $p = .619$, $\eta^2 = .003$[b]
Number of hours per week active	2.52	1.57	2.33	1.38	2.33	1.38	2.06	1.25	$F_{(1,89)} = .096$, $p = .757$, $\eta^2 = .001$	$F_{(1,89)} = 3.354$, $p = .07$, $\eta^2 = .036$[a] $F_{(1,89)} = .741$, $p = .392$, $\eta^2 = .008$[b]
Weekday television viewing*	4.04	2.50	3.19	2.46	3.83	2.40	3.77	1.95	$F_{(1,89)} = 3.351$, $p = .071$, $\eta^2 = 0.036$	$F_{(1,89)} = 2.987$, $p = .087$, $\eta^2 = .032$[a] $F_{(1,89)} = .390$, $p = .534$, $\eta^2 = .004$[b]
Weekend television viewing	4.89	2.71	4.12	2.61	4.52	2.54	4.63	2.43	$F_{(1,89)} = 2.544$, $p = .114$, $\eta^2 = .028$	$F_{(1,89)} = 1.487$, $p = .226$, $\eta^2 = .016$[a] $F_{(1,89)} = .018$, $p = .893$, $\eta^2 = .000$[b]
Weekday computer usage (not game play)	3.11	2.59	2.98	2.28	3.41	2.31	2.91	2.54	$F_{(1,89)} = .497$, $p = .483$, $\eta^2 = .006$	$F_{(1,89)} = 1.412$, $p = .238$, $\eta^2 = .016$[a] $F_{(1,89)} = .071$, $p = .790$, $\eta^2 = .001$[b]
Weekend computer usage (not game play)	3.26	2.82	3.40	2.58	3.57	2.66	3.34	2.74	$F_{(1,89)} = .366$, $p = .547$, $\eta^2 = .004$	$F_{(1,89)} = .016$, $p = .900$, $\eta^2 = .000$[a] $F_{(1,89)} = .069$, $p = .793$, $\eta^2 = .001$[b]
Weekday computer usage (game play)	3.40	3.22	3.72	2.75	3.52	2.53	3.61	2.35	$F_{(1,89)} = .209$, $p = .649$, $\eta^2 = .002$	$F_{(1,89)} = .675$, $p = .414$, $\eta^2 = .008$[a] $F_{(1,89)} = .000$, $p = .993$, $\eta^2 = .000$[b]
Weekend computer usage (game play)	3.98	3.25	4.70	2.83	4.55	2.87	4.56	2.78	$F_{(1,89)} = 1.621$, $p = .206$, $\eta^2 = .018$	$F_{(1,89)} = 1.726$, $p = .192$, $\eta^2 = .019$[a] $F_{(1,89)} = .147$, $p = .703$, $\eta^2 = .002$[b]

[*]**Interaction and main effects presented are from transformed data.**

Table 5.5.

Percentage of time spent in different activity over the eight ActiveChat lessons

	ActiveChat Group (*n = 51*)		**Control Group (*n = 47*)**		**Independent *T*-Test**	**Cohen's d**
	M	*SD*	*M*	*SD*		
Mean Sedentary Time (%)	76.14	6.78	87.04	6.64	$t(96) = -8.03$, $p < .001$	*d = -1.62*
Mean Light Physical Activity (%)	20.27	6.04	11.54	6.15	$t(96) = 7.08$, $p < .001$	*d = 1.43*
Mean Moderate-Vigorous Physical Activity (%)	3.65	2.05	1.39	1.41	$t(96) = 6.30$, $p < .001$	*d = 1.28*

The nature of the ActiveChat programme targeted adolescents at an intrapersonal level in the classroom setting. As outlined in the Social-Ecological Model (Sallis, & Owen, 1999), there are other factors to consider which can affect an individuals' PA behaviour. These include interpersonal, environmental, and policy factors. Although it can be argued that the ActiveChat programme also targets some interpersonal factors (i.e. their peers), there are other social factors that the programme cannot directly influence (e.g. parents, others friends, social norms). In addition, environmental factors out with the ActiveChat programme may not encourage PA, for example school clubs may finish for the winter months [reference from a pupil focus group – in detail in Chapter 6]. The school where the ActiveChat programme was delivered was in a deprived area of Glasgow (SIMD Rank = 1), therefore opportunities may be limited due factors including, for example, cost of activities and, proximity and access to facilities (Kirby, Levin, & Inchley, 2013). These examples of environmental factors could have a significant influence on PA behaviour, hence if pupils' environments does not facilitate PA behaviour, it is difficult to change habitual PA and SB. Likewise, if pupils significant others do not favour PA, they may be less inclined to participate in PA.

5.5.3 ActiGraph Data

On average, the ActiveChat programme resulted in higher levels of light activity (8.73%) and MVPA (2.26%) compared to the control class. This equates to an average of 4.37 minutes more time in light activity and 1.13 minutes more time in MVPA per 50-minute class. In Scotland, there are slight variations amongst class period scheduling time; however, the school this study was trialled in had six 50-minute classes per day. If every class adopted MI and activity breaks, there could be an increase in light activity by 2 hours and 11 minutes, and MVPA by ~34 minutes per week. Adapting lessons in secondary school to incorporate

movement as designed in the ActiveChat programme, could enhance adolescents weekly MVPA by 7.6% (excluding the standard two PE classes).

There are many definitions to 'movement within a classroom', which can range from activity breaks or brain breaks to adapting educational content to incorporate movement (movement integration) (Institute of Medicine, 2013; McMullen, Martin, Jones, & Murtagh, 2016). Incorporating movement within primary school classrooms has been shown to increase levels of PA and reduce SB (Mahar et al., 2006; Martin & Murtagh, 2015; Norris et al., 2015; Stewart et al., 2004). As there is no previous research (to the author's knowledge) with regards to incorporating movement within secondary school classrooms, lessons were developed to include activity breaks and MI. Accelerometer results suggest the ActiveChat programme had a positive effect on class-time PA and SB. This is a novel finding as research into incorporating movement within the secondary school classroom is lacking in the published literature.

5.5.4 Strengths and Limitations

There were a number of strengths to this study. Group comparisons could be made due to the presence of a control group. The control group was the other PSE class, which ran parallel with the ActiveChat class, for each year group (e.g. S1 ActiveChat and S1 control were both delivered on a Friday 3rd period). Both ActiveChat and control classes were in the same school. This allowed for a more reliable comparison due to the pupils being from the same age, demographic area and school environment, thus reducing the threats of external validity and potential extraneous variables. The study yielded a high response rate from pupils willing to participate with only a small number opting out/withdrawing. This indicates that experimental mortality was minimal (Thomas, Nelson, & Silverman, 2005).

A key strength of the ActiveChat programme was its design to be implemented as part of an already timetabled class and was delivered by the teachers themselves. This means no additional time is required within the school day to implement the programme and no external individuals are required, thus being time and financially efficient. As the ActiveChat programme was designed to address learning outcomes from the CfE, specifically within the areas of health and wellbeing, literacy, and numeracy, it is readily available to be integrated as part of the Scottish education system.

There were limitations to the study. One limitation was that classes were not randomised due to teachers allocating and volunteering their PSE classes to implement the ActiveChat programme. Random allocation is important to strengthen the quality of the study (as assessed in the EPHPP), and to control for allocation bias (Sedgwick, 2013), which was a possible issue in this study. These teachers may have valued the programme more and thus were more likely to adhere to its delivery. Although the programme and control classes being in the same school is considered a strength, this could also be a potential limitation. Contamination could have occurred in this study. This is when the two groups (experimental and control) interact with one another and the control group may receive parts of the programme through this interaction (Rhoads, 2011). Due to the close proximity of the two classes, pupils in the ActiveChat class may have shared their experiences and understanding gained in the ActiveChat programme, which in turn could influence motivations and attitudes towards PA and SB, and PA and SB behaviour of those in the control class.

Another limitation is the lack of baseline measures of in-class PA and SB prior to the start of the study. Although objective measures did indicate a greater level of in-class PA and reduced SB in the ActiveChat classes, it cannot be determined whether it was the ActiveChat programme itself which influenced this. Other explanations for this finding could be due to

the individual teachers and their teaching pedagogy in the respective intervention classes compared to the control classes.

Objectively measured PA and SB would have provided a more accurate representation of habitual PA and SB in adolescents at baseline and post-programme. 7-day recall questionnaires used to assess PA (IPAQ) have been found to overestimate PA behaviour and research suggests there is a low to moderate correlation (r^2 = .07-.36) between accelerometers and questionnaires (Hagstromer, Ainsworth, Oja, & Sjostrom, 2010). There is also an issue with 'absolute' validity (Sallis, & Saelens, 2000) due to lack of standardisation between different subjective measures of PA/SB, which makes it difficult to compare results (Shephard, 2003). Measuring PA using objective methods, such as an accelerometer, has been shown to be valid and reliable and can reduce the risk of bias (Reilly et al., 2008). However, due to equipment availability and various feasibility issues for the researcher and for participants, assessing PA/SB using questionnaires was the most feasible.

A sub-sample of pupils were invited to participate in a focus group as part of the process evaluation (discussed in Chapter 6). However due to logistics, some pupils participated in these focus groups prior to completing the post-programme questionnaires. Some questions in the focus group addressed pupils' motivation to being physically active, which could have influenced their questionnaire responses. Unfortunately, this was out-with the researcher's control.

Lastly, this study was conducted in one school in a deprived area of Glasgow; therefore, it cannot be assumed the results would be the same for all adolescents across Glasgow. The next stage of this process would be to conduct a full scale RCT within different schools across Greater Glasgow and if possible, across Scotland to determine the ActiveChat's impact on adolescents' motivations, perceived psychological needs, attitudes, and PA and SB (both habitual and in-class).

5.6 Conclusion

In conclusion, the ActiveChat programme appeared to maintain pupils' internalised forms of motivation, and perceived competence and relatedness. Seasonal changes could have been a factor in the results, as the ActiveChat programme ran from the beginning of autumn into winter.

Although there were no effects of the programme on habitual PA/SB, a major finding of this study was the large group differences in class-time PA and SB. To the author's knowledge, this is the first study to assess class-time PA and SB within a secondary school environment in Scotland, and this has contributed uniquely to the research area. There is still a lack of research on class-time PA in secondary schools, but the ActiveChat programme has shown to be an example of a programme which can successfully integrate movement into traditional lessons.

Chapter 6 (Study 3): Evaluation of the ActiveChat programme

6.1 Preface

This chapter assesses the feasibility of the ActiveChat programme through process evaluation using a mixed methods approach: conducting qualitative interviews and focus groups with teachers and pupils, and monitoring the level of implementation using teacher evaluations and observation techniques. This chapter will primarily explore teachers and pupils' perceptions of the ActiveChat programme. Secondarily, the data recorded from the teacher evaluations and observations will determine fidelity of the programme. The results of this process evaluation will establish the feasibility of the ActiveChat programme in Scottish secondary schools, whilst also determining ways to improve the programme for future implementations. It is important to note, this is not an in-depth qualitative study, but a semantic level evaluation using qualitative methods.

6.2 Introduction

6.2.1 Importance of evaluation

Feasibility studies are often conducted to determine the proof of concept of a newly designed programme. Results of a feasibility study can be used to inform future implementations (e.g. to determine sample size or to further develop the programme (Jago & Sebire, 2012). Wight and colleagues (2016) published a six-step framework (6SQuID) to develop programmes. Step 6 emphasised the need for evidence that the programme is doing what was intended. This is assessed through pre and post-programme data (Wight et al., 2016). Using qualitative methods can provide additional and rich data to further determine the programme's feasibility.

6.2.2 Process evaluation in classroom-based programmes

The number of classroom-based programmes to improve levels of PA and reduce SB have increased over the years. As highlighted in Chapter 2, reporting of implementation is important in understanding the effectiveness of a programme on the monitored outcomes (Glasgow et al., 1999). It was previously suggested by van Sluijs et al. (2007), that reporting of implementation of school-based PA programmes was rare, yet within the past decade, this appears to have changed. More and more researchers of school-based PA and SB programmes are reporting methods used to monitor implementation (Contento et al., 2007; Contento et al., 2010; Dunton et al., 2009; Tymms et al., 2016; Whittemore et al., 2013). Some researchers are now publishing separate process evaluation articles on their programmes (Jago et al., 2015; Norris et al., 2018b). Based on our recent review (McMichan et al., 2018), detailed results of process evaluation in classroom-based PA and SB programmes in secondary schools appear scarce with only two studies reporting data (Cui et al., 2012; Dunton et al., 2009). This is likely due to few classroom-based studies within secondary school settings, but highlights the gap in the current literature for thorough evaluation of such programmes.

6.2.3 Aims of the Chapter

Aims of this chapter were to:

i. Explore the perceptions of teachers and pupils on the ActiveChat programme;
ii. Evaluate the implementation of the ActiveChat programme based on the constructs of implementation outlined by Durlak and DuPre (2008).

6.3 Methods

6.3.1 The researcher

The author of this PhD thesis (Lauren McMichan) conducted all focus groups/interviews. The researcher is female, and at the time of data collection, was 26 years old. The researcher attended focus groups/interviews in casual attire (tracksuit bottoms and hooded jumper) to promote an informal atmosphere. This was important when conducting focus groups with pupils, to ensure they were not intimidated by the researcher. Undergraduate students who assisted with data collection and were present for the focus groups/interviews wore University branded sports gear. The researcher was present for all ActiveChat lessons during the 8-week programme, therefore had built up a rapport with the pupils and teachers.

6.3.2 Participants

Pupils

Pupils who took part in ≥ 50% of all ActiveChat classes met the inclusion criteria for participating in the focus groups. The researcher believed those who attended at least half the number of classes would have enough experience to provide feedback on the content. Six pupils who met the inclusion criteria were randomly invited for each focus group (one focus group per year group). This number of participants has been recommended in previous literature for conducting paediatric focus groups (Heary & Henessey, 2002; Peterson-Sweeney, 2005). The researcher's supervisor (DR) randomised participants using IBM SPSS Statistics for Windows (v.23) (IBM Corp, Armonk, NY). Randomisation was carried out for each year group and the first three boys and three girls in the order were invited to participate. If an individual declined, then the next boy/girl in the list was then invited. It was emphasised by the researcher that participation was voluntary. Seventeen pupils (females n = 8, males n =

9), aged between 11 and 14 years, participated in the focus groups. Of the pupils invited to participate (N = 21), two declined the invitation, and two did not attend after providing consent.

Teachers

The two teachers (one male; one female) who delivered the ActiveChat programme signed consent to participate in the study. The teachers were invited to complete evaluation questionnaires after each ActiveChat lesson, and to participate in a one-to-one semi-structured interview with the researcher at the end of the ActiveChat programme. The evaluation questionnaires were to determine the teachers' perceptions on the implementation of each lesson, whilst the interviews were to determine their perceptions of the ActiveChat programme as a whole. The teachers were aged between 35-64 years and had a combined total of 56 years teaching experience. Both had expertise in subject areas beyond pastoral care (PE and English).

6.3.3 Study Design

Methodological orientation and theory

A phenomenological approach was adopted for this study. A phenomenological approach explores an individual's perceptions and experience of an event (i.e. the 'phenomenon'), and was a concept developed in the 20th Century by Edmund Husserl (Giorgi & Giorgi, 2008; Jones, Brown, & Holloway, 2013). This approach was adopted due to exploring the pupils and teachers experience of the particular 'phenomenon': the ActiveChat programme. An essentialist framework was adapted due to the assumption that pupils and teacher would form their own opinions on the ActiveChat programme (Smith, 2008).

6.3.4 Focus groups/interviews

Setting

Focus groups/interviews took place in a meeting room with a glass-panelled door, located within the school where the ActiveChat programme was delivered. This meeting room was beneficial for the focus groups as the furniture was arranged in a circle to facilitate discussion. The 4th year undergraduate student who was present for the specific year group's ActiveChat class (e.g. S1, S2, or S3) was present for the focus group/interview of that class. It was important to have the same student present for each year group as these students had built up a rapport with the pupils and the teacher.

Pupil focus groups/ teacher interviews

Pupils were invited to sit round the table alongside the researcher and student. Materials and lesson plans used throughout the ActiveChat programme were displayed on the table for pupils and teachers to refer to if required and to remind them of the content of the ActiveChat programme. The researcher acted as a facilitator, guiding the discussion based on the semi-structured schedule (sample schedules are in Appendices J and K). The student was present to take any additional notes, if required. For the focus groups, the researcher and student sat back from the table to distance themselves. The focus groups and interviews were recorded using two Dictaphones (Olympus DM 450, Olympus VN-5500PC; Olympus Corporation, Tokyo, Japan) to ensure there was a backup if one failed to record. The length of focus groups/interviews ranged from ~ 15-30 minutes. All focus group and interview recordings were transcribed verbatim by the researcher.

Interview schedule

The interview schedule was developed by the researcher to address the aims of the study. Both focus groups and interview schedules were piloted using volunteers from the University department. Pilot participants were briefed beforehand to provide the context of the questions. Order sequence and wording of questions were adapted following the pilot focus groups/interviews. This was to ensure a logical flow of questioning.

6.3.5 Teacher evaluation

Teacher evaluations (Appendix L) were conducted after each lesson using a 5-point Likert scale addressing nine different constructs: pupil/teacher rapport; clarity of instructions; relevance of content; appropriate use of demonstration; pupil behaviour; pupil engagement; what percentage of learning outcomes were achieved; teaching style that helped achieve learning outcomes; and smooth transitions between lesson stages. These constructs were adapted from previous teaching evaluations (Chapter 4) to aid in determining teachers' perceptions of fidelity, pupil responsiveness, delivery of lessons, clarity of lesson plans, and relevance of topics.

6.3.6 Implementation

Ongoing evaluation was performed throughout the ActiveChat programme to determine implementation of the programme. An observation checklist was designed by the researcher to incorporate the elements of implementation as described by Durlak and DuPre (2008). These were: fidelity, dosage, monitoring of control, programme reach and adaptation. The checklist included number of pupils in attendance for the class (of those who agreed to take part in the date collection) (programme reach); number of sessions delivered (dosage); record of what was being taught in the control class (monitoring of the control); list of the

learning outcomes for each lesson (fidelity); and comments section (adaptation). This was to determine if the researcher's lesson design was clear and appropriate for teachers. A sample template of the observation checklist is shown in Appendix M. The observation checklist did not include the assessment of quality, as the researcher is not a teacher herself; therefore, it was inappropriate to assess the quality of delivery. Pupil responsiveness was also not included as this was assessed through the focus groups/interviews and the teacher evaluation. Programme differentiation would be narratively discussed.

For each class who had the ActiveChat programme delivered, with the permission of the teacher, the researcher would sit at the back of the class and observe the lesson whilst completing the checklist. Alongside the researcher, one of the three 4th year undergraduate students were present to co-observe and independently complete an observation checklist.

6.3.7 Data Analysis

Interviews/Focus Groups

A concurrent deductive and inductive content analysis (McCarthy & Jones, 2007) was used by the researcher. Deductive analysis was used to identify themes of pupils and teachers' perceptions of the ActiveChat programme based on previous evaluation work (Chapter 4). Inductive analysis was used to identify themes that were not considered as part of the ActiveChat programme evaluation. The researcher read the transcripts multiple times to familiarise herself with the data. The researcher then highlighted key words or phrases that were related to the research question and collated them into meaning units (Graneheim & Lundman, 2004). Meaning units were grouped together based on similarity to form first-order themes. First-order themes with similar meaning were grouped to form second-order themes. Finally, second-order themes were grouped to form overall themes. The researcher was the primary coder for all interviews/focus groups ($N = 5$). Due to the researcher being

present for all ActiveChat lessons, the researcher may have had preconceptions of the qualitative data, potentially introducing an element of bias. To counter this, the researcher's lead supervisor (AMG) acted as a 'critical friend' and independently coded one focus group and one interview. This process has been outlined in Sparkes and Smith (2014) to allow an individual who had no direct connection to the ActiveChat programme within the school, and who did not know the pupils or teachers, to analyse and explore potentially alternative meanings of the data. Upon completion of the coding, both researcher and supervisor discussed the codes to ensure there was an agreement. Coding was performed using NVivo Pro 11 for Windows (QRS International Pty Ltd; Doncaster, Australia).

Teacher evaluation

Three different Likert scales were used for the teacher evaluation. The first section determined teachers' perceptions on the following assessments: pupil/teacher rapport; clarity of instructions; relevance of content; appropriate use of demonstration; pupil behaviour and pupil engagement. The anchors of scale ranged from *poor*, *fair*, *satisfactory*, *good*, *excellent*. The second section Percentage of learning outcomes achieved during the lesson where the anchors of scale ranged from *0-20%, 21-40%, 41-60%, 61-80%, 81-100%*. The third section assessed how teaching style helped achieve learning outcomes and smooth transitions between lesson stages where the anchors of scale ranged from *strongly disagree*, *disagree*, *neither disagree or agree*, *agree*, *strongly agree*. A narrative description of the results of the evaluation is presented in Appendix N.

Implementation

The primary aim of the observation checklist was to determine the fidelity level of the ActiveChat programme. To provide a quantitative representation of fidelity, all the intended

activities/outcomes of each lesson were circled when they were met. The percentage of intended activities/outcomes met for each lesson was determined using the following equation:

(Number of activities/outcomes addressed ÷ Total number of the activities/outcomes) × 100

As there were two observers, the two percentage scores for each lesson were averaged. For each year group, an average percentage score for all eight lessons was calculated to determine overall fidelity of the programme. Dosage was determined by stating the number of lessons delivered. Participant reach was determined through attendance where the percentage of pupils present for each lesson was calculated and averaged across the eight lessons to provide a quantitative representation of overall programme reach.

6.4 Discussion of results

6.4.1 Pupils' perceptions of the ActiveChat programme

A full summary of the first-order, second-order, and overall themes that were identified from the pupil focus groups are presented in Table 6.1. To ensure anonymity of the pupils, pseudonyms have been used.

Positive overview of the ActiveChat programme

Positive feelings towards the ActiveChat programme

The ActiveChat programme was well received by pupils. Some pupils emphasised that "It was fun" (Charlotte, S1; Nathan, S3) and found the programme "interesting" (Anna, S3).

Activities

A number of pupils expressed their enjoyment of moving about during the class. Pupils specified they enjoyed walking about the school and taking part in star jumps, "Usually just read out of text books or something like. When we do that [ActiveChat programme] we got to like star jumps and walk about the corridors" (Hannah, S1).

Other than being able to move within the classroom, pupils also expressed their enjoyment of poster making (final lesson) and getting to measure their PA during class by wearing ActiGraph accelerometers and pedometers (lesson 6).

> Aye like, the poster was the most recent but even if it was at the start I would still remember it because ["it was fun" Ryan, S1] we were learning and at the same time we were having fun. It was good. (Alex, S1)

Different to traditional classes

Pupils expressed their enjoyment of the ActiveChat programme, as it was "outside the box" (Alex, S1), and different to traditional classes due to MI and varying tasks, "It was absolutely fab because we didnae [did not] need to sit and listen to [teacher] saying the same thing every week… it was good to have something different" (Nathan, S3)

Learning about health

Learning about the effects of PA and SB on health was highlighted as a topic pupils liked about the programme, "I liked how we learned how like different part of our body, like different things can change when we do active things." (Anna, S3).

Table 6.1

Summary of first-order, second-order, and over all themes from the pupil focus groups

Pupil Focus Groups Themes		
First Ordered Themes	**Second Ordered Themes**	**Overall Themes**
Positive Feelings towards the ActiveChat Programme	→	Positives Aspects of the ActiveChat Programme
Positive Feedback towards Activities	Activities	
Positive Feedback towards Movement		
Pupil Voice/ Sharing Experiences	Autonomy	
Having a choice within the programme		
Different to Traditional Classes	→	
Perceived positive views of peers	→	
Learning about health	→	
Relatedness to peers	→	
Personal awareness of own PA	→	
Negative Feelings towards Repetition	→	Negative Aspects of the ActiveChat Programme
Content too easy	Inconsistent Content Difficulty	
ActivPAL chart data difficult		
ActivPAL chart data easy		
Poster too easy		
Dislike ActivPAL task	Dislike of content	
Dislike PowerPoint presentations		
Perceived negative feelings of peers	→	
Lack of Pupil Participation	→	
Competition	→	Recommendations to Improve ActiveChat Programme
Make content more challenging	Content	
Incorporate more activities		
Incorporate more physical exercise		
Additional content required		
Opportunities to expand sport experience		
More activities outside the classroom		
Pupil Voice/ Sharing Experiences	→	
Clarity of instruction	→	
Motivations to being active	Knowledge Obtained	Learning Outcomes
Knowledge of PA/SB		
Knowledge of Health Outcomes of PA/SB		
Knowledge of Guidelines		
Solutions to being more active	Solutions	
Solutions to reducing sedentary behaviour		
Cold weather	→	Barriers to PA
Lack of motivation	→	
Sedentary activities taking priority	→	

Personal awareness of own physical activity

Although not directly part of the ActiveChat programme itself, two pupils liked wearing accelerometers to measure their PA, "I enjoyed the, the thingy [ActiGraph] where you just wear it. It's like, it sounds so cool how you can just like measure how, how much, how active you are in class." (Ryan, S1).

Relatedness with peers

One pupil expressed his enjoyment of being able to work with his friends, allowing him to communicate with them on the topic of PA, "It was fun because you get to like, you can go into groups with your friends so it's fun because like, you can talk about being active with your friends…" (Ryan, S1).

Autonomy

Some pupils felt they were given the opportunity to express their opinions on PA/SB and share their experiences, "By asking like, what we thought physical activities were." (Aiden, S2). One pupil expressed he particularly enjoyed this element of the ActiveChat programme, "We got listen to other peoples' opinions" (Ryan, S1).

One pupil felt they had autonomy during the programme by choosing whom to work with in their groups. They believed this helped them focus on tasks, "Well, being able to choose the members of your group that you'd work well with really like encourages you to do it because it helps you concentrate." (Avery, S2).

Perceived positive views of peers

Overall, pupils believed that their peers would enjoy the programme if it were delivered to them because it was something different and the programme was interesting.

Pupils responded well to the ActiveChat programme, emphasising their enjoyment with regards to movement within the classroom and the programme's differentiation to traditional lessons. Similar themes of 'enjoyment' (Finn & McInnis, 2014; Martin & Murtagh, 2017b), and 'a sense of change from previous lessons' (Martin & Murtagh, 2017b, p223) were reported in other studies exploring pupils' perceptions of PA programmes within the classroom.

Pupils in the ActiveChat programme liked working with their peers, which again is similar to the findings of Martin and Murtagh (2017b). The ability to share and listen to each other's personal experiences of PA was deemed important by some pupils. These findings suggest feelings of relatedness with peers and the autonomy of being able to choose group members and to express opinions/experiences as important to these pupils, linking back to the SDT. The feelings of relatedness were maintained within the ActiveChat group at baseline and post the programme, whilst the control class significantly decreased as shown through the quantitative data. Likewise, autonomy was also maintained yet this was not significantly different to the control class. The comments made by the pupils indicate the importance of relatedness and autonomy. Additionally, the sharing of pupils' experiences may be linked with other behaviour change models such as SCT (Bandura, 1986) whereby a pupils' self-efficacy to perform a particular behaviour may be enhanced through the successful experiences of their peers (Bandura, 1991).

Pupils emphasised their enjoyment of moving within the classroom. This may help to explain the significant enhancement of in-class PA within the ActiveChat group; that if the pupils enjoyed the movement aspect, they are more likely to participate.

Negative views of the ActiveChat programme

Pupils were asked about which elements of the ActiveChat programme they disliked. Three first-order and two second-order themes were identified from the three focus groups.

Lack of pupil participation

S1 pupils discussed their dislike for the lack of participation from some pupils in the ActiveChat programme or that they "cheated" during the pedometer lesson, "Yeah, I know, when we were like making the poster, lots of people were no taking part." (Ryan, S1).

Perceived negative views of peers

One pupil stated they believed that their peers would not have enjoyed presenting their poster, "I don't think they would have liked, like having to, you know when you had to present the posters; I don't think people like going out and speaking." (Sarah, S1).

Repetition

S1 pupils emphasised their dislike of the repetitive element of the ActiveChat programme delivery. Pupils expressed this made aspects of the programme boring, "Like we went over the same stuff every week, and like [teacher] kept talking like the same thing. I didnae [did not] like that." (Hannah, S1).

Disliked content

S3 pupils highlighted two elements of the ActiveChat programme they disliked: the activPAL data analysis session and the PowerPoint presentations. Caleb expressed he had found the graphs irritating in the analysis session, "…that graph was, er, quite annoying. It was quite annoying." (Caleb, S3). Nathan commented he found the PowerPoint presentations

used each week to deliver the key messages of the ActiveChat programme boring, and stated he would like the programme delivered differently:

> I think it would have been better if [Teacher] was standing there with [their] wee PowerPoint on the board, like I think it would have been better if [they] did it a different way because it was getting quite boring when [they] did that every week. (Nathan, S3)

Inconsistent content difficulty

Content difficulty was addressed by a number of pupils. This was inconsistent across the three year groups. For the S1 group, they found the content of the ActiveChat programme was not challenging, "It was just listening to [Teacher] and like talking, there wasnae [was not] really any work. It was just like easy stuff you got to do." (Hannah, S1). In S2, pupils stated the poster and activPAL data analysis activities were too easy, "The poster making was easy." (Zoe, S2); "It was easy to understand." (Jackson, S2). In S3, Lucas agreed the activPAL data analysis was easy, yet Anna stated that it was difficult at first, but became easier to understand, "It was to start off with but when you get used to how to read it then it became easier." (Anna, S3). Contrary to their peer's views, Avery and Nathan emphasised that they struggled with analysing the activPAL data, "Trying to get the times right and like the pie charts." (Avery, S2), "Too hard to read." (Nathan, S3).

Overall, there were minor comments regarding the negative aspects of the ActiveChat programme. For future implementation, the programme should be developed to become more challenging for pupils, and there should be varied methods of content delivery. When developing the programme, teachers should be more involved in the design of the content and materials. This is to ensure the content and materials are truly addressing the 3rd phase and/or

4th phase learning outcomes of the CfE and are academically challenging enough for the pupils it would be delivered to. However, there may be barriers to this due to teacher schedules and their ability to invest such time into a new programme.

Negative views of the repetitive nature of the ActiveChat programme has been echoed in feedback from other classroom-based programmes (Dyrstad et al., 2018; Norris et al., 2018b). These results suggest that pupils prefer varied activities rather than repeating similar content.

Barriers to taking part in physical activity

Although the aims of this evaluation were not to determine why pupils were or were not active, three first-order themes were identified as barriers to PA participation and reducing SB.

Weather

Three pupils identified weather conditions as barriers to being physically active. For Noah, when pupils suggested more activities outside, he stated, "Except on rainy days I don't like that." (Noah, S1). Hannah expressed that her clubs would stop in the winter months, "But see in the winter time, all your clubs are like, finished." (Hannah, S1). Noah responded that nobody wants to go out due to the cold weather, "I know and it's cold and naebody [nobody] wants to go out" (Noah, S1). This was echoed by Nathan, "In the winter, naw… Because it's freezin'" (Nathan, S3).

Lack of motivation

One pupil explicitly stated laziness as a barrier to reducing SB, "I don't think there's any other way to put it, just lazy." (Amelia, S3).

Sedentary behaviours take priority

Three pupils identified other sedentary activities they enjoy, which would prevent them from reducing their SB, “I mean apart from being lazy, I have games to play and games that need completing” (Amelia, S3); “I love playing, like reading my stories on my laptop.” (Anna, S3), and “I just like, read all the time.” (Lucas, S3).

There were a number of barriers, which pupils believed prohibited their ability to increase PA and reduce SB. Barriers included cold weather in the winter months, and other SB taking priority, such as game playing and reading. These reasons may have contributed to lack of change in PA and SB based on the self-reported data collected pre- and post- the ActiveChat programme. This suggests that the ActiveChat programme was ineffective at overcoming barriers towards PA. These are common barriers that have been documented in previous literature. A systematic review by Martins and colleagues (2015) investigated adolescents’ barriers and facilitators to being physically active. Barriers identified from the review were similar to those found in this study, for example, lack of motivation. Similarly, other activities taking priority, such as screen time, were reported barriers. Weather was a perceived barrier by pupils in the current study, yet in Martins et al. (2015) review, this was not evident. Weather as a barrier may have been more prominent in this particular group of individuals as focus groups were conducted in the winter season. Lack of availability of PA programmes were identified as a perceived barrier in the review. This aligned with comments made by one ActiveChat pupil who reported that clubs cease over winter, suggesting opportunities are reduced. This emphasises the importance of MI within the classroom to ensure pupils still have the opportunity to be more active during the winter months.

Learning outcomes

Knowledge obtained

Pupils identified key ‘take-home’ messages from the ActiveChat programme. These included what PA is; the different types of PA; what SB is, and how SB is different from PA. The health benefits/risks of being active/sedentary were frequently discussed. Pupils believed the programme increased their motivation to be active due to the health knowledge attained, “Aye well yeah it does, because it shows you the risk which you could have, like if something with your blood or something clogging or something cause you’re always sitting down” (Alex, S1), and “It puts the idea into your head that if you don’t go and do like physical exercise then you could become like unwell” (Hannah, S1).

Pupils also acknowledged the programme emphasised how much activity they should be doing, “Cause it’s told us how much we should be active and how much we shouldnae [should not] be sitting around doing nothing.” (Nathan, S3).

Solutions to increasing physical activity and reducing sedentary behaviour

Pupils identified solutions to increasing PA and reducing SB and provided examples during the focus group. Examples included participating in more physical exercise, “Go out on more runs” (Nathan, S3), and making adaptations to their journey to school, “…you could do like, if your house is quite a bit far you could stop the bus, from the bus you could stop, like quite a bit, like half way and then walk it from there” (Noah, S1). Reducing their screen time was one solution to reducing SB, “Cut down the amount of time you’re on your phone” (Hayley, S3).

The ActiveChat programme was designed to promote the importance of PA and reducing SB whilst addressing learning outcomes of the CfE, specifically the areas of health and wellbeing, literacy and numeracy. Pupils demonstrated their understanding of these behaviours and highlighted the health importance associated, directly addressing learning

outcome HWB3-15a of health and wellbeing. Throughout the ActiveChat programme, pupils were given the opportunity to share opinions and express ways to improve their own PA and reduce SB, addressing learning outcome HWB3-19a of health and wellbeing. All CfE learning outcomes addressed in the ActiveChat programme are presented in Appendix C.

Similarly, pupils who participated in an 'Active Science Curriculum' programme emphasised an enhanced learning experience and were more aware of their own PA behaviours (Finn & McInnes, 2014).

Pupils were able to identify ways in which they could increase PA and reduce SB. The identification of these solutions by the pupils themselves suggest they have identified control and choice over their PA/SB behaviours, linking to autonomy, but also to perceived behavioural control. Perceived behavioural control is a predictor of behavioural intention and behaviour as outlined in the TPB (Azjen, 1991). Again, pupils in the ActiveChat class maintained their levels of autonomy based on the quantitative data, yet this did not significantly differ from the control.

Recommendations

Pupils were asked what they thought would improve the ActiveChat programme. Three first-order and one second-order themes were identified for improving the ActiveChat programme.

Adaptations to content

Pupils expressed their interest in more activities outside the classroom:

> You could try and get the PE hall and put people into different bits and like someone could see how high the shuttle [shuttlecock] can get up in the sky and people might be doing basketball so see how many baskets they get in 30 seconds. (Hannah, S1)

The walking tasks were received positively by pupils and it was suggested there should be more opportunities to do these types of activities:

> More stuff outside the class, maybe like, in the corridor cause see when we were in the corridors like twice that was always the best bits. Don't do it every single period but like do it more 'cause it was fun. (Alex, S1)

Activities that incorporated sport participation and physical exercise were recommended by a number of pupils, "You could do like a certain sport every week and do like exercises you would do in that sport. You could do that." (Ryan, S1). Activities that required physical exercise, such as push-ups and bleep tests, were suggested, "Like, go to the gym and see how long you can last like running back and forth. The bleep test basically." (Aiden, S2).

Pupils expressed that they would to do "more activities" including relevant games and walking activities, "Like you could do this, it's like I don't know how to explain it, it's like you would do something like a sport and could act like they were playing a sport and had to guess it kinda." (Ryan, S1), and "More lessons where you're like, walking about." (Nathan, S3).

Some pupils expressed that some of the content of the ActiveChat programme was not challenging enough and the poster needed to incorporate more topics to provide more choice over what they get to present and thus increase autonomy.

Competition

Some pupils suggested activities incorporate a competitive element, "I would at least do something ["crunches" Alex, S1] like a line down the hall and probably like time it or something, then you run down and run back." (Noah, S1), and "Doing timed activities, like who can do the most star jumps in like 30 seconds or something." (Sarah, S1).

Facilitate sharing opinions/experiences

Having more opportunities to share their own opinions and experiences of sports and physical activity was recommended by S1 pupils, "Share your experiences like if you go to a club, like swimming or something, you could show them something like a stretch or like an exercise, to maybe do the exercise in the club. You could do that." (Ryan, S1). One pupil believed sharing experiences could encourage others to participate in PA:

> Or like, you could do different challenges and then go and talk to your friends, or the class gets [inaudible] and you do different challenges and you talk about it to the people who done different challenges and then they might want to do that so they do it. (Noah, S1).

This relates to the psychological needs sub-theory (Ryan & Deci, 2000b) from the Self Determination Theory (Deci, & Ryan, 1985). Autonomy is addressed through pupils being able to voice their own opinions of PA and SB; perceived competency towards PA may increase if pupils can see that their peers can do it; and perceived relatedness will increase through sharing the experiences together as a class. A previously mentioned, this personal perception of competency and self-efficacy through the experience of others is related to SCT (Bandura, 1986). This involves the personal observation of others and learning the behaviour, indicating other behaviour change models are involved in motivating others to become physically active. Pupils sharing their experiences of PA within the classroom may promote PA as a normative behaviour and motivate others to take part. This again could link to TBP (Azjen, 1991), as subjective norm is a predictor of behavioural intention and behaviour.

Pupils emphasised the need for content that is more challenging, and more activities incorporating physical exercise. Incorporating physical exercise (e.g. running) may be what

pupils would like to do in class, yet this is unlikely to be feasible in a secondary school classroom. There is a lack of space to perform these types of activities, and there is a time pressure to ensure the curriculum is delivered as each class period is only 50-55 minutes.

Incorporating a more competitive environment into the ActiveChat programme was suggested by both male and female S1 pupils. This is contradictory to findings in the review by Martins et al. (2015) which suggested that competitive elements were a barrier to PA in adolescents. Incorporating more competition was only suggested in one focus group; therefore, this may only be unique to the younger age group or this particular group of pupils.

Pupils were keen to incorporate activities that were outside the classroom environment, a recommendation similar to that reported by Norris et al. (2018b) in their primary school programme. Incorporating lessons outside the classroom may be more feasible in the primary school environment due to greater flexibility in the school day. However, this is likely to be difficult in secondary schools due to regimented structure and limited time with pupils in each class period.

6.4.2 Teachers' perceptions of the ActiveChat programme

Six overall themes identified from the interviews with the teachers. A full summary of the first-order, second-order, and overall themes are presented in Table 6.2.

Positive overview of the ActiveChat programme

Positive feelings towards materials/contents and delivery

The teachers emphasised that the ActiveChat programme was good, the topics were relevant, and they enjoyed delivering the programme, "I really enjoyed it. It was dead interesting and I mean because all the materials were there, and the kids enjoyed them then it

kinda made it quite enjoyable to teach." (Lynne), and "It always a wee challenge when you haven't made the lessons up or it's something you are unfamiliar with, but no I enjoyed it." (Paul). Teachers were aware of current adolescent PA levels and believed the ActiveChat programme was good for pupils, "I think the levels of physical activity will be absolutely frightening so I think it's really good for them." (Lynne).

Pupils' responses to ActiveChat

Teachers believed that pupils were very receptive to the programme, as they engaged with the topic and enjoyed the activities:

> I thought the pupils engaged very readily. They got into a routine and they understood how to put the ActiGraphs on, they understand the idea of even standing up in the class, you know walk about, and you know, walk up stairs, and things like that. And they, you know they took that on board in a, a good way without misbehaving and that, they enjoyed that aspect of it. (Paul).

It was reported that pupils understood the concept of the programme and identified the importance of the topics:

> It's something they could related to. It's not, it's not, it's a fairly concrete idea, you know, it's not something that's, that's um, too difficult for them to conceptualise. So no, I think the lessons in that respect, pupils found it easy to, to see the point of them. (Paul).

Table 6.2

Summary of first-order, second-order, and overall themes from the teacher interviews

Teacher Interviews		
First-Order Themes	**Second-Order Themes**	**Overall Themes**
Positive feelings towards material and contents	→	Positive Overview of the ActiveChat Programme
Pupils were engaged	Pupils' Response to ActiveChat	
Pupils identified the important of the topics		
Pupil enjoyment		
Aged appropriately	Activities	
Quantity of lesson matched lesson time		
Different to traditional classes		
Group tasks		
Positive structure/planning	Lesson Plans	
Good provision of lesson plans/materials		
Positive feelings towards delivering the ActiveChat programme	→	
Addresses outcomes of CfE	→	Intended Outcomes
Met intended learning outcomes	→	
Programme incorporated pupil voice	→	
Negative response to activity breaks	→	Negative Views towards Movement Outside Lesson Tasks
Negative view towards standing	→	
Helps people learn	→	Benefits of Active Learning
Good for mental wellbeing of pupils	→	
Break from traditional learning	→	
Encourages participation	→	
Incorporate movement as part of lessons	Movement within the classroom	Recommendations
Classroom management		
Identifies activities where active learning can be applied		
Use of visual stimulus	→	
Activities to incorporate more pupil voice	→	
Teacher adaptations	→	
Teacher support	Teacher Experience	Personal Experience and Perceptions
Teacher engagement		
Teacher behaviour change	→	
Pupils perceptions of PA	→	
Different delivery style	→	

Activities

It was reported by the teachers that the activities of the ActiveChat programme were aged appropriately:

> You never got a sense from the kids that aww this is, aww you know too young for me or this is a bit immature or you know, they engaged well in it and responded well to it so yeah it was an appropriate, aged appropriately. (Lynne).

One teacher commented that because the year groups are close in age (specifically S2-S3), the teacher themselves could differentiate the materials if required, “You could almost take the materials and differentiate them slightly as you deliver them but as I said, because it’s two year groups [S2/S3] just one apart it was absolutely fine.” (Lynne).

Pupils responded well to group work, and teachers reported that this encouraged participation, “I think actually it forces their hands working in a group. They all had to take a bit of responsibility and delivering a bit. I thought that worked really well too.” (Lynne).

One teacher commented on the programme’s differentiation to traditional PSE classes due to movement integration, “I thought the young people enjoyed taking part in the programme and was something a wee bit different, because they don’t often get to move about a classroom unless it’s a practical subject” (Paul).

Lesson plans

The lesson plans were positively received by both teachers. One teacher had reservations having not planned the lessons himself yet believed the lesson plans worked well:

> Very good. Yes, I thought they were very good. It’s only when you put them into practice with a class that you can really judge generally how they work, and I think the vast majority of the lessons worked very well. (Paul).

Teachers expressed the lessons were well planned, including the clarity and timing of activities:

> Yeah no they were really clear and it was quite straightforward but you know, they were really well planned, broken down really well, the tasks that really matched the time allocated to them. The lesson plans were really clear and comprehensive. (Lynne).

Lesson plans were provided in advanced prior to the lesson beginning and little input was required from the teacher, "…all the lessons we had in good time so that we could have a look over them and eh, no, all the materials were provided. There really wasn't much at all that was needed, so that was good." (Paul).

Teachers believed the ActiveChat programme was an interesting and relevant programme that engaged S1-S3 pupils. Activities were aged appropriately and the lessons plans were clear and well structured. All lesson plans and materials were provided for the teachers, resulting in minimal required preparation time. Although this may be perceived as positive in reducing time burden on already busy teachers, this may remove teachers' autonomy (Martin & Murtagh, 2017b, Riley, Lubans, Holmes, & Morgan, 2016) and as a consequence reduce motivation towards delivering the ActiveChat programme. This does not appear to be true to the current study, yet this was the first implementation of a novel programme. In order to maintain teacher autonomy, teachers could be involved in further development of the programme or the researcher could provide a variety of activities for the teachers to choose. Additionally, providing teachers with more autonomy of the lesson plans and materials would allow them to differentiate the lessons and adapt the level of difficulty depending on the age range, as highlighted by Lynne.

Intended outcomes

Addressed outcomes of the CfE

One of the key objectives of the ActiveChat programme was to ensure that learning outcomes within the areas of health and wellbeing, literacy and numeracy from the CfE, were

addressed. These areas are deemed the responsibility of all teaching practitioners (Education Scotland, n.d.b). Teachers confirmed the ActiveChat programme met learning outcomes from these areas:

> …they would have definitely hit the e's and o's [experiences and outcomes] for literacy and then numeracy… definitely for literacy when they had written tasks to do and they had to, you know, present things and formats. No I think it covered a good range of e's and o's I'd say across the board." "…I'm sure you could match it up if you looked at some of the e's and o's that are covered in health and wellbeing, it would certainly, um, cover quite a few of them… (Lynne)

Met intended objectives of the ActiveChat programme

From an educational standpoint, one teacher believed the programme met the intended objectives and enhanced pupils' knowledge of PA and SB, including the ability to distinguish different types of PA (e.g., active living, exercise, and sport), the benefits of being physically active, and the detriments of being sedentary:

> Yes, they were clear about what the learning objectives were so absolutely, and I think that was clarified today, you know being able to talk about physical activity and I think most of them would be able to characterise the different physical activity and talk about SB. They can talk about why it's good for them, why that's not good for them, and what they can do to address that. Yeah, no I think the objectives were definitely met. (Lynne)

Programme incorporated pupil voice

Both teachers emphasised that pupils were able to express their opinions and share experiences freely within the ActiveChat programme. Pupil voice was an important part of the ActiveChat programme to facilitate increasing perceived autonomy, competence, and

relatedness. Although psychological needs scores did not increase, they were maintained based on the results of the quantitative data (Chapter 5). As previously discussed, there may also be links to increase perceived self-efficacy through the sharing of experiences.

Negative views of activity breaks/standing in class time

One teacher expressed their views against activity breaks and standing within the classroom due to the perception that stopping the class midway through the lesson could cause disruption and make it difficult to get pupils back on-task and standing would be too uncomfortable:

> …when you've got them on-task, and you've got them focused, really last thing you want to do then is to, you know it was almost a bit like an interruption… it's an opportunity for someone to mess about and carry on, so… they were to do it whilst they were standing then it's just awkward, not comfortable, you know when they were writing. (Lynne)

In secondary school, lesson periods last 50 minutes. It was stated there might only be ~ 40 minutes of teaching, after which pupils naturally get an active break when transferring to their next class. Both teachers emphasised that activity should be incorporated into the lesson to ensure there is no compromise to teaching time and pupils have an understanding of why they are doing what they are doing. The barriers highlighted by the teachers (i.e., time constraint, on-task behaviour, potential for pupils to become disruptive) have been found in other published literature on teachers' perceptions to movement integration within the classroom (Dyrstad et al., 2018; Martin & Murtagh, 2017b; Routen et al., 2018).

Benefits of active learning

Break from traditional learning

Traditional pedagogical methods of teaching involve pupils spending the majority of time sitting. One teacher valued breaking up sedentary time in the classroom, "I think as human beings, pupils need, you know, movements natural to human beings, and I think you know, it helps youngsters gather their thoughts and gives them a positive break from traditional ways of learning." (Paul).

Good for mental wellbeing

There is evidence suggesting PA is good for psychological wellbeing in adolescents (Biddle & Asare, 2011). This was highlighted by Paul who acknowledged the role of PA and its effects on the mental wellbeing of his pupils:

> They tend to sit down if it's a Maths class, an English class, and human beings find that difficult especially young human beings so I think, any lesson that can incorporate a bit of movement and a bit, you know, it's good for the mental wellbeing of the pupils. (Paul)

Facilitates learning/ participation

Both teachers acknowledged the value of being active to facilitate learning. It was emphasised that being active gets them "thinking more" (Lynne) and "physical movement actually helps people learn" (Paul). Being active facilitates the transference of key learning points, increases pupil participation, and encourages decision making, "…gets the point across better if they actually actively do it and also they're moving and active and all those things you wanted them to do but it was kind of, part of, of the lesson." (Lynne).

Teachers believed active learning was beneficial for pupils. The perception that being active facilitates learning has been shown in previous research (Benes, Finn, Sullivan, & Yan, 2016; Martin & Murtagh, 2017; Stylianou et al., 2015). The encouragement of pupil participation was echoed in recent research exploring teachers' perceptions of movement within the classroom (Benes et al., 2016).

Paul identified that pupils can find it difficult to remain seated. This perception has been highlighted by teachers in other published research, "…because there is nobody who can just sit that long" (Stylianou et al., 2015, p.398). This suggests that teachers understand the need for breaking up sedentary time to keep pupils on-task. The teachers' beliefs in the importance of movement may have contributed to the enhanced in-class PA based in the ActiveChat programme, whereby they may have been more inclined to implement this type of teaching pedagogy. If teachers do not have the same belief system regarding the importance of PA in an education setting, levels of in-class PA may have differed.

Recommendations

Movement within the classroom

Movement within the classroom as part of the learning experience was perceived to be a favourable pedagogical method of learning by both teachers. They recommended that movement should be incorporated as part of the lesson, and activities should not be separate entities (e.g., a quiz where individuals walk to a wall with the specific answer (a,b or c) instead of a two-minute active break). It was also emphasised that management is important when incorporating movement within the classroom:

> Providing there's a clear purpose for it, it's useful because it's a 50-minute period; on average what we have in school. It's a long time for youngsters to remain, as I say generally in a lot of classes they don't move around so you know, I think the good

thing is as long as it's carefully incorporated into the lesson. You know pupils need to have an idea why they're doing it. (Paul).

Lynne provided an example of where movement could be incorporated into a specific activity:

> You know, like the kinda barriers and solutions sheet, I get, like they could be doing that but then you could have you know, all the barriers, big sheet barriers on one wall and solutions on the other and they've got to go round and put up. You know, it's just if that's what you're trying to do is have them more active, you know just look at your activities and a lot of them you could kind of, you know, adapt. (Lynne).

Improvements to content/materials

There were only a couple of recommendations with regards to content/materials. Paul recommended that for future implementations, using more visual stimuli, such as the use of videos, would be beneficial to highlight key messages and encourage pupil engagement:

> I think sometimes what would be quite useful, quite a, a fan of visual, stimuli, so I think perhaps, you know a, very short video clips, you know to illustrate you know a point you know, I think it reinforces meaning sometimes. (Paul).

Lynne also recommended ways in which more pupil voice and personal reflection could have been incorporated within the programme, specifically regarding their PA planning for the week:

> …we could be more structured with that and actually give them some kind of homework to do and to actually take it away with them; right here is what you're saying is your plan for the week, is that what your plan looked like? …they come back and you say, well did you achieve your targets and did you think about reducing

> your SB… if they done a task to return with then, it would maybe reflect a wee bit more on their own physical activity and they could improve it… (Lynne).

The key message from the recommendations was clear: in order to incorporate movement within the classroom, the movement needs to be integrated as part of the lesson. Feedback from the teachers suggests that pupils need to understand the purpose of the movement, rather than doing it aimlessly. Other recommendations included techniques which could enhance pupils' engagement and allow them to reflect more on their own activity. This could contribute to enhancing pupils' autonomy and competence through taking more ownership of their own PA, making their own choices on how to improve it, and potentially setting themselves targets, which may have been viewed as challenging in the past.

Personal experiences/perceptions

Different delivery style

Paul emphasised that the ActiveChat programme was different to their traditional PSE classes, and it required them to adapt to a new way of teaching. Paul also expressed that this was a change for the pupils:

> It always a wee challenge when you haven't made the lessons up or it's something you are unfamiliar with but no I enjoyed it. It certainly kept me on my toes and made me engage with the topic as it was a new style of delivery in a classroom and the fact that the pupils normally in PSE periods they, you know they don't move about very much. You know it's a lot of discussion in groups and things like that, so this was a wee change for them. (Paul).

Pupils perceptions of physical activity

Paul suggested that the ActiveChat programme was beneficial in terms of educating pupils on PA. He stated that pupils often think of PA as sport or physical education and that the programme informs pupils of alternative ways to being more physically active and emphasises the potential benefits of being active:

> …I think that youngsters often think that physical activity, they automatically think PE, and they automatically think maybe an organized team sport, but they don't necessarily think of everyday activities as exercise, like walking to school or cycling to school or walking their dog, household chores, and you know the benefits of exercise, they seem to get that, you know, living longer, and feeling better, and also being more focused on their lessons because their brains were more alert. (Paul).

Teacher behaviour change

Paul briefly discussed the effects the ActiveChat programme had on himself personally. He explained that it made him more aware and he now tries to increase his PA through cycling and walking, "It's made me realise I need to be more active myself… Tried to cycle and do a bit more walking and tried to think about how I could do that in terms of coming to work." (Paul).

Lynne felt that the premise of the ActiveChat programme reflected her own personal philosophy as a PE teacher, and therefore the ActiveChat programme did not change her opinions or motivation towards being active, "No, I mean P.E.'s my subject I'd like to think that's my philosophy anyway." (Lynne).

Teacher engagement in the programme

Both teachers expressed their enjoyment of the ActiveChat programme, and emphasised how relevant the topic was, “I really enjoyed it. It was dead interesting and I mean because all the materials were there, and the kids enjoyed them then it kinda made it quite enjoyable to teach.” (Lynne).

The two teachers who delivered the ActiveChat programme expressed their support for the programme, emphasising the importance of PA, SB and health in the adolescent population, establishing the potential the ActiveChat programme has within the Scottish education system.

6.4.3 Teacher evaluation

The teacher evaluation was used to explore teachers’ perceptions of fidelity, quality and participant responsiveness. Additional information was gathered to help determine the clarity of lesson plans and relevance of content in relation to the Scottish CfE. Nine constructs were measured after each ActiveChat lesson. Full results of the evaluation are presented in Appendix N. The same teacher (Lynne) delivered the ActiveChat programme to both S2 and S3. For Paul’s evaluation, an ‘x’ was placed for lesson five due to this lesson being taken out of the programme. The three ‘x’ for lesson two for Lynne’s evaluation was due to missing data.

Pupil/teacher rapport

Overall, teachers perceived to have good/excellent rapport with their pupils for the lessons. Only one lesson was perceived as satisfactory for pupil/teacher rapport. This was for lesson 5 in the S3 class. This lesson was the measurement of PA, SB and activPAL data. Some pupils in S3 previously stated in the focus groups that they struggled with the activPAL data. The teacher themselves also had limited experience with the activPAL and associated

data, therefore this was new concept for all which may have contributed to the decrease in pupil/teacher rapport for this particular class.

Clarity of instructions

Teachers perceived the clarity of instructions good/excellent for all lessons, except for lesson 5. Again, this was perhaps due to the teacher not having previous experience with the activPAL and associated data. For future implementation, the researcher should conduct a training session with teachers prior to the programme commencing to explain the activPAL data.

Relevance of content

Overall, relevance of content was perceived as primarily excellent. For Paul, he found the pedometer lesson (lesson 6) only satisfactory in regard to relevance. This lesson involved the pupils performing walking tasks and measuring their step count. This was perhaps perceived as only satisfactory as there was not as many learning outcomes in this lesson. The activPAL lesson (lesson 5) was again, only perceived as satisfactory. Previous discussion is echoed here, that perhaps this lesson was too complex for pupils and more explanation from researchers was required.

Appropriate use of demonstration

Lesson 5 was perceived as only satisfactory for appropriate use of demonstration for both S2 and S3. This highlights the need for clearer guidance and explanations from researchers to the teachers regarding unfamiliar data sets. For S1, lessons 4 and 6 were perceived as satisfactory. With regards to lesson 6, this lesson started 20 minutes late due to circumstances out with the teacher's control. To ensure that the tasks were completed, this

lesson was rushed in comparison to other lessons, hence there may have been a perception that appropriate use of demonstration was only satisfactory.

Pupil behaviour

Pupil behaviour was perceived to be good for the majority of the ActiveChat programme. Two lessons were perceived to be satisfactory: lessons 4 and 5. In lesson 4, pupils were required to work in groups and then take part in an active quiz. This may have affected their behaviour during the class. For lesson 5, due to the inconsistent perception of difficulty with regards to the activPAL data, this may have contributed to deterioration in pupil behaviour compared to other lessons.

Pupil engagement

Pupil engagement was perceived as good/excellent in all year groups. However, in S3, lessons 4 and 5 were only scored satisfactory. As with previous discussion on lesson 5, the inconsistent perception of difficulty regarding the activPAL data may have disengaged some pupils. For lesson 4, pupils may not have been engaged in group discussion or wanted to take part in the active quiz.

Percentage of learning outcomes achieved

Teachers reported for most lessons that 81-100% of the learning outcomes were achieved when delivering the ActiveChat programme. For S1, the teacher perceived only 61-80% of the lesson outcomes were achieved for lesson 4. This could have been due to the deterioration of pupil behaviour, whereby the teacher was more focused on classroom management. He also believed that 61-80% of lesson 6 was achieved. As per previous discussion, this lesson started 20 minutes late; therefore, some outcomes had to be taken out.

For S2 and S3, the teacher perceived that only 61-80% of lesson 5 outcomes were achieved, supporting earlier discussion on this session.

Teaching style helped to achieve learning outcomes

Pedagogical methods were adapted during the ActiveChat programme to include more activity within the lessons. Teachers agreed/strongly agreed that the teaching style contributed to achieving the learning outcomes. This perhaps was due to learning outcomes being focused on PA and SB.

Smooth transitions between lesson stages

Teachers reported that they agreed/strongly agreed that there were smooth transitions between lesson stages. Although, the lesson plans were designed to link between stages, the smooth transitions could have been due to the quality of the delivery of the experienced teachers.

The teacher evaluations were primarily positive with regards to lesson design, delivery and pupil responsiveness. However, it is clear from the evaluation that lesson 5 was not perceived as favourably by the teacher. If this lesson is to be included in future implementations, the researcher needs to ensure teachers have a clear understanding of the data and what it represents, for the delivery of the material itself and for pupil learning.

6.4.4 Implementation

Fidelity of the ActiveChat programme was assessed using an observation checklist. This checklist included the key learning outcomes and tasks outlined for each ActiveChat

lesson. The percentage of the learning outcomes achieved for each lesson were calculated and then the overall 'fidelity' percentage was calculated across the eight-lesson programme.

The fidelity of the Active programme for S1, S2, and S3 classes were 62%, 61%, 66%, respectively (using mean observer percentage). This suggests that ~ 2/3 of programme was delivered as it was designed, by the researcher. Findings from the review by Durlak and DuPre (2008) established that monitoring the implementation of a programme resulted in positive outcomes 2-3 times greater than those who did not monitor implementation, and that positive outcomes were attained when fidelity was ~ 60%. This suggests that the fidelity of the ActiveChat programme was high enough to have a positive impact on the outcome variables. The level of fidelity was close to levels previously reported for classroom-based PA and SB programmes in secondary schools. Dunton et al. (2009) evaluated their statewide classroom-based PA and SB programme "Exercise your Options". Using direct observations of a sub-sample of classes, and monitoring four out of the eight lessons, Dunton reported a fidelity level of 81-100%. This result is similar to perceived fidelity of the teachers who delivered the ActiveChat programme, yet it has been reported that few studies attain this level of fidelity (Durlak & DuPre, 2008).

Level of fidelity reported by teachers differed from the level of fidelity measured through direct observation by the researcher and undergraduate student. Although educational learning outcomes were addressed throughout the ActiveChat programme, pupils were not encouraged to stand or take part in activity breaks as instructed in the lesson plans. However, it is important to note that teachers did adapt activities to incorporate more movement. Although teachers delivered > 60% of the lesson as designed, their adaptations still facilitated movement within the classroom. Literature emphasises the importance of monitoring implementation and the role that plays in outcome measures. However, when working within an environment where the researcher might not be the expert, teachers may make adaptations,

Table 6.3

Percentage of lesson plans delivered as designed (fidelity of ActiveChat programme)

	S1			S2			S3		
	Observer 1 (Researcher)	Observer 2 (Student 1)	**Mean**	Observer 1 (Researcher)	Observer 2 (Student 2)	**Mean**	Observer 1 (Researcher)	Observer 2 (Student 3)	**Mean**
Lesson 1	73.91	95.65	**84.78**	95.65	82.61	**89.13**	95.65	78.26	**86.96**
Lesson 2	57.89	78.95	**68.42**	63.16	68.42	**65.79**	73.68	73.68	**73.68**
Lesson 3	29.63	77.78	**53.70**	81.48	85.19	**83.33**	66.67	81.48	**74.07**
Lesson 4	50.00	81.25	**65.63**	50.00	50.00	**50.00**	81.25	75.00	**78.13**
Lesson 5	0	0	**0**	72.73	77.27	**75.00**	68.18	63.64	**65.91**
Lesson 6	56.25	75.00	**65.63**	50.00	56.25	**53.13**	56.25	68.75	**62.50**
Lesson 7	90.91	100.00	**95.45**	36.36	36.36	**36.36**	36.36	36.36	**36.36**
Lesson 8	61.54	61.54	**61.54**	30.77	38.46	**34.62**	61.54	30.77	**46.15**
Mean % for all lessons	52.52	71.27	**61.89**	60.02	61.82	**60.92**	67.45	63.49	**65.47**

which are more beneficial to the outcome measures. Participant reach was monitored using the ActiGraph class registers. Mean percentage of pupils attended the ActiveChat programme for S1, S2, and S3 was 77%, 75%, and 83%, respectively. All eight lessons were delivered in S2 and S3. Lesson 5 was not delivered to S1 due to scheduling conflicts within the school and out-with the researcher's control. The normal PSE classes did not address PA or SB.

6.5 Strengths and limitations

Strengths of this process evaluation were the mixed-methods used to thoroughly evaluate the ActiveChat programme. The use of qualitative methods provided rich data on the pupils and teachers' perceptions of the ActiveChat programme. By allowing pupils and teachers to freely express their opinions on the programme, recommendations on how to improve the programme were identified. Another strength was the ability of the researcher and student to observe each lesson. This method allowed for rigorous assessment of the fidelity and adaptations of the programme.

However, this may be a potential limitation. There could be a level of bias as teachers may have been more inclined to deliver the programme as designed due researcher presence. There could also be an element of social desirability bias in regard to the teacher evaluation and interview/focus groups. Teachers may have reported higher scores on the evaluation and/or replied with answers which were perceived to be favourable to the researcher. Caution should also be taken when reviewing the fidelity scores. Excluding missing data may have resulted in skewed fidelity scores. Missing scores may be a result of the activity/ learning outcome not being addressed, yet this cannot be assumed. The fidelity scores are for the activities/learning outcomes that were marked as completed. The full results are presented in Appendix O.

Another limitation is that the opinions of teachers and pupils are based on a small sample, from one school in a low socio-economic area in Glasgow. Although the data suggests a substantial level of agreement with previous literature, this may not be representative of teachers and pupils across Greater Glasgow and beyond. Interviews and focus groups should be continued until saturation has been reached (Jones, Brown, & Holloway, 2013) however, due to the nature of the feasibility study and the limited number of individuals involved, saturation may not have been reached. It is also worth noting that the comparison of teachers and pupils' perceptions of the current study to previous literature are based in two different environments: secondary school vs primary school. This is due to the lack of literature of classroom-based PA and SB programmes in secondary schools (McMichan et al., 2018).

Although the researcher tried to support the teachers by ensuring lesson plans were easy to follow and were distributed a week in advanced, there needs to be more support provided to ensure teachers are confident in the delivery of the lessons. Dedicated training sessions may be a way to increase support and enhance confidence in delivery, yet teachers are under extreme time pressure, therefore it may not possible to do this. Having open communications with teachers is vital, and working closely with them throughout the duration of the programme is important to provide support.

6.6 Conclusion

The aims of this study were to determine the feasibility and acceptability of the ActiveChat programme through rigorous process evaluation. To reiterate, this was a semantic evaluation of the ActiveChat programme using a mixed-method approach and was not an in-depth qualitative study. A key message from the interviews and focus groups was that the programme was well received by both teachers and pupils. Pupils stated that they enjoyed the

programme, as it was something different and they particularly enjoyed the movement aspects. Teachers expressed that the programme did meet the intended learning outcomes of the CfE and that movement within the classroom is beneficial to pupil's learning, but only if it has a purpose and is integrated into the lesson. The results of the observation also suggested that there was a good level of programme fidelity.

Overall, the results of this process evaluation suggest the ActiveChat programme could successfully be integrated within Scottish secondary schools. However, this was a feasibility study conducted in one secondary school in Glasgow. A larger scale trial whereby the ActiveChat programme is implemented into more secondary schools in Glasgow and surrounding areas would further determine its feasibility as a programme and its integration as part of the CfE.

Chapter 7: Conclusion, recommendations, and future direction

7.1 Preface

The aim of this chapter is to summarise the key findings from the three studies: the systematic review and meta-analysis of classroom-based PA and SB interventions in adolescents; the evaluative case study; and the ActiveChat feasibility study, respectively. The results of this PhD research aim to provide practical recommendations for future research. Firstly, this chapter will revisit the aims and key findings from each study. The chapter will then address the strengths and weaknesses of the PhD research, followed by practical recommendations for further research in the area.

7.2 Summary of aims and results

7.2.1 Study 1 – Systematic review and meta-analysis of classroom-based physical activity and sedentary behaviour interventions in adolescents

Study 1 (Chapter 3) of this PhD is a systematic review and meta-analysis of the current literature on classroom-based PA and SB interventions in early adolescents. The primary aim of this review was to determine the most effective methodologies to increase PA and reduce SB. Secondary aims were to determine intervention effects on psychological determinants of PA; and determine the effect of implementation on desired outcomes. Three main conclusions were drawn from this study:

i. The findings of the meta-analysis did not identify an effective classroom-based intervention methodology to increase PA and reduce SB in adolescents. The studies included in the meta-analysis had two-group comparisons (intervention and control). This reduced the number of studies to be included to five. All five assessed PA but only three assessed SB. The small number of studies indicates the lack of research in

this area, and the need for further research to develop high quality methodologies within the classroom to increase PA and SB.

ii. Classroom-based interventions had an overall positive effect on psychological constructs of self-efficacy, motivation, and attitudes. Although increasing psychological constructs can facilitate behaviour change, this did not translate into changes in PA or SB. This could highlight the intention-behaviour gap (Rhodes & Dickau, 2013) (i.e. although an individual intends to perform a behaviour, this does not always translate to actually performing the behaviour) or social desirability bias (when an individual responds in a way that they believe will be perceived positively by others) (Grimm, 2010). Only five studies measured psychological constructs, therefore it is difficult to determine why this did not translate into PA/SB behaviour change.

iii. Monitoring of implementation did not appear to influence the outcomes of the studies. Six studies discussed their strategies to ensure implementation (Contento et al., 2007; Contento et al., 2010; Cui et al., 2012; Dunton et al., 2009; Tymms et al., 2016; Whittemore et al., 2013) and fidelity of the interventions yet only two studies reported results of their implementation monitoring (Cui et al., 2012; Dunton et al., 2009). These two studies indicated high levels of implementation but there were mixed results on the interventions' impact on PA and SB behaviour. Again, due to the lack of studies, it is difficult to determine the effects of implementation on outcome measures, yet it is clear that reporting levels of implementation is important for further understanding of the effect of interventions.

7.2.2 Study 2 – Evaluative case study of the ActiveChat programme

Study 2 (Chapter 4) was a case study to evaluate the original ActiveChat programme. The primary aim of this study was to explore secondary school teachers' and teacher educators' opinions and feedback on the lesson materials and content. A secondary aim of the study was to explore the primary researcher's personal reflections on her experience delivering the ActiveChat programme in a local secondary school. There were four main conclusions drawn from the teacher and teacher educator surveys:

i. The content and materials were too simplistic for an S3 class (aged 13-14 years). Teachers agreed that the programme addressed learning outcomes from the 3rd education phase of the CfE (years S1-S3). It was suggested ActiveChat was designed for those in the lower end of phase 3.
ii. 10-weeks was perceived as potentially too long for this type of programme.
iii. This programme would suit the curriculum within PSHE classes, and teachers emphasised that if this were to be delivered in this class, it would need to be shortened.
iv. The suitability of the number of activities and content for a 50-minute class could not be determined. There were conflicting opinions regarding this, so it was concluded this would be dependent on the individual class.

Based on the feedback from the teachers and the researcher's own reflections, a number of recommendations were proposed. Organising the class into small groups was effective in keeping pupils on task. Due to the number of ActiveChat mentors in the room (the primary researcher and two undergraduate students); this allowed each group to work alongside a mentor. Again, this was beneficial in facilitating discussion amongst the groups and keeping pupils on-task. Short presentations were key to keep pupils engaged. Pupils responded well to the movement integration within the classroom.

There were activities that did not work and caused pupils to disengage. Taking pupils outside the classroom environment made it very difficult for behaviour management in this particular group. Pupils were also not receptive to the repetitive nature of some elements of the ActiveChat programme.

7.2.3 Study 3 – The feasibility of a classroom-based physical activity and sedentary behaviour programme in adolescents: The ActiveChat programme

This feasibility study was conducted in two phases:

i. Determining the effect of the ActiveChat programme on outcome measures;
ii. Evaluating the programme using a mixed methods approach.

Effects of the ActiveChat programme on outcome measures

The research aims were to:

i. Determine the effect of the ActiveChat programme on psychological constructs towards PA (motivation, psychological needs, attitudes);
ii. Objectively assess in-class PA and SB;
iii. Determine the impact of the ActiveChat programme on habitual PA and SB.

There were three main conclusions regarding the effects of the ActiveChat programme on outcome measures:

i. The ActiveChat programme appeared to maintain pupils' internalised forms of motivation, competence, relatedness, and attitudes towards SB. These findings suggest the ActiveChat programme facilitated in the maintenance of the constructs over time. This is deemed a positive result as control groups significantly decreased over time. There were no significant interactions or main effects for

perceived autonomy, externalised forms of motivation, or attitudes towards PA. This suggests pupils in both the ActiveChat programme and control class maintained these psychological constructs over time.

ii. The ActiveChat programme was designed to incorporate movement as part of the educational activities and through short activity breaks. Movement was integrated within a secondary school classroom and is a novel finding from this thesis, as there is little research that explores the use of movement integration within the secondary school classroom. The results show that in-class PA (LPA and MVPA) was greater by ~11% in the 50-minute lesson.

iii. The ActiveChat programme had no impact on habitual PA or SB. This finding is consistent with the results of the meta-analysis by McMichan et al. (2018), and other previous literature on the effects of school-based programmes on overall PA and SB (Hegarty et al., 2016; Kriemler et al., 2011; Russ et al., 2016).

Process evaluation of the ActiveChat programme

The aims of the process evaluation were to collate qualitative feedback from teachers and pupils on their perceptions of the ActiveChat programme and determine the levels of implementation.

There were three main conclusions drawn from the process evaluation:

i. The teachers and pupils responded with positive feedback towards the programme. Teachers emphasised it addressed the learning outcomes of the CfE, specifically in the area of health and wellbeing. Pupils reported that they enjoyed the active component of the ActiveChat programme, emphasising that it was different to traditional lessons. Teachers were honest and stated that activity breaks do not work within their classrooms, primarily due to classroom

management issues and time restraints. These views have been reported in other literature (Dyrstad et al., 2018; Martin & Murtagh, 2017b; Routen et al., 2018). However, teachers were in favour of activity when it was fully integrated as part of the lesson, suggesting academic movement integration is a better method when incorporated into secondary school classrooms compared to activity or brain breaks. Teachers also valued movement as a way to enhance learning.

ii. Evaluation and monitoring of implementation suggested a good level of fidelity (Durlak & DuPre, 2008), and adaptations made by teachers in some instances benefitted the ActiveChat programme, such as, changing a group task to incorporate movement instead of completing the task sitting down. These adaptations can be incorporated when further developing the ActiveChat programme for future implementation.

7.3 Strength and limitations

This PhD had a number of strengths. Firstly, to the author's knowledge, this is the first classroom-based PA and SB programme to be implemented within Scottish secondary schools, which included objectively measured MI. Previous research has explored MI and activity breaks within the classroom, but this is more prevalent in primary schools, with very little research in secondary school classrooms, increasing the relevance of this PhD.

Evaluating and designing the ActiveChat programme to address learning outcomes from the CfE, particularly for the areas of health and wellbeing, literacy, and numeracy, was a strength as schools were readily able to incorporate the programme as part of their curriculum enabling it to be teacher-led.

The rigorous process evaluation was another strength of this PhD. Interviews with the teachers who delivered the ActiveChat programme provided rich data on their perceptions of

the programme and recommendations for future adaptations to facilitate further integration within the curriculum. Two observers were able to monitor every ActiveChat lesson for all classes. This allowed for thorough monitoring of elements of implementation highlighted in Durlak and DuPre (2008). The data collected from the observation determined what activities worked within the classroom, and how activities can be adapted to improve the programme. Having two observers with the same checklist increased the reliability of the data.

There were some limitations in this PhD. The evaluative case study had a small response rate with only five teachers/teacher educators responding. This survey was shared online through social media, sent to education departments at all Scottish universities who offered teaching degrees and to schools across Scotland, therefore the adaptations made on their recommendations were based on a very small sample. Upon reflection, alternative methods should have been used. Recruiting teachers/teacher educators through face-to-face contact may have increased response rate, rather than email. Different data collection methods may have also increased response rate, for example, conducting focus groups or interviews. In addition, these methods may have produced more rich and detailed data for evaluating and developing the ActiveChat programme, hence why this was adopted as part of the process evaluation of the feasibility study.

Another limitation was that the programme and control classes in the feasibility study were not randomly assigned but were determined by the teachers. This potentially gave rise to allocation bias, as the teachers who volunteered their class for the ActiveChat programme may have supported the programme more than other colleagues. The teacher who delivered the ActiveChat programme to two of the classes was a PE teacher; therefore, they already had an interest in PA and SB. Although the presence of the researcher in the class was a strength for observing the delivery of the ActiveChat programme, this may have also influenced the

adherence to the programme. Teachers may have felt more obliged to deliver the lesson as it was designed.

Measurement of habitual PA and SB was conducted through questionnaires, which were adapted from the survey used in the HBSC study (Currie et al., 2015). This questionnaire was designed to collect observational data on Scottish adolescents and was adapted to collect data on 7-day recall on PA and SB. Objectively measuring pupils' PA and SB using accelerometers over a 7-day period would likely provide more accurate data.

7.4 Future of the ActiveChat Programme and Recommendations for Further Research

The research as part of this PhD has indicated a clear gap within the current literature in regards to classroom-based PA and SB programmes within the secondary school environment. The ActiveChat programme was designed to start bridging this gap.

The systematic review and meta-analysis highlighted the lack of literature within this area of study and concluded stronger quality research is required. Therefore, future studies should consider their methodologies carefully. However, when working in schools, there are elements assessed for the quality that are sometimes out-with the researcher's control (e.g. randomisation of classes).

Study 3 (Chapters 5 and 6) of this PhD explored the feasibility of implementing a PA and SB programme within secondary school classrooms. Although the results suggest the ActiveChat programme only maintained levels of the psychological constructs and habitual PA/SB, there was a significant enhancement of in-class PA, thus providing preliminary evidence that teaching pedagogy within the secondary school environment can be adapted to incorporate PA. The efficacy of physically activity lessons has been established within

primary schools yet the evidence regarding secondary schools is very limited. Based on the teacher feedback, further development of the ActiveChat programme would include the removal the activity breaks from the lesson plans and to adapt the activities to incorporate movement as part of the lesson.

The ActiveChat programme can be readily implemented within the Scottish education system; meeting key learning outcomes from the areas of health and wellbeing, literacy, and numeracy as part of the CfE. This was highlighted by the teachers themselves from the results of the qualitative interviews in Chapter 6. This, and the current PA/SB levels of Scottish adolescents, further confirms its place within the Scottish education system, particularly to sessions pertaining to SB, as currently, the learning outcomes of the CfE does not specifically address reducing SB (Education Scotland, n.d.d). As with other classroom-based programmes, ensuring the programme can be integrated within the education curriculum is important. This way, teachers can ensure that key learning outcomes are being addressed and can encourage movement within the classroom without compromising learning time.

A key factor in the implementation of the classroom-based programmes includes teacher support and ensuring teachers are confident delivering the material. Due to teachers' time restraint prior to the start of the ActiveChat programme, there were no training sessions on how to deliver the materials and content, other than what was set out in the lesson plans. In future, it might be beneficial to organise a session with teachers to fully explain the programme and discuss activities and determine whether they would be appropriate for the class it would be delivered to. In order to increase teacher autonomy, there should be a number of activities readily designed that the teachers can choose from or adapt if needed. This is where co-creation can play an important role; where teachers are involved in the further development of the ActiveChat programme, and contribute to the lesson planning and creation of materials. Co-creation would facilitate partnerships between researchers and

teachers, and may aid in the recruitment of schools, whereby it is acknowledged that the programme was based on teacher input.

Previous reflection also notes the external factors that may contribute to an individuals' PA behaviour (beyond intrapersonal factors, such as social and environmental factors), therefore the ActiveChat programme will need to be developed to address these (e.g., helping pupils identify local opportunities to be active). To date, it is still very uncertain whether classroom-based PA and SB programmes can have an impact on habitual PA and SB. However, the development of a programme which is based on multi-frameworks (e.g. SDT, TPB, SCT, Social-Ecological Model), may target other psychological and environmental constructs that that one model alone cannot target (e.g., SDT).

In addition to the above adaptations, the ActiveChat programme's feasibility needs to be further trialled. The ActiveChat feasibility study (Study 3) was conducted within one school in a low sociodemographic area in Glasgow, Scotland. The next stage would be to trial the ActiveChat programme across the Glasgow area, in different sociodemographic areas, to establish the programme's feasibility across a greater area. This process of programme development is based on the Medical Research Council (2006) guidelines for developing and evaluating complex interventions.

7.5 Final Conclusion

Overall, this PhD has established the ActiveChat programme can be successfully implemented into the Scottish secondary school curriculum and enhance in-class levels of PA, whilst maintaining internalised forms of motivation, competency, relatedness, and attitudes towards SB. To the author's knowledge, this is the first study to explore MI within

Scottish secondary schools and contributes to the limited literature on MI in secondary school environments, thus positively contributing to the field of research.

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9.0 Appendices

Appendix A – Lesson Plans for the Original ActiveChat Programme

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 1				
Objectives of Lesson Complete questionnaires Complete goal setting targets Familiarise ourselves with names and pupils Introduce physical activity into two board games				**Intended Learning Outcomes** HWB 3-01a, HWB 3-10a, HWB 3-11a, HWB 3-21a, HWB 3-23a LIT 3-02a, LIT 3-02a, LIT 3-06a, LIT 3-09a, LIT 3-26a
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Introduction (5 mins)	Get the class settled around the middle table as quickly as possible. Reintroduce ourselves.	n/a	Tables at the back of the class will be put together to form a 'meeting type' table that the pupils will sit around.	Introduce ourselves individually. Ask how Christmas break was? Short informal talk before presentation.
Presentation (5mins)	Give the ActiveChat introduction presentation. Open up a class discussion with slide 4, e.g. Do you know who these people are? What are they doing?	n/a	Tables at the back of the class will be put together to form a 'meeting type' table that the pupils will sit around.	Short, sharp and enthusiastic introduction. Look at each of the pupils. Ask pupils to discuss in groups about the pictures on slide 4 then ask the pupils questions regarding the discussion. To finish, emphasise to the pupils that they were chosen 'specially' and that they will have fun.
Name Game (5 mins)	Make a "class tree" on the board and get each child to come up and write their name and one activity they like to do.	Yes – All pupils will be sitting down at their seats. One of the ActiveChat Mentors will pick a pupil to come up. This pupil will stand up and walk towards the board and write their name and an activity on the board.	Tables at the back of the class will be put together to form a 'meeting type' table that the pupils will sit around.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class. The ActiveChat Mentors should take part so that the pupils feel they are involved.

Explanation of questionnaire and goal setting (5 mins)	Explain that we would like them to fill out the questionnaires and the goal setting forms.	n/a	Class in seats facing the board. One ActiveChat Mentor facing the class. Have the questionnaire and goal setting forms on the board so if they have any questions we can run through it as a class.	Emphasise that this is entirely their own questionnaire and their own goals and aims. Be enthusiastic and encourage them to contribute truthfully.
Questionnaire and goal setting (15-20 mins)	Where they are sitting, hand out the questionnaires and get them to fill it out. Each questionnaire will have its own unique ID for each pupil. ActiveChat Mentors will need to make sure that they can identify this is the first questionnaire (e.g. 01A). Give out goal setting forms and get them to fill it out. ActiveChat Mentors will wander round the group and help anyone that needs it and answer any questions they might have.	n/a	Tables at the back of the class will be put together to form a 'meeting type' table that the pupils will sit around.	ActiveChat Mentors will situate themselves around the table so they can be easily accessed by the pupils if they require additional help. If the pupils look bored or stop doing the questionnaire, the ActiveChat Mentors should encourage them and remind them of the fun games that are planned to end the session and throughout the other sessions.
Game	Game to end the class on – Split the class into two groups. On the board, write group 1 & group 2. Give each group a different coloured pen. Let the group discuss the different goals for 1 minute. When the ActiveChat Mentors say go, one group member at a time walks up to the board and writes down one goal they want from the class. After everyone has written up one goal, the ActiveChat Mentors will then get the pupils to sit down and have the last group discussion of the day about what the pupils want from the ActiveChat programme.	Yes – Standing in lines ready to move towards board in a competitive walking race and walking to seats after they have wrote on the board. This game incorporates physical activity and knowledge gained from the class task.	Two groups in single lines (class divided) facing towards the board. 1st person in line will have a marker to write on the board. They will then pass it to the next person. The person who has passed on the marker will return to their seat and sit down. This process will continue until all pupils have written on the board and are sitting in their seats.	Ensure all tables are out of the way. Ensure all pupils take part. Ensure ActiveChat Mentors are situated where they can see all pupils. Help pupils who have duplicate goals to come up with additional goals. Ensure noise levels do not exceed an appropriate level as it is a classroom session.

Brief Discussion - Twitter (3mins)	Brief discussion about the ActiveChat twitter page (e.g. Do they have twitter? Would they like an ActiveChat twitter page?)	n/a		

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 2				
Objectives of Lesson Informing the pupils of the different categories of physical activity (PA) – Active Living, Sport and Exercise. Encourage physical activity in class through bodily movement in the miming activity.			**Intended Learning Outcomes** HWB 3-01a, HWB 3-10a, HWB 3-11a, HWB 3-15a, HWB 3-23a, HWB 3-25a, HWB 3-27a LIT 3-02a, LIT 3-02a, LIT 3-06a, LIT 3-09a, LIT 3-15a, LIT 3-25a, LIT 3-26a, LIT 3-28a TCH 3-15a	
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Assign pupils to group/ icebreaker (10mins)	Pupils arrange themselves in their groups in order of age without speaking. Once arranged in age order, one ActiveChat Mentor will assign each pupil with a number. Each desk will have a number and the pupils will be asked to sit on the desk that corresponds with the number they were assigned.	Yes – being active moving to different chairs and getting into line.	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	
Presentation (5mins)	Presentation on physical activity which will include definitions of physical activity, active living, sport & exercise. The presentation will also emphasise the importance of being physically active.	n/a	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	Short, sharp and enthusiastic presentation. Look at each of the pupils. Explanation of different types of physical activity to aid learning by giving visual demonstrations. Allow pupils to contribute to the presentation by asking open ended questions and allow discussions.
Mind Map activity (15mins)	Each group will be given different coloured card (A6) and a category (active living, sport or exercise). 10 pieces of card per group. Each group will have to come up with 10 different	Yes – All pupils will be sitting down during the writing activity and discussion but they will be breaking up sedentary time by moving to the	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	The ActiveChat Mentors in each group should ensure that every pupil inputs into the group activity. The ActiveChat Mentors will be able to assist the pupils with the task to help

	activities for each category. In the middle of the classroom will be 3 pieces of paper with a different category on each (active living, exercise and sport). Each group will then come up to the desk and place their pieces of card next the correct category. Once all the pieces of card are next to the categories, the ActiveChat Mentors will open up a class discussion. A reading task is also provided in case there are pupils who do not want to take part in the group task.	desk to place the cards on the mind map.		them come up with ideas about each category (active living, exercise and sport). Give praise and encouragement.
Informal Discussion on PA Guidelines and Weekly PA planning sheet (15mins)	Informal discussion as to how much activity the pupils think they do (and mention physical activity guidelines). Get them then to fill the weekly activity planning form. If discussion fails, ActiveChat Mentors will ask open ended questions to promote further discussion	n/a	Tables grouped together to form 3 groups and 5 chairs at each table. Pupils sitting at tables.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class. If the pupils look bored or stop doing the task, the ActiveChat Mentors should encourage them and remind them of the fun games that are planned to end the session and throughout the other sessions.
Game – Miming PA board game (5mins)	Six chairs facing away from the board. Six of the pupils will be sitting in the chair the other six will be standing facing the board and their partners. The ActiveChat Mentor will write a type of physical activity from one of the three categories (active living, sport or exercise). The pupils standing up will mime the activity and the pupil sitting down (their partner) will try and guess what the activity is. Once they have guessed they will swap places and a new activity will be given for the next pupil to mime and guess.	Movement of body through miming. Rotating sitting and standing activities.	Six chairs facing away from the board. Six of the pupils will be sitting in the chair the other six will be standing facing the board and their partners.	One ActiveChat Mentor writing activities on the board, the other two helping mime and guess with pupils. Activities that are easy to mime will be essential. Keep a tally of how many they get right to make it into a competition.

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 3				
Objectives of Lessons Identifying personal motivators and barriers to physical activity. Educate and enhance knowledge on sedentary behaviour. Use of role play to make session more interactive, fun and memorable.			**Intended Learning Outcomes** HWB 3-10a, HWB 3-11a, HWB 3-15a, HWB 3-16a, HWB 3-23a, HWB 3-25a, HWB 3-27a LIT 3-02a, LIT 3-02a, LIT 3-06a, LIT 3-09a, LIT 3-25a, LIT 3-26a, LIT 3-28a EXA 3-01a, EXA 3-01b	
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Who do you think done it?	Same groups and table as previous week. Everyone will receive a piece of card. They will write an interesting fact about themselves on the card. The card will be folded and then put in a clear bag. The ActiveChat Mentors will use this throughout the sessions to get the attention of the pupils. They will say what is on the card and throw a soft ball to a pupil in the class and ask: who do you think done it?	Throwing actions – hand eye co-ordination	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	
Sedentary behaviour (10mins)	Presentations on sedentary behaviour – open up for discussion and allow the pupils to come up with examples of sedentary behaviour. If discussion fails, ask pupils to vote if examples given by ActiveChat Mentors are sedentary behaviour or not.	n/a	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	The ActiveChat Mentor in each group should ensure that every pupil inputs into the group activity. The ActiveChat Mentors will be able to assist the pupils with the task to help them come up with ideas. Give praise and encouragement.
Motivation / Barriers – PA Guidelines (15mins)	Recap of physical activity guidelines and get them thinking about their motivations and barriers to being physically active (filling out the form – it is their own motivation and barriers, not	n/a	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class. If the pupils look bored or stop doing the task, the ActiveChat Mentors should encourage

	the classes). Quick class discussion once forms have been filled out.			them and remind them of the fun games that are planned to end the session and throughout the other sessions.
Role play – sedentary behaviour and solutions (20mins)	Three different scenarios (one per group) whereby there will be a problem (i.e. John spends his Saturdays playing computer games. How could John break up his sedentary time?). Ensure lots of information is given about the person they are pretending to be. The pupil will come up with the solutions and act out these solutions in front of the class. A reading task is also provided in case there are pupils who do not want to take part in the group task.	Role play will involve bodily movement and getting the pupils to present to the class will include breaking up sedentary time.	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor). Clear route to classroom board where the pupils will act out their scenario and their solutions.	The ActiveChat Mentor in each group should ensure that every pupil is actively involved. The ActiveChat Mentor will be able to assist the pupils with the task. If needed, the ActiveChat Mentor can help them come up with a solution however the use of open ended questions should be adopted to ensure that the solution and ideas come from the pupils. Give praise and encouragement.
Game (10mins)	Ask the pupils what games they want to play and get them to describe the game to the class. If appropriate, the game will be played. If no suggestions are put forward then play heads down thumbs up.	Heads down thumbs up will require some pupils to move about whilst those tagged break up their sedentary time as they will stand up at the end.	Make sure all spare chairs are in and there are clear paths around the tables.	

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 4				
Objectives of Lessons Educate and enhance knowledge on research within sport and exercise science. Use of technology (pedometers and smartphone apps) to conduct their own research.			**Intended Learning Outcomes** HWB 3-11a, HWB 3-15a, HWB 3-16a, HWB 3-21a, HWB 3-23a, HWB 3-25a LIT 3-02a, LIT 3-02a, LIT 3-23a, LIT 3-25a	
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Research presentation (10mins)	Presentations on research methods – open up for discussion and allow the pupils to come up with examples of why research is important.	n/a	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	Open questions Loud, clear voice Eye contact with pupils
Demonstrate using pedometer and test.	Demonstrate how to use the pedometers. Get the pupils to try them out by walking around the classroom. Once the ActiveChat Mentors have check that all pupils' pedometers are working, the pupils will be instructed to follow their Mentor.	Yes – walking activity.	Each ActiveChat Mentor will have one group each (~ 4 pupils). Mentor will observe from the side of the group to ensure safety and management of pupils.	Rules for walking activity: 1. Walking in a single file 2. Quiet 3. Behaviour 4. Take care of the pedometers 5. Pick one responsible pupil to 'set the pace'
Walking Activity 1	Pupils walking at different speeds and record their step count from one end of the hub to the other.	Yes – walking activity.	Each ActiveChat Mentor will have one group each (~ 4 pupils). ActiveChat Mentors will take part in this activity to ensure safety and management of pupils.	Rules for walking activity: 1. Walking in a single file 2. Quiet 3. Behaviour 4. Take care of the pedometers 5. Pick one responsible pupil to 'set the pace' (front of the line)
Walking Activity 2	Get the pupils to walk up and down the stair well twice and record their step count.	Yes – walking activity.	Each ActiveChat Mentor will have one group each (~ 4 pupils). ActiveChat Mentors will be take part in this activity to ensure safety and management of pupils.	Rules for walking activity: 1. Walking in a single file 2. Quiet 3. Behaviour 4. Take care of the pedometers

				5. Pick one responsible pupil to be at the front of the line
Walking Activity 3	Get the pupils to walking around the hub at a normal walking pace for 5 minutes and record their step count.	Yes – walking activity.	Each ActiveChat Mentor will have one group each (~ 4 pupils). ActiveChat Mentors will be take part in this activity to ensure safety and management of pupils.	Rules for walking activity: 1. Walking in a single file 2. Quiet 3. Behaviour 4. Take care of the pedometers 5. Pick one responsible pupil to be at the front of the line.
Recap	Recap what was done in the lesson.	n/a	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 5				
Objectives for Lesson Educate and enhance knowledge on research within sport and exercise science. Experience reading ActivPal graphs and to enhance their knowledge of how data may be presented.			**Intended Learning Outcomes** HWB 3-10a, HWB 3-11a, HWB 3-23a LIT 3.02a, LIT 3.02a, LIT 3.09a, LIT 3.15a, LIT 3.23a, LIT 3.28a, LIT 3.29a MTH 3.20b	
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Presentation (10mins)	Presentation - Recap on pedometers - Explain the ActivPal and data - Open up for discussion in groups (looking at the data)	n/a	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	Open questions Loud, clear voice Eye contact with pupils
Quiz on Data in groups	Each group will be provided with 36 hour ActivPAL data. ActiveChat Mentor will verbally ask a question which will appear on the presentation too. The groups will have 2 minutes to discuss each question with their group and write an answer on their answer sheets, and then the next slide will appear with the next question. This will continue until all the questions have been asked and answered. The teams will then switch their answer sheets and correct another group's answers.	n/a	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	Individually, the ActiveChat Mentors in their group should ensure that every pupil inputs into the group activity. The ActiveChat Mentors will be able to assist the pupils in interpreting the data. Give praise and encouragement.
Homer Simpson Activity Quiz	Get the pupils to stay in their groups. Ask them to come up with a team name. An ActiveChat Mentor will put the team names on the board. Pupils will watch a YouTube clip about Homer going to the gym. The ActiveChat Mentors will then ask a series of questions on the clip and on what they have learnt. The teams will answer the question by putting up giant A, B and C letters in the air. The team with the most points at the end wins.	Upper body movement when raising the letters.	Tables grouped together to form 3 groups and 5 chairs at each table (~4 pupils, 1 ActiveChat Mentor).	Fun Activity. Can be done by using signs (A, B, C). Each group will hold up which answer they think is right and the answer will be revealed.

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 6				
Objectives for Lesson The aim of the lesson was for the pupils to reflect what they had learned over the last 5 weeks and to establish whether they met the goals they had set out in week 1. If the pupils met their goals then they would re-evaluate and make new goals. If they hadn't met their goals then they would reflect on why they hadn't and what they can do to meet them in the future.			**Intended Learning Outcomes** HWB 3-01a, HWB 3-10a, HWB 3-11a, HWB 3-24a, HWB 3-25a LIT 3-02a, LIT 3-02a, LIT 3-06a, LIT 3-26a	
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Get into groups/icebreaker (10 minutes)	Pupils will be split into groups of 3. Each group then comes up with 3 facts about themselves. One of the 'facts' are incorrect. The rest of the groups need to try and guess which 'fact' is fake.	Yes, standing up when it is their groups turn to tell their 'facts'.	3 groups on separate tables.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class.
ActiveChat questionnaire (10 minutes)	Fill out the same questionnaire that was completed in lesson 1. Discuss if anything has changed since then.	n/a	3 groups on separate tables.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class. If the pupils look bored or stop doing the task, the ActiveChat Mentors should encourage them or if stuck, offer support.
Looking at individual goal setting forms (5 minutes)	Recap of goal setting form that pupils completed in lesson 1. See if pupils have met and exceeded any of their goals. If not, what can be done to try and meet these goals by the end of the 10 week block?	n/a	3 groups on separate tables.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class. If the pupils look bored or stop doing the task, the ActiveChat Mentors should encourage them or if stuck, offer support.

Physical activity planner (5mins)	Recap of the physical activity planner that pupils filled out. Discuss if they achieved any of the physical activity goals set and if they think they have become more active since starting class.	n/a	3 groups on separate tables.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class. If the pupils look bored or stop doing the task, the ActiveChat Mentors should encourage them or if stuck, offer support.
Pop Quiz (10mins)	Presentation on the last 5 weeks – questions on different topics that have been covered with the use of funny videos and pictures that have been used in previous presentations to try and keep attention and act as memory aids. After, ask pupils if they have used excel before and how much they know. This will be to get an understanding of how challenging using excel for data analysis will be in order to better plan lesson 7.	n/a	3 groups on separate tables.	ActiveChat Mentors should ensure that all pupils have paper and pens to note answers down and that there is no conferring going on. The ActiveChat Mentors will be able to prompt pupils' memory when answering questions to give them ideas. Give praise and encouragement.
Game (10mins)	Pupils who received the highest score in the pop quiz get to choose the activity/fun game for the end of class. Get them to describe the game to the class. If appropriate play the game. If not play charades.	Depending on pupil activity chosen, yes.		

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 7				
Objectives for Lesson Teach pupils the importance of data analysis and how to analyse data correctly using excel. Discuss next week's presentation tasks.			**Intended Learning Outcomes** HWB 3-11a, HWB 3-23a LIT 3-02a, LIT 3-02a, LIT 3-09a MNU 3-20a, MTH 3-20b, MTH 3-21a TCH 3-04a, TCH 3-15a	
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Get into groups/icebreaker (10 minutes)	Pupils will be split into groups of 3. Each group then comes up with 3 facts about themselves. One of the 'facts' are incorrect. The rest of the groups need to try and guess which 'fact' is fake.	Yes, standing up when it is their groups turn to tell their facts.	Groups of 3 pupils seated around the computers. ActiveChat Mentors at each side of the room monitoring the class.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class.
Presentation on data analysis (10 minutes)	Presentation on data analysis with a step by step instruction guide on how to complete the analysis using excel.	n/a	3 pupils per group but seated at a computer each. ActiveChat Mentors at each side of the room monitoring the class.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class. If the pupils look bored or stop doing the task the ActiveChat Mentors should encourage them or if stuck offer support by referring to instructions on the board.
Performing data analysis using pedometer data (30mins)	Pupils working through step by step instructions to analyse pedometer data in excel.	n/a	3 pupils per group but seated at a computer each. ActiveChat Mentors moving around the room monitoring the class.	Have pupils' usernames and passwords to hand if pupils do not know log in details. ActiveChat Mentors moving around groups making sure everyone is staying focused on the task and everyone is contributing within a group.

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 8				
Objectives for Lesson Teach pupils how to make a good PowerPoint presentation. Introduce how to plan a PowerPoint.			**Intended Learning Outcomes** HWB 3-11a, HWB 3-23a LIT 3-23a, LIT 3-24a, LIT 3-26a, ENG 3-27a, LIT 3-29a TCH 3-04a, TCH 3-15a	
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Get into groups/recap on previous lessons (10 minutes)	Pupils will be split into groups of 3 as in lesson 7. A quick verbal recap of the topics being used in the presentations. Assign each group a topic for their presentation. These are: data analysis, sport, exercise, active living, and sedentary behaviour.	Yes, standing up and walking to receive their topic which they will choose at random.	3 pupils seated together at the computers. ActiveChat Mentors at each side of the room monitoring the class.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class.
Discussion of topics (5 minutes)	Pupils discuss the topic they've chosen, making themselves familiar with what the topic is and different activities that can be done within that topic.	n/a	3 pupils seated together at the computers. ActiveChat Mentors at each side of the room monitoring the class.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class. If the pupils look bored or stop doing the task the ActiveChat Mentors should encourage them or if stuck offer support.
Filling in PowerPoint planning sheet and template/ start PowerPoint presentation	Pupils writing down information about their topic and ideas for their PowerPoint in the form of a planning sheet. They are then to draw up a PowerPoint template based on their mind map.	n/a	3 pupils seated together at the computers.	Have pupils' usernames and passwords to hand if pupils do not know log in details. ActiveChat Mentors moving around groups making sure everyone is staying focused on the task and everyone is contributing within a group.

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 9				
Objectives for Lesson Teach the pupils how to put ideas from paper on to PowerPoint. Advise pupils on what makes a good presentation and how to make it visibly appealing.			**Intended Learning Outcomes** HWB 3-11a, HWB 3-23a LIT 3-23a, LIT 3-24a, LIT 3-26a, ENG 3-27a, LIT 3-29a TCH 3-04a, TCH 3-15a	
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Get into groups/recap on previous lessons (5 minutes)	Pupils will be seated in their groups of 3 as in lesson 8. A quick verbal recap of the topics being used in the presentations.	n/a	3 pupils seated together at the computers. ActiveChat Mentors walking around the room monitoring the class.	One ActiveChat Mentor at the front, back and side of class in order to have an overall view of class.
Active game (5 mins)	"Would You Rather" where pupils are given 2 scenarios and have to choose which they would rather do. Pupils make their decision by choosing a side of the room to stand at.	Yes. Standing up and moving around the classroom.	Pupils standing around the class room. Aware of tables and chairs around the room.	No running allowed during the game or the game is stopped.
Completion of PowerPoint (35 minutes)	Pupils will complete their presentation following the hand out guidance sheet and written plan.	n/a	3 pupils seated together at the computers. ActiveChat Mentors walking around the room monitoring the class.	Have pupils' usernames and passwords to hand if pupils do not know log in details. ActiveChat Mentors moving around the groups making sure everyone is staying focused on the task and everyone is contributing within a group.
Discuss session plan on week 10 (5 mins)	Pupils actively engaging in discussion of their last week and what they would like to see included.	n/a	Groups of 3 seated together at the computers.	

Appendix A – Lesson Plans for the Original ActiveChat Programme

ActiveChat Programme – Lesson 10				
Objectives for Lesson To allow the pupils to gain experience presenting their work to an audience.			**Intended Learning Outcomes** HWB 3-01a, HWB 3-10a, HWB 3-11a LIT 3-02a, LIT 3-02a, LIT 3-09a, LIT 3-28a, LIT 3-29a	
Phase & Time Allocation	**Activities**		**Organisation**	**Teaching Points**
	Teaching	**Physical Activity**		
Pupils to present their PowerPoint presentations (30 minutes)	A group at a time from random allocation will come up and present their PowerPoint to the rest of the class.	Yes – each group will break up sedentary time when they stand up to present.	The class will be sitting in their groups. Each group will come up to the board and present their PowerPoint.	Encourage speaking to an audience.
Completion of evaluation (10 minutes)	Each pupil will be given an evaluation form on what they thought of the ActiveChat programme.	n/a	The pupils will be sitting in their groups but it will be emphasised that this is an individual task. ActiveChat Mentors will be walking around to provide any help if needed.	Emphasised that this is entirely the pupil's own opinion. Pupils should not put their names on the evaluation to keep it anonymous.
Certificates (5 minutes)	ActiveChat Mentors will give out certificates to the class to show that they had completed the ActiveChat programme.	Walking up to receive their certificate.	Pupils will be seated in their groups and will walk up to receive their certificates from the ActiveChat Mentors when their name is called.	Emphasise that these certificates should be something they are proud of as it shows that they put the work in for the ActiveChat programme.
Hangman (5 minutes)	The pupils will be allowed to play a game of hangman for the last 5 minutes of the class.	The pupil who writes on the board will be walking and standing. All pupils should be encouraged to stand during the game to break up sedentary time.	Pupils will remain seated and/or stand in their groups. If pupils have their backs turned then they will turn their chairs to be able to see the board.	Each pupil can have their turn to guess and no shouting over each other.

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

ActiveChat Programme – Lesson 1 Materials

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

Welcome to ActiveChat

What is ActiveChat?

* The ActiveChat programme is a specially designed class just for you – you are the CHOSEN ONES!
* ActiveChat is a fun interactive programme that'll get YOU chatting to us about your favourite physical activities and why it's so important.

What are you going to do?!

* You'll learn about being active!
* You'll learn about the disadvantages of sitting too much!
* You get to conduct your very own **research** using top of the range **Technology!**
* You'll set goals, which you will aim to achieve!!

Who can tell us who is in each picture and what type of activity are they doing?

3 – week plan

Week 1 - Introduction

Week 2 – Physical Activity

Week 3 – Not Moving Enough

Most importantly…

You'll have FUN!!!

ActiveChat Questionnaire

READ THIS BEFORE YOU START ANSWERING THE QUESTIONS:

- This survey is anonymous, so please do not write your name anywhere on the paper
- Please try to answer all the questions.
- There are NO right or wrong answers
- Please ask someone if you are not sure of something.

1. Are you a boy or a girl?

Boy ☐
Girl ☐

2. How do you usually get to school?

Someone drives you ☐
Cycle ☐
Walk ☐
Public transport ☐

Other.....

3. How do you usually get home from school?

Someone drives you ☐
Cycle ☐
Walk ☐
Public transport ☐

Other.....

4. What type of physical activity do you normally do in your spare time (at least once a week)? For example: playing football, dancing, jogging, walking outdoors, playing with friends, cycling, etc.

Write all your activities here:

.....
.....
.....
.....
.....

5. Who are you <u>normally</u> physically active together with (you can choose one or more)?

- I do physical activity on my own ☐
- With my family ☐
- With my friends ☐
- With my classmates ☐

Others.....

6. Who would you want to be physically active with if you could choose (you can choose one or more)?

- I prefer doing it on my own ☐
- My family ☐
- My friends ☐
- My classmates ☐

Others.....

7. When you have been physically active (either at school or in your spare time) how does it <u>usually</u> make you feel (you can choose one alternative or more)?

Calm ☐	Concentrated ☐	Motivated ☐
Stressed ☐	Nervous ☐	Sad ☐
Good ☐	Quiet ☐	Loud/noisy ☐
More chatty ☐		

Other.....

8. After being physically active in school (after PE and/or breaks) how do you think classmates feel?

Calm ☐	Concentrated ☐	Motivated ☐
Stressed ☐	Nervous ☐	Sad ☐
Good ☐	Quiet ☐	Loud/noisy ☐
More chatty ☐		

Other.....

9. Approximately how much time do you spend on being physically active throughout <u>a week</u> (both at school and in your spare time)?

0-30 mins ☐	30-60 mins ☐	1-2 hrs ☐	2-3 hrs ☐
3-4 hrs ☐	4-5 hrs ☐	6 or more hrs ☐	

10. How much time during break would you <u>usually</u> spend being active? (<u>playing</u> sport, dance, walk, run etc.)?

- The whole time ☐
- Half of it ☐
- Less than half ☐
- I am not physically active ☐

11. What do you normally do during break time (explain in your own words)?

.....
.....
.....
.....

12. Why are you physically active (explain in your own words)?

.....
.....
.....
.....
.....

13. Would you like to be more physically active than you are today?

Yes ☐
No ☐

Thank you for answering all our questions today!!

GOAL-SETTING FORM

NAME: Date:

WHAT DO YOU WANT TO LEARN IN THIS CLASS? (LEARN ANY SKILLS EG; HOW TO DO MORE EXERCISE, ANYTHING YOU WANT TO KNOW MORE ABOUT?)

WHAT DO YOU HAVE TO DO FOR THIS TO COME TRUE?

WHAT CAN YOU DO TO MAKE PEOPLE AROUND YOU FEEL GOOD DURING THIS PERIOD? (FOR EXAMPLE YOUR CLASSMATES, TEACHERS, ACTIVECHAT MENTORS)

HOW CAN YOU MAKE SURE THAT YOU REMEMBER TO HAVE YOUR OWN GOALS IN MIND DURING ALL TEN LESSONS?

WHAT CAN YOU DO YOURSELF?	WOULD YOU NEED SOMETHING FROM ANYONE ELSE – WHAT?

WHAT DO YOU WANT TO DO THESE NEXT TEN WEEKS (PLEASE LIST ANY IDEAS OR WISHES YOU MAY HAVE FOR ACTIVITIES AND/OR EXERCISES)?

ActiveChat Programme – Lesson 2 Materials

Physical Activity

What is Physical Activity?

* Any body movement that uses energy

Active Living

* Choosing to do the healthier option during your day

GETTING TO SCHOOL

WALKING

DRIVING

WHEN YOUR OUT SHOPPING

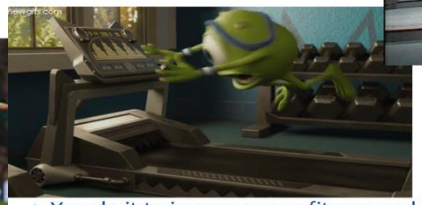
* ESCALATOR Vs STAIRS

Sport

* Activities that use skill and effort
* Either by yourself or in a team
* Can be competitive or just for fun

Exercise

* Something you've planned to do



* You do it to improve your fitness and to be healthy

Why is all this Important?

DO YOU KNOW HOW MUCH PHYSICAL ACIVITY YOU SHOULD BE DOING?

* People aged 5-18 should be:
* Doing 1 hour of physical activity everyday!

*ARE YOU?

Reading Task **14/01/2015**

Read through these TEN scenarios and decide (by referring to the physical activity definitions sheet) which form of physical activity they come under: Active Living, Sport or Exercise. (Circle the correct answer)

1. Ben's mum and dad do not have a driving licence. Ben lives close enough to the school to walk. Ben walks to and from school every day.
   Active Living / Sport / Exercise

2. After school, Lucy accompanies her mum to an aerobics class every Tuesday evening.
   Active Living / Sport / Exercise

3. Josh and Paul both play on the school football team. Every Saturday morning they play a match.
   Active Living / Sport / Exercise

4. Liam and Lucy know that they have the bleep test coming up in their physical education class. They are worried about getting a low score so they decided to meet up on Monday after school to do a 1 mile run.
   Active Living / Sport / Exercise

5. Lindsay helps her mum do house cleaning chores on a Sunday morning. She hoovers and dusts the house.
   Active Living / Sport / Exercise

6. Patrick enjoys dancing and starts the lunch time dance class on Wednesdays.
   Active Living / Sport / Exercise

7. Mrs Rice, the classroom teacher, plays squash with other members of staff.
   Active Living / Sport / Exercise

8. Louise accompanies her dad at the weekend when he goes hill walking she hopes to one day complete the West Highland Way.
   Active Living / Sport / Exercise

9. Dean assists his mum by carrying the shopping bags from the car to the house and helps her unpack the shopping too.
   Active Living / Sport / Exercise

10. Paul and Lisa are going to start cycling to school in the summer.
    Active Living / Sport / Exercise

ActiveChat Programme – Lesson 3 Materials

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

Being Sedentary

What is being Sedentary?

Watching television, playing computer games, lying listening to music.

These are all examples of 'Sedentary Behaviour'

Sedentary Behaviour means that you are doing an activity where you are sitting or lying when you are awake.

Why Is Too Much Sitting Bad?

* Research has shown that sitting for a long time when you're awake can increase your risk of developing Diabetes and Heart Disease when you are older.

Sedentary or Not Sedentary?

Sedentary or Not Sedentary?

Sedentary or Not Sedentary?

Sedentary or Not Sedentary?

Sedentary or Not Sedentary?

Sedentary or Not Sedentary?

Sedentary or Not Sedentary?

Sedentary or Not Sedentary?

How Can You Break Up Sitting Time?

* In your groups, we will each give you a story about a person who sits for a long time.
* We would like YOU to come up with ideas about how this person could break up their sitting time and act it out.

But First…

* Everyone stand up!
* Each group move round one table.

Why Do You Want To Be Active? (Motivations)	Why Don't You Want To Be Active? (Barriers)
	

Scenario 1

Katie is a girl who loves to just sit and listen to music. When she gets home from school, the first thing she does is put on her iPod and sits for hours just listening to her music. Katie does not like video games but loves to read her magazines. Katie also doesn't like sports but she does enjoy dancing from time to time. Her friends like to go for walks after school but she never goes with them.

Please list all the possibilities you can think of that Katie could do to break up her sitting time.

Scenario 2

Derek and Anna are best friends. Together they take a 10 minute drive to the cinema on Saturdays. After they have been to the cinema, they drive home and then sit and watch more movies for the rest of the day. At the complex where the cinema is, there is also a shopping centre and a sports centre that offers swimming and ice skating.

Please list all the possibilities you can think of that Derek and Anna could do to break up their sitting time.

Scenario 3

Lewis enjoys playing football and action games on his Xbox 1. He plays them as soon as his homework's finished until he goes to bed. His mum is concerned as he doesn't do any activity at the weekend except play his computer games. The only break Lewis has from his Xbox 1 at weekends is to eat and sleep. His friends ask him to go out and play in the local park but he always says no and invites them in to play his Xbox 1.

Please list all the possibilities you can think of that Lewis could do to break up his sitting time.

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

Individual Reading Task **21/01/2015**

Read through these scenarios and **identify** the **barrier(s)** the person in the scenario is facing. In the space provided, write at least **one solution** you would give the person in the scenario. (Refer to the barrier cards provided to see which barriers are included in the examples).

1. Ben works from 9am-5pm and has to get home to walk his dog. He feels that he can't do any activity.

What is Ben's barrier(s)?

What can Ben do to overcome his barrier(s)?

2. After school, Lucy completes any homework she has and by the time she has dinner she "can't be bothered doing anything".

What is Lucy's barrier(s)?

What can Lucy do to overcome her barrier(s)?

3. Josh accompanied his dad to his tennis club and played him at tennis. His dad won and Josh didn't go back because he felt that he wasn't good enough.

What is Josh's barrier(s)?

What can Josh do to overcome his barrier(s)?

4. Liam enjoys karate and is in a club with his cousin. He also enjoys hockey in school but is too shy to try out for the local team.

What is Liam's barrier(s)?

What can Liam do to overcome his barrier(s)?

5. Lindsay loves trampolining, however she doesn't participate in the after school club anymore since she fell off and sprained her ankle.

What is Lindsay's barrier(s)?

What could Lindsay do to overcome her barrier(s)?

6. Patrick works Monday to Friday and takes his children to sports on Saturday mornings. He used to go a 10mile run on a Sunday morning, however Patrick's only long lie is on a Sunday and he feels too weak to do anything on this day.

What is Patrick's barrier(s)?

What could Patrick do to overcome his barrier(s)?

7. Mrs Rice recently gave up her job due to old age. She finds it hard to engage in any form of sport or exercise due to her age.

What is Mrs Rice's barrier(s)?

What could Mrs Rice do to overcome her barrier(s)?

8. Linda's husband used to watch the children in the evening whilst she attended exercise classes. Her husband now works different hours so she has no one to watch her children therefore she feels she cannot exercise.

What is Linda's barrier(s)?

What could Linda do to overcome her barrier(s)?

9. During the winter Paula only goes on a run if it's not cold and raining. Her training declines in the winter due to this.

What is Paula's barrier(s)? **What could Paula do to overcome this barrier(s)?**

10. Paul and Lisa used to attend the gym 5 minutes from their house. The gym recently shut down and the nearest gym is over 30 minutes, walk away. Both haven't been to the new gym since the old gym shut.

What is Paul and Lisa's barrier(s)? **What could Paul and Lisa do to overcome this barrier(s)?**

ActiveChat Programme – Lesson 4 Materials

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

Research!

Why Is Research Important?

* We want to know more!
* We want to make things better!
* We want to help people!

Examples

Research in Sport and Exercise

Our Own Research

* We are going to conduct our own research today!!

Our Own Research

Pedometers

* A pedometer is a device that measures the number of steps you take.
* We will be using two different pedometers:

Every Piece of Research Starts With A Question!

* Our question:
* Do these two types of pedometers record the same number of steps?

Research Time!

* In your groups:
* You and your ActiveChat mentor will go out and complete 3 walking tasks.
* At the end of each task, you will write down your step counts on the record sheet provided.
* The data YOU collected will be used in a later lesson.

Health and Safety

1. NO Running
2. Good Behaviour
3. Single File
4. Be Quiet
5. Take Care of the Equipment and Each Other

Team Name:	

Step Record – 5 Minute Walk

Pedometer Step Count	Pedometer App Step Count

Group Total	

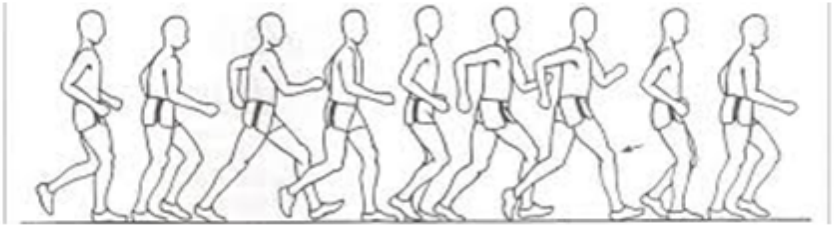
Team Name:	

Step Record – Stair Walk

Pedometer Step Count	Pedometer App Step Count

Group Total	

Team Name:



Step Record – Different speeds

Slow Walking	
Pedometer Step Count	**Pedometer App Step Count**

Medium Walking	
Pedometer Step Count	**Pedometer App Step Count**

Fast Walking	
Pedometer Step Count	**Pedometer App Step Count**

Group Total	

ActiveChat Programme – Lesson 5 Materials

Research - ActivPAL!

Last Week

Last week we used an 'Activity Monitor' that measured your step count.

Who remembers what it was called?!

PEDOMETER

FOOT MEASURE

This Week

* New Activity Monitor
* Same but a bit different

The ActivPAL

What does it do?

* It measures:

Sitting

Standing

Stepping

How does it work?

* Attach to thigh
* Leg Position
* Inclinometer

These are the results

Now – Quiz Time

* In your teams!
* Please answer the questions!
* Keep an eye on the timer!

Question 1

What time do you think this person woke up?

Question 2

What time do you think this person went to bed?

Question 3

What hour was the person **MOST ACTIVE**?

Question 4

When this person was awake, what hour were they most **SEDENTARY**?

Question 5

What hour did they **STAND** for the longest?

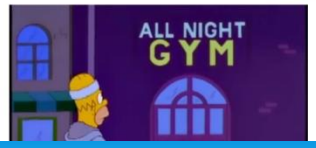
Question 6

What hour did they **STEP** for the longest?

ANSWERS

- Question 1 – 9.15am
- Question 2 – Just before 11.45pm
- Question 3 – From 10am to 1pm
- Question 4 – 3pm to 4pm

Homer Simpson YouTube Quiz



Homer Simpson YouTube Quiz

Question 1
What activity was Homer doing at the start?

A. Running

Homer Simpson YouTube Quiz

Question 2
What type of physical activity does walking class as?

A. Sport
B. Exercise
C. Active Living

Answer: **C. Active Living**

Homer Simpson YouTube Quiz

Question 3
What colour of head band was homer wearing?

A. White
B. Green
C. Yellow

Answer: **A. White**

Homer Simpson YouTube Quiz

Question 4
What activity does Homer do when he goes into the gym?

A. Running Machine
B. Weight Machine
C. Dumbbells

Answer: **C. Weight Machine**

Homer Simpson YouTube Quiz

Question 5
What type of activity would doing the weight machine class as?

A. Sport
B. Exercise
C. Active Living

Answer: **B. Exercise**

Homer Simpson YouTube Quiz

Question 6
What colour of sweatbands does Rainer Wolfcastle have?

A. Blue
B. Red
C. Pink

Answer: **B. Red**

Homer Simpson YouTube Quiz

Question 7
What does Ron call the abdominal muscle machine?

A. Ab-Tractor
B. Ab-Ductor
C. Ab-Dominator

Answer: **C. Ab-Dominator**

Homer Simpson YouTube Quiz

Question 8
How long later did it show Homer with the Dumbbells?

A. 1 week
B. 1 month
C. 2 months

Answer: **C. 2 months**

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

Questions

1. **What time do you think this person woke up?**
2. **What time do you think this person went to bed?**
3. **What hour was the person most ACTIVE?**
4. **When this person was awake, what hour were they most SEDENTARY?**
5. **Looking at the times (in minutes) next to the pie charts, what hour did they STAND for the longest?**
6. **Looking at the times (in minutes) next to the pie charts, what hour did they STEP for the longest?**

ANSWER SHEET

1.
2.
3.
4.

End Of Quiz

ActiveChat Programme – Lesson 6 Materials (see lesson 1 for repeated materials).

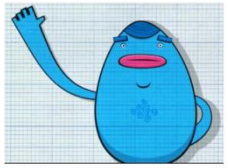
The Answers

Question 1

Which Statement is True?

A. Bob is consuming more energy than is needed.

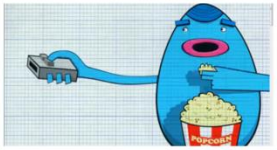
B. Bob is not consuming enough energy.



Question 2

What is the result of Bob lack of physical activity and high food intake?

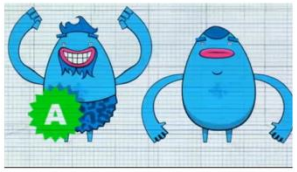
Being overweight or Obese



Question 3

What is the main difference between Bobs Current life and Bob 7000 years ago?

Bob was more active, he had to find and kill his food



Question 4

As we are NOT a fictional cartoon like Bob and there is no special medicine for obesity, What do we need to do to avoid obesity?

We need to maintain a healthy balanced diet and meet the recommended guidelines for physical activity.

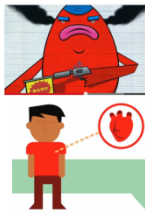
Question 5

What is the term used for Inactivity?

Sedentary Behaviour

Question 6

- After watching the first 2 clips name 2 diseases that are associated with minimal physical activity?



- Heart Disease
- Diabetes
- Osteoporosis
- Anxiety / depression
- High Blood Pressure
- Infertility

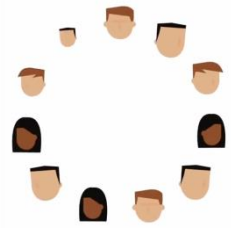
Question 7

What is the recommended daily guidelines for physical activity for children and young adults (minutes/per day)?

Question 8

Name 2 benefits of being active that clip 2 provide?

- Aerobic Capacity (Breathing)
- Muscle and Bone Strength
- Reduction in Anxiety / Depression
- Self Concept (Increased Confidence)
- Increased Academic Achievement / Performance

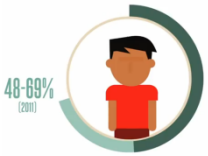


Question 9 (a+b)

Clip 2 – What percentages of children did not attend physical education (PE) on an average week 48% - 69%.

Bonus Question :

What year were these statistical percentages from, the year was in brackets? 2011



Question 10

Where should physical activity be given in schools? There are 6 examples given in clip 2. Give 2 examples but not PE or Classroom activity.

- Physical Education (PE)
- Classroom Activity
- During break times
- Active Transport
- Before and after school activities
- Sports Clubs

Question 11

A. What is the name of this device?
B. Where on the body do you put this device?
C. What is its purpose?

A. Pedometer
B. Trouser Band / Pocket
C. To count steps

Question 12

Question 16

What group activity do the minions take part in and what type of physical activity is it?

Aerobics

•Sport
•Exercise
•Active Living

Question 13

Question 17

What does the instructor say is good about a banana?

They are a great source of energy!

Question 14

Question 18

There is no right or wrong answer

Why do you think school is a good place to promote physical activity?

Discussion …

Question 15

to work on in their

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

First Name: _____

Question Number:	Answer
1	
2	
3	
4	
5	
6	
7	
8	
9	
Bonus Question	
10	

11	a. b. c.
12	a. b. c. d.
13.	
14.	
15.	
16.	
17.	
18.	

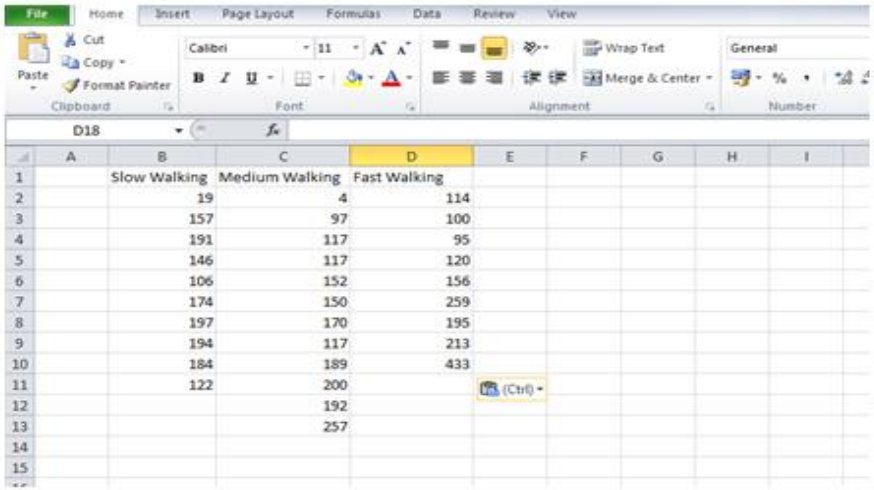
ActiveChat Programme – Lesson 7 Materials

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

Step 1: Go to the windows circle at the bottom.

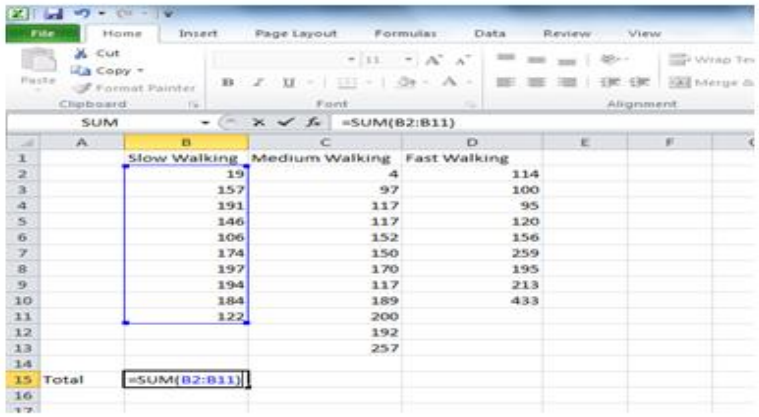
Step 2: Go to all programmes, go into Microsoft Office folder, click EXCEL.

Step 3: From the data sheet provided. Write in the numbers into the table like this:



	A	B	C	D	E	F	G	H	I
1		Slow Walking	Medium Walking	Fast Walking					
2		19	4	114					
3		157	97	100					
4		191	117	95					
5		146	117	120					
6		106	152	156					
7		174	150	259					
8		197	170	195					
9		194	117	213					
10		184	189	433					
11		122	200						
12			192						
13			257						
14									
15									

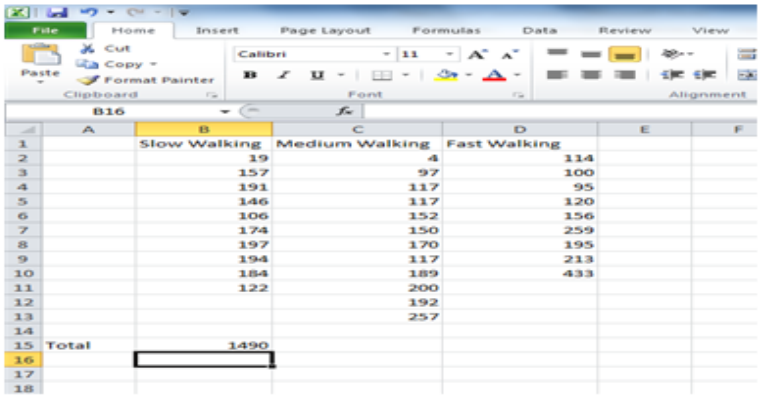
Step 4: Add the step counts together in each column like this:



	A	B	C	D	E	F
1		Slow Walking	Medium Walking	Fast Walking		
2		19	4	114		
3		157	97	100		
4		191	117	95		
5		146	117	120		
6		106	152	156		
7		174	150	259		
8		197	170	195		
9		194	117	213		
10		184	189	433		
11		122	200			
12			192			
13			257			
14						
15	Total	=SUM(B2:B11)				
16						

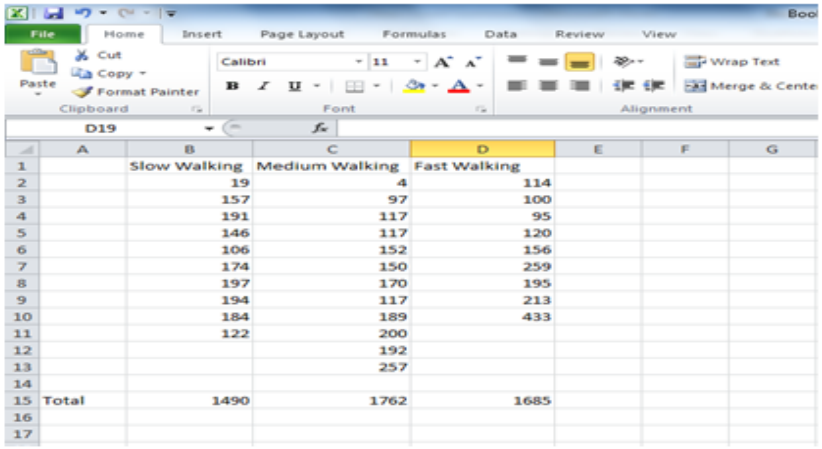
ActiveChat –Lesson 7

To do this, in the box next to total, type in '=SUM(' then highlight the numbers you want to add together. Then close it with a) like in above picture and press enter. So it looks like this:



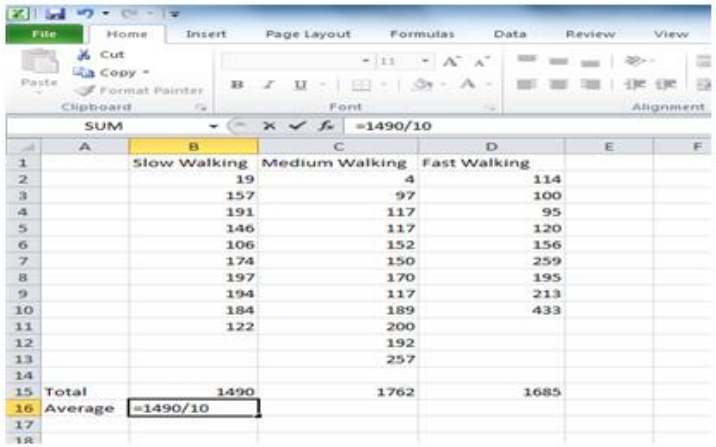
	A	B	C	D	E	F
1		Slow Walking	Medium Walking	Fast Walking		
2		19	4	114		
3		157	97	100		
4		191	117	95		
5		146	117	120		
6		106	152	156		
7		174	150	259		
8		197	170	195		
9		194	117	213		
10		184	189	433		
11		122	200			
12			192			
13			257			
14						
15	Total	1490				
16						
17						
18						

Step 6: Repeat for Medium walking and fast walking.



	A	B	C	D	E	F	G
1		Slow Walking	Medium Walking	Fast Walking			
2		19	4	114			
3		157	97	100			
4		191	117	95			
5		146	117	120			
6		106	152	156			
7		174	150	259			
8		197	170	195			
9		194	117	213			
10		184	189	433			
11		122	200				
12			192				
13			257				
14							
15	Total	1490	1762	1685			
16							
17							

Step 7: We now want to find the average. To do this type the word 'Average' under the word total. Next to it type in '=the number in total/the number of step counts in the column' e.g. '=1490/10'. Click enter.

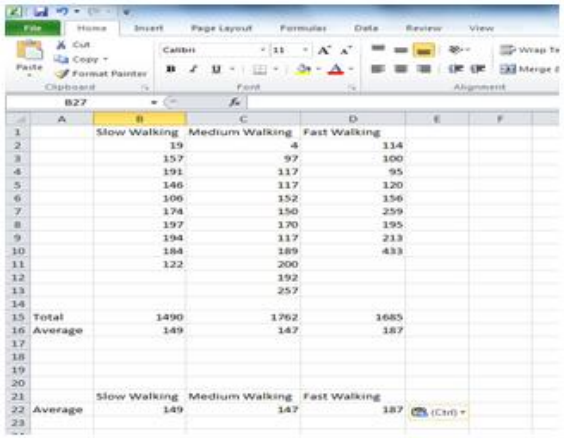


	A	B	C	D
1		Slow Walking	Medium Walking	Fast Walking
2		19	4	114
3		157	97	100
4		191	117	95
5		146	117	120
6		106	152	156
7		174	150	259
8		197	170	195
9		194	117	213
10		184	189	433
11		122	200	
12			192	
13			257	
14				
15	Total	1490	1762	1685
16	Average	=1490/10		
17				

Step 8: Repeat for medium and fast walking.

Step 9: Now we want to look at the different steps for different walking speeds. To do this, we need to make a graph.

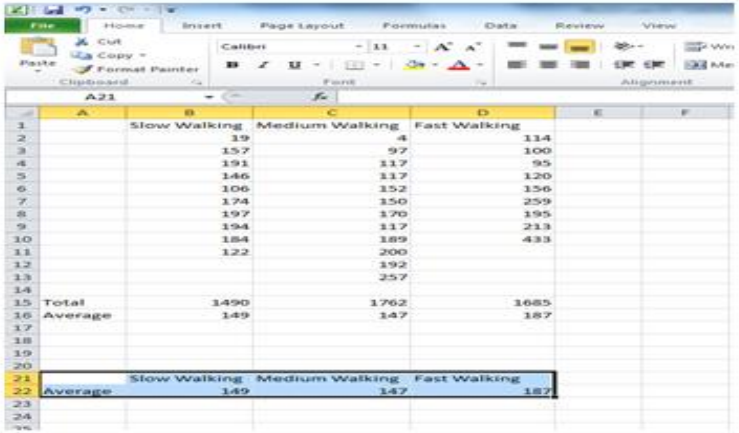
Step 10: Make a new table like this in the same page.



	A	B	C	D
1		Slow Walking	Medium Walking	Fast Walking
2		19	4	114
3		157	97	100
4		191	117	95
5		146	117	120
6		106	152	156
7		174	150	259
8		197	170	195
9		194	117	213
10		184	189	433
11		122	200	
12			192	
13			257	
14				
15	Total	1490	1762	1685
16	Average	149	147	187
17				
18				
19				
20				
21		Slow Walking	Medium Walking	Fast Walking
22	Average	149	147	187
23				

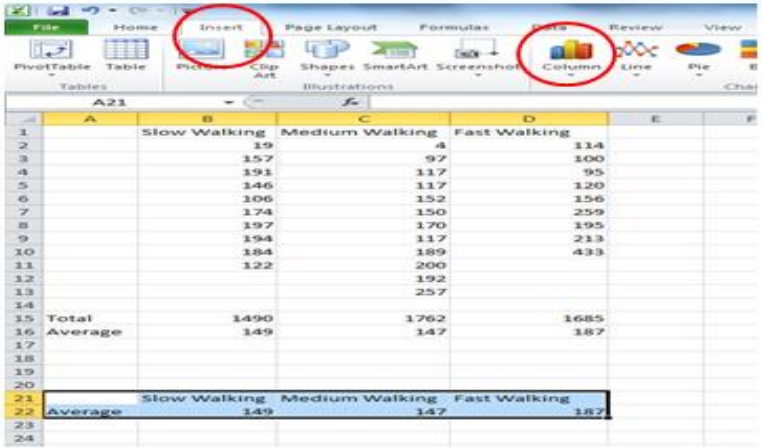
ActiveChat –Lesson 7

Step 11: Highlight all of the new table by clicking and dragging. Like this:



	A	B	C	D
1		Slow Walking	Medium Walking	Fast Walking
2		19	4	114
3		157	97	100
4		191	117	95
5		146	117	120
6		106	152	156
7		174	150	259
8		197	170	195
9		194	117	213
10		184	189	433
11		122	200	
12			192	
13			257	
14				
15	Total	1490	1762	1685
16	Average	149	147	187
17				
18				
19				
20				
21		Slow Walking	Medium Walking	Fast Walking
22	Average	149	147	187
23				
24				

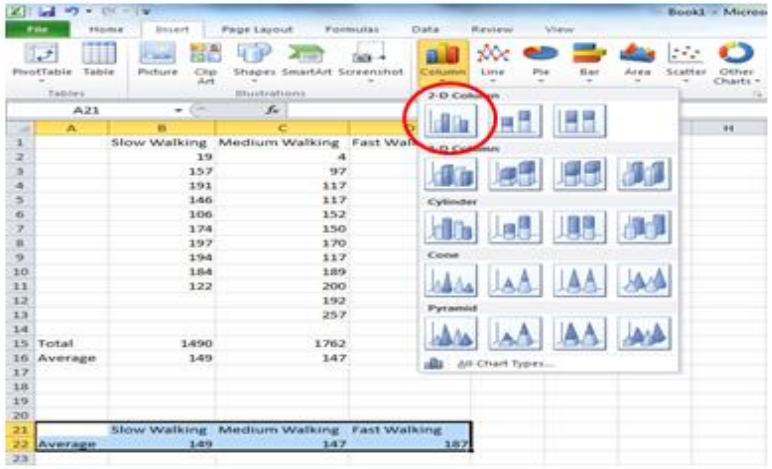
Step 12: Take the mouse up to 'Insert' then click on the Column button.



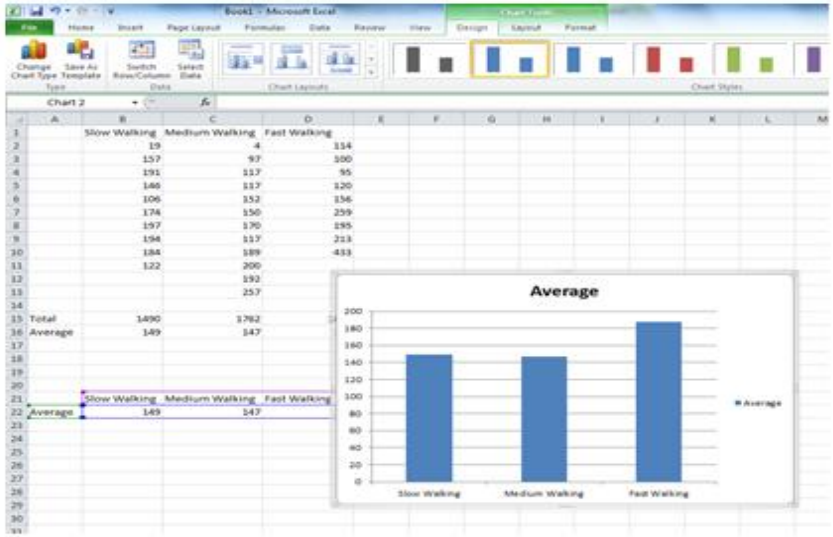
	A	B	C	D
1		Slow Walking	Medium Walking	Fast Walking
2		19	4	114
3		157	97	100
4		191	117	95
5		146	117	120
6		106	152	156
7		174	150	259
8		197	170	195
9		194	117	213
10		184	189	433
11		122	200	
12			192	
13			257	
14				
15	Total	1490	1762	1685
16	Average	149	147	187
17				
18				
19				
20				
21		Slow Walking	Medium Walking	Fast Walking
22	Average	149	147	187
23				
24				

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

Step 13: Once you click on 'Column', click on the first chart.

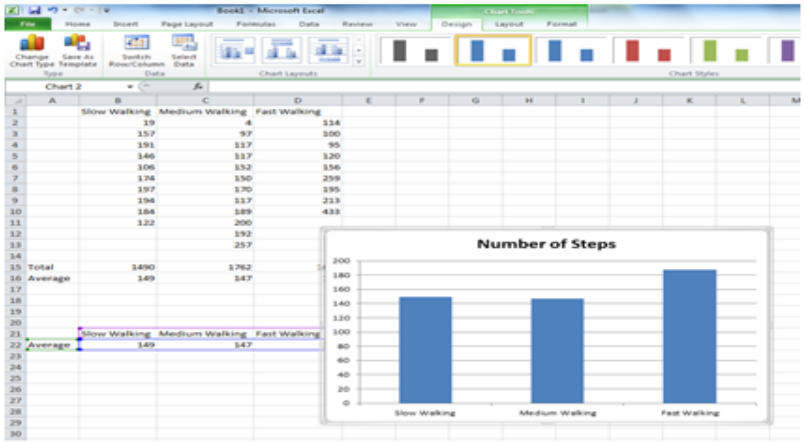


Step 14: Now you will have a graph!! ☺

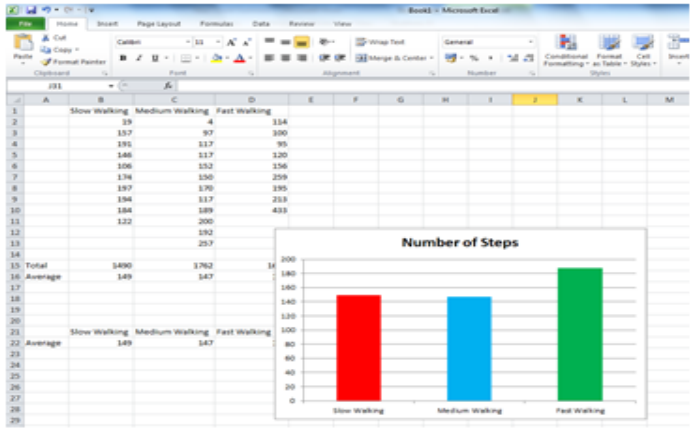


ActiveChat –Lesson 7

Step 15: At the bottom you have different walking speeds, down the side (y-axis) you have the number of steps taken. You can change the title to 'Number of Steps'. So the graph now looks like this:



Step 16: You can also change the colour by double clicking on one bar.



Now – Question Time!!

From the graph YOU have just made, which walking speeds makes you walk the most steps?

Discuss in your groups.

Data YOU Collected

Slow Walking Step Count	
Number	Step Count
1	19
2	157
3	191
4	146
5	106
6	174
7	197
8	194
9	184
10	122

Medium Walking Step Count	
Number	Step Count
1	4
2	97
3	117
4	117
5	152
6	150
7	170
8	117
9	189
10	200
11	192
12	257

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

Fast Walking Step Count	
Number	Step Count
1	114
2	100
3	95
4	120
5	156
6	259
7	195
8	213
9	433

ActiveChat Programme – Lesson 8 and 9 Materials

What Makes A Good PowerPoint?

TITLE PAGE (SLIDE 1)

* Snappy, fun, enthusiastic title
* Make it simple
* Include your names (first only)
* Include your topic
* Use pictures

INTRODUCTION (SLIDE 2)

* What is your topic?
* Definitions (description) of topic area
  - Active Living, sport, exercise, sedentary behaviour, research.
* Use pictures

TYPES OF TOPIC (SLIDE 3)

* Give examples of activities in your topic.
* Examples: Active Living- walking to school
  Sport – basketball
  Exercise – aerobics
  Sedentary Behaviour – watching tv
  Research – pedometer
* Use pictures

DISCUSSION (SLIDE 4)

* Ways to:
* Do more active living
* Do more sport
* Do more exercise
* To be less sedentary

* How to use research in active and/or sedentary settings

YOUR OWN SCENARIO (SLIDE 5)

* Make up your own story where a person is taking part in your topic area.
* This can be done through pictures but you will need to describe this to the class.

GENERAL GUIDELINES

* Not too much writing
* Not too many pictures a slide
* Make it colourful
* Make it FUN!!!

ActiveChat Programme – Lesson 10 Materials

Appendix B - ActiveChat Supporting Materials for Original ActiveChat Programme

Evaluation of the ActiveChat Programme

Could you please answer the following questions.

On a scale of 1-5 (1 = really bad, 2= bad, 3 = ok, 4 = good, 5 = really good).

	1	2	3	4	5
What did you think of the programme?	O	O	O	O	O
What did you think of the activities?	O	O	O	O	O
How do you think the ActiveChat Mentors did?	O	O	O	O	O
What did you think about the Physical Activity lesson?	O	O	O	O	O
What did you think about the Sedentary Behaviour lesson?	O	O	O	O	O
What did you think about the Pedometer lesson?	O	O	O	O	O
What did you think about the ActivPAL lesson?	O	O	O	O	O
What did you think about the Data Analysis lesson?	O	O	O	O	O
What did you think about making the Power Points?	O	O	O	O	O
What did you think about presenting your topic to the class on the last lesson?	O	O	O	O	O

1) What did you think of the ActiveChat programme?

2) What was your favourite part of ActiveChat?

3) What did you not like about ActiveChat?

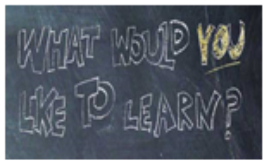
4) Do you feel like you have learned something that you didn't know before about physical activity, sedentary behaviour or research? If yes, what did you learn?

5) Was there anything that you found difficult?

6) Was there anything that you found too easy?

7) Did you like how the ActiveChat mentors took the class?

8) Is there anything you would have liked to have done or learned in the class in relation to physical activity, sedentary behaviour or research?



9) Is there anything you would like to tell us about your experience on the ActiveChat programme?

Thank you very much for completing this form and being a part of the ActiveChat programme!!


Certificate of Participation
Awarded to
For the successful completion of
CertificateStreet.com

Appendix C – ActiveChat Programme – Curriculum for Excellence Learning Outcomes

Appendix C - ActiveChat Programme – Curriculum for Excellence Learning Outcomes

Area	Number	Outcome
Health and Wellbeing	HWB 3-01a	I am aware of and able to express my feelings and am developing the ability to talk about them.
Health and Wellbeing	HWB 3-10a	I recognise that each individual has a unique blend of abilities and needs. I contribute to making my school community one which values individuals equally and is a welcoming place for all.
Health and Wellbeing	HWB 3-11a	I make full use of and value the opportunities I am given to improve and manage my learning and, in turn, I can help to encourage learning and confidence in others.
Health and Wellbeing	HWB 3-15a	I am developing my understanding of the human body and can use this knowledge to maintain and improve my wellbeing and health.
Health and Wellbeing	HWB 3-16a	I am learning to assess and manage risk, to protect myself and others, and to reduce the potential for harm when possible.
Health and Wellbeing	HWB 3-21a	As I encounter new challenges and contexts for learning, I am encouraged and supported to demonstrate my ability to select, adapt and apply movement skills and strategies, creatively, accurately and with control.
Health and Wellbeing	HWB 3-23a	I am developing the skills to lead and recognise strengths of group members, including myself. I contribute to groups and teams through my knowledge of individual strengths, group tactics, and strategies.
Health and Wellbeing	HWB 3-24a	I can analyse and discuss elements of my own and others' work, recognising strengths and identifying areas where improvement can be made.
Health and Wellbeing	HWB 3-25a	I am experiencing enjoyment and achievement on a daily basis by taking part in different kinds of energetic physical activities of my choosing, including sport and opportunities for outdoor learning, available to my place of learning and in the wider community.
Health and Wellbeing	HWB 3-27a	I can explain why I need to be active on a daily basis to maintain good health and try to achieve a good balance of sleep, rest and physical activity.

Appendix C - ActiveChat Programme – Curriculum for Excellence Learning Outcomes

Area	Number	Outcome
Literacy and English	LIT 3-02a	When I engage with others, I can make a relevant contribution, encourage others to contribute and acknowledge that they have the right to hold a different opinion.
Literacy and English	LIT 3-02a	I can respond in ways appropriate to my role and use contributions to reflect on, clarify or adapt thinking.
Literacy and English	LIT 3-06a	I can independently select ideas and relevant information for different purposes, organise essential information or ideas and any supporting detail in a logical order, and use suitable vocabulary to communicate effectively with my audience.
Literacy and English	LIT 3-09a	When listening and talking with others for different purposes, I can: communicate information, ideas or opinions; explain processes, concepts or ideas and identify issues raised, summarise findings or draw conclusions.
Literacy and English	LIT 3-15a	I can make notes and organise them to develop my thinking, help retain and recall information, explore issues and create new texts, using my own words as appropriate.
Literacy and English	LIT 3-23a	Throughout the writing process, I can review and edit my writing to ensure that it meets its purpose and communicates meaning at first reading.
Literacy and English	LIT 3-24a	I can consider the impact that layout and presentation will have on my reader, selecting and using a variety of features appropriate to purpose and audience.
Literacy and English	LIT 3-25a	I can use notes and other types of writing to generate and develop ideas, retain and recall information, explore problems, make decisions, generate and develop ideas or create original text. I recognise when it is appropriate to quote from sources and when I should put points into my own words. I can acknowledge my sources appropriately.
Literacy and English	LIT 3-26a	By considering the type of text I am creating, I can independently select ideas and relevant information for different purposes, and organise essential information or ideas and any supporting detail in a logical order. I can use suitable vocabulary to communicate effectively with my audience.
Literacy and English	LIT 3-28a	I can convey information, describe events, explain processes or concepts, and combine ideas in different ways.
Literacy and English	LIT 3-29a	I can persuade, argue, evaluate, explore issues or express an opinion using a clear line of thought, relevant supporting detail and/or evidence.
Literacy and English	ENG 3-27a	I can engage and/or influence readers through my use of language, style and tone as appropriate to genre.

Appendix C - ActiveChat Programme – Curriculum for Excellence Learning Outcomes

Area	Number	Outcome
Numeracy and Mathematics	MNU 3-20a	I can work collaboratively, making appropriate use of technology, to source information presented in a range of ways, interpret what it conveys and discuss whether I believe the information to be robust, vague or misleading.
Numeracy and Mathematics	MTH 3-20b	When analysing information or collecting data of my own, I can use my understanding of how bias may arise and how sample size can affect precision, to ensure that the data allows for fair conclusion to be drawn.
Numeracy and Mathematics	MTH 3.21a/b	I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology.
Expressive Arts	EXA 3.01a	I have used the skills I have developed in the expressive arts to contribute to a public presentation/performance.
Expressive Arts	EXA 3.01b	I have experienced the energy and excitement of being part of an audience for other people's presentations/performances.
Technologies	TCH 3.04a	I enhance my learning by applying my ICT skills in different learning contexts across the curriculum.
Technologies	TCH 3.15a	Having explored graphical techniques and their application, I can select, organise and represent information and ideas graphically.

Appendix D -Researcher's Reflections on the ActiveChat programme

Appendix D – Researcher's Reflections on the ActiveChat Programme

Class Topic: Introduction Session Number: 1/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
Appropriate use of demonstration	1 – 2 – (3) – 4 – 5 – 6 – 7 – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10

1	Did the session start well? If so, why?	It was a difficult start to the lesson. Getting the pupils settled was a challenge. This might have been due to a change of supply teacher about 5-10 minutes into the lesson. Due to the time it took for the pupils to a) get into class and b) to get themselves ready for the lesson we were unable to rearrange the tables like we originally planned.
2	Were the activities effective in meeting the lesson's aims and objectives?	I believe that the activities met the lessons aims. The questionnaire was designed to allow pupils to establish how much activity they do and the goal setting form allowed the pupils to have their input as to what they wanted out of the programme. However, with that being said, I don't feel the pupils took as much advantage of the goal setting form as they could have in terms of communicating what they wanted out of the programme.
3	How was the content of the activity appropriate to the pupils' needs?	I believe the content of the activity was age appropriate for the pupils. The activities allowed the pupils to think about their own physical activity and the goal setting form allowed them to express what they wanted to achieve in the programme therefore addressed their need for autonomy.

4	Were the arrangements and organisation adequate and appropriate, (e.g. equipment, timing, all pupils' involved)?	We originally wanted to arrange the room to a 'meeting type' arrangement so make it feel like everyone would be involved yet due to timing this was not possible. We misjudged the timing it would take to complete the questionnaires and also how long it would take to get the pupils settled. This resulted in that we could not do the last game with them. Most pupils seemed to be involved yet there were some who were not engaged and refused to take part.
5	How was the main content delivered?	The main content of the class was delivered through a presentation which was presented by one of the ActiveChat mentors. We also gave verbal explanations on how to fill out the questionnaires and goal settings.
6	How did you sum up at the end of the lesson?	The last few minutes or so of the classroom was lost to lack of attention and engagement from the pupils. We asked them if they would like to have a twitter page dedicated to the ActiveChat programme. This was a very short conversation as most of the pupils said that either they didn't want it or that they didn't use twitter.
7	Reflection-in-action (completed on day of session):	Not all pupils finished the task at the same time. Those finished quickly were left sitting doing nothing so we then provided those who were finished first with pieces of card and were asked to write down any games/activities that they would like to do within the class for future lessons. We were running out of time for the final activity so instead of the originally planned activity, we changed it to throw the ball at each pupil who would then catch it and shout out what they would like to learn in the class as opposed to getting into teams and writing it up on the board.
8	Reflection-on-action (Completed day after session):	The lesson didn't go as smoothly as I had hoped. It felt a bit scattered and sometimes out of control. However, we did manage to get through the important aspects of the class which was good. The questionnaire seemed to cause no issues with the pupils however the goal setting form was much more of a challenge for them. Some pupils seemed to be enthusiastic about the programme and wanted to learn more about why physical activity is so important whereas there are some pupils who have little to no interest in the class.
9	Area of practice to continue in future sessions:	The use of the ball to keep the pupils from shouting out was really effective. It has been suggested we use different 'props' each week i.e. bean bag one week, ball the next, etc to try and keep it a bit fresh.

		They seemed to like coming up to the board so continuing activities where they have to come write things on the board would be good. I think the reason we managed to keep them engaged for so long was due to the fact we didn't speak at them for long periods of time. 2-3 minute talking bouts seem to work well for them. I think this needs to continue throughout the programme.
10	Areas of practice to develop for future sessions:	The development of smooth transitions within the lesson is definitely needed. This way it will stop the couple of minutes where the class could lose control. Once there is this loss of control, it can be difficult to get them engaged again. Try to keep the class engaged for the length of the period. The last 5 minutes was very difficult and we lost their attention. I believe we also need to come up with activities that they want to play. The pupils weren't very forthcoming with ideas so it'll be down to us to try and come up with these innovative activities. The class should be more manageable when split into smaller groups.

Appendix D – Researcher's Reflections on the ActiveChat Programme

Class Topic: Physical Activity Session Number: 2/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10

1	Did the session start well? If so, why?	The session started a bit scrambled (due to classroom move) and then it was difficult to get the pupils engaged.
2	Were the activities effective in meeting the lesson's aims and objectives?	The aims of the class were to get pupils more aware of what physical activity is and the different types. I am satisfied that the activities met the objectives.
3	How was the content of the activity appropriate to the pupils' needs?	I believe the content of the activities did meet the pupil's needs. It was at a level they all seemed comfortable with and they were engaged with the activities.
4	Were the arrangements and organisation adequate and appropriate, (e.g. equipment, timing, all pupils' involved)?	At the start, the organisation could have been improved. We did not stick to the timings as well as we had planned however we still managed to get the important aspects of the class done. All equipment was appropriate to the class.
5	How was the main content delivered?	The main content was delivered by the student in a clear and concise manner that kept the pupils engaged. This was through presentations and activities that got the pupils discussing different types of physical activity.
6	How did you sum up at the end of the lesson?	We summed up the end of the lesson by playing a 'role-play' game whereby pupils had act out different types of physical

		activity. We found this really worked well and got all the pupils engaged.
7	Reflection-in-action (completed on day of session):	Due to the lack of time at the end, instead of getting all the pupils up taking part in the activity, we took volunteers which also seemed to work well for the role playing game. The pupils seemed very receptive to this idea.
8	Reflection-on-action (Completed day after session):	Overall I believe the session went very well. The tasks were completed without too much issue and the class engaged with all activities without major behavioural issues. Getting them randomly allocated into groups was a very good idea and is something we'll continue in the next 8 weeks.
9	Area of practice to continue in future sessions:	Putting them into groups made a huge difference and we will continue to do this. We will also be giving the student who has a form of autism reading tasks every week as this allowed them to still learn the appropriate material as well as actually engaging more in the class.
10	Areas of practice to develop for future sessions:	I think in the planning stages we need to give ourselves much more time for each activity as we seem to run out of time.

Appendix D – Researcher's Reflections on the ActiveChat Programme

Class Topic: Sedentary Behaviour Session Number: 3/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10

1	Did the session start well? If so, why?	We were not able to stick to the plan of starting the class with a game. This was due the time it took pupils to get to class and get themselves settled.
2	Were the activities effective in meeting the lesson's aims and objectives?	I believe the activities met the needs of all students and addressed the week's main aims and objectives.
3	How was the content of the activity appropriate to the pupils' needs?	I believe the content of the activities did meet the pupil's needs. It was at a level they all seemed comfortable with and they were engaged with the activities.
4	Were the arrangements and organisation adequate and appropriate, (e.g. equipment, timing, all pupils' involved)?	The vast majority of pupils were engaged and contributed to group discussion. There were one or two who did not contribute at all. Overall, the organisation was very good.
5	How was the main content delivered?	The main content was delivered by the student in a clear and concise manner that kept the pupils engaged. This was through presentations and activities that got the pupils discussing ways to increase activity and reduce sedentary behaviour.

6	How did you sum up at the end of the lesson?	We summed up the end of the lesson through a quick poster presentation with one spokesperson in each group telling us about the scenario they were given and read out the ways in which the person in the scenario could increase their activity and break up their sitting time.
7	Reflection-in-action (completed on day of session):	The pupils weren't very receptive to the idea of acting out their scenarios and solutions so we adapted it and made it into a poster presentation.
8	Reflection-on-action (Completed day after session):	Overall I believe the session went very well. The tasks were completed without too much issue and the class engaged with all activities without major behavioural issues. We kept them in the groups they were in from last week as they worked well together and this was proven again this week.
9	Area of practice to continue in future sessions:	Keeping them in their current groups will be a good idea as they seem to work well together. However we may have to change them about a little bit as it has ended up that one boy is with a group of girls and one girl is with a group of boys. Next week we will mix this up a bit.
10	Areas of practice to develop for future sessions:	I think in the planning stages we need to give ourselves much more time for each activity as we seem to run out of time. We didn't manage to go through any games with them as we seemed to run out of time fairly quickly.

Appendix D – Researcher's Reflections on the ActiveChat Programme

Class Topic: Pedometers Session Number: 4/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 - 10

1	Did the session start well? If so, why?	Most of the pupils sat down quickly and behaved themselves. There was slight disruption from one pupil who was continually talking over the rest of the class. Overall the pupils were attentive and seemed to be keen to get started.
2	Were the activities effective in meeting the lesson's aims and objectives?	The aim of the lesson was to provide the pupils the chance to conduct their own research through the use of pedometers and smartphone apps. Although the activities were successful in the pupils collecting some data (pedometer only), I do not believe some of the pupils fully grasped the point of the lesson as they did not appear to be engaged.
3	How was the content of the activity appropriate to the pupils' needs?	Although the 3 activities were relevant to the aims of the lesson, I do not believe the activities engaged the pupils as much as we had anticipated. Some of them appeared bored whilst some started to act up.
4	Were the arrangements and organisation adequate and appropriate, (e.g. equipment, timing, all pupils' involved)?	I believe the equipment used was adequate for the lesson especially getting the smartphone involved (where possible). However, things that did not work well were pupil involvement and timing. Some of them were bored and did not want to participate whilst some saw the opportunity to misbehave when outside the classroom environment. This resulted in loss of time in trying to engage the

		pupils who were uninterested and manage those who were misbehaving. Overall this resulted in some activities not being completed.
5	How was the main content delivered?	The main content was delivered through a presentation on research (the pupils were engaged on this part) and 3 walking activities and wearing pedometers. These walking activities included stair climbing, different walking paces and walking for 5 minutes. The pupils would then record their data on the record sheets provided.
6	How did you sum up at the end of the lesson?	The lesson was summed up in our own groups. My group lesson was completed by discussing the differences between the pedometer and the pedometer app on the smartphone. This was also followed by a discussion regarding what their step counts should be on a daily basis.
7	Reflection-in-action (completed on day of session):	Due to only one pupil downloading the app, we had to adapt and get the pupils just to record their step count from the pedometer.
8	Reflection-on-action (Completed day after session):	Overall, it felt that the lesson did go as smoothly as previous lessons. This is likely to have been due to the pupils being allowed out of the classroom environment and pushing to see how far they go in terms of their behaviour. The pupils got bored with the activities very quickly which was also when some started to misbehave. Timing was an issue. Some groups didn't get through all the tasks whether that was through trying to get them engaged in the task or whether this was due to the group returning to class because of behavioural issues. Because none of the pupils downloaded the app (apart from one), the lessons overall objectives were not met. On a slightly more positive note – by the end of the lesson, there was some good discussion coming from my group which suggested they were interested in some aspects.
9	Area of practice to continue in future sessions:	We shall continue to split the class into smaller groups. We find the pupils are more engaged with the topics when they are having a discussion one ActiveChat mentor in a smaller group. We also see their confidence growing every week with regards to speaking out in the class which will bode well for their presentations in the final week.
10	Areas of practice to develop for future sessions:	The vast majority of the class work well in their groups however it has been established that some pupils cannot work together. They will be separated and put into different groups next week. We, as teachers, need to show more authority but also show more enthusiasm especially when doing the research topics which might lose the pupils interest.

Appendix D – Researcher's Reflections on the ActiveChat Programme

Class Topic: ActivPAL Session Number: 5/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10

1	Did the session start well? If so, why?	The lesson didn't start that smoothly. This was due to a disruption from a pupil who was sent out of the class followed by one pupil who was constantly talking. The pupils didn't really pay attention the presentation.
2	Were the activities effective in meeting the lesson's aims and objectives?	The aim of the lesson was to provide the pupils the chance to see a high quality research tool and assess the output it provides. At the first, the pupils almost seemed too daunted by the data output provided however once we were in smaller groups and explain the output more clearly, the pupils seemed more interested and were answering the questions given and answered follow up questions confidently. I therefore believe that the activity fully met the aims.
3	How was the content of the activity appropriate to the pupils' needs?	Although the content could be perceived as fairly complex for a 3rd year class, once the pupils had been shown what the data meant and how to read it they appeared much more confident and capable of answering the questions provided.
4	Were the arrangements and organisation adequate and appropriate, (e.g.	I believe the equipment we used was appropriate for the pupils as they were engaged with all that was provided. They didn't seem to be too impressed with the ActivPAL however once we showed them the output (colour graphs) they seemed much more engaged and asked questions. We managed to get through the questions for the ActivPAL

	equipment, timing, all pupils' involved)?	much more quickly than expected therefore we may have underestimated their abilities. This was backed up at the end when we did a Homer Simpson at the gym quiz and the pupils told us the answers were too easy.
5	How was the main content delivered?	The main content was delivered through a presentation on research (pupils didn't really hold their attention on this part), having the data output of the ActivPAL on their desks (1 for each group) and then answered the questions provided. Due to getting through this quickly, we then went onto the Homer Simpson at the gym quiz whereby we got them to answer questions based on the clip which led onto questions from previous lessons. The pupils thoroughly enjoyed it.
6	How did you sum up at the end of the lesson?	The lesson was summed up by recapping what we had done over the lesson and asked them some questions to make sure they had listened i.e. what does the red colour stand for in the data output of the ActivPAL, etc.
7	Reflection-in-action (completed on day of session):	The activities we had planned were finished quicker than we anticipated. This was mainly due to our underestimation of the pupils understanding of the ActivPAL data and/or we didn't have enough questions. Because we had 5-10minutes left at the end we asked the pupils what they wanted to play. The general consensus was for heads down thumbs up so that was played in the final part of the lesson.
8	Reflection-on-action (Completed day after session):	Overall, this lesson was much more successful than the previous lesson. This was likely due to being split into smaller groups and being kept in the classroom environment. The pupils appeared interested in the ActivPAL data once it was explained in the smaller groups with them asking follow up questions. As previously said, I believe we underestimated their capabilities with regards to their understanding of the data with them finding the answers fairly easily.
9	Area of practice to continue in future sessions:	We shall continue to split the class into smaller groups. We also found that the pupils seem to be more engaged when provided with written tasks in their groups. It is down to each ActiveChat mentor to make sure all pupils put in a contribution which I feel has been successful thus far. Each mentor having a group has worked well in this programme especially with these pupils therefore we shall be continuing to do this.
10	Areas of practice to develop for future sessions:	I feel when giving the pupils tasks we need to make it a bit more of a challenge for them as they all appeared to find the questions far too easy. They definitely like the idea of being in 'teams' therefore I believe we need to keep that mentality throughout as it seems to get them more involved and wanting to do tasks. They may like the competitive element which is something we could enhance in future lessons.

Appendix D – Researcher's Reflections on the ActiveChat Programme

Class Topic: Reflective session Session Number: 6/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10

1	Did the session start well? If so, why?	The lesson started well. The pupils came in, sat down and were very quiet. We gave them out questionnaires to fill in which they did without any issue.
2	Were the activities effective in meeting the lesson's aims and objectives?	The aim of the lesson was to reflect over the last 5 weeks, look at their goals and see whether they have made any changes to their PA. The difficulty here was that the pupils weren't interested. Although in theory, the activities met the learning objectives, class engagement was fairly low. We also wanted to test the pupils on what they had learnt over the last 5 weeks with the use of NHS clips on physical activity and obesity and a US government clip of physical activity. It was quickly made apparent that these clips were boring to the pupils although they did answer the questions.
3	How was the content of the activity appropriate to the pupils' needs?	The clips that were shown were maybe not as appropriate for the class as they were not engaged and did not really pay attention. The questionnaires were appropriate however some of the pupils did not want to do it as they had already done it. The goal setting was also a challenge as the pupils put up barriers.

		They 'didn't know' what they could do even after providing examples.
4	Were the arrangements and organisation adequate and appropriate, (e.g. equipment, timing, all pupils' involved)?	Not all pupils involved themselves in this class. After encouragement some just didn't get involved at all. Some pupils did get involved but were reluctant. Our timings were a bit off which left 5 minutes at the end. We tried to have some classroom discussion at the end however this also failed.
5	How was the main content delivered?	The main content was delivered through explaining what we were going to do, the questionnaires and a goal setting sheets along with the pop quiz which was done via Power Point.
6	How did you sum up at the end of the lesson?	The lesson was summed up explaining to them what we would be doing next week and that we would be going to the computer room and asked them if they had used excel before. It would appear most of the pupils have never used excel.
7	Reflection-in-action (completed on day of session):	We had to leave out one of the clips we had planned to do due to that we had run out of time. We had also planned on going over the answers however as we had run out of time we will mark the answers and hand it back to them next week.
8	Reflection-on-action (Completed day after session):	Overall, this lesson wasn't very engaging for the pupils. I believe this may have been due to the repetitive nature of the class. They were reluctant (some refused to participate at all). Again, this might have been due to the fact they were not in small groups but as a class.
9	Area of practice to continue in future sessions:	Small groups are definitely needed for this class. The following 4 lessons they will be working in small groups. Being in these groups means that they are able to have one ActiveChat mentor each which works well. This will be continued. They appear to respond well to written tasks in their groups.
10	Areas of practice to develop for future sessions:	The ActiveChat mentors need to work more as a unit. I feel this last class was rather scattered which should not happen. A run-down of what is expected from each of us is needed prior to the lesson.

Appendix D – Researcher's Reflections on the ActiveChat Programme

ActiveChat Reflections

Class Topic: Data Analysis session Session Number: 7/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10

1	Did the session start well? If so, why?	The lesson started well. It may have been a bit disruptive due to us moving from the classroom to the computer room. Overall, pupils got into the computer room, logged on efficiently.
2	Were the activities effective in meeting the lesson's aims and objectives?	The aim of the lesson was to get the pupils to experience performing data analyses. This involved getting the pupils to use excel, create a graph and to discuss the 'research' question. The activity engaged (most) of the pupils and gave the pupils a taster for taking data and turning it into something visual which is a task researchers at University do. Therefore the activities did meet the aims and objectives of the lesson.
3	How was the content of the activity appropriate to the pupils' needs?	The content of the activity was appropriate for the class. The vast majority of the class were engaged and followed the instructions on the worksheet without any issues. If anything, we may have underestimated the pupils' capability by making it too easy.
4	Were the arrangements and organisation adequate and	The majority of the class worked well however an issue we noticed was that due to there being no specific seating plan in the class, the pupils sat with their friends. For most this was not an issue however some did not work as effectively as they

	appropriate, (e.g. equipment, timing, all pupils' involved)?	could have had we put them in specific groups. This was due to the pupils talking. We got the pupils to work in groups however if we were to repeat this we would make them do this on their own as I believe they are all capable of performing this task. We allocated too much time for this task. Pupils were finished well before the time.
5	How was the main content delivered?	The main content was delivered through worksheets that they had to follow through. This was a step by step guide to how to make a graph using the data they had collected back in lesson 4. The original idea was to run through it as a class however this ended up not being required.
6	How did you sum up at the end of the lesson?	The lesson was summed up explaining to them what we would be doing next week and that we would be putting them into groups and given a topic. The topic will be based around what they had learned over the last 10 weeks.
7	Reflection-in-action (completed on day of session):	The pupils were able to follow the step-by-step guide on their own therefore running through it on the smart-board was not needed. We as the ActiveChat mentors just went round the different groups and if they needed any help then we would talk them through it. As some of the pupils completed the task quickly, we asked them to then be the ones to lead and help anyone that needed it. This did not work as the pupils didn't want to do it so they just sat. This resulted in the ActiveChat mentor discussing the data with them in more depth to try and keep them engaged.
8	Reflection-on-action (Completed day after session):	Overall, I believe this lesson was just too easy for the class. Although we were told they had never used excel before, it turned out most of them had and were very good at it. This type of lesson engaged the pupils and they seem to like tasks that they can just get on with.
9	Area of practice to continue in future sessions:	We may need to provide more tasks that the pupils can just work through themselves as they seem to enjoy this. It might be that we need to have less group discussion and let them get on with the task then bring it together for a discussion after they've done the task.
10	Areas of practice to develop for future sessions:	Although the pupils were in small groups, they tended to sit with their friends. As the layout of the room meant the pupils had their back to the rest of the room it meant they were more likely to talk and be on their phones. Unfortunately this isn't something that can be helped so allocating groups might be the way to reduce social chat and may keep the pupils on task.

Appendix D – Researcher's Reflections on the ActiveChat Programme

Class Topic: PowerPoint Presentation Planning Session Number: 8/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10

1	Did the session start well? If so, why?	The lesson started well. It may have been a bit disruptive due to us moving from the classroom to the computer room. Overall, pupils got into the computer room, logged on efficiently.
2	Were the activities effective in meeting the lesson's aims and objectives?	The aim of the lesson was to get the pupils to experience preparing and making a power point presentation on the one of the five topics which were covered; sport, exercise, active living, sedentary behaviour and research. We initially planned on getting them to plan their slides based on the hand-outs we provided however they opted to just starting the power points themselves.
3	How was the content of the activity appropriate to the pupils' needs?	I believe the content of the lesson was appropriate for the class. The majority of the class go on with the task in hand without too much issue.
4	Were the arrangements and organisation adequate and appropriate, (e.g. equipment, timing, all pupils' involved)?	The majority of the class worked well however an issue we noticed was that they were in groups of two and we found that one person would lead whilst the other stepped back. There wasn't much team effort. I believe from experience over the last 8 weeks, the pairs they were in would have worked well however there was an unusual mood in the class where there wasn't much of a work ethic. They had all the equipment they

		needed to complete the task. Timing wasn't much of an issue as this will be continued next week.
5	How was the main content delivered?	The main content was delivered through a presentation on how to make a good power point as long with what they should include in their presentations. These slides were then handed out to the pupils for them to use as a guide.
6	How did you sum up at the end of the lesson?	The lesson was finished with us making sure they save their presentations and making them aware that they'll be continuing with them next week.
7	Reflection-in-action (completed on day of session):	There wasn't necessarily anything that we needed to change 'off the cuff' however we had planned on using an A3 sheet of paper to get them to plan their slides first however they went on to just start their presentations so we abandoned that idea.
8	Reflection-on-action (Completed day after session):	Overall, I believe this lesson could have gone better however was due to the lack of participation by some students. As previously mentioned, there was an unusual mood in the class where by some just did not want to work. This might have been due to those pupils being in a meeting prior to the class (we don't know what that was). Some of the pupils who we know work well together didn't seem to have that work ethic they usually had. A problem was that because they were in pairs, one took the lead while the other stepped back.
9	Area of practice to continue in future sessions:	We shall continue to try and start up group discussions within each group on their topics.
10	Areas of practice to develop for future sessions:	We as 'ActiveChat' mentors need to emphasise the importance of everyone's involvement and that they are working as a team on these presentations. We need to encourage those who are not willing to participate to take part by getting them interested e.g. showing them how to add animations.

Appendix D – Researcher's Reflections on the ActiveChat Programme

Class Topic: Making PowerPoint Presentation Session Number: 9/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10

1	Did the session start well? If so, why?	The lesson started relatively smoothly. Again there was a slight disruption with us moving from the classroom to the computer room but overall the pupils got themselves into their groups and logged on without any hassle. Was good to see the two groups who sat next to each other last week and misbehaved separated themselves this week.
2	Were the activities effective in meeting the lesson's aims and objectives?	The aim of the lesson was to get the pupils to continue preparing and making their power point presentation on one of the five topics which were covered; sport, exercise, active living, sedentary behaviour and research. Hand-outs were provided to help guide them through making the Power Point.
3	How was the content of the activity appropriate to the pupils' needs?	I believe the content of the lesson was appropriate for the class. The class worked well and stayed relatively focused as they got the task complete in the allotted time. This would indicate the activity was appropriate to the pupils' needs.
4	Were the arrangements and organisation adequate and appropriate, (e.g. equipment, timing, all pupils' involved)?	As with last week, the majority of the class worked well however the issue that they were in groups of two meant that one person would lead whilst the other stepped back. However there did seem to be much more of a team effort this week. Last week, pairs who usually worked well together didn't however this changed around this week. All groups worked well and giving them a set time of when the task

		was to be done by may have given them the motivation and focus to work. They had all the equipment they needed to complete the task.
5	How was the main content delivered?	The class was continued from the previous week therefore there wasn't 'delivery' and the pupils got on with their task. We did provide the hand-outs for the pupils to work from as we did last week.
6	How did you sum up at the end of the lesson?	We tried to sum up the end of the lesson by explaining what we were going to do for the last week. This was unsuccessful as the pupils had lost of focus and concentration so didn't listen. This was shown by the pupils constantly talking and walking about the classroom.
7	Reflection-in-action (completed on day of session):	We didn't need to 'think on our feet' today as it took the pupils the full lesson to make their presentations. We did have to encourage some pupils to put a little more effort in so suggested could use animations to make their presentation a bit more fancier. Also to make a group member feel more involved after them missing last week and a good 15 minutes of the class, I told them to look at the presentation and to add anything that they felt needed to be put into the presentation.
8	Reflection-on-action (Completed day after session):	Overall, I believe this lesson went as well as it could have done. The pupils put in more of a team effort in their presentations and they got the task in hand complete. A couple of pupils weren't as engaged as they had missed the last session so they had to jump in with another group. They would not have had time to complete a new presentation due to the time they had come into the class. We cannot control for the pupils who only attend classes on the odd occasion.
9	Area of practice to continue in future sessions:	Giving the pupils a set time frame to get tasks done seem to work well. They stayed relatively focused for the time allocated to the task. This might have been due to them knowing exactly how much time they have or the fact we gave them an incentive – you get the task done by 2.55pm and we can play games for the last 10 minutes.
10	Areas of practice to develop for future sessions:	We as 'ActiveChat' mentors need to emphasise the importance of everyone's involvement and that they are working as a team on these presentations. We need to encourage those who are not willing to participate to take part by getting them interested e.g. showing them how to add animations. I believe we did this in the second Power Point session. Another area we need to develop is working as a team to emphasise the teaching points to the pupils. We as the mentors need to establish the outcomes together and make sure they get across. This is important as often we are working with groups separately so we need to make sure they are all being taught the same and having the same 'pupil voice' experience.

Appendix D – Researcher's Reflections on the ActiveChat Programme

Class Topic: Presentations Session Number: 10/10

Evaluation of Lesson	
Pupil / teacher cooperation / rapport	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Learning intentions achieved	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Clarity of instructions	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Relevance of content	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Smooth transitions between lesson stages	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
Appropriate use of demonstration	1 – 2 – 3 – 4 – (5) – 6 – 7 – 8 – 9 - 10
Pupil behaviour	1 – 2 – 3 – 4 – 5 – 6 – (7) – 8 – 9 - 10
Teaching style helped achieve Learning Intentions	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
+ve activity - talk ratio	1 – 2 – 3 – 4 – 5 – (6) – 7 – 8 – 9 - 10
Effective class management	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 – 10
Effective use of voice (Variety)	1 – 2 – 3 – 4 – 5 – 6 – 7 – (8) – 9 - 10

1	Did the session start well? If so, why?	The lesson started with a lot of reluctance from the pupils. This was because they did not want to present their Power Points presentations. Therefore extra encouragement was required from the ActiveChat mentors.
2	Were the activities effective in meeting the lesson's aims and objectives?	The aim of the lesson was to get the pupils to present their Power Points in front of the class. The pupils protested their participation in doing this therefore we had to encourage them and got them to stand behind the computer whilst reading out the slides. This was something they did not enjoy.
3	How was the content of the activity appropriate to the pupils' needs?	I believe the content of the lesson was appropriate for the class however lack of experience talking in front of each other in the class was an issue and confidence was low for the pupils. I strongly believe they were all capable in completing the task.
4	Were the arrangements and organisation adequate and appropriate, (e.g. equipment, timing, all pupils' involved)?	After encouragement from the ActiveChat mentors. All the groups except one presented and one pupil presented on their own as their partner refused to participate. I strongly believe we as the mentors tried our best to encourage all participation however this was not enough. Following the presentations, the pupils completed a questionnaire on the programme. This was not an issue for them and they quickly got through it. Finally as

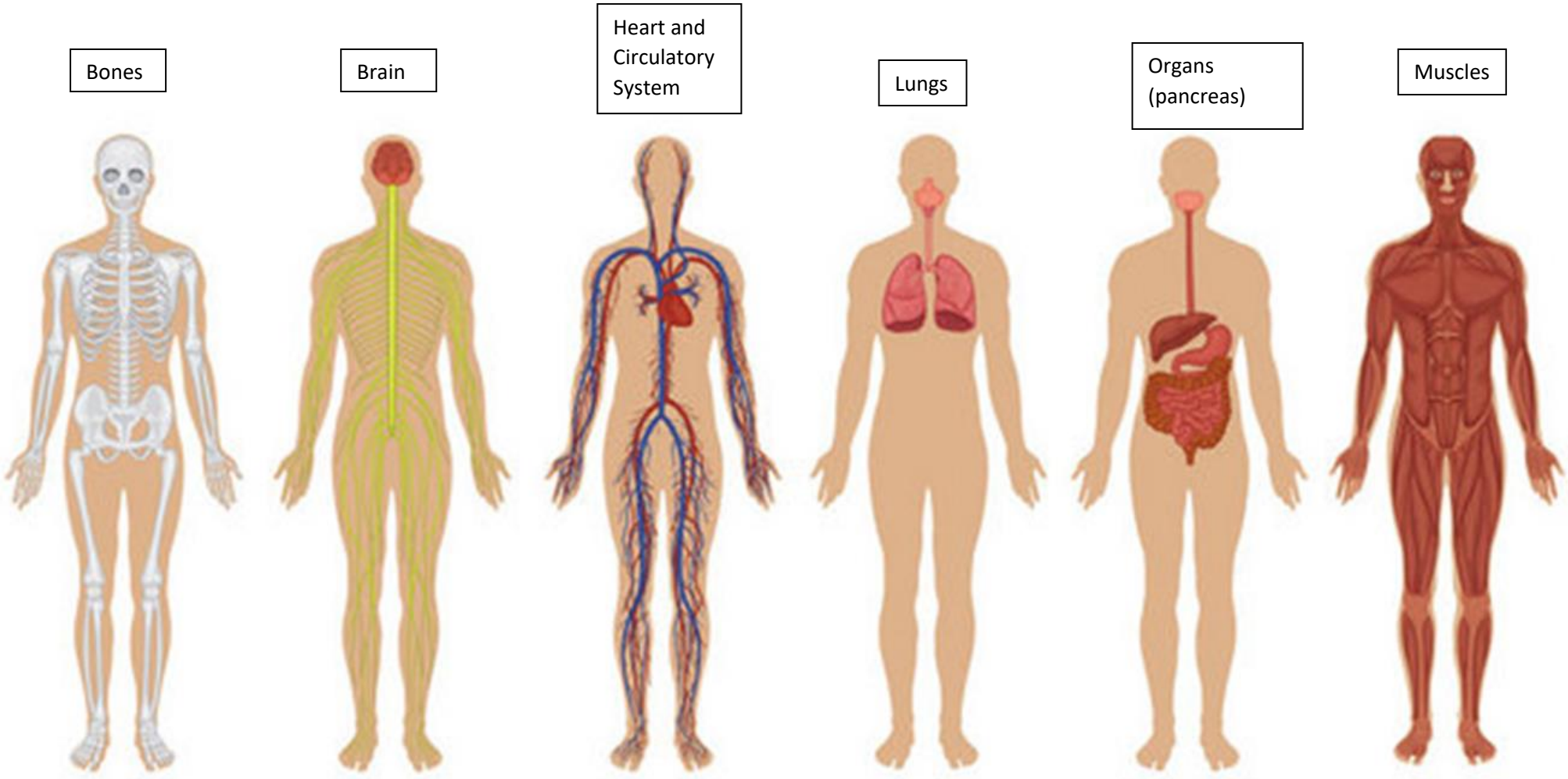
		it was the last session, for the last 10 minutes or so we let them play games. This was hangman. We tried to encourage them to stand up whilst playing it (this did not work).
5	How was the main content delivered?	Again there wasn't much delivery from us. This was about the pupils presenting their work. We did give out questionnaires for them to complete.
6	How did you sum up at the end of the lesson?	At the end of the lesson we recapped what we had done over the last 10 weeks and thanked them for their participation.
7	Reflection-in-action (completed on day of session):	As a first the pupils refused to present their presentations, we had to come up with compromises in order for them to go up and do it. We told them about the certificates as an incentive for them to do it however they didn't buy into that as they still refused.
8	Reflection-on-action (Completed day after session):	The last lesson was maybe a bit scrabbled with all the different things going on – presentations, evaluations, certificates being given out and games. The most challenging part of the lesson was getting the pupils to stand up and speak to the class.
9	Area of practice to continue in future sessions:	Again, giving the pupils a set time frame to get tasks done seem to work well. They completed the evaluation in the allotted time and again, giving them the incentive of playing a game at the end worked.
10	Areas of practice to develop for future sessions:	Talking out in front of each other is something that certainly terrified the pupils. It might be worth introducing more tasks where they are required to speak out to the class, even just sitting at their desks like we did in lesson 3 to get them used to it and hopefully build their confidence so that it doesn't seem so daunting on the last lesson.

Appendix E – ActiveChat Lesson Plans and Materials for Feasibility Study

Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

ActiveChat Programme – Lesson 1 (What is Physical Activity)			
Objectives of Lesson			
Phase & Time Allocation	**Activities**		**Teaching Points**
	Teaching	**Physical activity/ Break up sedentary time**	
Allow pupils to get seated and settled (10 minutes)	Get the class settled for started of class.	n/a	This is when the teacher will provide the Actigraphs for the pupils to put on.
Presentation – what is physical activity (10 mins)	What is physical activity? Ask the pupils what they think physical activity is before the presentation. Explain the difference types of physical activity (active commuting, active living, sport and exercise). Let them know the current recommended guideline for children their age – 60 minutes of moderate-vigorous PA per day. (S3 – perhaps go into detail regarding light, moderate and vigorous activity in terms of Metabolic Equivalents.)	Ways in which physical activity might be able to be incorporated is make them do an example of active living i.e. get them to quickly walk around the classroom and back to their seats. For exercise, asked them to push the chairs in and do 10 jumping jacks. Try to encourage standing and/or movement	Important to emphasise that physical activity doesn't always mean sport. They can be active by walking to the shop. Pupils their age should be doing 60 minutes of moderate-vigorous PA per day. Emphasise that this should require them to at least feel slightly breathless (should still be able to talk). They could this by playing sport, going on their bike, walking quickly. Allow for pupil discussion.
Why being physically active is important to everyday life? (10 minutes)	To discuss with the pupils the importance of energy balance. One wall will be titled 'energy in' and another wall will be 'energy out'. Get all the pupils to stand at the 'energy in' wall. Explain that this is positive energy imbalance which means we have more energy than needed. Ask half the pupils to move towards the 'energy out' wall. They are now in energy balance. Get the rest of the class to move to the 'energy out' wall and explain that they are now in a negative energy imbalance.	Pupils will be standing and moving to either side of the classroom.	Emphasise the importance of energy balance in order to maintain a healthy weight. Physical activity helps to maintain energy balance by burning the energy that goes in, hence it's important to be physically active.

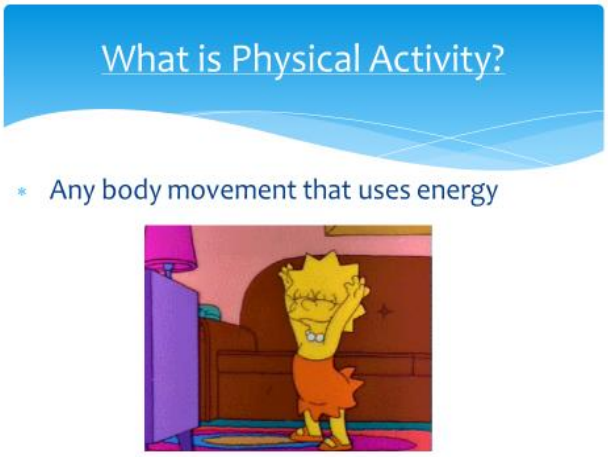
	(For S3's this could be made more challenging by getting the pupils to think about this themselves and figure out how many need to be at the other side to make it balanced).		
Why is physical activity important for health? (15-20 minutes)	This will be a group task. There will be a picture of a human body for each group along with a set of cards which corresponds to a part of the anatomy i.e. heart, lungs, head, muscles. The pupils will have 10 minutes to come up with why physical activity is beneficial to that part of the anatomy e.g. more self-confidence, stronger heart muscles, better fitness. The end of the first presentation will contain a slide that has a number of benefits physical activity has on the human body and we'll see how many the pupils come up with. (For S3's, maybe make it more difficult by not providing them with prompt cards).	Encourage as much as possible for pupils to stand during this task.	Physical activity has a number of health benefits. It's important that pupils understand these benefits themselves and start to take ownership over their own health behaviours at this age.
End of class	Once the bell rings, ensure that all pupils return the Actigraph devices before they leave.		

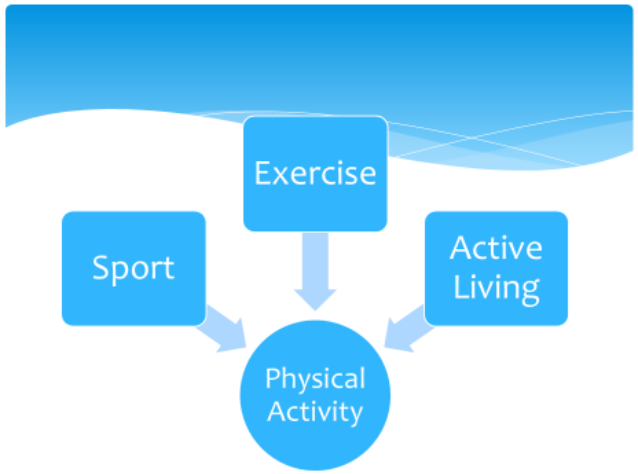

Bones
Brain
Heart and Circulatory System
Lungs
Organs (pancreas)
Muscles

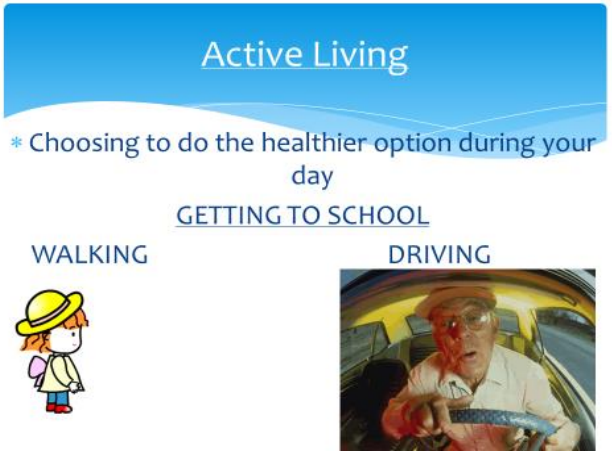

The ActiveChat Programme


What is ActiveChat?
You'll learn about being active and why it is important!
You'll learn about the disadvantages of sitting too much!
You get to conduct your very own research using top of the range research equipment!
You'll make and smash your own goals!
CRAWL
WALK
RUN
FLY


What is physical activity?


What is Physical Activity?
Any body movement that uses energy


Exercise
Sport
Active Living
Physical Activity


Active Living
Choosing to do the healthier option during your day
GETTING TO SCHOOL
WALKING
DRIVING

WHEN YOUR OUT SHOPPING

* ESCALATOR Vs STAIRS

Sport

* Activities that use skill and effort
* Either by yourself or in a team
* Can be competitive or just for fun

Exercise

* Something you've planned to do

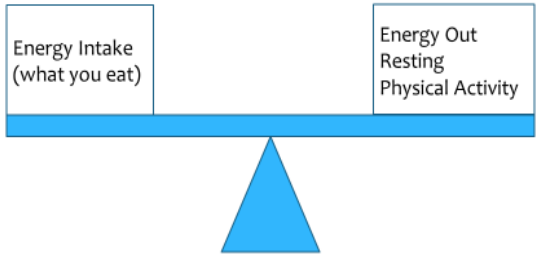
* You do it to improve your fitness and to be healthy

DO YOU KNOW HOW MUCH PHYSICAL ACIVITY YOU SHOULD BE DOING?

* People aged 5-16 years should be:
* Doing 1 hour of physical activity everyday!
* This is activity that raises your heart rate such as walking fast, cycling your bike, dancing, running about.
* But remember, moving about at all is better not moving about.

Why is all this Important?

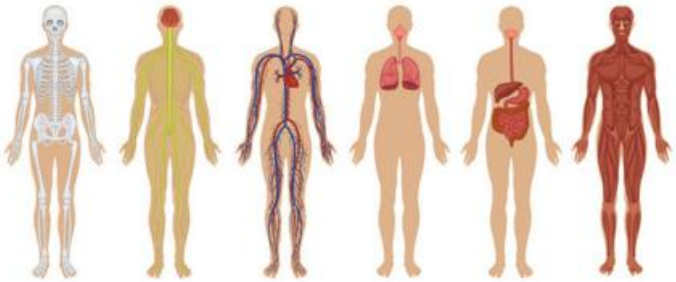
* It helps with 'energy balance'.



Why is all this Important?

* In your groups, you will work together and discuss possible reasons why being physically active is good for you.
* There are prompt cards to help you if you get stuck.

Why is all this Important?



Take home messages!

* All physical activity is good for you whether it's walking, playing sport or doing things like gardening, whatever you find fun!
* Ideally you should be doing at least 1 hour per day of activity which raises your heart rate.

Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

ActiveChat Programme – Lesson 2 (Your Physical Activity)			
Objectives of Lesson			
Phase & Time Allocation	**Activities**		**Teaching Points**
	Teaching	**Physical activity/ Break up sedentary time**	
Allow pupils to get seated and settled (10 minutes)	Get the class settled for started of class.	n/a	This is when the teacher will provide the Actigraphs for the pupils to put on.
Recap from last week (5 minutes)	Recap from what they had learned last week. Ask the pupils what they remembered.	n/a	Re-emphasise the different aspects of physical activity i.e. active living, active commuting, exercise and sport. Remind them of the guidelines and that they should be aiming for 10,000 steps per day. Allow for pupil discussion.
Different types of PA (20 minutes)	This task will test them on the different types of PA. Each group will receive 15 bits of card. They will be asked to come up with 15 different activities. After they have come up with the different activities, they will be asked to arrange them according to the type of activity they are: active living, exercise, sport. Each person will then be given an additional two pieces of card – this is for them to write down two activities they enjoy.	Encourage breaking up their sedentary by standing up at their seats if they wish. Encourage movement as well e.g. walking around their groups table.	Emphasise that PA is a positive health behaviour.
Goal setting and physical activity planner (15 minutes)	The goal setting form will allow the pupils to think about physical activity goals they want to achieve.	Encourage breaking up their sedentary by standing up at their seats if they wish.	These goals could be getting off one stop earlier on the bus, cycling to school instead of the car, going for a walk at lunchtime, going for a run with friends…

	There is also a physical activity planner which they will be able to schedule when they might be able to be physically active and can than schedule in the activity they've set for a goal.		Something that the pupils belief they can do but also this gives them the choice of what they would like to do.
End of class	Once the bell rings, ensure that all pupils return the Actigraph devices before they leave.		

PLAN AND GOALS FOR WEEKLY ACTIVITIES

Task: Think about the physical activity you do now and put it into the planner. Then think of ways that you could do more physical activity. These will be your 'GOALS' for the week. Add these into the planner and use the highlighter to highlight your goals.

NAME: CLASS:

MON: _____ TUE: _____ WED: _____ THU: _____ FRI: _____

HOW TO GET TO SCHOOL?				

WHAT TO DO IN THE SCHOOL BREAKS?				

HOW TO GET HOME FROM SCHOOL?				

AFTER-SCHOOL ACTIVITIES?				

HOW TO BREAK UP SITTING TIME?				

Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

ActiveChat Programme – Lesson 3 (Barrier/ Motivations to Physical Activity/ Introduction to Sedentary Behaviour)			
Objectives of Lesson			
Phase & Time Allocation	**Activities**		**Teaching Points**
	Teaching	**Physical activity/ Break up sedentary time**	
Allow pupils to get seated and settled (10 minutes)	Get the class settled for started of class.	n/a	This is when the teacher will provide the Actigraphs for the pupils to put on. Provide Actigraphs before heading up to computer suite.
Recap goals/ Motivation and barriers (20 minutes)	Recap the previous week and ask the pupils if any of them met their goals. If any of the pupils met their goals then ask to share with the class. If some of the pupils didn't, ask them how they might reach their goals for next week. Hand out a barriers and motivators form. This will allow the pupils to identify their barriers (perhaps why they didn't meet their goals), their motivators to be physically active, and what solutions they come up with to overcome their barriers and complete their goals.	Encourage pupils to stand during this part of the lesson.	The teacher might need to help them come up with solutions but try where possible to get the pupils to come up with the solutions themselves. Barriers might be lack of time, bad weather, no friends were doing it… Motivators might be to be healthier, to lose weight, to feel better. Solutions to barriers might to get up half an hour earlier or do something that's inside.
Sedentary behaviour presentation (5 minutes)	Presentation on what is sedentary behaviour and why is it not good for you.	n/a	
Human body task (15 minutes)	Get the pupils in their groups and standing round the picture of the body along with their prompt cards. Ask them to think about what too much sedentary time can do to these parts of the body and get them thinking about why this might happen.	Encourage the pupils to stand around this.	The final slide on the presentation will have the potential detrimental effects prolonged sitting has on the body. Ask the pupils to share their ideas.
End of class	Once the bell rings, ensure that all pupils return the Actigraph devices before they leave.		

Sedentary Behaviour

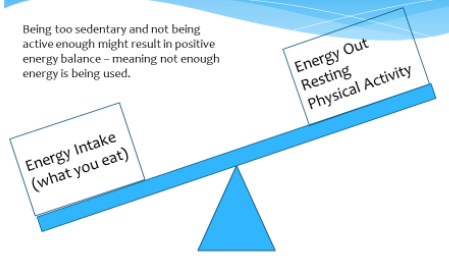
What is Sedentary Behaviour?

Sedentary behaviour is any activity where you are sitting or lying and using little energy.

Who can come up with examples of 'sedentary behaviour'?

Remember 'Energy Balance'

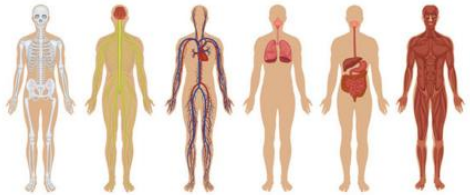
Being too sedentary and not being active enough might result in positive energy balance – meaning not enough energy is being used.



Positive Energy Balance

- If you are in positive energy balance for too long, this may result in becoming overweight and obese in later life.
- Therefore it is important to eat healthily and to move about and use that energy.

Why Is Too Much Sedentary Behaviour Bad?



If you are too sedentary and are not active enough

- Mind: less focused; feel lazy/tired; bad mood.
- Pancreas: increases risk of Type II Diabetes later in life.
- Lungs: reduces efficiency in carrying oxygen around the body; reduces fitness.
- Heart: can contribute to higher blood pressure; can increase risk of cardiovascular disease in later life.
- Muscles: become weaker; reduced muscular endurance
- Bones: can reduce bone density.

Take home messages!

- Not all sitting or lying is bad for you.
- Sleep is very important and very good for you.
- Of course, we can't be moving about all the time.
- Just try not to play on the Xbox or watch tv for a long time (no more than 2 hours per day).

Name: _____ **Class: _____**

Why Do You Want To Be Active? **(Motivations)**	**What stops you from being active?** **(Barriers)**
Example: I want to be active because my friends are active. ****If this example applies to you, you can still write it down.***	***Example: There is nowhere for me to be active.*** ****If this example applies to you, you can still write it down.***

Think about your motivations to being active and your possible barriers.

TASK: Come up with solutions on how to overcome your barriers.

Example: Because there is nowhere for me and my friends to be active, we go for walks after school.

Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

ActiveChat Programme – Lesson 4 (Sedentary Behaviour)			
Objectives of Lesson			
Phase & Time Allocation	**Activities**		**Teaching Points**
	Teaching	**Physical activity/ Break up sedentary time**	
Allow pupils to get seated and settled (10 minutes)	Get the class settled for started of class.	n/a	This is when the teacher will provide the Actigraphs for the pupils to put on.
Recap – goals/ sedentary behaviour (10 minutes)	Recap the previous week and ask the pupils if any of them met their goals. If any of the pupils met their goals then ask to share with the class. If some of the pupils didn't, ask them how they might reach their goals for next week. Recap on what they learned the week before on sedentary behaviour.	Encourage all pupils to stand during this part of the lesson.	
Group Task (20 minutes)	In small groups, get the pupils to discuss with each other their sedentary activities. Get them to think about how they might decrease their sedentary activities. The group will then write down their solutions. Each group will then read out what solutions they came up with and why.	To get the pupils into groups – ask them order themselves into height order then randomly distribute them into groups. When each group presents their solutions, encourage all group members to stand.	Emphasise that the solutions are their ideas. Recap what sedentary behaviour is.
Active Quiz (10 minutes)	Pupils will be asked a series of questions on the content covered over the past 4 weeks. There will be an A on one wall, B on another wall, and C on another wall. The teacher will read out the questions and the pupils will answer either A, B or C by	Pupils will be standing and walking to the wall they think is correct.	This to gauge how much the pupils have taken in over the past 4 weeks.

	walking to the wall they think is correct. This is a bit of fun and can be done in their teams.		
End of class	Once the bell rings, ensure that all pupils return the Actigraph devices before they leave.		

Group Name:_____ Class:_____

Sedentary behaviours that you do

Come up with possible solutions on how you can break up your sedentary behaviour.

1) Alex is walking to and from school. What would this be called?	a) Exercise b) **Active Living** c) Sedentary Behaviour
2) Taylor has walked 15,000 steps. Has Taylor met the recommended step count?	a) **Yes** b) No c) Don't Know
3) Fiona doesn't think she can be active because her friends are not active. What does she have?	a) Motivation b) Solutions c) **Barriers**
4) Paul assists his mum by carrying the shopping bags from the car to the house and helps her unpack the shopping too.	a)Exercise b**)Active Living** c)Active Commuting
5) Jack and Katie play doubles in tennis. They have won a number of junior competitions. This is an example of:	a)Sedentary Behaviour b) Exercise c) **Sport**
6) John likes to go home and play his Xbox. This is an example of:	a)Active Living b) **Sedentary Behaviour** c) Exercise
7) Alice performed moderate physical activity for one hour 3 days of the week. Is Avril meeting the current physical activity guidelines?	**a) No** b) Yes c) don't know
8) Sarah likes to spend hours after school listening to music. This is an example of:	a)Active Living b) **Sedentary Behaviour** c) Exercise

ActiveChat Programme – Lesson 5 (Measures of Physical Activity/Sedentary Behaviour)			
Objectives of Lesson			
Phase & Time Allocation	**Activities**		**Teaching Points**
	Teaching	**Physical activity/ Break up sedentary time**	
Allow pupils to get seated and settled (10 minutes)	Get the class settled for started of class.	n/a	This is when the teacher will provide the Actigraphs for the pupils to put on. Provide Actigraphs before heading up to computer suite.
Recap – goals (10 minutes)	Recap the previous week and ask the pupils if any of them met their goals. If any of the pupils met their goals then ask to share with the class. If some of the pupils didn't, ask them how they might reach their goals for next week.	Encourage all pupils to stand during this part of the lesson.	Reinforce the benefits of physical activity and reducing sedentary behaviour. Emphasise it's their choice what physical activities they can do and it's their body. Emphasise that being active is fun!
Measuring physical activity and sedentary behaviour presentation (10 minutes)	Presentation on the different measures of physical activity and sedentary behaviours. These range from commercial devices such as Fitbit, pedometers on their phone to devices used in research such as the yamax pedometers which they will use in the following lesson, the Actigraph that they're wearing and the ActivPAL which they will look at in a bit more detail.	Encourage pupils to stand throughout this part of the lesson.	This is to give the pupils of how popular it is now to monitor physical activity but will also get them seeing what researchers use in physical activity research.
Activity Break (5 minutes)	Activity break.	Get the pupils to get up and walk around the classroom then back to their seats where they stand up and sit down for a set of 10.	Emphasise again that feeling of getting ready and feeling refreshed for the next lesson. Emphasise that feeling good for having an active break.

Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

ActivPAL Analysis (15 minutes)	Pupils will be provided with 36 hours of ActivPAL data. The teacher will explain to them what the different colours mean (yellow – sedentary, green – standing, red – walking). The pupils will then be asked to a number of questions regarding the data.	Encourage standing throughout this task.	This is get the pupils to have a taste of how researchers can view this type data and read.
End of class	Once the bell rings, ensure that all pupils return the Actigraph devices before they leave.		

Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

How we measure physical activity.

Why do we measure physical activity and sedentary behaviour in the first place?

Researchers are interested in how much physical activity and sedentary behaviour people are doing.

Everyone might want to track their physical activity or sedentary behaviour for a variety of reasons:

- Out of interest to see how much they do.
- To try and do more physical activity.
- Other goals such as losing weight and to help them keep track.

How do we measure physical activity?

* Here's the fun part!

Pedometers

Pedometers are used to count how many steps you count.

Alongside the physical activity guidelines – it is recommended you try and take 10,000 steps per day.




fitbit

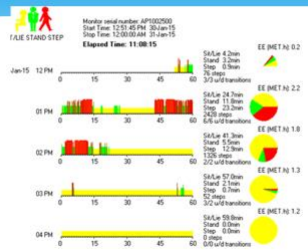
Accelerometers

* These are devices which are often used in research.


ActiGraph

PALtechnologies
PROVIDING THE EVIDENCE

ActivPAL



Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

Name:_____ Class:_____

Question	Answer
What time do you think this person woke up?	
What time do you think person go to bed?	
What hours were the person most active?	
When this person was awake, what hour were they most sedentary?	
Looking at the times (in minutes) next to the pie charts, what hour did they stand for the longest?	
Looking at the times (in minutes) next to the pie charts, what hour did they step for the longest?	
On Saturday, how many minutes did this person spend standing?	
On Saturday, how many minutes did this person spend sedentary?	
On Saturday, how many minutes did this person spend stepping?	

Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

ActiveChat Programme – Lesson 6 (Measures of Physical Activity/Sedentary Behaviour)			
Objectives of Lesson			
Phase & Time Allocation	**Activities**		**Teaching Points**
	Teaching	**Physical activity/ Break up sedentary time**	
Allow pupils to get seated and settled (10 minutes)	Get the class settled for started of class.	n/a	This is when the teacher will provide the Actigraphs for the pupils to put on. Provide Actigraphs before heading up to computer suite.
Recap – goals (10 minutes)	Recap the previous week and ask the pupils if any of them met their goals. If any of the pupils met their goals then ask to share with the class. If some of the pupils didn't, ask them how they might reach their goals for next week. Recap the previous week regarding the ways to measure physical activity.	Encourage all pupils to stand during this part of the lesson.	Reinforce the benefits of physical activity and reducing sedentary behaviour. Emphasise it's their choice what physical activities they can do and it's their body. Emphasise that being active is fun!
How to use Yamax pedometers (5 minutes)	Provide each pupil with a pedometer and show them how to put it on and use it. (Open up the pedometer, reset button to restart the steps, close it, and get them to place it on their waistband or belt).	Pupils will be standing and testing the pedometers.	This is to give the pupils an opportunity to use a high quality research device and test it out.
Pedometer task (20 minutes)	Pupils will be given three tasks. Task one will be to walk for five minutes and record their step count. Task two will be to walk up and down two flights of stairs and record their step count. If the school approves, the pupils can compare this with the pedometers on their phone (if they have access) and see if they're the same.	Pupils will be walking.	This is to give the pupils a sense of 'data collection' and how to monitor their own activity.

	When all pupils are back in, get them discussing the two questions on the sheet. Differences between the pedometer and app might be the placement (phone might be upside down/ might not be in their pocket the whole time/ etc) and why their step count might differ from their peers (stride length/etc).		
End of class	Once the bell rings, ensure that all pupils return the Actigraph devices and the pedometers before they leave.		

Name:_____ Class:_____

Task 1: Walking for 5 minutes

Pedometer Count	Pedometer App Count

Difference between pedometers:_____

Task 2: Walking for up and down the school stairs twice

Pedometer Count	Pedometer App Count

Difference between pedometers:_____

Question: Why might there be a difference between your steps between the pedometer and the pedometer app on your phone?

Question: Why might there be a difference between your steps and your classmate's steps?

Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

ActiveChat Programme – Lesson 7 (Making Your Presentation)			
Objectives of Lesson			
Phase & Time Allocation	**Activities**		**Teaching Points**
	Teaching	**Physical activity/ Break up sedentary time**	
Allow pupils to get seated and settled (15 minutes)	Get the class settled for started of class. If possible, go to computer suite.	n/a	This is when the teacher will provide the Actigraphs for the pupils to put on. Provide Actigraphs before heading up to computer suite.
Recap - goals (5 minutes)	Recap the previous week and ask the pupils if any of them met their goals. If any of the pupils met their goals then ask to share with the class. If some of the pupils didn't, ask them how they might reach their goals for next week.	Encourage all pupils to stand during this part of the lesson.	
Lesson Poster (30 minutes)	In groups of 3-4, the pupils will be tasked with coming up with their own lesson on physical activity. They can focus on the benefits of physical activity, why these are benefits, the different kinds of physical activity and/or sedentary behaviour. This is a task to get them thinking about what they've learned and to teach this to others.	Encourage active breaks every 10 minutes. Get the pupils to stand up and sit down 10x. Waken them up a bit!	Emphasise this needs to be done in the lesson.
End of class	Once the bell rings, ensure that all pupils return the Actigraph devices before they leave.		

Your Own Physical Activity and Sedentary Behaviour Lesson

What do you need to do?

* In your groups: create your own lesson on physical activity or sedentary behaviour.
* Using the pens and paper provided, you will make a poster which will include the key points of your lessons.
* Feel free to draw pictures!

* You should include:
  - What is physical activity or sedentary behaviour?
  - Why is it good/bad for you?
  - What recommendations would you make?
  - Come up with ideas on how you can be more active/ do less sedentary behaviours.

* Next week, you will be the teacher and teach the rest of the class about physical activity or sedentary behaviour.
* You will present your poster (no more than 3 minutes) and tell us all the key points from your poster.
* At the end, you should tell the class what you took away from the ActiveChat programme.

Appendix E – Lesson Plans and Materials of ActiveChat Programme for Study Three

ActiveChat Programme – Lesson 8 (Your Presentation)			
Objectives of Lesson			
Phase & Time Allocation	**Activities**		**Teaching Points**
	Teaching	**Physical activity/ Break up sedentary time**	
Allow pupils to get seated and settled (10 minutes)	Get the class settled for started of class.	n/a	This is when the teacher will provide the Actigraphs for the pupils to put on.
Finishing of poster presentations (10 minutes)	Time for pupils to finish off their posters.	Encourage standing	Pupils should keep in mind the key points which were on the PowerPoint last week.
Pupil Lesson Presentations (25 minutes)	Pupils will come up in their groups and deliver their 3 minute lesson. Their poster lesson will be either on the benefits of physical activity, the different types of physical activity and how this can be done or sedentary behaviour.	Encourage all pupils to stand during this part of the lesson.	This is about the pupils teaching their peers what they've learned about physical activity and sedentary behaviour.
Recap of the programme (5 minutes)	A general recap of the programme. Perhaps ask them what they enjoyed.	Encourage standing	Emphasise the health benefits to the being physically active, remind them that physical activity can be fun and they have the choice of the activities they do. Emphasise that they need to take ownership of their own health behaviours.
End of class	Once the bell rings, ensure that all pupils return the Actigraph devices before they leave.		

Appendix F – Ethics Confirmation and Glasgow City Council Approval for Study 3

Appendix F – Ethics Confirmation and Glasgow City Council Approval for Study 3

Ethics Approval

Linsey Baxter

To: Ann-Marie Gibson; David Rowe; Lauren McMichan
Cc: Rachel Hughes

Our ref: 691 01-Jun-16

Dear All

A classroom-based physical activity and sedentary behaviour intervention in early secondary school adolescents in Scotland:

A feasibility study.

CI	Ann-Marie	Gibson	Other Investigator	David Rowe, Lauren McMichan

I can now confirm full ethical and sponsorship approval for the above study.

Regards

Linsey Baxter, RaKET Administrative Assistant (Research and KE support team)
Faculty of Humanities and Social Sciences
University of Strathclyde
LH 340, Level 3 Lord Hope Building
141 St James Road
Glasgow
G4 0LT
0141 444 8418

Phone: Direct Line 0141-287-3556
Fax: 0141-287 4945
Email: michele.mcclung@education.glasgow.gov.uk

Website: www.glasgow.gov.uk
Our Ref : MM/Research/15.52
Date: 22nd June 2016
If phoning please ask for Dr Michele McClung

Lauren McMichan
University of Strathclyde

Dear Lauren,

Proposed Research Project – A classroom based physical activity and sedentary behaviour intervention in early secondary school adolescents in Scotland: A feasibility study.

Thank you for your completed research application form in respect of the above.

I now write to advise you that this department has no objection to you seeking assistance with your project from xxxxx xxxxx in Glasgow. I would confirm however that it is very much up to the Head of Establishment to decide whether or not they participate and assist you in your research.

A copy of this letter should be sent to the Head of Establishment when contacting the school. Please also send a copy of your PVG certificate.

I hope that this is helpful and that you have success with your project. We would be interested to see the findings from your research once it is completed.

Yours sincerely

Michele McClung

Dr Michele McClung
Support Services Manager – Policy & Research
Planning, Performance and Research Unit

Appendix G – Example of Information Sheet (Parents)

Parent Information Sheet

Name of school: School of Psychological Sciences and Health
Title of the study: A classroom-based physical activity and sedentary behaviour intervention in early secondary school adolescents in Scotland: A feasibility study.

Introduction
My name is Lauren McMichan and I am a PhD student at the University of Strathclyde as part of the Physical Activity for Health Research Group. Your child is invited to participate in a study which is being conducted. Please read the following information before you decide whether you wish your child to take part and if you have any questions, please feel free to ask me (my contact details are below).

What is the purpose of this investigation?
This is a study to determine if a classroom-based physical activity and sedentary behaviour programme can be implemented into the early Scottish secondary school curriculum.

Does your child have to take part?
This is entirely voluntary and you and your child have the right to refuse or withdraw at any point during the study. You will have the opportunity to withdraw the information collected in the interview up to two weeks after the data has been conducted.

Please note that if your child takes part in the focus group, this will not be able to be withdrawn due to the anonymity of the data recording.

What will your child do in the project?
If you agree to your child taking part, I will ask your child to complete some questionnaires at two different time points. These questionnaires will ask for your child's thoughts on physical activity. I will also ask your child to wear a small matchbox sized device called an accelerometer during 8 specific classes which measures their movement. Myself or their teacher will show your child how to put it on correctly. Their teacher will provide the device at the start of class and your child will return the device to their teacher at the end of the class. This device is very easy to put on. Your child will tie it around their waist using the belt. If they have any issues, their teacher will be able to help.

Not all pupils taking part in the study will be in the physical activity and sedentary behaviour programme class. It will be decided beforehand which class will have the programme.

Only pupils who were in the class for the programme will be asked if they would like to take part in a discussion with other pupils in the class. This discussion will be about what the pupils thought about the programme and will be audio recorded.

Why has your child been invited to take part?
Your child has been invited to take part in the study as they are a pupil within a specific class and are aged between 11-15 years.

What are the potential risks to you in taking part?
There are no known potential risks to taking part in the study.

Appendix G – Example of Information Sheet (Parents)

What happens to the information in the project?
The data we collect will be completely confidential. The questionnaires we will ask your child to complete will be anonymised and stored in a locked filing cabinet. The data collected from the devices will be anonymised and stored on a password protected computer at the University of Strathclyde and will be backed up in a password protected server which is run by the University of Strathclyde.

The audio recording and transcription of the group discussion will be anonymised and stored on a password protected computer at the University of Strathclyde and will be backed up in a password protected server which is run by the University of Strathclyde. Please note, due to the nature of the group discussion, complete confidentiality cannot be ensured due to the other pupils present within the discussion.

The questionnaires will have your child's name on the form yet these will be immediately coded and names will be erased therefore their questionnaire results will be anonymous.

As part of University regulations, data will be stored for 10 years, after which the data will be destroyed. The audio recording of the group discussion will be transcribed (typed), after which the audio file will be deleted.

The University of Strathclyde is registered with the Information Commissioner's Office who implements the Data Protection Act 1998. All personal data on participants will be processed in accordance with the provisions of the Data Protection Act 1998.

Thank you for reading this information – please ask any questions if you are unsure about what is written here.

What happens next?
After reading this information sheet, if you are happy for your child to take part in the study then you will not have to take additional action.

If, after reading this information sheet, you decide you do not wish your child to take part in the study then we ask that you sign the 'opt-out' form provided and return the form to the school where I will collect it.

The data gathered from the study may be used in an article which may be submitted for publication and for inclusion in my PhD thesis. We can inform you when the article becomes published and send you a copy. The information gathered may also be used if we present the findings of the study at relevant conferences and knowledge exchange events.

Researcher Contact Details:

Name: Lauren McMichan

Email: lauren.mcmichan@strath.ac.uk

Address: Room 535, Physical Activity for Health, School of Psychological Sciences and Health, University of Strathclyde, Graham Hills Building, Glasgow, G1 1XQ

Appendix G – Example of Information Sheet (Parents)

Supervisor Details:

Name: Dr Ann-Marie Gibson
Email: annmarie.gibson@strath.ac.uk
Address: Physical Activity for Health
School of Psychological Sciences and Health
University of Strathclyde
Graham Hills Building
Glasgow
G1 1XQ
Telephone: 0141 548 3412

Name: Dr David Rowe
Email: david.rowe@strath.ac.uk
Address: Physical Activity for Health
School of Psychological Sciences and Health
University of Strathclyde
Graham Hills Building
Glasgow
G1 1XQ
Telephone: 0141 548 4069

This study was granted ethical approval by the School of Psychological Sciences and Health Ethics Committee.

If you have any questions/concerns, during or after the study, or wish to contact an independent person to whom any questions may be directed or further information may be sought from, please contact:

Dr James Baxter

(Convener of the Ethics Committee)
School of Psychological Sciences and Health
University of Strathclyde
Graham Hills Building
40 George Street
Glasgow
G1 1QE

Telephone: 0141 548 2242
Email: j.baxter@strath.ac.uk

Appendix H – Example of Opt-Out Form (Parents)

School: School of Psychological Sciences & Health.

Title of Study: A classroom-based physical activity and sedentary behaviour intervention in early secondary school adolescents in Scotland: A feasibility study.

- To be completed if the parent or guardian **DOES NOT** wish their child to take part in the study.
- I confirm that I have read and understood the information sheet provided for the above study.
- I **DO NOT** wish my child to take part in the above study.

Name of Child:_____
(please print)

Print Name(Parent/Guardian):	
Signature (Parent/Guardian):	Date:

Appendix I – ActiveChat Questionnaire

This questionnaire will ask you questions on your thoughts and current levels of physical activity and sedentary behaviour. The questionnaire will remain confidential and nothing you say will be identified back to you.

Please note: THIS IS NOT A TEST!!

Nothing you say is right or wrong. These are your own opinions and current levels of physical activity and sedentary behaviour.

The knowledge questions at the end are for us to understand what you know about physical activity and sedentary behaviour.

If you have any questions, please ask the researcher.

Name:
Class:
Age:
Girl/Boy:

Appendix I – ActiveChat Questionnaire

Please complete the questionnaire below by **circling** the number which you think **best** describes how **you feel** if you were to be physically active **during your free time** on most days (1 = I disagree a lot, 2 = I disagree, 3 = I do not disagree or agree, 4 = I agree, 5 = I agree a lot). If you have any questions, please ask me. **Remember: no answer is right or wrong so please be honest.**

If I were to be physically activity during my free time on most days…	I disagree a lot	I disagree	I do not disagree or agree	I agree	I agree a lot
it would help me cope with stress	1	2	3	4	5
it would help me make new friends	1	2	3	4	5
it would get or keep me in shape	1	2	3	4	5
it would make me look better	1	2	3	4	5
it would give me more energy	1	2	3	4	5
it would make me better at sports, dance, and other activities	1	2	3	4	5
It would make me healthier	1	2	3	4	5
It would make me feel better	1	2	3	4	5
It would be painful	1	2	3	4	5
It would be difficult	1	2	3	4	5
It would be embarrassing	1	2	3	4	5
It would make me feel uncomfortable	1	2	3	4	5
It would make me tired	1	2	3	4	5
It would make me sore	1	2	3	4	5
It would be a hassle	1	2	3	4	5
It would be too much time	1	2	3	4	5

Appendix I – ActiveChat Questionnaire

If I were to sit/ lie down (not sleeping) for several hours during my free time on most days…	**I disagree a lot**	**I disagree**	**I do not disagree or agree**	**I agree**	**I agree a lot**
It would make me feel unhealthy	**1**	**2**	**3**	**4**	**5**
It would make me feel bad	**1**	**2**	**3**	**4**	**5**
I would have less energy	**1**	**2**	**3**	**4**	**5**
It would not be useful	**1**	**2**	**3**	**4**	**5**
It would increase my risk of diseases later on in life	**1**	**2**	**3**	**4**	**5**
It would make me more stressful	**1**	**2**	**3**	**4**	**5**
It would make me look worse	**1**	**2**	**3**	**4**	**5**
I would make more friends	**1**	**2**	**3**	**4**	**5**
It would make me be in less shape	**1**	**2**	**3**	**4**	**5**

Appendix I – ActiveChat Questionnaire

Please complete the questionnaire below by **circling** the number which you think **best** describes how true the statements on **physical activity are to you** (1 = Not true for me, 2 = Not very true for me, 3 = sometimes true for me, 4 = True for me, 5 = Very true for me). If you have any questions, please ask the researcher. **Remember: no answer is right or wrong so please be honest.**

	Not true for me		Sometimes true for me		Very true for me
It's important to me to be physically active regularly	1	2	3	4	5
I don't see why I should have to be physically active	1	2	3	4	5
I am physically active because it's fun	1	2	3	4	5
I feel guilty when I am not physically active	1	2	3	4	5
I am physically active because it is consistent with my life goals	1	2	3	4	5
I am physically active because other people say I should	1	2	3	4	5
I value the benefits of being physically active	1	2	3	4	5
I can't see why I should bother being physically active	1	2	3	4	5
I enjoy being physically active	1	2	3	4	5
I feel ashamed when I am not physically active	1	2	3	4	5
I consider being physically active as part of my identity	1	2	3	4	5
I am physically active because my friends/family say I should	1	2	3	4	5
I think it is important to make the effort to be physically active regularly	1	2	3	4	5
I don't see the point in being physically active	1	2	3	4	5
I find being physically active pleasurable	1	2	3	4	5

Appendix I – ActiveChat Questionnaire

	Not true for me		Sometimes true for me		Very true for me
I feel like a failure when I haven't been physically active in a while	**1**	**2**	**3**	**4**	**5**
I consider being physically active as a fundamental part of who I am	**1**	**2**	**3**	**4**	**5**
I am physically active because others will not be pleased with me if I am not	**1**	**2**	**3**	**4**	**5**
I get restless if I am not physically active regularly	**1**	**2**	**3**	**4**	**5**
I think being physically active is a waste of time	**1**	**2**	**3**	**4**	**5**
I get pleasure and satisfaction from being physically active	**1**	**2**	**3**	**4**	**5**
I would feel bad about myself if I do not make time to be physically active	**1**	**2**	**3**	**4**	**5**
I consider being physically active consistent with my values	**1**	**2**	**3**	**4**	**5**
I feel under pressure from my friends/family to be physically active	**1**	**2**	**3**	**4**	**5**

Appendix I – ActiveChat Questionnaire

Please complete the questionnaire below by **circling** the number which you think **best** describes how true the statements on **are to you** (1 = strongly disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neither Disagree or Agree, 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree). If you have any questions, please ask the researcher. **Remember: no answer is right or wrong so please be honest.**

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Disagree or Agree	Somewhat Agree	Agree	Strongly Agree
I feel that I am able to complete physical activities that are personally challenging	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel confident I can do even the most challenging physical activities	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel confident in my ability to perform physical activities that personally challenge me	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel capable of completing physical activities that are challenging to me	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel like I am capable of doing even the most challenging physical activities	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel good about the way I am able to complete challenging physical activities	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel free to do physical activity in my own way	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel free to make my own physical activity decisions	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Appendix I – ActiveChat Questionnaire

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Disagree or Agree	Somewhat Agree	Agree	Strongly Agree
I feel like I am in charge of my physical activity decisions	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel like I have a say in choosing the physical activities that I do	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel free to choose which physical activities I participate in	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel like I am the one who decides what physical activities I do	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel attached to my physical activity companions because they accept me for who I am	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel like I share a common bond with people who are important to me when we do physical activities together	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel a sense of camaraderie with my physical activity companions because we exercise for the same reasons	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel close to my physical activity companions who appreciate how difficult physical activites can be	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel connected to the people who I interact with while we do physical activity together	**1**	**2**	**3**	**4**	**5**	**6**	**7**
I feel like I get along well with other people who I interact with while we do physical activity together	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Now we are going to ask you about your own physical activity and sedentary behaviour.

Moderate to vigorous physical activity is any activity that **increases your heart rate** and makes **you get out of breath some of the time**.

Physical activity can be done in sports, school activities, playing with friends, or walking to school.

Some examples of physical activity are running, walking quickly, cycling, dancing, skateboarding, swimming, football, and gymnastics.

For the next question, add up all the time you spend in physical activity **each day**.

Over the **past 7 days**, on how many days were you physically active for a **total of at least 60 minutes per day**? (**please circle one**)

0 days	**1 day**	**2 days**	**3 days**	**4 days**	**5 days**	**6 days**	**7 days**

Leisure Time Vigorous Activity

OUTSIDE SCHOOL HOURS: Over the **past 7 days**, **HOW OFTEN** did you exercise in **your free time** so much that you **got out of breath or sweat**? (**please circle one**)

Every day	**4 to 6 times a week**	**2 to 3 times a week**	**Once a week**	**Once a month**	**Less than once a month**	**Never**

OUTSIDE SCHOOL HOURS: Over the **past 7 days**, **HOW MANY HOURS** did you exercise in **your free time** so much that you **got out of breath or sweat**? (**please circle one**)

None	**About half an hour**	**About 1 hour**	**About 2 to 3 hours**	**About 4 to 6 hours**	**7 hours or more**

Appendix I – ActiveChat Questionnaire

TRAVEL TO SCHOOL: Over the **past 7 days**, how did you **usually** get to school? (**please circle one**)

Walking	Bicycle	Bus, train, tram, underground or boat	Car, motorcycle or moped	Other means

TIME SPENT WATCHING TELEVISION: Over the **past 7 days**, how **MANY HOURS PER DAY**, in your **free time**, did you spend watching TV, videos (including YouTube or similar services), DVDs, and other entertainment on a screen? (**please circle one**)

WEEKDAYS								
None at all	About half an hour a day	About 1 hour a day	About 2 hours a day	About 3 hours a day	About 4 hours a day	About 5 hours a day	About 6 hours a day	About 7 or more hours a day
WEEKENDS								
None at all	About half an hour a day	About 1 hour a day	About 2 hours a day	About 3 hours a day	About 4 hours a day	About 5 hours a day	About 6 hours a day	About 7 or more hours a day

PLAYING COMPUTER GAMES: Over the **past 7 days**, how **MANY HOURS PER DAY**, in **your free time**, did you spend playing games on a computer, games console, tablet (like iPad), smartphone or other electronic device (not including moving or fitness games)? (**please circle one**)

WEEKDAYS								
None at all	About half an hour a day	About 1 hour a day	About 2 hours a day	About 3 hours a day	About 4 hours a day	About 5 hours a day	About 6 hours a day	About 7 or more hours a day

Appendix I – ActiveChat Questionnaire

WEEKENDS								
None at all	**About half an hour a day**	**About 1 hour a day**	**About 2 hours a day**	**About 3 hours a day**	**About 4 hours a day**	**About 5 hours a day**	**About 6 hours a day**	**About 7 or more hours a day**

USING A COMPUTER FOR PURPOSES OTHER THAN PLAYING GAMES: Over the **past 7 days**, how **MANY HOURS PER DAY**, in **your free time**, did you spend using electronic devices such as computers, tablets (like iPad) or smart phones for other purposes, for example, homework, emailing, tweeting, facebook, chatting, surfing the internet? (**please circle one**)

WEEKDAYS								
None at all	**About half an hour a day**	**About 1 hour a day**	**About 2 hours a day**	**About 3 hours a day**	**About 4 hours a day**	**About 5 hours a day**	**About 6 hours a day**	**About 7 or more hours a day**
WEEKENDS								
None at all	**About half an hour a day**	**About 1 hour a day**	**About 2 hours a day**	**About 3 hours a day**	**About 4 hours a day**	**About 5 hours a day**	**About 6 hours a day**	**About 7 or more hours a day**

Appendix I – ActiveChat Questionnaire

Now we'd like to know what your understanding of physical activity and sedentary behaviours are. Please answer the following questions below by circling either a, b, c, or d. **Remember: This is not a test. We just want to know what you guys know.**

Question	Multiple Choice Answers
1) What is physical activity?	**a) P.E.** **b) Exercise** **c) Body movement that uses energy** **d) Don't Know**
2) What would be considered light activity?	**a) walking at a leisurely pace** **b) lying watching tv** **c) fast running** **d) Don't Know**
3) What would be considered moderate-vigorous activity?	**a) 200m sprint** **b) walking at a hurried pace** **c) washing dishes** **d) Don't Know**
4) How much moderate-vigorous physical activity should you be doing?	**a) 60 minutes, 2 days a week** **b) 20 minutes all days of the week** **c) 60 minutes most days of the week** **d) Don't Know**
5) What are some of the potential positive effects to being physically active?	**a) makes me feel more focused** **b) makes me hungry** **c) makes me feel lazy** **d) Don't Know**
6) What is sedentary behaviour?	**a) activities that involve sitting or lying down and not using much energy** **b) activities that involve sleeping** **c) activities that involve moving about and using a lot of energy** **d) Don't Know**
7) What are examples of sedentary behaviour?	**a) Playing computer games.** **b) Going to sleep at the end of the day** **c) Going to the kitchen to get a drink of water** **d) Don't Know**
8) Is too much sedentary behaviour bad for you?	**a) Yes** **b) No** **c) Don't know**

9) How does sedentary behaviour effect the energy balance (energy in = energy out)?	**a) energy in is the same as energy out** **b) too much energy out** **c) too much energy in** **d) don't know**
10) What does too much sedentary behaviour increase the risk of?	**a) losing weight** **b) heart disease** **c) making your heart stronger** **d) don't know**

Thank you for answering the questions.

Appendix J – Sample of Teacher Semi-Structured Interview Schedule

Appendix J – Sample of Teacher Semi-Structured Interview Schedule

Thank you for agreeing to take part. I will be the one to conduct this interview and with your permission, this interview will be recorded. I will be asking your views and opinions of the ActiveChat programme which you delivered to your class. The main topic areas we will discuss will be: the materials and content of the programme, pupil engagement, movement in the classroom, adaptations and, your own physical activity and sedentary behaviour. This discussion will remain confidential and there will be no identifying information published.

Topic	Questions	Additional Questions (which could be asked)
Topic 1 – Content and materials	What did you think of the materials/ contents?	Did they meet the school objectives? Were the materials/contents age appropriate? What did you think of the quantity of content? Did it fit a 50-minute class? What did you feel were the strengths and weaknesses of the programme?
	What did you think of the materials/objectives in relation to the Curriculum for Excellence?	Could you please explain why they did/didn't meet the objectives of the Curriculum for Excellence? Could you please give examples of where you think the programme met the Curriculum for Excellence?
	What did you think of the lesson plans? How did you feel about delivering the lesson plans?	Could you please explain why? Did you ever have to make adaptations? Why/why not? What did you think of the recapping of goals?

Appendix J – Sample of Teacher Semi-Structured Interview Schedule

	Do you think there was an element of pupil voice incorporated within the programme? Was there anything the researchers could have done to make to lesson plans easier to follow/ easier for yourself as the teacher?	Please elaborate on this. Could you please explain what?
Topic 2 – Pupil engagement	What do you think the pupils thought of the programme? Were the activities age appropriate? Could you describe the level of engagement from the pupils? What learning objectives do you think the pupils achieved?	Could you please explain why you think is? Could you please clarify why? Could you please explain why?
Topic 3 – Movement within the classroom	What was your opinion on the 'activity' breaks in the lessons? What is your opinion on encouraging standing during the class? What is your opinion on active learning? What do you think about having pupils moving in the classroom?	Why is this? Why is this? Do you think there are any advantages or disadvantages to moving in the classroom?

Appendix J – Sample of Teacher Semi-Structured Interview Schedule

	Would you incorporate movement within your other classes?	Are there any barriers to movement within the classroom?
Topic 5 – Recommendations/Improvements	What suggestions would you make to improve the ActiveChat programme?	Could you please explain why?
Topic 6 – Teacher PA/SB	What has the ActiveChat programme done for your own attitudes towards physical activity and sedentary behaviour? What has the ActiveChat programme done for your own physical activity and sedentary behaviour?	Have you made any changes yourself? And if so, how?
Topic 7 – Additional comments	Do you have any other comments you'd like to make?	

I would like to thank you for participating in this interview.

Appendix K – Pupil Focus Group Schedule

Appendix K – Pupil Focus Group Schedule

Focus Group Introduction:

Hi, thanks for coming along and taking part of this focus group. Myself and [insert name of student] will be taking the focus group which will involve a group discussion on what you thought about the ActiveChat programme which you have just finished. With your permission, this discussion will be recorded. Before we start, I've got some important things to say. Firstly, it is important that you do not discuss what other people have said in the group with people outside the group. This is to keep what others have said confidential. Secondly, I want to emphasise that there are no right or wrong answers to the questions asked and everyone has the right to express their own opinions, even if they do not agree with what others have said. I would encourage all of you to speak. Do you have any questions?

Focus group schedule:

Research Question:

(Primary) How did the pupils respond to the ActiveChat programme?

(Secondary) How did the pupils feel ActiveChat programme impacted on their PA, SB and motivations/attitudes?

Main Question	**Follow up questions**	**Clarification Questions**
1) Amongst yourselves, can you discuss what you all thought of the ActiveChat programme?	What did you enjoy about the programme? What did you not enjoy about the programme?	Why did you enjoy the part of the programme? Why did you not enjoy this part of the programme?
2) Amongst yourselves, can you discuss if there was anything that you found particularly difficult?		Why did you find these activities difficult?
3) Please discuss if you thought that there was anything that you found too easy?		Why did you find these activities easy?
4) Amongst yourselves, discuss what you feel you have learned from being in the ActiveChat class?		Why do you think this had stuck with you?

5) What do you think would make the ActiveChat programme more interesting for you?		
6) Do you think other pupils in your year group would enjoy the ActiveChat programme?		
7) After being in the ActiveChat programme, do you think that you can increase your physical activity?		How do you think you can do this?
8) After being in the ActiveChat programme, do you think that you can reduce your sedentary behaviour?		How do you think you can do this?
9) Do you think being in the ActiveChat programme changed your motivation and attitudes towards being active?		Could you explain how?
10) Is there anything else you'd like to add in regards to your experience in the ActiveChat programme?		

Appendix L – Teacher Evaluation

Teacher Evaluation – ActiveChat Lesson 1

Name: **Class:**

This is a teacher self-evaluation. The purpose of this evaluation is to get your opinions on how you felt this lesson went. This is to help the researcher get an understanding of the lesson and the class as a whole. This will help to inform future adaptations of the ActiveChat programme.

If you could please complete the questionnaire below by circling the number which you think best describes the statement regarding the lesson. If you have any questions, please ask the researcher.

	Poor	**Fair**	**Satisfactory**	**Good**	**Excellent**
Pupil / teacher rapport	1	2	3	4	5
Clarity of instructions	1	2	3	4	5
Relevance of content	1	2	3	4	5
Appropriate use of demonstration	1	2	3	4	5
Pupil behaviour	1	2	3	4	5
Effective class management	1	2	3	4	5
Effective use of voice (Variety)	1	2	3	4	5
Pupil Engagement	1	2	3	4	5

	0-20%	**21-40%**	**41-60%**	**61-80%**	**81-100%**
What percentage of learning outcomes was achieved?	1	2	3	4	5

	Strongly Disagree	**Disagree**	**Neither disagree or agree**	**Agree**	**Strongly Disagree**
Teaching style helped achieve Learning Outcomes	1	2	3	4	5
Smooth transitions between lesson stages	1	2	3	4	5

Appendix M – Example of Observation Checklist

Appendix M – Example of Observation Checklist

Lesson 1 – What is Physical Activity? ActiveChat Programme Implementation Record

Observer:	**Date:**	
Class:	**Teacher:**	
Actigraph class start time:	**Actigraph class stop time:**	
Number of pupils in attendance: **(see register for breakdown).** **Number of pupils wearing the Actigraph:**		
Session elements delivered		
All pupils who gave consent receive Actigraphs	**Yes**	**No**
Presentation – What is physical activity?	**Yes**	**No**
Why is physical activity important to everyday life?	**Yes**	**No**
Why is physical activity important for health?	**Yes**	**No**
Retrieve all Actigraphs from pupils who gave consent	**Yes**	**No**
Control class topic (see lesson plans if possible):		

Appendix M – Example of Observation Checklist

Element 1: Physical Activity Presentation:		Comments:	Adaptations made:
Explain the different types of PA.	Yes No		
Emphasise that PA doesn't mean sport.	Yes No		
Emphasise the current PA guidelines. (Start Active Stay Active/ 10,000 steps)	Yes No		
Mention MVPA or how hard they should be doing PA	Yes No		
Encourage movement around the room/standing	Yes No		
Pupil discussion	Yes No		
Emphasise PA as a positive behaviour.	Yes No		

Appendix M – Example of Observation Checklist

Element 2: Importance of PA in daily life		Comments:	Adaptations made:
Explain energy balance	Yes No		
Explain PA's role in energy balance	Yes No		
Carry out energy balance activity as planned (one wall – energy in, opposite wall – energy out, get pupils walking between the two walls).	Yes No		
Encourage standing/ moving about during the task.	Yes No		
Explain why energy balance is important e.g. for weight maintenance.	Yes No		

Appendix M – Example of Observation Checklist

Element 3: Why is physical activity important for health?		Comments:	Adaptations made:
Groups provided with materials (picture and prompt cards)(no prompt cards for S3)	Yes No		
Explanation that the pupils need to come up with why PA is good for certain parts of the body	Yes No		
Pupil Discussion	Yes No		
Encourage standing and movement throughout task	Yes No		
Teacher address:		The messages put across?	
heart, lungs, diabetes,	Yes No Yes No Yes No		

Appendix M – Example of Observation Checklist

muscles, mind Emphasise that PA is a positive behaviour	Yes No Yes No Yes No		

Appendix N – Example of Observation Checklist

Lesson 1 – Normal PSE Record

Observer:	**Date:**
Class:	**Teacher:**
Actigraph class start time:	**Actigraph class stop time:**
Number of pupils in attendance: **(see register for breakdown).** **Number of pupils wearing the Actigraph:**	
Control class topic (see lesson plans if possible):	

Additional Comments:

Appendix N – Teacher Evaluation Full Results

Appendix N – Teacher Evaluation Full Results

Construct	Lesson No.	S1	S2	S3
Pupil/Teacher Rapport	L1	Excellent	Good	Good
	L2	Good	Good	Excellent
	L3	Good	Good	Good
	L4	Good	Excellent	Good
	L5	x	Good	Satisfactory
	L6	Good	Excellent	Good
	L7	Good	Good	Good
	L8	Good	Good	Good
Clarity of Instructions	L1	Excellent	Good	Excellent
	L2	Good	Excellent	Excellent
	L3	Good	Excellent	Excellent
	L4	Good	Excellent	Excellent
	L5	x	Satisfactory	Satisfactory
	L6	Good	Excellent	Excellent
	L7	Good	Excellent	Good
	L8	Excellent	Excellent	Excellent
Relevance of content	L1	Excellent	Good	Excellent
	L2	Excellent	Excellent	Excellent
	L3	Excellent	Excellent	Excellent
	L4	Excellent	Excellent	Excellent
	L5	x	Good	Satisfactory
	L6	Satisfactory	Good	Excellent
	L7	Excellent	Excellent	Excellent
	L8	Excellent	Excellent	Excellent
Appropriate use of demonstration	L1	Good	Excellent	Good
	L2	Good	Good	Excellent
	L3	Good	Excellent	Excellent
	L4	Satisfactory	Excellent	Good
	L5	x	Satisfactory	Satisfactory
	L6	Satisfactory	Good	Excellent
	L7	Good	Excellent	Good
	L8	Good	Good	Excellent
Pupil Behaviour	L1	Good	Good	Good
	L2	Good	Good	Good
	L3	Good	Good	Good
	L4	Satisfactory	Excellent	Satisfactory
	L5	x	Satisfactory	Satisfactory
	L6	Good	Excellent	Good
	L7	Excellent	Good	Good
	L8	Satisfactory	Excellent	Good

Appendix N – Teacher Evaluation Full Results

Construct	Lesson No.	S1	S2	S3
Pupil Engagement	L1	Excellent	Good	Excellent
	L2	Good	Excellent	Excellent
	L3	Good	Excellent	Good
	L4	Good	Excellent	Satisfactory
	L5	x	Good	Satisfactory
	L6	Good	Excellent	Excellent
	L7	Excellent	Good	Excellent
	L8	Good	Excellent	Excellent
What % of learning outcomes were achieved?	L1	81-100	81-100	81-100
	L2	81-100	x	81-100
	L3	81-100	81-100	81-100
	L4	61-80	81-100	81-100
	L5	x	61-80	61-80
	L6	61-80	81-100	81-100
	L7	81-100	81-100	81-100
	L8	81-100	81-100	81-100
Teaching style helped achieve learning outcomes	L1	Agree	Strongly Agree	Strongly Agree
	L2	Agree	x	Strongly Agree
	L3	Agree	Strongly Agree	Strongly Agree
	L4	Agree	Strongly Agree	Strongly Agree
	L5	x	Agree	Agree
	L6	Agree	Strongly Agree	Strongly Agree
	L7	Agree	Strongly Agree	Strongly Agree
	L8	Strongly Agree	Strongly Agree	Strongly Agree
Smooth transitions between lesson stages	L1	Agree	Strongly Agree	Strongly Agree
	L2	Agree	x	Strongly Agree
	L3	Agree	Strongly Agree	Agree
	L4	Agree	Strongly Agree	Strongly Agree
	L5	x	Agree	Agree
	L6	x	Strongly Agree	Strongly Agree
	L7	Agree	Strongly Agree	Strongly Agree
	L8	Agree	Strongly Agree	Strongly Agree

Appendix O – Observation Data

Appendix O – Observation Data

		S1		S2		S3	
Session Elements Delivered	**Learning Outcomes For Each Session**	Lesson 1		Lesson 1		Lesson 1	
		Observer 1 (Researcher)	Observer 2 (Student 1)	Observer 1 (Researcher)	Observer 2 (Student 2)	Observer 1 (Researcher)	Observer 2 (Student 3)
Presentation - What is Physical Activity?	Explain the different types of PA	Yes	Yes	Yes	Yes	Yes	Yes
	Emphasise that PA doesn't mean sport	-	Yes	Yes	Yes	Yes	Yes
	Current PA guidelines	Yes	Yes	Yes	Yes	Yes	-
	Mention Intensity They Should Be Doing	Yes	Yes	Yes	Yes	Yes	-
	Encourage Movement/ Standing	No	Yes	Yes	Yes	No	Yes
	Pupil Discussion	No	Yes	Yes	Yes	Yes	Yes
	Emphasise PA as Positive Behaviour	No	-	Yes	-	Yes	Yes
Why is PA Important to Everyday Life?	Explain Energy Balance	Yes	Yes	Yes	Yes	Yes	Yes
	Explain PA's Role in Energy Balance	Yes	Yes	Yes	-	Yes	-
	Energy Balance Activity	Yes	Yes	Yes	Yes	Yes	Yes
	Encourage Movement/ Standing	Yes	Yes	Yes	Yes	Yes	Yes
	Explain Why Energy Balance is Important e.g. Weight Maintenance	Yes	Yes	Yes	-	Yes	Yes
Why is PA Important for Health?	Groups Provided with Materials	Yes	Yes	Yes	Yes	Yes	Yes
	Why PA is Good for Parts of the Body	Yes	Yes	Yes	Yes	Yes	Yes
	Pupil Discussion	Yes	Yes	Yes	Yes	Yes	-
	Encourage Movement/ Standing	Yes	Yes	No	No	Yes	Yes
	Heart	Yes	Yes	Yes	Yes	Yes	Yes
	Lungs	Yes	Yes	Yes	Yes	Yes	Yes
	Diabetes	No	Yes	Yes	Yes	Yes	Yes
	Muscles	Yes	Yes	Yes	Yes	Yes	Yes
	Minds	Yes	Yes	Yes	Yes	Yes	Yes
	Bones	Yes	Yes	Yes	Yes	Yes	Yes
	Emphasise PA as Positive Behaviour	-	Yes	Yes	Yes	Yes	-
	Percentage of Programme Delivered As Intended	73.91	95.65	95.65	82.61	95.65	78.26
	Mean Percentage from both Observers	**84.78**		**89.13**		**86.96**	

Appendix O – Observation Data

		S1		S2		S3	
Session Elements Delivered	**Learning Outcomes For Each Session**	Lesson 2		Lesson 2		Lesson 2	
		Observer 1 (Researcher)	Observer 2 (Student 1)	Observer 1 (Researcher)	Observer 2 (Student 2)	Observer 1 (Researcher)	Observer 2 (Student 3)
Recap of Previous Lesson	Different Types of PA	Yes	Yes	Yes	Yes	Yes	Yes
	Guidelines	Yes	Yes	Yes	Yes	Yes	Yes
	Pupil Discussion	No	-	Yes	Yes	No	-
	MVPA	No	-	No	Yes	Yes	Yes
	PA as a Positive Behaviour	Yes	Yes	Yes	Yes	No	-
Different Types of PA Task	Split into Groups	Yes	Yes	Yes	Yes	Yes	Yes
	Pupils Given 15 Bits of Card	Yes	Yes	Yes	Yes	Yes	Yes
	Pupils Rearranged the Cards into Different Types of PA	Yes	Yes	Yes	Yes	Yes	Yes
	Pupils Wrote Down Two Activities They Enjoy	Yes	Yes	No	No	No	No
	Encourage Movement/ Standing	Yes	Yes	Yes	Yes	Yes	Yes
	Pupil Discussion	Yes	Yes	Yes	Yes	Yes	Yes
	Emphasise PA as Positive Behaviour	-	-	No	No	No	-
Goal Setting/Activity Planner	Provide Planner	Yes	Yes	Yes	Yes	Yes	Yes
	Get Pupils Thinking About What They Did During The Week	Yes	Yes	Yes	Yes	Yes	Yes
	Think and Write Down PA Goals	-	Yes	Yes	Yes	Yes	Yes
	Remind Them to Try and Meet Their Goals	-	Yes	-	-	Yes	Yes
	Pupil Discussion	-	Yes	No	No	Yes	Yes
	Encourage Movement/Standing	-	No	No	No	Yes	Yes
	Emphasise PA as Positive Behaviour	-	Yes	No	No	-	No
	Percentage of Programme Delivered As Intended	57.89	78.95	63.16	68.42	73.68	73.68

Appendix O – Observation Data

	Mean Percentage from both Observers	**68.42**	**65.79**	**73.68**

		S1		S2		S3	
Session Elements Delivered	**Learning Outcomes For Each Session**	Lesson 3		Lesson 3		Lesson 3	
		Observer 1 (Researcher)	Observer 2 (Student 1)	Observer 1 (Researcher)	Observer 2 (Student 2)	Observer 1 (Researcher)	Observer 2 (Student 3)
Recap of Previous Lesson	Remind Pupils of their Goals	No	Yes	Yes	Yes	Yes	Yes
	Asked if anyone met their goals	No	No	Yes	Yes	Yes	Yes
	Ask those who didn't reach them	No	No	No	No	No	Yes
	Reinforce PA and SB	No	Yes	Yes	Yes	Yes	Yes
	Pupil Discussion	-	Yes	No	Yes	No	Yes
	Encourage Standing/Movement	-	Yes	No	No	No	-
	Jumping Jacks	-	Yes	No	No	No	-
Motivation and Barriers	What are motivations and barriers?	Yes	Yes	Yes	Yes	Yes	Yes
	Motivations and barriers form	Yes	Yes	Yes	Yes	Yes	Yes
	Examples of motivations and barriers	Yes	Yes	Yes	Yes	Yes	Yes
	Pupil Discussion	Yes	Yes	Yes	Yes	No	No
	Encourage Standing/Movement	Yes	Yes	No	No	-	Yes
Sedentary Behaviour PowerPoint	Definition of Sedentary Behaviour	Yes	Yes	Yes	Yes	Yes	Yes
	Examples of Sedentary Behaviour	-	Yes	Yes	Yes	Yes	Yes
	Refer back to Energy Balance	Yes	Yes	Yes	Yes	Yes	Yes
	Encourage Standing/Movement	-	No	Yes	Yes	No	-
Sedentary Behaviour	Pupils moved to a different table	No	No	No	Yes	Yes	Yes
	Groups provided with materials	No	No	Yes	Yes	Yes	Yes
	Pupils need come up with why sb in bad for health	No	No	Yes	Yes	Yes	Yes
	Pupil discussion	Yes	Yes	Yes	Yes	Yes	Yes
	Encourage Standing/Movement	-	Yes	Yes	Yes	Yes	Yes
	Heart	-	Yes	Yes	Yes	Yes	Yes
	Lungs	-	Yes	Yes	Yes	Yes	Yes
	Diabetes	-	Yes	Yes	Yes	No	-
	Muscles	-	Yes	Yes	Yes	Yes	Yes
	Minds	-	Yes	Yes	Yes	Yes	Yes
	Emphasise SB as a negative Behaviour	-	Yes	Yes	Yes	-	Yes
	Percentage of Programme Delivered As Intended	29.63	77.78	81.48	85.19	66.67	81.48
	Mean Percentage from both Observers	**53.70**		**83.33**		**74.07**	

Appendix O – Observation Data

		S1		S2		S3	
Session Elements Delivered	**Learning Outcomes For Each Session**	Lesson 4		Lesson 4		Lesson 4	
		Observer 1 (Researcher)	Observer 2 (Student 1)	Observer 1 (Researcher)	Observer 2 (Student 2)	Observer 1 (Researcher)	Observer 2 (Student 3)
Recap of Previous Lesson	Remind Pupils of their Goals	No	No	-	-	-	No
	Asked if anyone met their goals	No	Yes	-	-	-	No
	Ask those who didn't reach them	No	No	-	-	-	No
	Reinforce PA and SB	No	Yes	-	-	Yes	-
	Pupil Discussion	No	Yes	-	-	Yes	Yes
	Encourage Standing/Movement	Yes	Yes	-	-	Yes	Yes
Solutions to Reduce SB	Split into small groups	Yes	Yes	Yes	Yes	Yes	Yes
	Emphasise individual sedentary behaviours	No	Yes	No	No	Yes	Yes
	Pupil Discussion	Yes	Yes	Yes	Yes	Yes	Yes
	Encourage Standing/Movement	No	Yes	Yes	Yes	Yes	Yes
	All pupils standing when presenting their solutions	No	No	No	No	Yes	Yes
Active Quiz	Each wall has either A, B, or C	Yes	Yes	Yes	Yes	Yes	Yes
	Teacher read out questions	Yes	Yes	Yes	Yes	Yes	Yes
	Pupils walking and standing to correct answer	Yes	Yes	Yes	Yes	Yes	Yes
	Teacher telling the correct answer once all pupils stood by a letter	Yes	Yes	Yes	Yes	Yes	Yes
	Encourage Standing/Movement	Yes	Yes	Yes	Yes	Yes	Yes
	Percentage of Programme Delivered As Intended	50	81.25	50	50	81.25	75
	Mean Percentage from both Observers	**65.63**		**50**		**78.13**	

Appendix O – Observation Data

		S1		S2		S3	
Session Elements Delivered	**Learning Outcomes For Each Session**	Lesson 5		Lesson 5		Lesson 5	
		Observer 1 (Researcher)	Observer 2 (Student 1)	Observer 1 (Researcher)	Observer 2 (Student 2)	Observer 1 (Researcher)	Observer 2 (Student 3)
Recap of Previous Lesson	Remind Pupils of their Goals			Yes	Yes	No	-
	Asked if anyone met their goals			Yes	Yes	No	-
	Ask those who didn't reach them			-	-	No	-
	Reinforce PA and SB			Yes	Yes	Yes	Yes
	Pupil Discussion			-	Yes	No	-
	Encourage Standing/Movement			-	No	Yes	Yes
Presentation on Measures of PA/SB	Explain that there is a lot of interest in measuring PA/SB			Yes	Yes	Yes	Yes
	Lots of ways to measure			Yes	Yes	Yes	Yes
	Fitbit (commercial)			Yes	Yes	Yes	Yes
	Pedometers/Apps			Yes	Yes	Yes	Yes
	ActiGraphs (Research)			Yes	Yes	Yes	Yes
	ActivPAL (Research)			Yes	Yes	Yes	Yes
	Explain why it's important to measure			-	-	Yes	-
	Pupil Discussion			-	-	No	-
	Encourage Standing/Movement			-	-	No	-
The ActivPAL	Pass Around ActivPAL			Yes	Yes	No	-
	Explain to pupils how it's worn and what it measures			Yes	Yes	Yes	Yes
	Example data output			Yes	Yes	Yes	Yes
	Distribute Data and Questions			Yes	Yes	Yes	Yes
	Go over answers			Yes	Yes	Yes	Yes
	Pupil Discussion			Yes	Yes	Yes	Yes
	Encourage Standing/Movement			Yes	Yes	Yes	Yes
	Percentage of Programme Delivered As Intended			72.73	77.27	68.18	63.64
	Mean Percentage from both Observers			**75**		**65.91**	

Appendix O – Observation Data

		S1		S2		S3	
Session Elements Delivered	**Learning Outcomes For Each Session**	Lesson 6		Lesson 6		Lesson 6	
		Observer 1 (Researcher)	Observer 2 (Student 1)	Observer 1 (Researcher)	Observer 2 (Student 2)	Observer 1 (Researcher)	Observer 2 (Student 3)
Recap of Previous Lesson	Remind Pupils of their Goals	No	Yes	No	-	No	-
	Asked if anyone met their goals	No	No	No	-	No	-
	Ask those who didn't reach them	No	Yes	No	-	No	-
	Reinforce PA and SB	Yes	Yes	Yes	Yes	No	Yes
	Pupil Discussion	Yes	Yes	No	Yes	No	-
	Encourage Standing/Movement	No	No	No	-	No	-
Yamax Pedometers	All pupils have a pedometer	Yes	Yes	Yes	Yes	Yes	Yes
	Explain what the pedometers measure	Yes	Yes	Yes	Yes	Yes	Yes
	Explain where to place the pedometer	Yes	Yes	Yes	Yes	Yes	Yes
	If applicable - compare that of pedometer to phone	No	No	No	No	Yes	Yes
	Pupil Discussion	No	Yes	-	-	No	Yes
	Encourage Standing/Movement	Yes	Yes	Yes	Yes	Yes	Yes
Pedometer Task	5-minute Walk Task	Yes	Yes	Yes	Yes	Yes	Yes
	Stair Walk Task	Yes	Yes	Yes	Yes	Yes	Yes
	Answer and Discuss Questions on Sheet	No	-	Yes	Yes	Yes	Yes
	Pupil Discussion	Yes	Yes	-	-	Yes	Yes
	Percentage of Programme Delivered As Intended	56.25	75	50	56.25	56.25	68.75
	Mean Percentage from both Observers	**65.63**		**53.13**		**62.50**	

Appendix O – Observation Data

		S1		S2		S3	
Session Elements Delivered	**Learning Outcomes For Each Session**	Lesson 7		Lesson 7		Lesson 7	
		Observer 1 (Researcher)	Observer 2 (Student 1)	Observer 1 (Researcher)	Observer 2 (Student 2)	Observer 1 (Researcher)	Observer 2 (Student 3)
Recap of Previous Lesson	Remind Pupils of their Goals	Yes	Yes	No	No	No	No
	Asked if anyone met their goals	Yes	Yes	No	No	No	No
	Ask those who didn't reach them	No	Yes	No	No	No	No
	Reinforce PA and SB	Yes	Yes	No	No	No	No
	Pupil Discussion	Yes	Yes	No	No	No	No
	Encourage Standing/Movement	Yes	Yes	No	No	No	No
Lesson PowerPoint	Split the Class into Small Groups	Yes	Yes	Yes	Yes	Yes	Yes
	Explain That Pupils come up with their own lesson on PA/SB	Yes	Yes	Yes	Yes	Yes	Yes
	Remind them of key points	Yes	Yes	Yes	Yes	Yes	Yes
	Pupil Discussion	Yes	Yes	Yes	Yes	Yes	Yes
	Encourage Standing/Movement	Yes	Yes	-	-	No	-
	Percentage of Programme Delivered As Intended	90.91	100	36.36	36.36	36.36	36.36
	Mean Percentage from both Observers	**95.45**		**36.36**		**36.36**	

Appendix O – Observation Data

		S1		S2		S3	
Session Elements Delivered	**Learning Outcomes For Each Session**	Lesson 8		Lesson 8		Lesson 8	
		Observer 1 (Researcher)	Observer 2 (Student 1)	Observer 1 (Researcher)	Observer 2 (Student 2)	Observer 1 (Researcher)	Observer 2 (Student 3)
Pupil Presentations (Finishing Off)	Pupils' finishing off their presentations	Yes	Yes	Yes	Yes	Yes	Yes
	Pupil Discussion	Yes	Yes	Yes	Yes	Yes	Yes
	Encourage Standing/Movement	Yes	Yes	No	No	-	-
Pupil Presentations	All Pupils Presented Their Lesson	Yes	Yes	Yes	Yes	Yes	Yes
	Pupil Discussion	-	Yes	-	Yes	Yes	-
	Encourage Standing/Movement	Yes	Yes	Yes	Yes	Yes	Yes
Recap of ActiveChat Programme	Different Types of PA	Yes	Yes	-	-	No	-
	Why PA in Important	Yes	Yes	-	-	Yes	-
	What SB is	Yes	-	-	-	Yes	-
	Why SB is not good	-	-	-	-	Yes	-
	Why you should break up SB	-	-	-	-	No	-
	Using measures of PA/SB	-	-	-	-	No	-
	Making up your own lesson	-	-	-	-	No	-
	Percentage of Programme Delivered As Intended	61.54	61.54	30.77	38.46	61.54	30.77
	Mean Percentage from both Observers	**61.54**		**34.62**		**46.15**	