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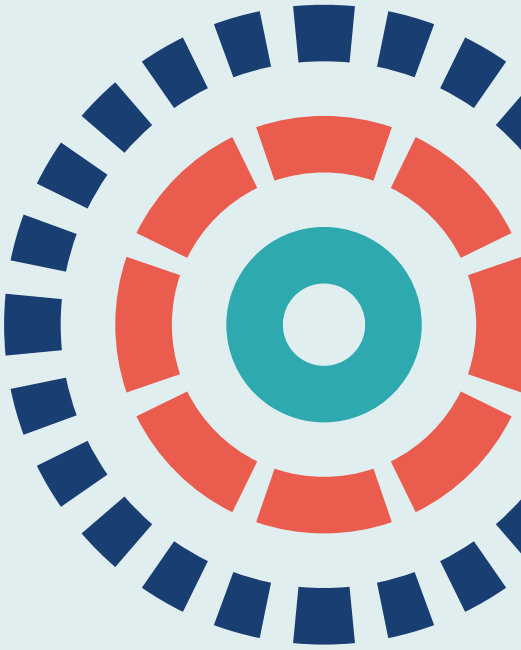

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A revised teaching assistant-led extracurricular physical activity programme for 8- to 10-year-olds: the Action 3:30R feasibility cluster RCT

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Abstract

A revised teaching assistant-led extracurricular physical activity programme for 8- to 10-year-olds: the Action 3:30R feasibility cluster RCT

Russell Jago,[1,2*] Byron Tibbitts,[1] Alice Porter,[1] Emily Sanderson,[3] Emma Bird,[4] Jane E Powell,[4] Chris Metcalfe[3] and Simon J Sebire[1]

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Background: Many children do not meet the recommended guidelines for physical activity. The after-school period may be a critical time for children to participate in physical activity. Teaching assistants are important within the school system and could be trained to deliver after-school physical activity programmes. Our previous work showed that a teaching assistant-led after-school physical activity intervention held promise.

Objectives: To examine the feasibility, evidence of promise and cost of Action 3:30R, a revised after-school physical activity intervention.

Design: A cluster-randomised feasibility study, including process and economic evaluations.

Setting: The setting was 12 primary schools in south-west England.

Participants: The participants were Year 4 and 5 children (aged 8–10 years).

Intervention: Two teaching assistants from each intervention school attended a 25-hour (5-day) training course focused on how to deliver an after-school physical activity programme. As Action 3:30 is grounded in self-determination theory, the training focused on promoting children's autonomy, belonging and competence. Teaching assistants received resources to aid them in delivering a 60-minute after-school physical activity programme twice per week for 15 weeks (i.e. 30 sessions).

Main outcome measures: Measures focused on feasibility outcomes and evidence of promise. Feasibility measures included the recruitment of schools and pupils and the attendance at the after-school programme. Evidence of promise was measured by comparing accelerometer-determined minutes of moderate to vigorous physical activity between the arms at follow-up. Process evaluation measures were conducted using the RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework. The cost of delivery was also assessed.

Results: Twelve primary schools were recruited and 41% of eligible pupils consented, 49% of whom were girls. Schools were randomised after baseline measures: six to the intervention arm ($n = 170$ pupils) and six to the control arm ($n = 165$ pupils). Two schools allocated to the intervention arm withdrew from the study before the start of the intervention, leaving 111 pupils in the intervention arm. The

intervention training was well attended and positively received; eight out of nine teaching assistants attended 100% of the sessions. Action 3:30R clubs were well attended; 74% of pupils attended at least 50% of the 30 sessions. Mean weekday moderate to vigorous physical activity did not differ between the arms at follow-up (–0.5 minutes, 95% confidence interval –4.57 to 3.57 minutes). The process evaluation revealed that Action 3:30R was received positively by pupils, teaching assistants and key contacts in intervention schools. Pupils enjoyed Action 3:30R, and teaching assistants and pupils perceived the teaching style to be autonomy-supportive. Economic evaluation showed that Action 3:30R is inexpensive; the estimated cost of the programme after 1 year was £1.64 per pupil per session.

Limitations: A reason for withdrawing was given by one school but not by the other. The reason given was an inability to release staff for training.

Conclusions: Action 3:30R is a low-cost, feasible after-school programme that engages a range of pupils and offers continuing professional development to teaching assistants. However, Action 3:30R does not show evidence of promise in increasing levels of moderate to vigorous physical activity and does not warrant a trial evaluation.

Future work: Future research should focus on improving the quality of current after-school provision in primary schools to increase physical activity.

Trial registration: Current Controlled Trials ISRCTN34001941.

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List of abbreviations

BMI	body mass index
CACE	complier-average causal effect
CHU9D	Child Health Utility 9D
CI	confidence interval
CONSORT	Consolidated Standards of Reporting Trials
COREQ	Consolidated Criteria for Reporting Qualitative Research
CPD	continuing professional development
c.p.m.	counts per minute
HRQoL	health-related quality of life
ICC	intraclass correlation coefficient
ID	identification
IQR	interquartile range
ITT	intention to treat
MVPA	moderate to vigorous physical activity
NIHR	National Institute for Health Research
Ofsted	Office for Standards in Education, Children's Services and Skills
PAQ-C	Physical Activity Questionnaire for Children
PE	physical education
RE-AIM	Reach, Effectiveness, Adoption, Implementation, Maintenance
SD	standard deviation
SDT	self-determination theory
TA	teaching assistant
TSC	Trial Steering Committee

Plain English summary

Many children are not physically active enough to stay healthy. The Action 3:30 intervention is an after-school club aiming to engage a range of pupils, be fun and increase physical activity. This study evaluated whether or not children who attend Action 3:30 clubs become more physically active.

A total of 335 Year 4 and 5 (aged 8–10 years) pupils in 12 schools across the south-west of England took part in the study. Two out of six schools assigned to the intervention arm did not run the club, meaning that four schools delivered the club; at least two teaching assistants in each school were trained to deliver an after-school club that ran twice per week for 15 weeks, and each session lasted 60 minutes. Six schools were comparison schools. Pupils in the 10 included schools wore an activity monitor for 7 days and completed surveys about their attitudes towards physical activity at two time points (before the start of the intervention and near the end). We also measured the cost of running the Action 3:30 club. We talked to pupils, teaching assistants, school staff and public health professionals about what they liked about the intervention and about potential improvements.

A range of pupils took part, including pupils with low levels of physical activity, and half of the pupils were girls. The results showed that schools found the intervention acceptable and that pupils enjoyed the club. Teaching assistants liked that the training provided them with professional development that they could use beyond the study. Club attendance was good in all four schools, with > 70% of pupils attending at least half of the sessions available to them. Using information from the activity monitor, there was no difference in the amount of activity between schools than ran the club and those that did not. The cost of running Action 3:30 was estimated at £1.64 per session per pupil.

Scientific summary

Background

Physical activity is positively associated with improved health, yet at least 50% of children in the UK do not meet the minimum recommendation of 60 minutes per day of moderate to vigorous physical activity. Therefore, strategies to engage children in more physical activity opportunities are warranted.

After-school programmes present opportunities for increasing discretionary physical activity; however, provision is dominated by external companies delivering competitive sports, which can be expensive for schools. Physical activity declines as children age, and the decline is more pronounced in girls. Alternative options that are affordable to schools and engage the least active children, particularly girls, are needed.

Formative piloting of the Action 3:30 intervention in schools tested a model that trained teaching assistants to deliver an active after-school programme, underpinned by motivational theory, to children aged 9–11 years. The intervention showed promise as a scalable physical activity approach that increased physical activity levels in boys but not in girls. Evaluation work concluded that more work was needed to improve attendance rates and to appeal to girls and less active children.

Based on review of existing evidence and the issues raised in the original programme, a revised programme called Action 3:30R (hitherto referred to as Action 3:30 for simplicity) was developed, underpinned by motivational theory. The aim of this research is to test, via a feasibility study, whether or not the revised programme has the potential to recruit less active children, engage the interest of girls, achieve higher attendance levels, assess the evidence of promise for increasing the physical activity of boys and girls, and thereby examine the evidence for progressing to a definitive trial.

Objectives

Objective 1
To optimise the intervention to increase activity in boys and girls.

Objective 2
To identify effective means of recruiting less active children.

Objective 3
To assess intervention fidelity.

Objective 4
To estimate the effect of allocation to the Action 3:30 intervention on weekday moderate to vigorous physical activity of participants and related physical activity behaviours.

Objective 5
To collect the information needed to assess the feasibility of conducting a definitive trial and assess the implementation potential of the Action 3:30 intervention.

Objective 6
To assess whether or not five progression criteria for conducting a definitive trial are met:

1. At least 25% of schools that are approached agree to join the study.
2. At least 25% of eligible Year 4/5 pupils express an interest in the study by returning consent forms.
3. At least 40% of participants expressing an interest in the study are girls.

4. At least 50% of the participants in the intervention arm attend 50% of the sessions.
5. At follow-up, at least a small benefit for weekday moderate to vigorous physical activity is observed for each of boys and girls, comparing intervention schools with control schools, and the upper bound of the 95% confidence interval exceeds 10 minutes.

Methods

Study design

The study had two components. Component A, intervention optimisation, was used to address objective 1. Component B (addressing objectives 2–6) was a cluster-randomised controlled feasibility trial in primary schools to compare the Action 3:30 intervention with a usual-practice control. The trial included quantitative, qualitative, process and economic evaluations.

For component A, two primary schools were recruited and a sample Action 3:30 session was delivered by trained coaches to one class of Year 5 (aged 9–10 years) pupils in each school. Focus groups were held after the session with six boys and six girls separately in each school. Pupils commented on the content and teaching style of the sessions and offered suggestions of potential improvements that they thought would make the club more appealing. The findings were used to enhance the programme before it was delivered.

For component B, 12 primary schools were recruited from two local authorities (South Gloucestershire, $n = 8$; North Somerset, $n = 4$). Half of the schools recruited were above the local authority median for free school meals (an indication of socioeconomic position, i.e. more deprived).

Pre baseline

To address objective 2, all pupils in Years 3 and 4 in the 12 recruited schools were asked, via a parental opt-out consent process, to complete the validated Physical Activity Questionnaire for Older Children (www.prismsports.org/UserFiles/file/PAQ_manual_ScoringandPDF.pdf; accessed 10 April 2017) before being invited to take part in the main study when they reached Years 4 and 5, respectively. In a subset of four South Gloucestershire schools, participants were also asked to wear an accelerometer for 7 days. These data were used to compare physical activity levels between pupils who did and pupils who did not consent to participate in the main study.

Recruitment and measures

Prior to randomisation, baseline data were collected from up to 32 Year 4 and 5 pupils from each school who returned parental consent forms. Two different recruitment strategies were tested for effectiveness. Recruitment method A (standard) involved a short briefing in each class as well as detailed information sheets. Recruitment method B (enhanced) involved recruitment method A plus a 20- to 30-minute taster session of Action 3:30 club activities. Baseline measures included parent-reported individual and family demographics, including school travel mode and after-school club participation, objectively measured height, weight and physical activity (7 days of accelerometry), and child-reported psychosocial and health-related quality of life. Measures were repeated at follow-up during the final 3 weeks of the intervention in each school.

Randomisation

Schools were randomised to control ($n = 6$) or intervention ($n = 6$) after baseline data collection. Randomisation was stratified by local authority and recruitment method. Two teaching assistants in each intervention school were recruited to undertake training to deliver the intervention. Two of the intervention schools were unable to provide staff to attend the intervention training and so did not deliver the intervention. Therefore, four schools were intervention schools and six were control schools.

Teaching assistant training and intervention

In total, nine teaching assistants from the four intervention schools (at least two from each school) attended a 25-hour (5-day) training programme off-site. The programme equipped teaching assistants with the skills and resources (a comprehensive training guide for reference, 30 detailed session plans and access to an online video archive demonstrating 22 of the activities in the session plans) to deliver structured physical activity sessions focused on promoting children's perceptions of autonomy, relatedness and competence in relation to being physically active. Schools delivering the intervention were also given £200 to buy the equipment needed for the planned sessions. Once trained, teaching assistants delivered the Action 3:30 after-school club twice per week for 15 weeks. Each session lasted 60 minutes. Attendance rates in each intervention school were assessed after session 12 and spaces in each club were offered to new children.

Process evaluation

A process evaluation using the RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework, reporting on recruitment, dose, intervention effectiveness, fidelity and adoption, was conducted in the four intervention schools to address objectives 3 and 5 using quantitative and qualitative components.

Quantitative

The number of schools approached and the proportion recruited were recorded. Teaching assistants were asked to record attendance and dose (the extent to which sessions were delivered as planned) of the intervention in log books. Three observation visits were conducted by research team members in each intervention school to assess intervention fidelity and dose, during which researchers observed sessions, pupils completed self-report measures of enjoyment and exertion, and teaching assistants completed surveys relating to self-efficacy and autonomy-supportive teaching style adoption. These teaching assistant measures were also conducted pre and post training to ascertain training fidelity and effectiveness at promoting autonomy-supportive teaching. School context was assessed in all schools using a validated school physical activity environment audit tool and questions relating to school physical activity policies. These data were used to examine whether or not differences in the social/physical environment and school policy strategies could affect the delivery of the intervention.

Qualitative

Post-intervention semistructured interviews were conducted with teaching assistants who delivered the intervention to explore their experience of the study, training and intervention, and to highlight potential changes to improve maintenance. Focus groups were conducted with eight boys and eight girls in each of the four intervention schools, exploring recruitment motivation, attendance issues, delivery experience, enjoyment and potential improvements. Key contacts from intervention schools were interviewed to explore wider attitudes to the programme, school burden and potential sustainability, improvements and potential contamination from teaching assistants moving between schools or sharing expertise with control schools. Finally, eight external stakeholders, including regional public health leads, school sport coordinators and directors of public health non-profit organisations, were interviewed about the sustainability, commissioning potential and dissemination considerations for programmes such as Action 3:30.

Analysis

Qualitative

The framework method was used to analyse qualitative data, as it produces a matrix of data from different participant groups and allows for constant comparison. Researchers identified themes for exploration in each participant group inductively and deductively. Themes were triangulated across groups to explore convergent and divergent perspectives. Findings were reported in line with Consolidated Criteria for Reporting Qualitative Research guidelines.

Quantitative

Summary statistics were presented comparing the control and intervention arms at baseline and follow-up on demographics, psychosocial and accelerometer variables, including moderate to vigorous physical activity. When distribution of the outcomes was approximately normal, mean values and standard deviations were presented. For binary/categorical variables, a number and percentage were presented. As this was a feasibility trial, the primary and secondary outcomes were reported using basic statistics to describe the recruitment, attendance, accelerometer and questionnaire data.

Economic evaluation

An analysis was conducted to estimate the cost-effectiveness and cost utility of the Action 3:30 intervention compared with no active intervention over the 1-year period of the feasibility study. Resource use and actual costs incurred by teaching assistants was assessed with a checklist. Prices were drawn from timesheet data and from published, established sources. Costs were categorised according to stage of programme delivery and were stratified by school as follows: one-off training resources, recurrent programme preparation resources and recurrent programme delivery resources.

To estimate the potential cost-effectiveness of Action 3:30 compared with no active intervention, objectively measured follow-up moderate to vigorous physical activity for intervention and control arms and data collected on Action 3:30-related resources and costs were examined. To assess the potential for change in health-related quality of life as a result of participating in Action 3:30, pupils were asked to complete two validated measures at baseline and follow-up: KIDSCREEN-10 (www.kidscreen.org/english/questionnaires/kidscreen-10-index/; accessed 10 April 2017) and the Child Health Utility 9D (www.sheffield.ac.uk/polopoly_fs/1.44111!/file/Health-Questionnaire-final-watermarked.pdf; accessed 10 April 2017). To compare Action 3:30 delivery costs with existing extracurricular club provision at participating schools, key contacts at each participating school were asked to complete a retrospective survey at baseline and follow-up providing a description of each existing after-school club, including session duration and the cost to the school and to parents or guardians.

Results

The primary goals were to assess the feasibility of conducting a cluster randomised controlled trial of the Action 3:30 project and to assess the efficacy for increasing physical activity in boys and girls.

Recruitment and attendance

Interest in the project was high, with 44% of schools approached agreeing to join the project and 43% of eligible pupils expressing an interest in the study by returning consent forms ($n = 459$). The programme appealed to boys and girls; 50% of consenting pupils were girls ($n = 228$) and > 70% of pupils (70% of girls and 74% of boys) attended at least half of the club sessions. Progression criteria 1–4 were therefore met. Furthermore, only 60% of control pupils and 62% of intervention pupils met the current physical activity guidelines at baseline, indicating that a range of pupils across the physical activity spectrum were recruited.

Physical activity outcomes

No evidence was found of a difference in weekday moderate to vigorous physical activity minutes between the intervention arm and the control arm at follow-up (–0.5, 95% confidence interval –4.57 to 3.57). Likewise, the proportion of pupils meeting the guidelines of 60 minutes of moderate to vigorous physical activity per weekday was similar between the arms overall and among boys and girls separately. There was no difference in any accelerometer-derived measures of physical activity between the arms at follow-up. Therefore, progression criterion 5 was not met.

Secondary outcomes

No psychosocial outcomes showed any notable difference between the control arm and the intervention arm. The number of active travel days from school and the number of after-school clubs attended (excluding Action 3:30) was slightly smaller in the intervention arm than in the control arm (1.94 vs. 2.35, and 1.44 vs. 1.70, respectively).

Process evaluation

The RE-AIM framework provided an appropriate and comprehensive structure for the process evaluation. Quantitative and qualitative data indicated that, once schools were signed up to the study, teaching assistants were willing to be delivery agents and that Action 3:30 was successful in reaching a variety of children, including girls and those who were less active. Barriers to adoption at the school level included congested after-school programmes and the cost related to releasing teaching assistants for training. The training programme for teaching assistants was valued as professional development, which aligns with many school priorities. Intervention adherence was consistent across schools and acceptable. The training was deemed comprehensive and supported high adherence to content. The overall fidelity of implementation of Action 3:30 core principles was high, despite different teaching assistant experiences. One school decided to continue running Action 3:30 and other intervention schools expressed an interest in doing so, giving evidence of maintenance. Stakeholders suggested that the following were key to maintenance: delivery costs comparable with those for existing provision, funding for delivery and equipment, continued teaching assistant training, a flexible number of weekly sessions, and the ability to evolve content to keep less active children engaged. The results suggested that Action 3:30 may have replaced existing after-school provision rather than adding to it, which may partly explain why no increase in moderate to vigorous physical activity was observed.

Economic evaluation

As Action 3:30 was not shown to be effective at increasing moderate to vigorous physical activity, there was no basis for creating a cost-effectiveness ratio. Health-related quality-of-life measures did not differ between the intervention arm and the control arm at baseline or at follow-up. The findings indicated that Action 3:30 is inexpensive (with a mainstream cost after 1 year of £1.64 per pupil per session) compared with the average school-level costs of existing extracurricular physical activity (£5.91 per pupil per session). Therefore, Action 3:30 may provide a more economically viable option for schools than existing school provision.

Conclusions

A teaching assistant-led after-school physical activity programme is feasible to implement in primary schools. The study was able to recruit a range of pupils, including girls and less active children. Attendance levels were high for both boys and girls and were maintained throughout the study, and intervention fidelity was high. No effect was observed in any of the primary or secondary accelerometer-derived outcomes when comparing intervention and control participants. Process data implied that participants attending Action 3:30 sessions were swapping physical activity from other contexts instead of adding physical activity where it did not exist before. However, the economic evaluation revealed that Action 3:30 is inexpensive to deliver compared with existing provision and so could be a financially viable programme for primary schools to deliver, which would engage a range of pupils in physical activity and upskill core staff simultaneously.

Trial registration

This trial is registered as ISRCTN34001941.

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Chapter 1 Introduction and background

Benefits of physical activity

Physical activity is associated with a reduced risk of heart disease, stroke, type 2 diabetes mellitus, obesity and some cancers.[1] Physical activity is also associated with improved profiles for a number of risk factors, including insulin, glucose, blood pressure, body composition[2] and emotional well-being in young people[3] and adults.[1]

Children's physical activity levels

Despite the widely demonstrated benefits associated with being regularly physically active, data from the UK Millennium cohort study[4] show that only 51% of 7- to 8-year-olds meet the recommendation of 1 hour of moderate to vigorous physical activity (MVPA) per day. Primary school is a key time for developing motor co-ordination and sport-related skills and for building children's confidence and interest in physical activity. Physical activity levels in children have been shown to decline during primary school.[5,6] Making the most of these 'skill-hungry' years could be essential to the development of positive physical activity skills and attitudes. There is moderate evidence of physical activity behaviours tracking from childhood to adulthood;[7] therefore, finding ways to foster physical skills and positive attitudes during these early years may help children engage in regular physical activity at secondary school and on into adulthood.

Previous school-based physical activity interventions

The primary school setting provides opportunities to reach large numbers of children in order to implement public health interventions.[8] Systematically reviewed evidence[9] has indicated that the effectiveness of school-based physical activity interventions delivered during the curriculum is limited. The review concluded that where there was an effect this was mainly in studies of poor methodological quality.[9] Identified limitations included short follow-up, inadequate adjustment for potential confounders, lack of adjustment for children clustered in schools and the use of self-report measures of physical activity.[9] A 2012 review[10] of physical activity interventions for children and adolescents, which included an objective assessment of physical activity, reported an average improvement of 4 minutes of MVPA per day in intervention participants compared with control participants. Of the 30 studies included in the review, only 16 were deemed to be of high methodological quality. Contributory factors to low-quality scores included high attrition, lack of intention-to-treat (ITT) analyses and no adjustment for the clustered nature of the data.

There is an absence of child physical activity programmes that have been shown to be effective and that are ready to be implemented by local public health teams.[11] The RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework was developed to translate research into practice.[12] The RE-AIM framework strikes a balance between public health-focused interventions that have good internal validity (as examined in effectiveness trials) and public health-focused interventions that have good external validity (can be nationally implemented).[12] Numerous physical activity interventions have shown promise at the pilot/feasibility stage, but either they failed to achieve an impact in a definitive trial[10] or, if an impact was achieved throughout a trial, this was not sustained during implementation.[13] As such, it is important to design physical activity interventions with future implementation in mind. A feasibility study can be used to identify changes to the study/intervention design that can enhance the external validity of the definitive trial evaluation.[14] One way to achieve this is to identify whether or not all elements of the RE-AIM framework can be assessed and then use the information to guide changes to the design.[11]

Rationale for extracurricular interventions

The primary school curriculum is limited to 2 hours of physical education (PE) per week, making it challenging to implement curriculum-based physical activity interventions and providing little opportunity for children to meet public health guidelines or to develop their physical literacy.[15] Time immediately after school is discretionary time for children[16] and could be utilised to promote physical activity.[17] Evidence shows that children who are inactive after school are less likely to meet physical activity guidelines;[16] therefore, organised after-school programmes that maximise the opportunities for physical activity could be an effective means of engaging primary school children in more physical activity.[8,18] Owing to a lack of capacity among teaching staff, the current provision of extracurricular physical activity in primary schools is dominated by expensive external practitioners, such as football coaches,[19] which is costly to the school or to parents, and caters primarily to children who are already active. Provision may have been enhanced since the UK government doubled the primary school PE Premium to £320M for all primary schools in England, which was available from September 2017;[20] however, the external provider model remains expensive for schools.

Use of teaching assistants

Teaching assistants (TAs) are an important part of the school system. TAs support teachers in class management and teaching. The number of TAs has significantly increased in the UK since 2000 and they now constitute one-third of the workforce in UK schools.[18] Streamlined staff numbers in schools highlight the importance of utilising existing staff to deliver extracurricular programmes. Therefore, training TAs to deliver after-school programmes could be a low-cost means of helping children to be active. An aim of the study is to assess the feasibility, potential sustainability and cost-effectiveness of an after-school physical activity intervention delivered by TAs.

Use of self-determination theory

Interventions have been more successful when they are based on psychological theory than when they are not.[21] Psychological theory can be used to inform intervention design and facilitate the identification (ID) of key mediators of behaviour change.[21] Self-determination theory (SDT)[22] may be particularly appropriate for understanding children's physical activity. SDT focuses on motivation for behaviour and argues that those with autonomous motivation (i.e. doing physical activity because it is fun or personally valued) have more positive behavioural, cognitive and affective outcomes than those with controlled motivation (i.e. doing physical activity because of feelings of guilt or pressure from others). Evidence from the PE and sport psychology literature demonstrates that autonomous motivation is associated with positive physical activity outcomes in children and adolescents.[23] Previous research into UK primary school children shows that having intrinsic motivation is associated with higher levels of objectively measured physical activity.[24] Autonomous motivation and psychological well-being can be achieved when three innate needs are met: (1) autonomy (i.e. having choice about and ownership over one's behaviour), (2) competence (i.e. feeling able and effective in one's environment) and (3) relatedness (i.e. feeling a mutual sense of connectedness with others). Cross-sectional evidence supports the positive relationship between psychological need satisfaction and autonomous motivation in primary school children.[24] Thus, programmes that help children feel part of the decision-making process, confident and competent in their physical ability and part of a supportive team will increase their motivation to be and remain active.

Another feature of SDT is that it suggests that motivational quality is determined partly by the motivational climate created by leaders.[25] This is particularly appropriate for Action 3:30R (hitherto referred to as Action 3:30 for simplicity), as previous research has shown that TAs can be trained to provide curricular content in a safe environment, using a delivery style that fosters optimal motivation and development.[26] For example, TAs can enhance autonomous motivation by (1) being autonomy-supportive

(e.g. involving children in decision-making), (2) providing structure (e.g. giving clear expectations, reasoning and guidelines) and (3) being interpersonally involved (e.g. showing empathy and interest). By doing this, TAs can have a positive effect on pupils' motivation, behavioural engagement and psychological well-being.[25]

Summary of formative work

An evaluation was recently completed of an after-school intervention, Action 3:30.[18] The original feasibility study was conducted in 20 schools and participants were Year 5 and 6 pupils (aged 9–11 years). Ten schools were allocated to the intervention arm and 10 schools were allocated to the control arm (normal practice). The intervention consisted of training TAs to deliver 60-minute after-school physical activity sessions twice per week for 20 weeks. The intervention was based on SDT. TAs were trained to facilitate sessions that covered a range of activities and provided support for pupils' autonomy, competence and relatedness.[27] The results showed that the Action 3:30 intervention holds promise as a scalable physical activity approach.[26,28] The adjusted difference in weekday MVPA was 4.3 minutes higher [95% confidence interval (CI) −2.6 to 11.3 minutes higher] at the end of the intervention in the intervention arm. Sex-stratified analyses indicated that the intervention may hold more promise for boys (8.6 more minutes of weekday MVPA than control, 95% CI 2.8 to 14.5 more minutes) than for girls (0.15 more minutes of weekday MVPA than control, 95% CI −9.7 to 10.0 more minutes). The results from the process evaluation suggested that the intervention was implemented as planned and well received by schools, TAs and pupils.[26,28] Although the effect on mean levels of MVPA among boys was among the best that has been shown for physical activity interventions in children,[21] more work is needed to improve the content for girls. In addition, findings from the process evaluation showed that improvements are required to improve attendance, recruit less active pupils and increase TAs' ability to manage disruptive behaviour.

Rationale for the trial

The evaluation of the original Action 3:30 programme showed that training TAs to deliver after-school physical activity sessions holds promise. The issues raised from the original programme have been addressed in a revised intervention. The aim of the study is to test, in a feasibility study, whether or not the revised intervention leads to increases in the physical activity of both boys and girls, as well as whether or not it results in the recruitment of less active children and in higher attendance levels. In addition, the study aims to test whether or not it is possible to use the RE-AIM framework to assess the implementation potential of the intervention.

Chapter 2 Trial design and methods

Aims and objectives

The study had six research objectives, underpinned by seven research questions.

Objective 1: optimise the intervention to increase activity in boys and girls

1. How can the intervention materials be optimised to increase activity in boys and girls?

Objective 2: identify effective means of recruiting less active children

2. How can recruitment be optimised to recruit less active children?

    (a) Is it feasible to collect self-reported activity data from Year 4/5 pupils using 'opt-out' consent?
    (b) Is it feasible to collect accelerometer data from all Year 4/5 pupils using an 'opt-out' consent procedure at baseline and follow-up in a subgroup of pupils in four schools?
    (c) Does an 'enhanced recruitment approach' facilitate recruiting less active children?
    (d) Is it feasible and acceptable for schools and pupils to provide opportunities for enrolment at the mid-point of the intervention?

Objective 3: assess intervention fidelity

3. To what extent was Action 3:30 delivered as intended?

    (a) What proportion of the Action 3:30 sessions were delivered?
    (b) What was the mean attendance and were there differences by sex?
    (c) To what extent was the intervention delivery consistent with the underpinning theory?

Objective 4: estimate the effect of allocation to the Action 3:30 intervention on weekday moderate to vigorous physical activity of participants and related physical activity behaviours

4. What is the difference in mean accelerometer-assessed MVPA of boys and girls in the intervention and control arms in the last few weeks of the intervention when the programme was still running (follow-up)?

    (a) Is there any evidence that intervention participants' school travel mode or organised club attendance changes as a result of attending Action 3:30?

Objective 5: collect the information needed to assess the feasibility of conducting a definitive trial and assess the implementation potential of the Action 3:30 intervention

5. How many data can be provided for secondary outcomes?

    (a) Is it feasible to collect information on how costs of implementation are influenced by school infrastructure, staff leadership/participation and overall extracurricular club provision/cost in schools?
    (b) Is there any evidence of contamination between intervention and control schools?
    (c) What are the factors that need to be addressed to minimise health inequalities?

6. What would the sample size for a definitive trial be?
7. Is it feasible to collect all data on all dimensions of the RE-AIM framework to estimate the potential population impact of Action 3:30 in a definitive trial?

Objective 6: assess whether or not the five progression criteria for conducting a definitive trial are met

Progression criteria

1. At least 25% of schools that are approached agree to join the study.
2. At least 25% of eligible Year 4/5 pupils express an interest in the study by returning consent forms.
3. At least 40% of participants expressing an interest in the study are girls.
4. At least 50% of the participants in the intervention arm attend 50% of the sessions.
5. At follow-up, at least a small benefit for weekday MVPA is observed for each of boys and girls, comparing intervention schools with control schools, and the upper bound of the 95% CI exceeds 10 minutes.

Research design

The study had two components. Component A, intervention optimisation, is described in *Chapter 3*. Component B, detailed in this chapter, was a cluster randomised controlled feasibility study in primary schools to compare the Action 3:30 intervention with a usual-practice control. The trial included quantitative, qualitative, process and economic evaluations.

Protocol amendments

The original study protocol (version 1.0) was submitted to NIHR on 3 March 2017. Version 1.1 was submitted on 21 September 2017 with one change, and version 1.2 was submitted on 19 April 2018 with one further change. These revisions are detailed in *Table 1*.

TABLE 1 Protocol amendments

Date	Original protocol point	Amendment	Approved
9 August 2017	On page 15 of the approved study protocol (version 1.0) it states that in the four 'opt-out' schools we will collect data on school travel mode from all children who do not opt out	Data on school travel mode will be collected via the parental questionnaire from all children in all 12 schools who opt in at baseline and follow-up, but not specifically from all children in the opt-out schools	Uploaded to NIHR in version 1.1 on 21 September 2017
6 November 2017	Page 10 states: *'One session will be conducted with parents that received recruitment strategy A with the other conducted with parents in a school that and one school that received recruitment strategy B. The sessions school will be used to understand in more detail how to overcome the issues that were raised in the surveys. We will then repeat the process with Year 4 and 5 pupils in the same schools to understand how recruitment could be improved'*	One session will be conducted with parents that received recruitment strategy A, and the other will be conducted with parents in a school that received recruitment strategy B. The sessions in each school will be used to understand in more detail how to overcome the issues that were raised in the surveys Exclude final sentence as it was pasted from exemplar text elsewhere out of context, and we are addressing children's opinions of how to optimise recruitment in our Children's Advisory Group meetings	Uploaded to NIHR in version 1.2 on 19 April 2018

Ethics

The study was granted ethics approval from the School for Policy Studies, University of Bristol. The trial was registered with Internal Standard Randomised Controlled Trial Register under the reference number ISRCTN34001941. The project was funded by the NIHR Public Health Research (PHR) programme (project number 15/55/09). It was agreed that any adverse events during data collection would be recorded and reported to the chairperson of the Ethics Committee and the chairperson of the Trial Steering Committee (TSC), but there were no such events.

Study population and recruitment

The study sought to recruit 12 primary schools in two local authorities (South Gloucestershire and North Somerset). The number of schools approached and the proportion recruited were recorded, as was the percentage of their pupils claiming free school meals (an indicator of socioeconomic status of the pupils' families, i.e. higher is more deprived). To participate, schools needed to be willing to allocate space for two after-school sessions per week for 15 weeks between November 2017 and March 2018. To ensure that the sample represented local diversity, half of the schools recruited were above the local authority median for free school meals. Eight schools were recruited in South Gloucestershire and four were recruited in North Somerset (as the latter is a smaller local authority).

The study aimed to recruit 30 Year 4 and 5 pupils (aged 8–10 years) in each school, and 40% of the sample was to comprise girls. The pupils were recruited when they were in Years 3 and 4 (aged 7–9 years) during the summer term ahead of the intervention starting the following autumn. The only exclusion criterion was that pupils who were unable to participate in standard PE lessons could not take part. If more than 30 eligible pupils signed up to the study, pupils were randomly selected using a computer-based algorithm.

Two recruitment methods were tested to examine which was more effective in order to inform a recruitment strategy in a definitive trial. The two methods were designed to ensure that we recruited participants with a range of physical activity levels. Recruitment method A (briefing) involved a short briefing in each class to explain the study and to give out pupil and parent information sheets and consent forms. Recruitment method B (briefing plus taster session) involved the same as recruitment method A plus a 20- to 30-minute taster session led by coaches from Bristol City Council. The taster session aimed to give the pupils an idea of what the Action 3:30 after-school intervention would be like. It was also intended to allay any concerns about the level of physical activity that might be required to take part in the study and to highlight that the sessions would be enjoyable. Four schools in South Gloucestershire and two schools in North Somerset were randomly selected to receive recruitment method B. Written parental consent was obtained for each child. A brief 'reason for non-consent' questionnaire was sent home to parents who did not give their consent in order to explore why they did not want their child to take part.

Pre-baseline data (opt-out)

Before the main study commenced, all Year 3 and 4 children in all 12 schools were asked to complete the validated Physical Activity Questionnaire for Older Children (PAQ-C).[29,30] Data were collected in an opt-out consent process. Parents were informed of the measures on an information sheet and asked to return an opt-out form if they did not want their child to participate. In four of the schools in South Gloucestershire, accelerometer data from all Year 3 and 4 pupils were also collected via this opt-out process. This process was conducted in only four schools to assess the utility of the approach and to provide an indication of the potential additional resources that the research team would need if such an approach were used in a larger trial. These data were used to compare the levels of physical activity between pupils who did and pupils who did not consent to take part in the main study and they were treated as the baseline values for participants who subsequently took part in the randomised controlled trial.

Baseline data

Following recruitment and before randomisation, baseline data were collected from the selected children in each school. A summary of the measures can be found in *Box 1*. Participant age at baseline was calculated from parent-reported date of birth. Parental ethnicity was self-reported by selecting one of 13 descriptions based on the UK census. Pupils' socioeconomic status was estimated using two measures: parent-reported highest level of education (i.e. up to General Certificate of Secondary Education or similar; Advanced levels/National Vocational Qualifications; first degree/diploma/Higher National Certificate/Higher National Diploma; or higher degree); and parent-reported postcode, which was used to ascertain Index of Multiple Deprivation (see *Appendix 1*) using *English Indices of Deprivation 2010*.[31] Accelerometer data that had been collected in the four schools during the opt-out process were used for baseline.

BOX 1 Description of data collected at baseline

Data collected at baseline

School level

Local authority.

Percentage of free school meals (indication of deprivation).

Total number of Year 3/4 pupils.

Participant level

Objectively measured

Accelerometer data for 7 days.

Height (cm) and weight (kg) to calculate standardised BMI *z*-score (kg/m^2).

Child self-reported

Psychosocial questionnaire (on tablet device).

KIDSCREEN score (on tablet device).

CHU9D score (on tablet device).

Parent reported

Home postcode.

Child's date of birth.

Number of siblings.

BOX 1 Description of data collected at baseline (*continued*)

Highest level of parental education.

Parents' ethnicity.

School travel mode.

Child's current participation in after-school clubs.

BMI, body mass index; CHU9D, Child Health Utility 9D.

Parent public and patient involvement

Two public and patient involvement meetings were held with parents in two schools following recruitment and randomisation. Both meetings were held in control schools, one of which had received recruitment method A and the other of which had received recruitment method B. The aim of the meetings was to gather more information about why parents had not given consent for their children to join the study (following the completion of the reason for non-consent questionnaire) and how to overcome these issues, as well as the parents' thoughts about the recruitment methods and materials.

Measures

Data were collected from all of the selected children (intervention and control) at two time points:

1. baseline – June 2017
2. follow-up (weeks 13–15 of the intervention) – February/March 2018.

Accelerometer-determined physical activity

Pupils wore ActiGraph GT3X+ accelerometers (ActiGraph, Pensacola, FL, USA) for 7 consecutive days to assess their physical activity levels. Periods of $\geq$ 60 minutes of zero counts were recorded as 'non-wear time' and were removed.[32] Pupils were included in the analysis if they provided $\geq$ 3 valid days (500 minutes of data between 6 a.m. and 11 p.m.). Minutes in MVPA were estimated for weekdays and weekends using the Evenson cut-off point. [33] In addition, total physical activity was derived from accelerometer counts per minute (c.p.m.) and sedentary time was estimated based on a cut-off point of $<$ 100 c.p.m.

Objective measures

Pupils' height and weight were measured to the nearest 0.1 m and 0.1 kg, respectively, with their shoes, coats and jumpers removed, using a portable Seca stadiometer and digital Seca scale (both Seca United Kingdom, Birmingham, UK), respectively. Body mass index (BMI) (kg/m^2) was calculated and converted to an age- and sex-specific standard *z*-score.[34]

Self-reported measures

Pupils completed a tablet device-based questionnaire assessing their motivation to undertake physical activity and their activity-based perceptions of autonomy, relatedness and competence need satisfaction, using established scales that have been developed and used with a similar age group successfully,[24] as well as self-esteem and peer support. Pupil-reported questionnaire data were collected and managed using REDCap[35] (https://brtcclinical.bris.ac.uk/redcap/; accessed 20 April 2018) hosted at the University of Bristol.

Physical activity motivation was assessed[36] using a five-point Likert scale ranging from 0 (not true for me) to 4 (very true for me). Four types of motivation were assessed via three items each: (1) intrinsic (e.g. because I enjoy being active), (2) identified (e.g. because it is important to me to do active things), (3) introjected (e.g. because when I'm not active, I feel bad) and (4) external (e.g. because other people pressure me to be active). The mean of the three items was calculated for each type of motivation. Composite scores for autonomous (mean of intrinsic and identified) and controlled (mean of introjected and external) motivation were calculated. This scale has been previously validated with primary school-age children.[24]

Autonomy[37] (six items, e.g. I can decide what activities I want to do), competence[38] (six items, e.g. I think I do well, compared with other children my age) and relatedness[37] (six items, e.g. I am supported by others) were assessed using a 6-point Likert scale, ranging from 1 (not like me at all) to 6 (really like me). A mean score for each variable was calculated.

Self-esteem was assessed using a 10-item Likert scale, ranging from 1 to 5, where pupils had to state how true or false each statement was.[39] Eight items were positively worded (e.g. I do lots of important things) and two items were negatively worded (e.g. I can't do anything right). Negatively worded items were reverse coded and the mean of all items was calculated.

Peer support was assessed using a four-item Likert scale, ranging from 0 to 4 (0 – no, never; 1 – not much; 3 – quite a lot; 4 – all the time). All items started with 'Thinking about your good friends, do they . . .', followed by a statement (e.g. 'encourage you to be active'). The sum of all four items was calculated.

Health-related quality of life (HRQoL) was assessed using the KIDSCREEN-10[40,41] and Child Health Utility 9D (CHU9D)[42,43] questionnaires as part of the economic evaluation. The economic evaluation is described in *Chapter 5*.

Parent-reported measures

Pupils' parents completed a questionnaire to enable the collection of demographic data (baseline only). In addition, data on daily travel mode to and from school and child's current participation in after-school clubs were collected at baseline and follow-up. Daily travel mode was assessed for weekdays only, with four response options (i.e. walk, cycle/scoot, car, and public transport). Data on usual travel mode and participation in after-school clubs were collected to capture whether or not attending Action 3:30 affected these in intervention pupils.

Randomisation

School was the unit of randomisation. Schools were randomised to the control ($n = 6$) or intervention ($n = 6$) arm after baseline data had been collected. Randomisation was stratified by local authority (South Gloucestershire or North Somerset at a ratio of 2 : 1 in each arm) and recruitment method (recruitment method A or recruitment method B at a ratio of 1 : 1 in each arm). Randomisation and allocation were conducted by an independent member of the Bristol Randomised Trial Collaboration using Stata version 15.1 (2017; StataCorp, College Station, TX, USA). Two of the intervention schools were unable to provide staff to attend the intervention training programme and therefore did not deliver the intervention. This is described in more detail in *Chapter 4*. Therefore, four schools were intervention schools and six schools were control schools.

Blinding

Because of the nature of the study, it was not possible to blind the schools or the pupils, as they had to know whether or not they had been allocated to the intervention. It was also not possible to blind the trial manager or field workers, as they collected the outcome and process evaluation measures.

The randomisation processes and primary and secondary analyses were conducted blind by the statistician in the Bristol Randomised Trials collaboration, who was then unblinded to conduct the complier-average causal effect (CACE) analysis.

Sample size

As this was a feasibility trial, no formal sample size calculations were performed. For safety reasons, the maximum number of pupils that could be enrolled in the main study was 30 per school, giving a maximum sample of 360 pupils. Potential sample sizes for a definitive trial were estimated using the derived intraclass correlation coefficient (ICC) for MVPA from this study and published ICCs from comparable studies and based on combinations of key parameters (type I and type II error).

The Action 3:30 intervention

Teaching assistant training

Nine TAs from the four intervention schools (two from three schools and three from one school) attended a 25-hour (5-day) training programme in September/October 2017. TA time to attend the training was covered by the schools. The training programme also met the requirement of the Community Sports Leader award. The training programme was delivered by the coach development manager at Bristol City Council, a very experienced senior coach who has led training courses for a number of sports. Action 3:30 is based on the principles of SDT[22] and therefore the programme focused on promoting children's autonomy, relatedness and competence in relation to being physically active. To promote autonomy, TAs were taught to empower pupils by offering choice within activities, such as leading warm-ups, adapting games and controlling the speed at which activities progressed. They were encouraged to invite ideas for designing games and to help children to set their own goals. They were discouraged from using prizes or promised rewards to incentivise club members. A section of the training also focused on how to run child-led sessions in which the pupils choose the activities. TAs were encouraged to create relatedness through empathetic TA–child interactions, and through emphasis on co-operation rather than competition. TAs were trained to support competence by setting progressive activities targeting success balanced by optimal challenge, and by using specific praise to reinforce a message of quality over quantity. A learning point from the previous Action 3:30 pilot study was that TAs needed more support to manage disruptive behaviour.[28] In response to this need, a section of the training was tailored with input from the coach development manager at Bristol City Council, who co-designed the original training materials, to prepare TAs for how to best manage disruptive behaviour in different scenarios. TAs also received a training guide, a comprehensive reference document that reinforced all of the content in the training.

The after-school club

Once trained, the TAs delivered the Action 3:30 after-school club twice per week for 15 weeks between November 2017 and March 2018. To mirror usual school provision, each session lasted 1 hour, commenced immediately after school and was available to all pupils in the year group. TAs received a leader's manual, which included 30 detailed session plans, a range of games and activities, and reminders about how to embed the key principles of SDT. TAs were asked to deliver the sessions in the prescribed order. Video recordings of model delivery were supplied for 22 games/activities within the sessions using a secure online platform, and links to online resources were given for 19 of the sessions to aid delivery. In addition, pupils were provided with home activity cards every three sessions. These cards aimed to reinforce session content and advise pupils about how they could practise the activities at home with friends and family.

The intervention was refined and improved following the original Action 3:30 study based on findings from the primary analysis[18] and process evaluation.[28] *Table 2* highlights the changes made to the intervention content.

School/pupil appreciation in the intervention and control arms

Intervention schools received £200 to spend on equipment, which they used to cover any school-specific gaps in the equipment that was necessary to deliver the Action 3:30 sessions. Schools were reimbursed for 2 hours per week for two TAs at the TAs' usual pay rate to cover their time spent delivering the club. Control schools and the two former intervention schools received a £300 donation in recognition of the time spent by school staff to accommodate data collection. Each child (control and intervention) received a small gift at each data collection. The gift was used to encourage the prompt return of accelerometers and was selected to promote physical activity.

TABLE 2 Issues raised and changes made to the original Action 3:30 intervention

Issue raised	Change made
Sessions not appealing enough to girls	All session plans were reviewed by three independent physical activity experts to identify ways in which appeal to girls could be increased. Sessions were refined by local advisory groups and TAs who took part in public and patient involvement work. Key changes included adding activities that girls could do in girl-only groups initially to build confidence, ensuring exposure to a variety of activities to find those the children enjoyed and providing more options in sessions for pupils to choose or modify the activities
Content better pitched at younger children	Target population was changed to Years 4 and 5 (from Years 5 and 6)
Prioritising the Action 3:30 club	TAs felt that ensuring that the school leadership team was aware of the sessions and had commitment to the intervention was essential and that it was important to ensure that other important activities for children in Years 4 and 5 did not clash with Action 3:30. The school/study agreement was refined to reflect these, and specific contingency plans were developed in each intervention school to ensure that the club could always run as planned, even when other activities were taking place, such as a school performance
It would help to see exemplar sessions being delivered	22 model activities/games included in the session plans were video-recorded and uploaded to an online platform. The videos were signposted in the leader's manual
Signpost additional resources	'Skill links' were added to all session plans; these are links to third-party websites that highlight content that could aid delivery
TAs needed more help with managing disruptive behaviour	A 'managing disruptive behaviour' section was added to the training guide and this was taught during the training programme. Eight TAs reviewed this and commented on its acceptability and how it could be improved. A 'warning sign' system was added to flag sessions that could be susceptible to disruption. It was suggested that TAs form close links with classroom teachers so that they were aware of arguments and disruptions during the school day. TAs were asked to ensure that classroom teachers did not use the threatening to 'take away' Action 3:30 as a form of punishment. It was suggested that TAs used sanctions for disruptive behaviour that were consistent with school policy. To gain attention in noisy groups, it was suggested that TAs used consistent signals in each session
Enhance embedding of motivational content	A 'star' symbol was added to each session plan that details where and how TAs can build 'want to' motivation and embed the key principles of SDT that was taught during training

Re-enrolment

Data from the original Action 3:30 study and a recent evaluation of an extracurricular dance programme[18,44] highlighted that schools usually provide an opportunity for pupils to re-enrol in after-school programmes every term to allow more children to join the programme if others drop out. To enhance external validity, attendance rates in each intervention school were assessed after session 12 (December 2017/January 2018). In each club, if there were spaces available, information sheets and consent forms were sent home with all remaining eligible Year 4/5 pupils. Demographic data were collected from pupils who joined the study at the enrolment point and participated in the follow-up measures.

Process evaluation

Overview

A process evaluation using the RE-AIM framework, reporting on recruitment, dose, intervention effectiveness, fidelity and adoption, was conducted in the four intervention schools. It had both quantitative and qualitative components, which are described below.

Quantitative process evaluation measures

The quantitative component was conducted using self-report questionnaires and observations. TAs were asked to complete a log book, which recorded attendance and the dose of the intervention (whether each session was delivered fully, partially or not at all to plan). A member of the research team observed three randomly selected sessions (one per half-term) in each intervention school during the 15 weeks. The visits were spaced evenly in each school: approximately 4 school-term weeks apart, starting at or near week 5 of the intervention. During the three observation visits, pupils completed the Sport Climate Questionnaire[45] to assess their perceived autonomy support of the TAs, which consisted of six questions on a seven-point Likert scale. Pupils also completed an enjoyment and exertion questionnaire at these observation time points, which consisted of two items referring to their enjoyment of that day's session and how tiring they perceived that session to have been. Pupils responded using a five-point Likert-type scale ranging from 1 ('not at all') to 5 ('a lot') for the enjoyment item and an 11-point Likert-type scale ranging from 0 ('not tired at all') to 10 ('very, very tired') for the exertion item. The dose of the intervention was also assessed by the researcher. TAs were asked to complete a validated self-efficacy questionnaire, made up of an adapted version of the Physical Education Teacher's Physical Activity Self-Efficacy Scale[46] and a vignette about autonomy-supportive teaching style and eight items referring to this.[47] The questionnaire was completed before and after the intervention training and during the three observation visits. A researcher assessed school context in all 12 schools using a validated school physical activity environment scale.[48] Data on school physical activity policy context were collected by soliciting information from a school contact about physical activity policies and curriculum. These data were used to examine whether or not differences in the social/physical environment and in school policy strategies could have an impact on the delivery of the intervention. Adoption of the intervention was assessed by recording the number and proportion of schools and TAs who stated that they would continue to deliver a version of Action 3:30 once the intervention period had ended.

Qualitative process evaluation measures

Following completion of the intervention training programme, the coach development manager at Bristol City Council (lead trainer) took part in an interview with the trial manager, which focused on the delivery of the training and whether or not it could be improved. He also completed a checklist to assess whether or not training had been delivered as planned.

Once the 15-week intervention was finished, all TAs ($n = 9$) and intervention school key contacts (staff members who act as the primary liaison between the school and the study team; $n = 4$) were asked to take part in semistructured interviews, and selected children (six boys and six girls in each intervention

school) were asked to take part in focus groups. Children were purposely selected based on their attendance at the club. The mean number of sessions attended was calculated for all pupils. Pupils with low, medium and high attendance rates were then selected. One pupil who joined at the second enrolment in each intervention school was also purposively selected. School key contacts ($n = 4$) and Year 3/4 classroom teachers ($n = 2$) in schools who took part in the accelerometer opt-out process were asked to take part in an interview to discuss the burden associated with this process, and how to mitigate it in future studies. One intervention school also took part in the accelerometer opt-out process, and so that school's key contact was asked about this process in the same interview. Eight external stakeholders were also asked to take part in an interview. After two schools withdrew from the intervention, a school key contact from each school was asked to take part in an interview to explain the reasons for withdrawal and how this could be prevented in future trials. Two researchers with master's-level qualitative experience (BT, male; and AP, female) conducted all of the interviews and focus groups. All informants received information about the research aims and the researchers and provided written consent prior to interview. Field notes were made during and after each interview or focus group by the researcher present.

Interview topic guides

Interview topic guides were developed for each informant group (five guides in total). Child focus groups were conducted in school with just the researcher present. The focus groups explored recruitment, attendance, delivery, enjoyment and possible improvements to the intervention. Pupils were asked what they enjoyed the most and least about the intervention and what motivated them to attend. Pupils were also asked to comment about their physical activity context and environment in school.

Face-to-face paired in-depth interviews[49] were conducted with TAs in each school, which involved interviewing TAs from the same school together[50] for the purpose of gathering information about how the pair/trio perceived the same event(s),[51] in this case the training programme and the intervention delivery. The topic guide explored the content and delivery of the training programme, with a focus on the managing disruptive behaviour section. Regarding the intervention, TAs were asked about attendance, delivery, theoretical fidelity and potential improvements. They were also asked to comment on recruitment (TAs and pupils), the re-enrolment strategy and potential contamination between schools.

Face-to-face interviews were conducted with intervention school key contacts in school. The topic guide addressed their involvement in the study, thoughts about the recruitment, content, delivery and enjoyment of the intervention, potential to continue the Action 3:30 programme, potential contamination between schools, and suggested improvements. If applicable, they were also asked to comment on the accelerometer opt-out process.

School key contacts and classroom teachers involved in the accelerometer opt-out process were interviewed face-to-face in school. The topic guide explored the logistics and potential burden of the process.

Face-to-face ($n = 3$) or telephone ($n = 5$) interviews were conducted with external impact stakeholders, including regional public health leads, school sport co-ordinators and directors of public health non-profit organisations. The topic guide examined the sustainability, future commissioning and dissemination opportunities of Action 3:30, as well as potential improvements.

Qualitative analysis

To synthesise the wide range of qualitative data collected, the framework method[52] was used, as it enables the production of a matrix of the data (from different participant groups), which allows for constant comparison between groups. The framework method also allowed a combined approach to

the analysis, enabling themes to emerge inductively from participant accounts and specific issues to be explored deductively. Data were analysed using the following steps:

- Researchers from the study team (BT and AP) thoroughly read and re-read each transcript and listened back to audio-recordings to become familiar with the data set. Their initial impressions of the data were recorded.
- Initial codes were created from the central tenets of the underlying intervention theory (SDT[22]) to interpret the data. These codes examined whether or not the intervention supported autonomous motivation among the participants and the three needs support constructs (autonomy or feelings of choice; relatedness – a feeling of connection between the participants and the instructor; and competence). In addition, a predefined code, 'school context', was included to assess the differences between schools in intervention experience and implementation linked to their physical/social/policy environment. For the deductive analysis, the predefined codes were broad, the primary purpose being to categorise relevant information to be further interrogated to elicit more refined codes and interpretations. The deductive analysis codes are presented in *Appendix 2*.
- An analytical framework was developed to fit each informant group to avoid losing any key data. Four researchers (BT, AP, SS and RJ) met to discuss and refine a set of codes that could be applied to all transcripts using the following process:
  - Two researchers (BT and AP) independently read and analysed two transcripts from each informant group, met, and discussed and created draft frameworks for each informant group.
  - A third researcher (SS) read two transcripts from half of the informant groups (e.g. boy pupils, TAs) and a fourth (RJ) read the other half (e.g. girl pupils, school contacts) and made notes of the key codes/themes.
  - All four researchers met to discuss and refine draft frameworks.
- The two primary researchers then applied frameworks to remaining transcripts (with some level of double coding, i.e. each researcher coded two more transcripts from each stakeholder group) using NVivo (QSR International Pty Ltd, Warrington, UK). Any new codes that emerged were discussed, and amendments were made to each framework.
- Coded data were then charted into a framework matrix in NVivo. This summarised the data for each informant by category and included representative quotations. To ensure consistency within the research team, summarising techniques were compared.
- Data were interpreted and themes were generated in frequent meetings to review the matrix. The two primary researchers agreed on illustrative quotations to show the nature of each theme.
- The frameworks were triangulated to compare the codes for each informant group to assess the degree of convergence.

The qualitative analysis is reported in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines[53] (*Table 3*) to optimise the credibility and transparency of the research.

Statistical analysis

Stata statistical software was used for all statistical analyses. Summary statistics were presented comparing the control and intervention arms at baseline and follow-up on demographics [age, ethnicity, socioeconomic status (using Index of Multiple Deprivation)] (baseline only), psychosocial variables and accelerometer variables, including MVPA. Where the distribution of the outcomes was approximately normal, mean values and standard deviations (SDs) were presented; otherwise, medians and interquartile ranges (IQRs) were presented. For binary/categorical variables, a number and percentage were presented. As this was a feasibility trial, the primary and secondary outcomes were reported using basic statistics to describe the recruitment, session attendance, accelerometer and questionnaire

TABLE 3 Compliance with the COREQ guidelines on reporting of qualitative research

Domain (COREQ)	How we established credibility and transparency
Research team and reflexivity	Our researchers' credentials, experience, sex and relevant training were declared in research outputs to contextualise their perspective and approach to the interview/ focus groups and to the analysis of the data resulting from them
Study design	Interviews and focus groups took place in settings of the participant's choosing in order to make the participant feel empowered
	Voice recorders were used to record interviews/focus groups to ensure that all data were available for use in analysis
	Topic guides are attached as standalone documents
Analysis and findings	Double coding on a sample of transcripts from different informant groups reduced researcher bias in coding
	Participant feedback on results were sought to ensure that interpretation was representative of their perspective

data. To avoid losing power when calculating average scores for the measure of autonomy-supportive teaching experienced by pupils (Sport Climate Questionnaire collected at three process evaluation time points), a multiple imputation approach was taken, which provides a more realistic representation of what would have been provided had all of the children provided complete data at all time points (see *Table 17*). Non-imputed data are also presented in *Appendix 4*.

For the accelerometer-assessed mean minutes of weekday MVPA outcome, the following analysis procedures were undertaken. All pupils providing measurements were included, as per their allocation, in an ITT primary analysis to assess the effectiveness of the Action 3:30 intervention to improve the mean minutes of MVPA per weekday among Year 4 and 5 pupils at follow-up using multivariable mixed-effects linear regression. Multivariable mixed-effects linear regression considers the hierarchical nature (i.e. the clustering) of participants within schools. The model included covariates for intervention arm, local authority (South Gloucestershire or North Somerset), recruitment strategy (taster session or not) and the baseline measurement of mean minutes of weekday MVPA. The difference in mean weekday MVPA between the two allocated arms was presented with its 95% CI. This was repeated with stratification by sex, with the differences in mean weekday MVPA between the two allocated arms being presented with 95% CIs for boys and girls separately. This model was adapted to secondary measures based on accelerometer estimates such as sedentary time. The total proportion of pupils meeting the UK recommendations of 60 minutes of MVPA per weekday was calculated based on the average minutes of MVPA across all valid weekdays.

The large majority of trial participants had indicated a willingness to join the Action 3:30 programme at the outset, before the allocation of their school to intervention or control, thereby ensuring allocation concealment. The ITT estimate was based on a comparison of these participating children between those whose school was allocated to intervention and those at schools allocated to control. Children who later joined their school's ongoing programme at 're-enrolment' made this decision knowing that they were at an intervention school; this fundamental difference prompted us to prespecify a separate analysis of the outcomes in these children, which, if justified, would then be combined using meta-analysis techniques with the ITT estimate.

A key issue when estimating the effect of the intervention in those children joining at re-enrolment is identifying an appropriate comparison group. It is not known which children in the control schools would have joined the intervention at the later opportunity, so the only unbiased comparison based on randomly allocated groups is between all children who did not indicate a willingness to join the Action 3:30 programme at the outset, comparing those at schools allocated to intervention with those

allocated to control. This estimate is not equivalent to our primary ITT estimate; here we pilot a CACE method to obtain an unbiased estimate of the effect of the intervention in those who joined the intervention at re-enrolment. This CACE estimate is comparable with the ITT estimate from those children indicating a willingness to enrol at the outset. It is worth noting that both the ITT estimates and the CACE estimates disregard the number of sessions each child attends: the intervention effect is calculated for those children intending to join the programme, whether this is at the outset or the later opportunity.

The CACE estimate and its CI were obtained using the two-stage least squares approach. This method needs all eligible children at each school to provide the necessary measurements; in this pilot, we did this for four schools. The key aim here was to specify the method and consider the feasibility of the approach, as the estimates produced at this stage would not be usefully precise.

Sample size

The sample size for a future definitive trial was estimated using the ICC for weekday MVPA. The school-related ICC was estimated for daily weekday MVPA to power a definitive trial to detect a difference in 10 minutes MVPA per weekday between the two arms. A variance component random-effects model was used to estimate the ICC. As the ICC for MVPA was estimated using data from only 12 schools, the school-related ICC was compared with that observed in other studies.

Compliance and missing data

Accelerometer compliance was measured by the number of valid days of accelerometer data provided by each pupil enrolled in the study at each time point. At minimum of 3 valid days of accelerometer data were required for compliance. Questionnaire compliance was measured by the number and percentage of pupils enrolled in the study who provide questionnaire data. Data provision rates for accelerometer (missing, invalid, valid) and questionnaire data (missing, not missing) were recorded for baseline and follow-up. There were missing data because some participants did not wear their accelerometer for enough time for data to be valid and some did not return their accelerometer (see *Table 11* for data provision at each time point).

Governance

A local advisory group was formed, which included local authority physical activity staff from the two local authorities. The group met three times during the study: once during baseline data collection, once during the intervention delivery period to advise on school-related/intervention issues and once at the end of the project to provide feedback about the interpretation of the findings and the future sustainability and dissemination of Action 3:30. A Children's Advisory Group was formed with children in the four intervention schools. Four children in each school (two boys and two girls) were recruited, one high active and one less active of each sex, to provide feedback about the intervention and raise any logistical issues. Three Children's Advisory Group meetings were held during the intervention.
A Trial Management Group was formed, comprising all of the applicants, the trial manager and the field worker. The Trial Management Group met once per month to discuss key issues. A TSC was formed, comprising an independent chairperson, two independent members and the study team. The TSC met three times during the study and provided independent scientific scrutiny of the study, support to the study team and guidance on how to progress to a definitive trial. A member of the local advisory group was invited to attend the TSC meetings to provide input.

Chapter 3 Intervention optimisation

Aim

The aim was to ensure that the intervention was optimised for participants and that its interest and appeal was maximised for both boys and girls.

Method

A sample session of the intervention was conducted in two schools in the summer term. One Year 5 class in each school was chosen to take part, as these pupils were of the target age but would not be eligible for the study because they would be in Year 6 when the intervention commenced in the autumn term. The sessions were delivered by Bristol City Council staff during a PE lesson. After the sessions, two separate focus groups (one with six boys and one with six girls) were conducted. Class teachers selected pupils with a range of activity levels for the focus groups. The pupils were asked to comment on their enjoyment of the session, their perception of how boys and girls interacted with each other, the teaching style and the ways in which the session could have been improved. Feedback from the first focus groups was used to improve the second sample session. Lessons learnt from all of the focus groups were used to improve the 30 session plans before the intervention commenced.

Focus group discussions were transcribed verbatim and anonymised.

Results

The analysis of the focus groups ($n = 4$) showed that all pupils were very positive about the sessions and rated them highly. There was no evidence of differences in response from boys and from girls, and therefore data are presented for each theme with indicative quotations from boys and girls where appropriate. The researcher-identified themes were agreed to be (1) variety, (2) teamwork, (3) level of activity, (4) potential improvements and (5) coaching style.

Variety

When the pupils were asked to comment on what they enjoyed, the variety and uniqueness of the activities was a theme that emerged in each of the focus groups. The games were different from those they usually played during PE, and the variety of activities prevented the pupils from getting bored:

> *I enjoyed the way it was very creative, and it brought new things to our school.*
>
> *School 2, girl*

> *I thought the different activities were good. Say if you started getting bored of the frisbee, you could go onto the other activity.*
>
> *School 2, boy*

Teamwork

Another theme that emerged was that pupils enjoyed working in a team and socialising with their classmates. The pupils liked working with others with whom they did not usually socialise and preferred that they did not pick their own teams (i.e. that they were not in a team with just their friends):

> *Because you get to work as a team and it's all really fun.*
>
> *School 1, boy*

I think it's good because people you don't normally spend a lot of time with, you're on the same team as them.

School 2, girl

When asked to comment on the sessions being for boys and girls, all of the pupils agreed that they preferred mixed-sex teams and that they would not have enjoyed the sessions as much had they been single sex. The pupils felt that a mixed session gave them the opportunity to work with pupils of the opposite sex, which they may not always choose to do:

I think it was good to mix up it all together because we might learn to get along more with boys.

School 2, girl

Boys don't normally play with girls and they don't really work together with them. So, I think it's good to have a chance to learn and do something with them.

School 1, boy

The pupils felt that having mixed teams made the activities and games fairer and that sports should not be exclusive to sex:

I think it's better with boys because they can catch more and they're better at stuff.

School 2, girl

If they [girls] were playing something, for example, tag and the boys were playing football, if a girl wanted to come in, you wouldn't say, 'No, you're a girl'. You would say, 'Yeah, come in'.

School 1, boy

However, the pupils did sometimes feel that the girls and boys grouped together, despite being on a mixed team:

Some of the girls didn't pass to the boys and some of the boys didn't pass to the girls. It did make it a bit unfair.

School 2, boy

Level of activity

Most of the pupils thought that the sessions were active and involved plenty of running around:

I think it was really pulse-raising.

School 1, girl

It gives you a lot of exercise.

School 2, boy

However, some pupils felt that certain aspects of the game or certain people were not active enough:

I don't think it was active enough because, as he said, if you're in the goal the whole game, you can't get out and run.

School 2, boy

In particular, the female pupils in school 2 did not think that the session was active enough. They commented that the lack of space and the size of teams limited their ability to be active, and they suggested possible improvements:

There's always a big huddle. There's always space over there but we're always over here.

School 2, girl

We could change the size because there were a lot of us and maybe we could do two games at once.

School 2, girl

Potential improvements

Several recurring suggestions were made of ways to improve the sessions. Pupils proposed that smaller teams and more space would allow more people to get involved:

> *You might be able to have two teams which would be better. Instead of everybody being rammed in one game.*
>
> *School 2, boy*

Adding more rules to the games was suggested as a way of improving the organisation and structure of the sessions, as well as increasing the level of activity:

> *I would say everyone at least has to throw it to every person in their group.*
>
> *School 2, girl*

> *The first goal, a girl would have to score it and then once a girl had scored, for the next half of the game, it could then be a boy who scores it.*
>
> *School 1, boy*

Other potential improvements included ways in which the games could have been made easier, for example by having bigger balls and bigger goals. The pupils also liked the idea of having more and longer games; however, this would have been difficult within the allocated time.

Coaching style

Pupils were asked to comment on how the Bristol City Council coaches delivered the sessions. In general, the pupils liked the coaches and were very positive about their coaching style. The pupils thought that the coaches gave clear instructions without being too strict:

> *They were very specific on what you had to do and what the rules were.*
>
> *School 1, boy*

> *They had a way of getting people's attention . . . and they weren't strict.*
>
> *School 1, girl*

The pupils felt that the coaches were very encouraging with regard to their skill development and keeping everyone active. They liked that the coaches gave good critical feedback and encouraged them to adapt the activities to progress their skills:

> *. . . if someone had done it wrong, he [the coach] would say, 'Ah, unlucky. What you could next time is . . .' He wouldn't say, 'Oh, that was really bad'.*
>
> *School 2, boy*

> *I liked the way that when we were doing frisbee they were helping us, giving us techniques.*
>
> *School 1, girl*

The only aspect of the coaches' delivery that the pupils did not like was that the coaches let the pupils choose their own teams and nominated people to be team captains, which they felt made the games slightly unfair:

> *They made one captain and it made all unfair because we couldn't say what we wanted.*
>
> *School 2, boy*

> *They [the coaches] could be team leaders and then go, 'One, two, three. One, two, three'.*
>
> *School 1, boy*

Summary

The results from the focus groups with Year 5 pupils showed that the sample sessions were well received by both girls and boys. The pupils enjoyed the sessions because they were fun, varied and different from usual PE lessons and encouraged teamwork with others with whom they did not usually play. Boys and girls enjoyed interacting and felt that the session would not have been as enjoyable had it been single-sex. The pupils liked that the coaches were encouraging and gave good critical feedback, which enabled them to improve their skills. Some of the pupils thought the sessions were active; however, others did not. Girls specifically suggested that smaller teams and more space to spread out would have improved the sessions because this would have enabled more people to get involved simultaneously. Introducing more rules into the games was also suggested, as this could have increased the activity level as well as adding more structure to the sessions. Pupils preferred that teams were chosen for them, rather than choosing their own teams, so that the games were equal and fair.

Results from these focus groups suggest that the revised session content appeals to both boys and girls but highlighted further refinements that were used to improve the 30 session plans and the intervention training programme. *Table 4* presents the lessons learned and the changes that were made to the intervention to reflect these.

TABLE 4 Lessons learned from intervention optimisation and implementation

Learning points	Intervention implementation
Children, especially girls, preferred smaller teams	Communicated to TAs during leader training
Boys and girls preferred working in mixed-sex teams	Communicated to TAs during leader training
Children preferred teams to be picked for them to make them fair	TAs were provided with options for ways to pick teams fairly, supported by examples in the training guide
Children valued autonomy, for instance by inventing rules to progress activities	This was highlighted during the motivation section of TA training, reminding TAs of where they could incorporate autonomy-supportive techniques during sessions. Case studies were added into the training guide that reflected this. Session plans already included suggestions for autonomy support within each activity
Children valued specific and constructive feedback from coaches	This was highlighted during the communication section of training and reinforced during the feedback and evaluation section of training. Examples of how to provide this type of feedback were provided in the leader's manual and training guide
Children liked to stay active for more of the session	Of the original 40 sessions, the 10 least active sessions were removed. The remaining sessions were edited to enhance the potential for suitable activity by offering suggestions to make each activity/game more or less active as needed

Chapter 4 Quantitative results

This chapter provides the quantitative results from the study. The recruitment data are presented first, followed by data provision and study results. Where findings specifically relate to progression criteria, these are clearly shown.

School recruitment

The study required participation of eight primary schools from South Gloucestershire and four from North Somerset, making a total of 12 study schools. Schools were approached based on the percentage of their pupils claiming free school meals and their intake size. Eleven schools in South Gloucestershire were invited to participate. Two schools did not respond to the invitations, one school declined to take part after the initial meeting and eight signed study agreements to take part. The agreements outlined the study role and what was expected of the school in terms of allocating space and staff time for the clubs and also the expectations that the school could have of the project team. In all schools, members of the project team met with the head teacher, provided an overview of the study and answered any questions during a face-to-face meeting. Sixteen schools in North Somerset were invited to participate. Eight schools did not respond to the invitations, four declined to take part after receiving the study information and four signed study agreements to take part. It is notable that the recruitment rate of South Gloucestershire schools was considerably higher than that of North Somerset schools. We believe that this reflects our long-established working relationship with South Gloucestershire Council and support from council staff in approaching schools. *Table 5* presents the recruitment rates.

Progression criterion 1 of the study was to recruit at least 25% of the schools approached. Forty-four per cent of all schools that were approached agreed to take part, so this criterion was met. An aim of the recruitment process was to recruit half of the schools in each local authority from above the median free school meals percentage of that local authority. The median free school meals percentage is 8.5% in South Gloucestershire and 9.3% in North Somerset. Six and four schools in South Gloucestershire and North Somerset, respectively, were above this level, indicating that these schools were in more disadvantaged areas.

Participant (pupil) recruitment

Opt-out: pre baseline

All Year 4 and 5 pupils had been asked to take part in the opt-out phase when they were in Years 3 and 4. Across all 12 schools, 1139 pupils were eligible to participate, and 1125 pupils participated (98.77%). *Table 6* presents the number of eligible pupils, the number of pupils recruited (those who did

TABLE 5 School recruitment

Local authority	Schools approached (*n*)	No response (*n*)	Declined (*n*)	Schools consented (*n*)	Recruited (%)
South Gloucestershire	11	2	1	8	72.73
North Somerset	16	8	4	4	25.00
Total	27	10	5	12	44.44

TABLE 6 Recruitment numbers by school and measurement method using opt-out consent process

School ID	Method	Eligible (*n*)	Recruited (*n*)	Opt-outs (*n*)	Recruited (%)
21	Survey	131	131	0	100.00
22	Accelerometer and survey	112	111	1	99.11
23	Survey	171	170	1	99.42
24	Survey	78	78	0	100.00
25	Accelerometer and survey	48	46	2	95.83
26	Accelerometer and survey	58	58	0	100
27	Survey	108	104	4	96.30
28	Accelerometer and survey	113	110	3	97.35
31	Survey	57	57	0	100.00
32	Survey	53	52	1	98.11
33	Survey	156	156	0	100.00
34	Survey	54	52	2	96.30
	Survey-only total	808	800	8	99.01
	Accelerometer and survey total	331	325	6	98.19

not opt out), the number of pupils who opted out (those who did not want to take part) and the recruitment percentage for each school in the opt-out phase. The percentage of pupils recruited was similar when they were asked to wear an accelerometer for 7 days and complete the PAQ-C survey (99.01%) and when they were asked to complete only the survey (98.19%).

Baseline

All eligible Year 4 and 5 pupils were asked to take part in the main study when they were in Years 3 and 4. Across the 12 schools, of the 1139 pupils eligible to take part, 459 pupils expressed an interest in doing so by returning study consent forms (41.39%). Owing to health and safety, a maximum of 30 children per school were selected to participate (the maximum was set at 32 in one school because this was the total number of interested pupils and the school approved the inclusion of two extra pupils rather than turning down two pupils). Of the 459 pupils who returned consent forms, 48.66% were girls. In one school (school 31), only 36.36% of pupils who returned consent forms were girls. *Table 7* presents the number of eligible pupils, the number and percentage of pupils who returned consent forms, the number and percentage of girls who returned consent forms and the number of pupils in each school who were selected to take part in the study.

Progression criterion 2 of the study was that at least 25% of eligible pupils express an interest in the study by returning consent forms, which was achieved (41.39%). Progression criterion 3 was that at least 40% of participants expressing an interest were girls, which was also achieved (48.66%).

An aim of the study (objective 2c, which studied an enhanced recruitment approach) was to compare two recruitment methods: briefing against briefing plus taster (see *Chapter 2*, *Study population and recruitment section*). A comparison of the two methods is shown in *Table 8*. The number and percentage of pupils recruited was similar using both recruitment methods. The mean PAQ-C score shows an indication of physical activity level. The score is on a scale of one to five, one being low and five being high. Standard procedures were followed to complete the scoring.[30] There was no difference in mean PAQ-C score between the briefing plus taster and the briefing-only recruitment methods.

TABLE 7 Recruitment at baseline

School ID	Eligible (*n*)	Returned forms (*n*)	Eligible (%)	Girls, *n* (%)	Pupils measured at baseline (*n*)
21	131	61	46.56	31 (50.82)	30[a]
22	112	38	33.93	18 (47.37)	30
23	171	70	40.94	36 (51.43)	30
24	78	28	35.90	13 (46.43)	28
25	48	19	39.58	8 (42.11)	19
26	58	27	46.55	14 (51.85)	27
27	108	40	37.04	20 (50.00)	30
28	113	31	27.43	14 (45.16)	31
31	57	22	38.60	8 (36.36)	22
32	53	32	60.38	18 (56.25)	32
33	156	65	41.67	34 (52.31)	30
34	54	26	48.15	14 (53.85)	26
Total	1139	459		228	334
Average			41.39	48.66	

a 30 pupils were selected to participate in this school. One participant completed the psychosocial questionnaire and height and weight measurements but did not wear an accelerometer.

TABLE 8 Comparison of participants recruited using briefing with those recruited using taster (objective 2c)

Recruitment method	Schools (*n*)	Eligible pupils (*n*)	Recruited pupils (*n*)	Recruited (%)	Girls (%)	PAQ-C score, mean (SD)
Briefing only	6	557	226	40.57	51.32	3.2 (0.12)
Briefing plus taster	6	582	233	40.03	48.07	3.08 (0.14)

Another aim of the study (objective 2c) was to compare physical activity levels between pupils who expressed an interest in the study and pupils who did not. In particular, the study aimed to appeal to and recruit less active children. *Table 9* compares the mean PAQ-C score and MVPA, assessed objectively with accelerometers, between pupils who did and pupils who did not consent to take part in the study. Minimal differences were seen between those who did and those who did not consent, which indicated that those who consented to the study were unlikely to have higher physical activity levels than those who did not consent. The data in the table also show that the participants were, on the whole, active and that the consented participants engaged in slightly more minutes of MVPA than non-consented participants (66.8 vs. 63.2 minutes of MVPA per day), but this difference was small.

Reasons for non-consent

During the participant recruitment process, brief letters were sent home to parents to collect data on why children did not want to take part in the study. *Table 10* presents the number of consent forms that were not returned (i.e. the number of pupils who did not express an interest), and the number and percentage of reasons for non-consent forms returned, for each school. The most common reasons for non-consent were 'my child does enough activities already' (38 responses) and 'my child is not interested in Action 3:30' (23 responses). Thirteen responses reported reasons related to the letters sent home about the study: parents misreading the information sheet or not receiving it, or not returning the consent form on time.

TABLE 9 Comparison of participants with participants with 'opt-out data' (objective 2c)

Type of data	Non-consented participants	Consented participants
PAQ-C (*n*)	681	443
Mean PAQ-C[a] (SD)	3.13 (0.71)	3.21 (0.68)
Accelerometer (*n*)	167	100
Mean MVPA minutes per weekday (SD)	63.23 (19.69)	66.75 (18.77)

a Score from 1 to 5.

TABLE 10 Reasons for non-consent

School ID	Eligible (*n*)	Returned forms (*n*)	Forms not returned (*n*)	Reason for non-consent forms returned (*n*)	Eligible (%)
21	131	61	70	12	9.16
22	112	38	74	7	6.25
23	171	70	101	13	7.60
24	78	28	50	3	3.85
25	48	19	29	3	6.25
26	58	27	31	2	3.45
27	108	40	68	4	3.70
28	113	31	82	13	11.50
31	57	22	35	7	12.28
32	53	32	21	4	7.55
33	156	65	91	7	4.49
34	54	26	28	8	14.81
Total	1139	459	680	83	
Average					7.57

School status

A total of 334 pupils were selected to take part in the study. Following randomisation, two schools (school 24 and school 28) that had been randomised to the intervention arm decided that they were unable to provide the intervention. For the purposes of this feasibility study, to obtain an indication of the impact of the intervention in those schools able to deliver it, these two schools were dropped from the primary analysis. Therefore, 165 pupils were randomly allocated to the control arm and 170 were allocated to the intervention arm. An interview was conducted with the key contact in school 28 to explore the school's reasons for withdrawal, and those findings are presented in *Chapter 6*. School 28 agreed to continue to take part in the study (albeit without delivering the intervention) and therefore participated in follow-up measurements and post-study interviews. School 24 became unresponsive following its decision to withdraw from the intervention. Therefore, an interview could not be scheduled, and the school was withdrawn from the study and any further data collection.

Figure 1 presents the study Consolidated Standards of Reporting Trials (CONSORT)[55] flow diagram and details of recruitment and retention throughout the study.

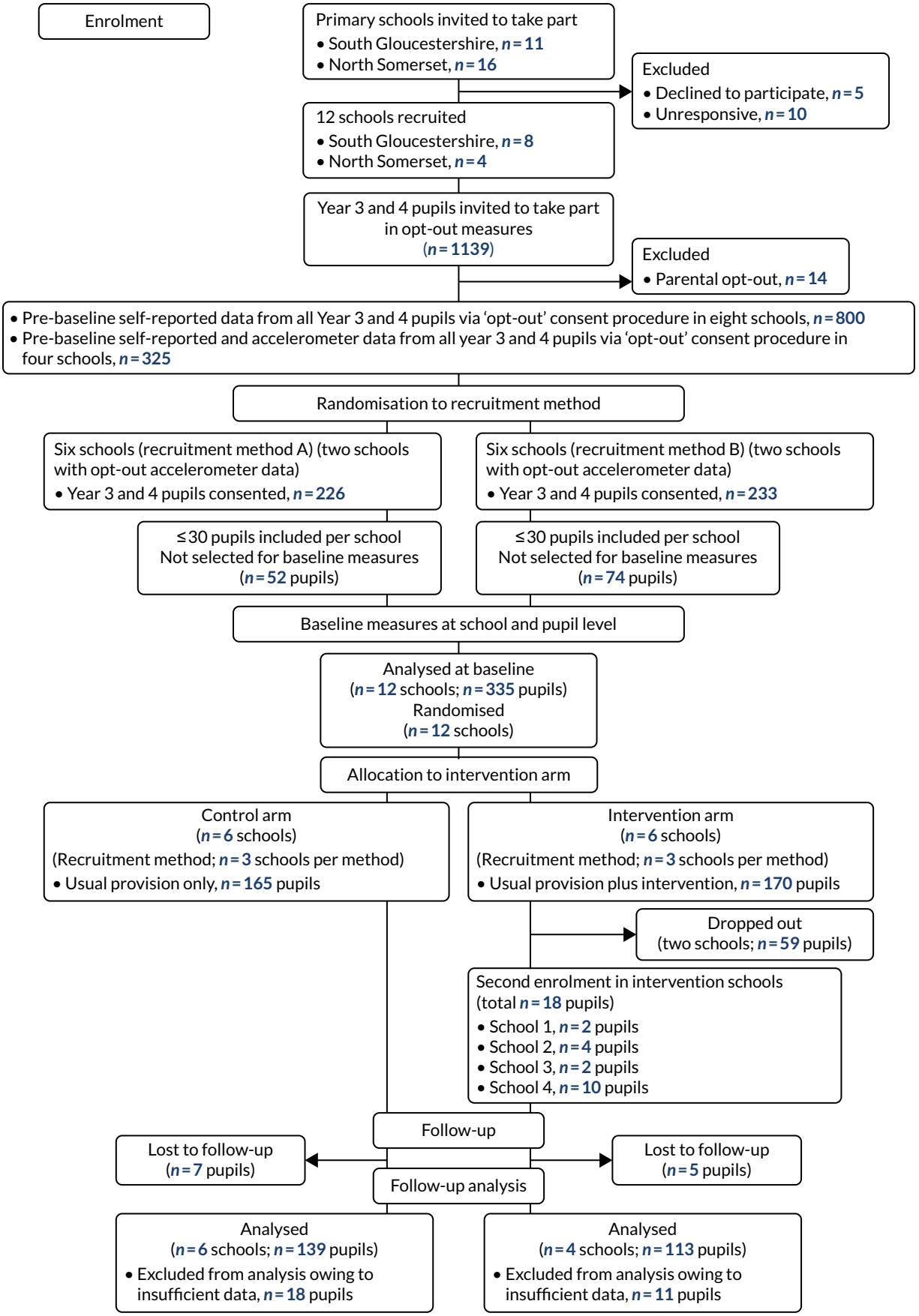

FIGURE 1 The CONSORT flow diagram. Reproduced from Jago *et al.*[54] © 2019 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).

Data provision

Data provision rates for all measures and accelerometer return are shown in *Table 11*, and these were similar at baseline and follow-up.

TABLE 11 Data provision for participants at each time point by trial arm

Variable	Trial arm, *n* (%)		Total, *n* (%)
	Control	Intervention	
Baseline			
Height	165 (100.00)	170 (100.00)	335 (100.00)
Weight	165 (100.00)	170 (100.00)	335 (100.00)
Accelerometers returned	164 (99.39)	170 (100.00)	334 (99.70)
Valid	151 (91.52)	158 (92.94)	309 (92.03)
Invalid	13 (7.88)	12 (7.06)	25 (7.46)
Missing	1 (0.61)	0 (0.00)	1 (0.30)
Psychosocial questionnaire			
Complete	162 (98.18)	170 (100.00)	332 (99.10)
Partial	3 (1.82)	0 (0.00)	3 (0.90)
Missing	0 (0.00)	0 (0.00)	0 (0.00)
KIDSCREEN-10 and CHU9D			
Complete	164 (99.39)	170 (100.00)	334 (99.70)
Partial	1 (0.61)	0 (0.00)	1 (0.30)
Missing	0 (0.00)	0 (0.00)	0 (0.00)
Parental questionnaire			
Complete	149 (90.30)	156 (91.76)	305 (91.04)
Partial	6 (3.64)	5 (2.94)	11 (3.28)
Missing	10 (6.06)	9 (5.29)	19 (5.67)
Follow-up			
Height	162 (99.39)	124 (100.00)	286 (99.65)
Weight	162 (99.39)	124 (100.00)	286 (99.65)
Accelerometers returned	157 (96.32)	124 (100.00)	281 (97.91)
Valid	139 (85.28)	113 (91.13)	252 (87.80)
Invalid	18 (11.04)	11 (8.87)	29 (10.10)
Missing	6 (3.68)	0 (0.00)	6 (2.09)
Psychosocial questionnaire			
Complete	162 (99.39)	119 (95.97)	281 (98.26)
Partial	1 (0.61)	4 (3.23)	5 (1.74)
Missing	0 (0.00)	1 (0.81)	1 (0.35)
KIDSCREEN-10 and CHU9D			
Complete	163 (100.00)	132 (99.19)	286 (99.65)
Partial	0 (0.00)	1 (0.81)	1 (0.35)
Missing	0 (0.00)	1 (0.00)	0 (0.00)
Parental questionnaire			
Complete	143 (87.73)	101 (81.45)	244 (85.02)
Partial	12 (7.36)	5 (4.03)	17 (5.92)
Missing	8 (4.91)	18 (14.52)	26 (9.06)

Baseline data

Baseline data are described in *Tables 12* and *13*. Data are presented as percentages in *Table 12* and as means and SDs in *Table 13*. Overall, the trial arm were well balanced. Parent ethnicity varied slightly between the arms, with the control arm having a higher proportion of white British parents. Accelerometer-assessed MVPA and sedentary time were similar across the arms, as were psychosocial variables.

Table 14 presents a comparison of accelerometer-assessed MVPA at baseline between the trial arms for all participants and for boys and girls separately. Data are presented as means and SDs and percentages. Mean MVPA was similar between the trial arms for both boys and girls. In both arms, mean MVPA was lower for girls than for boys. In the control arm, girls did 10.89 minutes less MVPA than boys, and in the intervention arm, girls did 12.35 minutes less MVPA than boys. The total proportion of both boys and girls meeting 60 minutes of MVPA per weekday was similar between the arms. In both arms, approximately 19% fewer girls than boys met the 60-minute guideline.

TABLE 12 Baseline demographics of sample

Variable	Trial arm, *n* (% of sample)	
	Control	Intervention
Sex		
Male	82 (49.70)	84 (49.41)
Female	83 (50.30)	86 (50.59)
Parent ethnicity		
White British	137 (90.73)	128 (80.50)
White other	4 (2.65)	13 (8.18)
Black British	2 (1.32)	1 (0.63)
Black African	2 (1.32)	1 (0.63)
Asian British		1 (0.63)
Indian	1 (0.66)	2 (1.26)
Pakistani	1 (0.66)	
Bangladeshi		1 (0.63)
Chinese		1 (0.63)
Mixed	4 (2.65)	5 (3.14)
Other		5 (3.14)
I would rather not say		1 (0.63)
Parent education		
Up to GCSE/GCE/O level or similar	27 (18.24)	27 (17.20)
A level/NVQ/GNVQ	53 (35.81)	45 (28.66)
First degree/diploma/HNC/HND	54 (36.49)	68 (43.31)
Higher degree (e.g. MSc/PhD)	14 (9.46)	17 (10.83)

A level, Advanced level; GCE, General Certificate of Education; GCSE, General Certificate of Secondary Education; GNVQ, General National Vocational Qualification; HNC, Higher National Certificate; HND, Higher National Diploma; NVQ, National Vocational Qualification; O level, Ordinary level.

TABLE 13 Baseline descriptive statistics of sample

Variable	Trial arm					
	Control			Intervention		
	n	Mean	SD	*n*	Mean	SD
Age (years)	151	8.40	0.63	158	8.35	0.68
IMD score	152	16.11	9.10	159	14.10	12.08
Total physical activity (mean accelerometer c.p.m. across all valid days)	151	648.27	211.93	157	625.62	177.49
Mean weekday c.p.m.	151	628.16	214.58	157	601.75	165.75
Mean weekend c.p.m.	142	701.69	295.25	144	686.04	313.95
Mean overall daily MVPA (minutes)	151	66.06	21.27	157	65.43	20.94
Mean weekday MVPA (minutes)	151	65.75	22.45	157	64.96	21.88
Mean weekend MVPA (minutes)	142	67.93	29.67	144	66.34	29.99
Mean overall sedentary time (minutes)	151	448.39	52.07	157	456.17	60.79
Mean weekday sedentary time (minutes)	151	457.23	57.09	157	465.81	60.86
Mean weekend sedentary time (minutes)	142	429.31	72.09	144	432.80	97.27
Height (cm)	165	134.40	5.60	170	133.40	7.20
Weight (kg)	165	31.20	5.60	170	30.20	6.10
BMI (kg/m^2)	165	17.21	2.35	170	16.86	2.46
zBMI (age- and sex-adjusted *z*-score)	165	0.47	0.99	170	0.26	1.15
Autonomous motivation physical activity[a]	165	3.41	0.69	170	3.35	0.68
Controlled motivation physical activity[a]	163	1.71	0.89	170	1.68	0.94
Autonomy need satisfaction[a]	165	4.83	0.89	170	4.70	0.96
Competence need satisfaction[a]	165	4.69	0.98	170	4.72	0.86
Relatedness need satisfaction[a]	165	5.03	0.99	170	5.02	0.92
Self-esteem[a]	165	3.67	0.48	170	3.76	0.45
Peer support[a]	165	19.28	3.68	170	19.19	3.88
School travel mode						
Number of active travel days to school[b,c]	154	2.71	2.27	163	2.44	2.30
Number of active travel days from school[b,c]	154	2.55	2.28	163	2.84	2.24
Number of after-school clubs attended[c]	152	1.84	1.41	160	1.56	1.45

IMD, Index of Multiple Deprivation (higher score = less affluent); zBMI, age- and sex-adjusted score compared with 1990 UK reference values.[34]
a Psychosocial questionnaire scoring.
b Based on the average reported number of days walked or cycled to and from school.
c Derived from the parental questionnaire.

Re-enrolment

Considering previous research, the study was designed to re-recruit pupils approximately half-way through the intervention if spaces became available. The number of spaces available was calculated by determining the average number of pupils attending each club on a weekly basis (from club attendance registers provided by the school) and subtracting that from the maximum capacity ($n = 30$ pupils). *Table 15* presents the number of spaces available in each school and the number of pupils who expressed an interest in participating.

TABLE 14 Baseline accelerometer data by sex

Variable	Control			Intervention		
	n	Mean	SD	*n*	Mean	SD
Mean weekday MVPA	151	66.06	21.27	157	65.43	20.94
Boys' mean weekday MVPA	74	71.62	23.41	78	70.75	23.56
Girls' mean weekday MVPA	77	60.73	17.54	79	60.18	16.52
Total proportion of pupils meeting 60 minutes of MVPA per weekday (%)	99	60.00		105	61.76	
Total proportion of boys meeting 60 minutes of MVPA per weekday (%)	57	69.51		60	71.43	
Total proportion of girls meeting 60 minutes of MVPA per weekday (%)	42	50.60		45	52.33	

TABLE 15 Re-enrolment participants

Variable	School ID			
	25	27	32	33
Spaces available (*n*)[a]	19	12	9	9
New consented pupils (*n*)	2	2	4	10
Spaces filled (%)	10.5	16.7	44.4	111.1

a Based on average club attendance over 4–7 weeks.

Teaching assistant attendance

Teaching assistants from all four intervention schools either were nominated by their school or volunteered to attend training and run the intervention in their schools. Two TAs from schools 25, 27 and 33 were recruited. Three TAs from school 32 volunteered. Eight TAs attended all 5 days of training and one TA from school 32 missed 1 day of the training.

Teaching assistant self-efficacy

Figures 2 and *3* show the results of the self-efficacy and perceived autonomy-support questionnaires completed by TAs before and after training and at three time points during the intervention. Measures of personal endorsement and intention to use an autonomy-supportive teaching style were completed pre and post training only (see *Figure 3*). Results from the teaching efficacy measure (see *Figure 2*) suggest that TAs became more confident across all teaching environment contexts in their ability to provide highly active after-school sessions under challenging circumstances following training and grew slightly more confident across all teaching contexts over the course of the intervention (process evaluation visit 3).

The results of the personal endorsement item (see *Figure 3*) showed a small increase in mean score between pre (6.0 ± 0.31) and post (6.4 ± 0.57) training. Similarly, there was a small mean score increase in the intention to use item (see *Figure 3*) pre (6.7 ± 0.45) and post (6.8 ± 0.28) training. Results from the autonomy support measure (see *Figure 3*) show that TAs perceived that they adopted a more

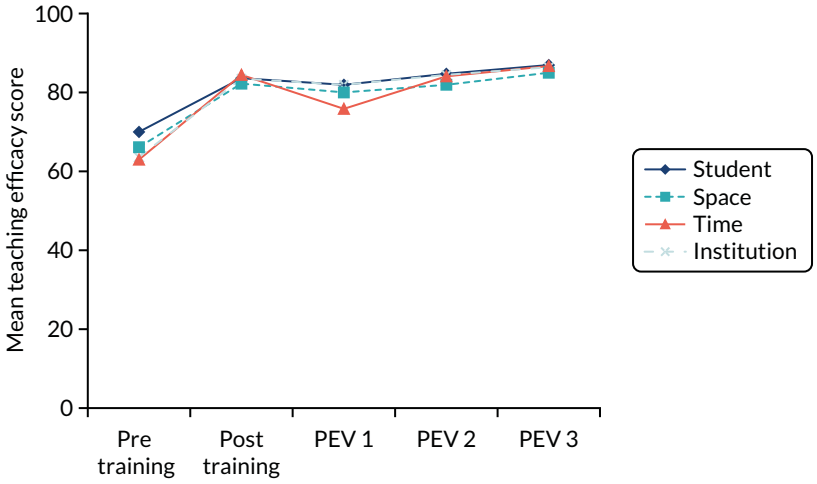

FIGURE 2 Self-perceived TA teaching efficacy. PEV, process evaluation visit. Reproduced from Tibbitts *et al.*[56] This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.

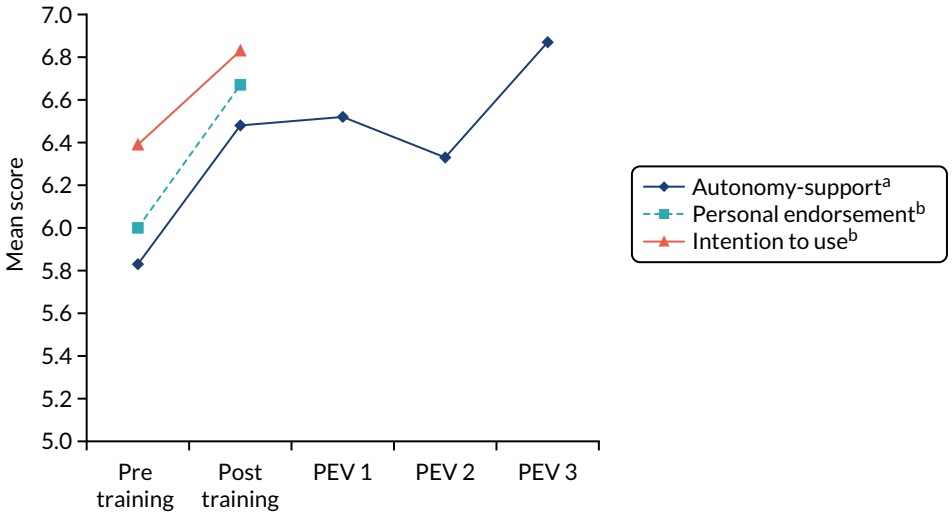

FIGURE 3 Teaching assistant-perceived autonomy-supportive teaching style. a, Adapted version of the Sport Climate questionnaire,[45] scale 1–7; b, Endorsement questionnaire,[47] measured only pre and post training, scale 1–7. PEV, process evaluation visit. Reproduced from Tibbitts *et al.*[56] This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.

autonomy-supportive teaching style post training than pre training, and that they perceived this to have been maintained throughout the intervention. For example, TAs agreed that they provided their pupils with options and tried to understand their pupils' perspectives before suggesting alternative ways of doing things. These results suggest that intervention delivery was consistent with underpinning SDT (objective 3c). Observational visits to schools at three time points during the intervention also affirmed this, as two project staff observed and agreed that an autonomy-supportive teaching style had been adopted by TAs in all four schools.

Session delivery (objective 3a)

Teaching assistants in all four intervention schools completed the log books (see *Appendix 3*), which were collected to assess intervention fidelity. As shown in *Table 16*, all 30 sessions were delivered in all four intervention schools. TAs described most of their sessions as partially delivered (69.2%), one-quarter of sessions as fully delivered, and a small number of sessions as not delivered at all (5.8%). Comments in log books and interviews with TAs (see *Chapter 6*) revealed that TAs felt that sessions were partially delivered because there was not enough time to complete all of the activities in the session plan. Furthermore, comments and TA interviews revealed that the sessions classified as not at all delivered were those where space had been limited and TAs chose to revisit previous session plans, which were more easily adaptable to the space, rather than deliver the current session plan.

Child-reported autonomy support and self-perceived exertion and enjoyment

Observations made by the project staff during three time points in each school aligned with results from the log books. All 12 sessions observed were thought to be either fully or partially delivered, the reason for partial delivery being the lack of time to fit in all of the activities. Overall, the intervention fidelity was good, and TAs used the session plans as intended.

Table 17 presents child-reported autonomy support scores at three process evaluation time points during the intervention, with scores derived from the short form of the Sport Climate Questionnaire.[45] Results are presented after multiple imputation and did not differ from the results produced before multiple imputation (see *Appendix 4*). The results show that children perceived their Action 3:30 leaders (the TAs) to be autonomy-supportive (as indicated by a high score) throughout the intervention, with little difference between time points. This may suggest that TAs were able to adopt an autonomy-supportive teaching style from the start of the intervention and maintain this throughout. This aligns well with the results shown in *Figure 3*, as TAs also perceived their teaching style to be autonomy-supportive throughout the intervention. Observational visits also support this finding, as project staff agreed that TAs successfully implemented the autonomy-supportive teaching techniques that had been taught during training. Overall, these findings suggest that the intervention was effective at underpinning SDT and that intervention fidelity was good.

Figure 4 presents child-reported mean perceived exertion and enjoyment at three time points during the intervention. It should be noted that the session number varied between schools at each process evaluation visit (process evaluation visit time point) and therefore the mean results reflect a variety of sessions and activities. The results of the self-perceived exertion measure suggest that children found the sessions towards the end of the intervention less tiring than those at the start. It is important to note that findings from the focus groups with a selection of pupils in each school suggested that they did perceive sessions to be active and tiring throughout the intervention period (see *Chapter 6*).

TABLE 16 Session delivery (objective 3a)

	Sessions, *n* (%)			
School ID	Provided	Fully delivered	Partially delivered	Not at all delivered
25	30	8 (26.7)	22 (73.3)	0 (0.0)
27	30	6 (20.0)	20 (66.7)	4 (13.3)
32	30	10 (33.3)	20 (66.7)	0 (0.0)
33	30	6 (20.0)	21 (70.0)	3 (10.0)
Total (*n*)	120	30	83	7
Average	30	7.5 (25.0)	20.8 (69.2)	1.8 (5.8)

TABLE 17 Child-reported autonomy support

Time point	*n*[a]	Mean[b]	SE[c]
PEV 1 (approximately week 5)	101	6.04	0.117
PEV 2 (approximately week 9)	101	5.91	0.116
PEV 3 (approximately week 13)	101	5.97	0.128

n, number of observations; PEV, process evaluation visit; SE, standard error.
a After multiple imputation.
b Score from 1 to 7.
c SE is presented as a descriptive to describe the variability between the 20 imputations in the chained imputation model using child autonomy support at each of the time points for each participant.
Scores are derived from the short form of the Sport Climate Questionnaire.[45]

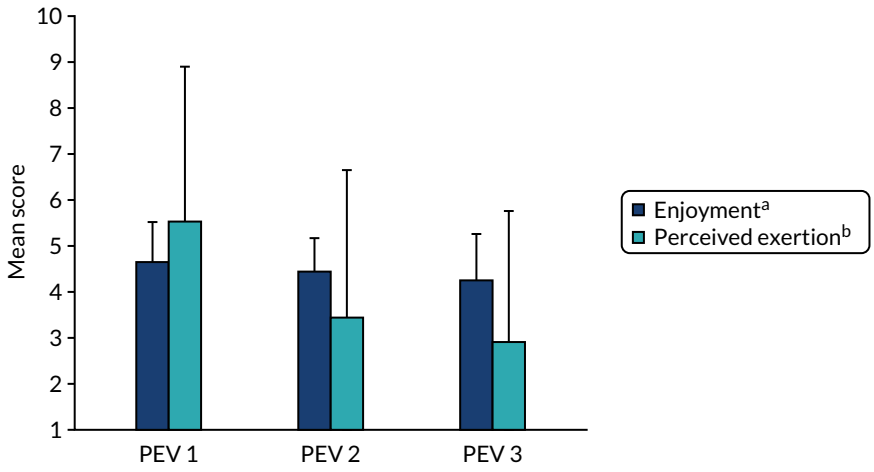

FIGURE 4 Child self-perceived exertion and enjoyment. a, Score from 1 to 5; b, score from 1 to 10. PEV, process evaluation visit.

The results of the enjoyment measure show that children did enjoy all of the sessions observed, with little variation between time points (as indicated by mean scores of > 4). These findings suggest that the intervention was effective at promoting enjoyment and are reflected in the focus groups with pupils and interviews with TAs. During observational visits, project staff also agreed that there was minimal disruptive behaviour.

Session attendance (objective 3b)

Table 18 presents the number, mean and percentage of intervention (club) attendance in each school and overall. *N* represents the total number of pupils who were enrolled in the study and the club, including re-enrolment pupils. The results are presented for all pupils enrolled into the study (including re-enrolment pupils and those who did not attend a single session) and for just those pupils who participated in at least one session, including re-enrolment pupils. Mean attendance refers to the number of sessions attended by pupils (not the number of pupils). Mean attendance is presented as total pupils and for boys and girls separately. The number and percentage of pupils attending > 50% of sessions are also presented overall and by sex.

Overall, the results suggest that attendance in all four schools was good. *Table 18* shows that among those who took part in at least one session, a mean of 19 sessions out of 30 were attended in total, with school 32 having the highest mean attendance (21 sessions). Mean attendance was similar between boys and girls and between schools, which suggests that the intervention was successful in engaging all pupils.

TABLE 18 Mean number of sessions attended (objective 3b)

School	*N*	Mean sessions attended	Mean sessions attended by boys	Mean sessions attended by girls	Pupils attending ≥ 50% of sessions, *n* (%)	Girls attending ≥ 50% of sessions, *n* (%)	Boys attending ≥ 50% of sessions, *n* (%)
All[a,b]							
25	20	17.3	17.7	16.9	15 (75.0)	6 of 9 (66.7)	9 of 11 (81.8)
27	32	15.9	14.1	17.3	17 (53.1)	10 of 17 (58.8)	7 of 15 (40.0)
32	37	18.0	16.5	18.8	27 (72.9)	18 of 24 (75.0)	9 of 13 (69.2)
33	39	17.2	17.1	17.3	25 (64.1)	17 of 25 (68.0)	8 of 14 (57.1)
Total	128				84	51 of 75 (68.0)	33 of 53 (62.3)
Average		17.1	16.4	17.6	66.3		
Pupils who participated in at least one session[b,c]							
25	17	20.4	22.1	18.8	15 (88.2)	6 of 8 (75.0)	9 of 9 (100)
27	28	18.2	18.0	18.3	17 (60.7)	10 of 16 (62.5)	7 of 12 (58.3)
32	31	21.3	23.9	20.5	24 (77.4)	16 of 21 (47.6)	8 of 10 (80.0)
33	37	17.6	18.1	17.3	25 (67.6)	17 of 25 (68.0)	8 of 12 (66.7)
Total	113				81	49 of 70 (70.0)	32 of 43 (74.4)
Average		19.4	20.5	18.7	73.5		

N, number of pupils in the club.
a 'All' refers to all pupils enrolled into the study, including re-enrolment pupils and those who did not attend any sessions.
b Those who joined the club at re-enrolment are measured against the possible number of sessions they could have attended from the point at which re-enrolment was offered, rather than against the full 30 sessions.
c Refers to pupils who attended at least one club session, including re-enrolment pupils and excluding pupils who did not attend any sessions.

To meet progression criterion 4, > 50% of pupils were required to attend at least 50% of sessions. This was achieved when analysing data from all pupils in the intervention arm and only those who took part in at least one club session. Across all schools, an average of 73.5% of pupils attended > 50% of sessions, with school 25 attaining the highest percentage (88.2%). The results suggest that the reach of the intervention was good for those who enrolled in the study and started the club.

Primary outcomes (accelerometer-derived weekday moderate to vigorous physical activity)

Table 19 presents the results comparing accelerometer-derived weekday MVPA between the control arm and the intervention arm at follow-up for the overall sample and by sex. MVPA at follow-up was very similar between the arms and, when adjusted for local authority, recruitment strategy and baseline MVPA, the lack of difference between the arms was reflected in the adjusted difference and 95% CI.

TABLE 19 Potential definitive trial primary outcomes at follow-up (mean accelerometer-derived physical activity): overall and by sex (objective 4a and progression criterion 5)

Outcome	Trial arm						Intervention vs. control, adjusted difference in means (95% CI)
	Control			Intervention			
	n	Mean	SD	*n*	Mean	SD	
Weekday MVPA minutes	139	58.28	19.72	113	58.33	19.28	−0.5 (−4.57 to 3.57)
Boys' weekday MVPA minutes	65	64.06	22.60	50	65.37	20.26	0.06 (−6.59 to 6.72)
Girls' weekday MVPA minutes	74	53.20	15.22	63	52.74	16.60	−0.79 (−5.65 to 4.07)

n, total pupils measured, by arm.
Model adjusted for local authority, recruitment strategy and baseline MVPA.

Among boys there was a slightly higher MVPA in the intervention arm than in the control arm; however, the adjusted difference and CI shows no notable difference. Among the group of girls, MVPA did not appear to differ between the arms and this was also reflected in the adjusted difference and 95% CI. None of these differences and 95% CIs met the 10-minute benefit required for progression criterion 5.

Table 20 presents the results comparing the proportion of pupils meeting current daily MVPA guidelines at follow-up for the overall sample and for boys and girls separately across weekdays and weekend days. The proportion of pupils meeting the 60 minutes of MVPA per day did not appear to differ between the intervention arm and the control arm overall and among the boys and girls separately. This is reflected in the adjusted odds ratios and the 95% CIs. In both arms, the proportion of boys who met the guidelines was generally higher than the proportion of girls who met the guidelines.

Complier-average causal effect analysis

A CACE analysis was conducted to explore the treatment effect of those participants who joined at the second enrolment. This analysis included data from children joining at the first or second enrolments in an unbiased evaluation of the intervention effect (primary analysis of children indicating a willingness to join the intervention at the start). By way of context, for the ITT analysis (primary analysis) there were 10 schools: six in the control arm (number of pupils: 27, 21, 23, 25, 19 and 24) and four in the intervention arm (number of pupils: 17, 32, 29 and 35). These pupils are those who said that they were willing to join the intervention at the start of the study and were followed up for the ITT analysis.

TABLE 20 Potential definitive trial primary outcomes at follow-up (accelerometer-derived proportion of participants meeting daily MVPA guidelines): overall and by sex (objective 4a and progression criterion 5)

Outcome	Trial arm				Intervention vs. control, adjusted odds ratio (95% CI)
	Control		Intervention		
	N	*n* (%)	*N*	*n* (%)	
Total proportion of pupils meeting 60 minutes of MVPA	157	70 (44.59)	123	50 (40.65)	0.75 (0.42 to 1.32)
Total proportion of boys meeting 60 minutes of MVPA	77	40 (51.95)	55	28 (50.91)	0.79 (0.35 to 1.77)
Total proportion of girls meeting 60 minutes of MVPA	80	30 (37.50)	68	22 (32.35)	0.73 (0.32 to 1.66)

%, percentage of pupils meeting guidelines, by arm; *N*, total pupils measured, by arm; *n*, total pupils meeting guidelines, by arm.

For the CACE analysis, three schools had complete accelerometer data for the entire year group at baseline and at follow-up, with a further school withdrawing from the study. Of the three schools, two were in the control arm ($n = 53$ and $n = 24$ pupils) and one was in the intervention arm ($n = 27$ pupils). These pupils did not say that they were willing to join the intervention at the start of the study and therefore could have enrolled had they had the chance at the point of second enrolment. In the one intervention school, one additional pupil joined at the re-enrolment point and provided useful data. We therefore examined, using a CACE methodology, whether or not there was a difference between the one pupil who re-enrolled from the intervention arm and those in the control arm who would have enrolled at the second enrolment had they had the chance, excluding pupils who enrolled in the first phase.

The unbiased CACE estimate of the intervention effect in children joining at the second opportunity is presented in *Table 21*; this is very imprecise as a result of having data from only one child who joined the intervention at this stage. The meta-analysis of the ITT analysis of children joining Action 3:30 at the first opportunity, and the CACE analysis of children joining Action 3:30 at the second opportunity, is also presented in *Table 21* as a demonstration of the analysis we had planned were we to proceed to a full trial evaluation of the intervention.

Secondary outcomes

Accelerometer-derived secondary outcomes

Table 22 presents the accelerometer-derived secondary outcomes at follow-up. The overall mean minutes of MVPA were similar between the intervention arm and the control arm, and, when adjusted for local authority, recruitment strategy and baseline outcome, the lack of difference between the arms remained. A similar result can be seen for mean weekend minutes of MVPA, mean weekday c.p.m., mean weekend c.p.m., mean weekday sedentary minutes, mean weekend sedentary minutes and overall sedentary minutes.

TABLE 21 The CACE analysis

Weekday MVPA	Intervention vs. control, adjusted difference in means (95% CI)
ITT analysis	−0.50 (−4.57 to 3.57)
Follow-up second enrolment (CACE analysis)	205.10 (−129.27 to 539.47)
Meta-analysis	−0.47 (−4.54 to 3.60)

TABLE 22 Potential definitive trial secondary outcomes (accelerometer derived) at follow-up

	Trial arm						
	Control			Intervention			Intervention vs. control, adjusted difference in means (95% CI)
Outcome	*n*	Mean	SD	*n*	Mean	SD	
Overall mean minutes of MVPA	139	55.41	18.99	113	54.53	17.45	−0.75 (−4.49 to 3.00)
Mean weekend day minutes of MVPA	111	45.37	25.35	87	41.94	21.24	−1.34 (−7.90 to 5.22)
Mean weekday c.p.m.	139	545.96	144.46	113	536.76	132.23	−7.47 (−40.74 to 25.81)
Mean weekend c.p.m.	111	467.87	194.12	87	464.06	246.49	12.98 (−52.98 to 78.94)
Mean weekday sedentary minutes	139	474.57	60.04	113	481.61	63.96	10.01 (−6.30 to 26.31)
Mean weekend sedentary minutes	111	462.48	76.54	87	475.14	86.05	6.51 (−21.65 to 34.67)
Overall sedentary minutes	139	2641.70	719.93	113	2718.69	757.85	94.80 (−142.07 to 331.66)

Model adjusted for local authority, recruitment strategy and baseline MVPA.

Questionnaire- and body mass-derived secondary outcomes

Table 23 presents the secondary outcomes derived from the questionnaire, as well as the measured BMI. No psychosocial outcomes show any notable difference between the control arm and the intervention arm once adjusted for local authority, recruitment strategy and baseline MVPA. Age- and sex-adjusted *z*-score was slightly lower in the intervention arm than in the control arm at follow-up. The number of active travel days from school and the number of after-school clubs attended (excluding Action 3:30) were slightly smaller in the intervention arm than in the control arm (1.94 vs. 2.35 active travel days and 1.44 vs. 1.70 number of after-school clubs attended respectively).

Adverse events

No adverse events were reported during the intervention delivery.

Sample size

Data from the feasibility study were used, along with those from other studies that detailed an ICC of the same outcome in school-based studies,[57] to inform the sample size of a definitive trial to detect a 10-minute difference in weekday MVPA.

TABLE 23 Definitive trial potential secondary outcomes at follow-up (psychosocial questionnaire, school travel mode) (objective 4a)

Outcome	Trial arm						Intervention vs. control, adjusted difference in means (95% CI)[a]
	Control			Intervention			
	n	Mean	SD	*n*	Mean	SD	
BMI	162	17.67	2.61	124	17.61	2.87	0.17 (−0.15 to 0.50)
zBMI	161	0.46	1.09	124	0.32	1.16	0.02 (−0.13 to 0.17)
Autonomous motivation physical activity[b]	163	3.42	0.64	123	3.46	0.58	0.06 (−0.08 to 0.20)
Controlled motivation physical activity[b]	163	1.44	0.82	123	1.57	1.00	0.08 (−0.12 to 0.29)
Autonomy need satisfaction[b]	163	4.92	0.86	123	4.95	0.85	0.03 (−0.17 to 0.22)
Competence need satisfaction[b]	163	4.75	0.88	123	4.81	0.76	−0.02 (−0.21 to 0.16)
Relatedness need satisfaction[b]	163	4.96	0.96	123	5.07	1.00	0.06 (−0.17 to 0.29)
Self-esteem[b]	163	3.69	0.50	123	3.76	0.50	−0.01 (−0.13 to 0.11)
Peer support[b]	163	18.00	3.81	123	19.00	4.22	0.74 (−0.49 to 1.97)
School travel mode							
Number of active travel days to school[c]	149	2.50	2.29	109	1.80	2.24	−0.03 (−0.49 to 0.30)
Number of active travel days from school[c]	149	2.35	2.27	109	1.94	2.24	−0.20 (−0.64 to 0.24)
Number of after-school clubs attended	149	1.70	1.38	107	1.44	1.28	−0.11 (−0.42 to 0.21)

zBMI, age- and sex-adjusted *z*-score.
a Model adjustments made for local authority, recruitment strategy and baseline outcome.
b Psychosocial questionnaire scoring.
c Based on number of days walked or cycled to and from school.

The ICC used in the top half of *Table 24* was taken from the observed data in this feasibility study. An average cluster size of 27 and an ICC of 0.01 were used in the sample size calculation. Differing levels of alpha and power were investigated. A 20% loss to follow-up rate was conservatively estimated, and the number required per arm was inflated by 20% prior to further inflation by cluster size. The total number of schools needed varies from 8 (4 schools in each arm) to 16 (eight schools in each arm), depending on the power and significance level. The ICC used in the bottom half of *Table 24* was taken from the primary outcome of the Bristol Girls Dance Project,[57] which was a large cluster randomised trial of an after-school physical activity (dance) programme that focused on weekday MVPA among 11- to 12-year-old girls. The ICC from this study was chosen as an additional measure as this study is the largest UK after-school physical activity study for which an ICC has been reported and it therefore provides the best alternative data available. An average cluster size of 27 and an ICC of 0.001 were used in the sample size calculation. Differing levels of alpha and power were investigated. A 20% loss to follow-up rate was conservatively estimated, and the number required per arm was inflated by 20%. The total number of schools needed varies from 20 (10 schools in each arm) to 38 (19 schools in each arm), depending on the power and significance level.

Data-driven exploratory analysis

After the study findings were discussed with the independent TSC, additional exploratory analyses were conducted to assess whether or not there was any evidence of a potential effect of the intervention on participants who were less active at baseline.

Least active pupils

Analyses to compare weekday MVPA between the control arm and the intervention arm were repeated including only those pupils categorised as least active. Least active pupils are defined as those in the lowest third of the sample in this study in terms of average weekday MVPA. All children who have < 53.44 minutes of weekday MVPA fall into the lowest third. Similar to the primary analyses, *Table 25* shows that there was no difference in weekday MVPA between the arms overall or for boys and girls separately. This was also observed for all other secondary accelerometer-derived variables (data not shown).

TABLE 24 Sample size calculations based on detecting a 10-minute difference in weekday MVPA

Outcome[a]	Cluster size	ICC[b]	α	Power (β)	Number required per arm	Number inflated for attrition[c]	Schools/ arm (*n*)	Total schools (*N*)[d]
Observed ICC								
MVPA/weekday (minutes)	27	0.01	5%	80%	81	101.25	3.75	8
MVPA/weekday (minutes)	27	0.01	5%	90%	108	135	5	10
MVPA/weekday (minutes)	27	0.01	1%	80%	135	168.75	6.25	14
MVPA/weekday (minutes)	27	0.01	1%	90%	162	202.5	7.5	16
ICC from Bristol Girls Dance Project[57]								
MVPA/weekday (minutes)	27	0.001[e]	5%	80%	81	101.25	3.75	8
MVPA/weekday (minutes)	27	0.001[e]	5%	90%	108	135	5	10
MVPA/weekday (minutes)	27	0.001[e]	1%	80%	108	135	5	10
MVPA/weekday (minutes)	27	0.001[e]	1%	90%	135	168.75	6.25	14

a Target difference = 10 minutes of MVPA.
b Observed ICC of weekday MVPA at follow-up (95% CI) was 0.01 (0.00 to 0.45).
c Estimated attrition = 20%.
d Based on 27 pupils per school.
e ICC from Bristol Girls Dance Project.[57]

TABLE 25 Comparison of weekday MVPA for least active pupils only

Outcome	Trial arm						Intervention vs. control, adjusted difference in means (95% CI)
	Control			Intervention			
	n	Mean	SD	*n*	Mean	SD	
Follow-up overall weekday MVPA minutes	48	47.28	13.84	29	45.69	9.15	−1.13 (−6.40 to 4.13)
Follow-up boys' weekday MVPA minutes	17	49.78	15.08	9	45.63	7.55	−0.91 (−9.95 to 8.13)
Follow-up girls' weekday MVPA minutes	31	43.53	13.32	20	43.41	10.13	0.15 (−6.60 to 6.90)

Model adjusted for local authority, recruitment strategy and baseline MVPA.

School context

The context in which an intervention takes place could influence that intervention's delivery, implementation or functioning[58] and, as such, is important to try to understand. Various data were collected during the study to establish school context and its effect on the implementation of the intervention. Details of school size and pupil premium were provided by the school contact or school reception. A school context form enabled members of the study team to collect information on school-level physical activity provisions and school policies on promoting physical activity to staff and students. The components of the form that researchers used were taken from Jones *et al.*'s[48] audit tool, which was created to measure the physical school environment's suitability for physical activity, and Lounsbery *et al.*'s[59] tool, which was devised to assess school policies regarding physical activity and physical activity throughout the curriculum. One form was completed per school. Each school was given a school physical activity suitability score, which is a sum of the scores from the cycling, walking, and sports and play provision components (*Table 26*). Scores were adapted from Jones *et al.*'s[48] original audit tool; facility quality was assessed on a more descriptive scale of 1–5 to improve measurement accuracy. Where a facility (e.g. a marked pedestrian crossing) was marked as present, scores were weighted as yes = 1 and no = 0. Where the quantity of facilities was provided, scores were weighted relative to the mean number of facilities across all schools: 0 = none are recorded, 1 = the number is between one and the mean plus

TABLE 26 School physical activity provision

Provision	School ID										Trial arm, mean (SD)	
	Intervention schools				Control schools							
	25	27	32	33	21	22	23	26	31	34	Control (*N* = 6)	Intervention (*N* = 4)
Cycling provision (0–49)	18	35	16	24	27	48	2	15	5	16	22.17 (14.66)	23.25 (8.54)
Walking provision (0–30)	13	23	11	20	20	30	18	9	5	11	15.50 (9.05)	16.75 (5.68)
Sports and play provision (0–140)	81	74	64	68	49	72	59	71	27	54	55.33 (16.62)	71.75 (7.41)
Other facility provision (0–42)	31	26	16	22	22	27	22	23	16	24	22.33 (3.61)	23.75 (6.34)
Design of school grounds (0–18)	17	18	13	14	15	17	14	16	15	16	15.50 (1.05)	15.50 (2.38)
Mean quality of all facility provision[a]	3.8	4.5	4.1	4	3.6	4.3	4.1	4.4	3.3	4.1	3.94 (0.44)	4.10 (0.32)
Overall physical activity suitability (0–298)	141	146	103	123	105	157	112	118	62	104	123.00 (19.51)	109.67 (30.47)

a Possible response for quality of facilities: 1, all items are low quality; 2, most items are low quality but not all; 3, all items are average quality, or some are good and some are low quality; 4, most items are good quality but one or two are low or average quality; and 5, all items are 'good' quality.

one SD, 2 = the number is greater than the mean plus one SD.[48] The modal quality of physical activity provision is also reported, by school, in *Table 26*. Individual school responses measuring school physical activity policies and physical activity throughout the curriculum are reported descriptively in *Appendices 6* and *7*, but are described in full below. Each school received a 'policy' score (maximum score of 13) and 'curriculum' score (maximum score of 8). Please note that data are presented only for the six control schools and the four intervention schools that delivered the intervention.

School physical activity provision

As displayed in *Table 26*, the between-school variation in physical activity provision scores was high across all schools measured. Variation was highest in the cycling provision scale (range 5–48) and in the sports and play provision scale (range 27–81). Intervention and control school clusters did not differ in average scores for cycling provision, walking provision, facility provision, aesthetics or design of school grounds. Schools in the intervention arm had a slightly higher average score for sports and play provision than those in the control arm and, therefore, a higher overall physical activity suitability score. The average quality of facility provision was high in both intervention and control schools, with little variation among individual item quality scores. We may therefore suggest that intervention schools had, on average, an outdoor environment slightly more supportive of active games according to the validation of the original audit tool.[48]

School policy on physical education provision and physical activity

Appendix 6 presents the scores for the school policy component of the school context audit tool. All schools reported having written or unwritten policies that supported physical activity for their student cohort in some way. Most schools (100% of control schools and 50% of intervention schools) reported having a policy that required PE to follow specific standards. In two control schools, this policy was not formally written/recorded. Two intervention schools had no such policy. Similarly, most schools (control arm, 83%; intervention arm, 75%) had a policy requiring a specific number of minutes be devoted to PE in the curriculum time each week. Half of control and intervention schools also had a written policy encouraging students to walk or cycle to school, and 100% of schools provided cycle training. By contrast, few schools reported consistently supporting staff physical activity through school policies. Only one school (in the intervention arm) reported having a policy supporting active travel for their staff, such as a cycle scheme. Similarly, only two control schools (33.3%) and one intervention school (25%) reported having a policy requiring that all school personnel receive professional development related to physical activity promotion. However, two-thirds of control schools and 100% of intervention schools provided facilities such as showers and cycle parking, which enable staff to travel by active means should they wish. Schools varied greatly in their allocation of budget to PE and PE equipment. All but one control school set aside a budget specifically for PE; however, the level of accountability for that money in different schools appears to differ randomly rather than be in favour of either the control or the intervention arm. PE teachers had some involvement in the spending of the PE budget in all schools; this did not differ by arm. On average, the control and intervention school arms did not differ in school policy scores. It was evident that policies focused mainly on supporting child physical activity, and fewer schools had policies beyond cycle parking and showers that supported or encouraged staff physical activity.

Physical activity in the curriculum

Schools reported a wide variety of other Key Stage 3 subjects that used PE in lessons, including primarily the core subjects. Outdoor learning has become something of an aspiration for all schools across their curricula in recent years, which may explain the high proportion of positive answers to this item on the audit tool. Many schools reported providing regular physical activity breaks during the day beyond PE and usual morning/afternoon breaks, although two of the six control schools did not. Similarly, except in two control schools, teachers were encouraged to promote physical activity to pupils. Pupils were not held back from taking part in curriculum PE in favour of core subjects; however,

two control schools reported that sometimes core subjects were prioritised over PE when competing for access to space or facilities. Overall, there was no difference in the mean score between control and intervention schools in terms of how school policy served to promote physical activity throughout the wider curriculum. A full report of the responses to the physical activity in the curriculum section of the questionnaire for each school is presented in *Appendix 7*.

Table 27 presents a summary of the results presented against the progression criteria and whether or not each criterion was met.

TABLE 27 Summary of results against progression criteria

Progression criterion	Evidence	Met/did not meet criterion
1. One-quarter of schools that are approached agree to join the study	44% recruited	Met
2. One-quarter of eligible Year 4/5 pupils express an interest in the study by returning consent forms	46% returned forms	Met
3. At least 40% of participants expressing an interest in the study are girls	48% opted in at baseline	Met
4. At least 50% of the participants in the intervention arm attend 50% of the sessions	63% average attendance	Met
5. At follow-up, at least a small benefit for weekday MVPA is observed for each of boys and girls, comparing intervention with control schools, and the upper bound of the 95% CI for each difference exceeds a 10-minute benefit for the intervention arm	Adjusted mean difference between the intervention arm and the control arm of −0.50 (95% CI −4.57 to 3.57)	Not met

Chapter 5 Economic evaluation

Aims

This chapter describes the methodology and results of an economic evaluation of the Action 3:30 intervention. Drawing on components of the RE-AIM framework,[12] the aims of the economic evaluation of the project were to:

- assess the potential for examining cost variation in Action 3:30 delivery across school settings (implementation)
- assess the potential for change in HRQoL (effectiveness)
- assess the potential for sustaining the outcome of the intervention from a cost perspective (maintenance).

This short-term analysis estimates the cost-effectiveness and cost-utility of the Action 3:30 intervention, compared with no active intervention, over the 1-year period of the feasibility study. For these analyses, it was assumed that there were no differences in costs or intervention effects between the intervention arm and the control arm beyond the 1-year follow-up period. The intervention occurred over the course of one school year, and, as a result, costs were not discounted. Analysis was conducted in SPSS (Statistical Product and Service Solutions) version 22 (IBM Corporation, Armonk, NY, USA).

Methods

Costing methods

To assess the feasibility of collecting cost data in a definitive trial, the project team used a resource use checklist, adapted from previous studies,[18,57] to collate data on the resource use and actual costs incurred by TAs over the 1-year period of the feasibility study (September 2017–August 2018). In the UK, many primary schools hire external agencies to provide extracurricular physical activity[19] and therefore identifying the potential cost of an in-house extracurricular club delivered by paid TAs is important. Prices were drawn from time sheet data collected by the project team (e.g. printing costs, sports equipment costs and venue hire costs) and from published and established sources. Costs were categorised according to stage of programme delivery and were stratified by school as follows: one-off training resources, recurrent programme preparation resources and recurrent programme delivery resources. Consistent with methods used in the Bristol Girls Dance Project,[57] recruitment and marketing costs were identified separately because they depend on the implementation context for participation in each school setting.

Cost-effectiveness

To estimate the cost-effectiveness of Action 3:30 compared with no active intervention, objectively measured follow-up MVPA for the intervention arm and the control arm and data collected on Action 3:30-related resources and costs were examined. The cost of Action 3:30 producing an additional minute of weekday MVPA compared with no active intervention was estimated by dividing the cost per pupil by the difference between the intervention arm and the control arm weekday minutes of MVPA at follow-up (incremental cost-effectiveness ratio). Average weekday minutes of MVPA at follow-up were calculated using multivariable mixed-effects linear regression, adjusting for intervention arm, local authority, recruitment strategy and baseline mean minutes of weekday MVPA.

Health-related quality of life

To assess the potential for change in HRQoL as a result of Action 3:30, pupils were asked to complete the KIDSCREEN-10[40,41] and the CHU9D[42,43] measures at baseline and follow-up.

KIDSCREEN-10

KIDSCREEN-10 is an instrument for measuring the well-being and HRQoL among children and adolescents aged 8–18 years. It has 12 items, 10 of which start with the stem 'Thinking about the last week . . .' (e.g. '. . . have you felt lonely?'). Responses are given on a 5-point Likert scale from 0 (not at all) to 5 (extremely). Item 11 assesses whether pupils have a long-term disability, illness or medical condition (response options of yes or no; if yes, which one), and item 12 assesses general health, with five response options ranging from 1 (poor) to 5 (excellent).

KIDSCREEN-10 data were handled in accordance with the KIDSCREEN handbook.[60] Negatively formulated items ('Have you felt sad?' and 'Have you felt lonely?') were recoded from 1 to 5. All items were then summed to generate *T*-scores with a scale mean of around 50 and a SD of around 10. A higher *T*-score was indicative of better HRQoL.

Child Health Utility 9D

The CHU9D is a preference-based instrument for measuring HRQoL in young people. It consists of nine dimensions: worried, sad, pain, tired, annoyed, schoolwork/homework, sleep, daily routine, and ability to join in activities. There are five levels representing increasing levels of severity within each dimension (e.g. I don't feel worried today, I feel a little worried today, I feel a bit worried today, I feel quite worried today, I feel very worried today).

Responses to the CHU9D were converted into utility scores[42] ranging from 0.00 (equivalent to being dead) to 1.00 (perfect health). A higher utility score was indicative of better HRQoL.

After-school physical activity provision

To compare the costs and resources associated with Action 3:30 with those of existing extracurricular club provision at participating schools, at baseline and follow-up key contacts at each participating school were asked to provide a description of each existing after-school club, including club duration and cost to the school and parents/guardians.

Results

Costs associated with the Action 3:30 intervention

The Action 3:30 intervention was delivered in four schools. The total cost of the programme, including training, preparation and delivery costs, was £7422.15, with an average cost per school of £1855.55 (based on 2017–18 prices) (*Table 28*). To estimate the costs associated with mainstream delivery of the intervention after 1 year, training costs were excluded, reducing the total indicative cost to £5929.73 and the average cost per school to £1482.44.

One-off training costs were £1494.42, with the cost of the lead trainer the biggest contributor (£750.00), followed by teaching cover costs to release TAs for training (£442.42) and costs associated with venue hire (£300.00). Recurrent programme preparation costs comprised printing costs and the costs of sports equipment, totalling £1113.83 across the four participating schools. Recurrent programme delivery resources were estimated at £4815.90, with programme delivery by TAs the main contributor to the indicative total cost (£3828.30). This involved 240 hours of intervention delivery time and equated to just over 50% of the total indicative cost of Action 3:30. Recruitment and marketing costs were identified separately and totalled £3560.67. These included the costs of the printed information sheets and consent forms issued to all eligible students, costs of the thank-you gifts for participating (frisbees and bouncy balls) and the cost of hiring trained coaches to deliver the taster sessions for the enhanced recruitment method.

TABLE 28 Action 3:30 resources and costs (September 2017–August 2018)

Category and description of resources	Unit cost (£)	Number of units	Total cost (£)	Mean (SD) cost (£) per school ($N = 4$)	Mean (95% CI) cost (£) per pupil[a]
Recruitment and marketing costs[b]	–	–	3560.67	–	–
One-off training resources					
Lead instructor induction training of TAs	–	–	750.00	187.50	6.25
Venue hire for induction training of TAs	–	–	300.00	75.00	2.50
Teaching cover to release TAs for training	–	–	442.42	110.61	3.69
Subtotal			1494.42	373.11	12.44
Recurrent programme preparation resources					
Printing: training guide	18.85/guide	9 guides	169.65	42.41	1.41
Printing: delivery manual for TAs	16.02/manual	9 manuals	144.18	36.05	1.20
Sports equipment	200.00	4	800.00	200.00	6.67
Subtotal			1113.83	278.46	9.28
Recurrent programme delivery resources					
Programme delivery[c]		240 hours	3828.30	957.08 (120.89)	31.90
Lead instructor e-mail/telephone support of TAs	25/hour	24 hours	600.00	150.00	5.00
Printing materials for programme delivery[d]	0.17/activity card	2280	387.60	96.90	3.23
Subtotal			4815.90	1203.98	40.13
Indicative total cost			7422.15	1855.55 (120.89)	61.85 (95% CI 55.44 to 68.26)
Mainstream indicative total cost after 1 year (excluding one-off training)			5929.73	1482.44 (120.89)	49.41 (95% CI 43.00 to 55.83)
Total cost per pupil per session[e]					2.06 (95% CI 1.85 to 2.28)
Mainstream total cost per pupil per session after 1 year (excluding one-off training)[e]					1.64 (95% CI 1.43 to 1.86)

a Average cost per school/maximum number of pupils recruited from each school ($N = 30$).
b Total cost of recruitment and marketing efforts across all 12 schools. Excluded from indicative total cost.
c Two TAs from each intervention school were paid their existing rate in their school (ranging from £11.28 to £18.00 per hour) to deliver Action 3:30 over 30 1-hour sessions (totalling 240 hours' delivery time).
d Post-intervention activity cards for intervention-arm pupils.
e Average cost per school/maximum number of pupils recruited from each school ($N = 30$)/30 Action 3:30 sessions.

The total cost of Action 3:30R per pupil, including training, preparation and delivery costs, and based on a class of 30 pupils attending 30 1-hour sessions, was £61.85 (95% CI £55.44 to £68.26). The estimated total cost per pupil per individual session was £2.06 (95% CI £1.85 to £2.28). After 1 year, when training costs were excluded, the total cost per pupil was reduced to £49.41 (95% CI £43.00 to £55.83) and the estimated total cost per pupil per individual session was £1.64 (95% CI £1.43 to £1.86).

The indicative total cost of Action 3:30R per pupil (£62) was comparable with that reported in the earlier Action 3:30 feasibility trial (£81), and the mainstream cost per pupil after 1 year is almost identical to that reported in the earlier Action 3:30 feasibility trial (£49 per pupil).[18] Few other studies report the costs of children's physical activity, but these estimates are comparable with those that have been reported in recent years.[57,61,62]

Cost-effectiveness

As this was a feasibility trial and not powered to detect significant differences in MVPA, there was no firm basis for creating a cost-effectiveness ratio to compare the change in costs with the change in outcomes (MVPA) through a full economic evaluation. However, a partial economic evaluation was viable and this was conducted on cost changes alone (see *Table 28*).

Health-related quality of life

KIDSCREEN-10

Intervention and control condition KIDSCREEN-10 responses were comparable at baseline and follow-up (*Table 29*). Mean *T*-scores were found to fall within the normative range of European and UK *T*-scores for children aged 8–11 years.[60] As responses were found to be negatively skewed, median-derived *T*-scores were used to generate CIs (95%). The lack of difference between the intervention arm and the control arm responses at baseline and follow-up is reflected in the 95% CIs presented in *Table 29*.

Child Health Utility 9D

The CHU9D-derived utility values were found to be similar at baseline and follow-up (*Table 30*). Similar to the KIDSCREEN-10 responses, CHU9D responses were negatively skewed and, thus, median-derived utility values were used in analysis. The findings reported in *Table 30* revealed no difference in intervention and control arm utility values at baseline or follow-up (95% CIs).

These findings are consistent with previous studies in which HRQoL measures were found to be unresponsive among school children with 'healthy' profiles,[57] and supports the case for alternative HRQoL measures that are appropriate for use with this population.

TABLE 29 Health-related quality of life: baseline and follow-up KIDSCREEN-10 scores

		Outcomes[a]					
					IQR		
Time point	*N*	Mean *T*-score	SD	Median *T*-score	25th quartile	75th quartile	Median 95% CI
Baseline							
Intervention	106	50.28	12.08	48.29	41.24	57.29	45.67 to 51.36
Control	163	50.51	10.21	49.76	43.35	55.07	46.94 to 51.36
Total	269	50.42	10.96	48.29	42.81	55.07	
Follow-up							
Intervention	105	51.56	11.76	49.76	42.27	57.29	45.67 to 53.11
Control	163	49.31	10.39	46.94	42.27	53.11	45.67 to 49.76
Total	268	50.19	10.98	48.29	42.27	55.07	

a Higher scores indicate a better HRQoL. European normative mean *T*-scores for children aged 8–11 years range from 48.53 to 59.27. UK normative *T*-scores for children aged 8–11 years range from 45.40 to 54.66.

TABLE 30 Health-related quality of life: baseline and follow-up CHU9D utility values

Time point	*N*	Outcomes[a]					
		Mean utility value	SD	Median utility value	IQR		Median 95% CI
					25th quartile	75th quartile	
Baseline							
Intervention	106	0.86	0.11	0.88	0.79	0.94	0.85 to 0.91
Control	163	0.88	0.10	0.88	0.81	0.95	0.87 to 0.91
Total	269	0.87	0.10	0.88	0.81	0.95	
Follow-up							
Intervention	106	0.85	0.11	0.86	0.77	0.94	0.84 to 0.89
Control	163	0.85	0.10	0.87	0.79	0.92	0.84 to 0.89
Total	269	0.85	0.11	0.86	0.79	0.92	

a A higher value indicates better HRQoL. CHU9D utility scores range from 0.00 (equivalent to being dead) to 1.00 (perfect health).

After-school physical activity provision

Data on extracurricular physical activity provision and costs were collected from all intervention and control schools at baseline (see *Appendix 8*) and follow-up (see *Appendix 9*). Study schools provided a range of extracurricular physical activity opportunities at a cost ranging from £0 to £45 per session for schools and from £0 to £8.50 per session for parents. As shown in *Table 31*, on average intervention schools provided more extracurricular physical activity clubs per week at baseline (intervention, mean 3.25 ± 0.96; control, mean 2.83 ± 1.47) and at follow-up (intervention, mean 3.75 ± 2.06; control, mean 3.00 ± 1.67). The average club duration across time and condition was approximately 60 minutes. The delivery of extracurricular physical activity clubs cost intervention schools more, on average, at baseline (intervention, mean £4.62 per session ± £11.27; control, mean £0.41 per session ± £1.16) and at follow-up (intervention, mean £9.00 per session ± £15.83; control, mean £3.33 per session ± 9.85)

TABLE 31 Summary of baseline and follow-up extracurricular physical activity provision

Time point	Number of clubs/week, mean (SD)	Club duration (minutes/week), mean (SD)	Cost (£),[a] mean (SD)	
			To school	To parents
Baseline				
Intervention	3.25 (0.96)	61.15 (14.31)	4.62 (11.27)	2.61 (2.81)
Control	2.83 (1.47)	56.00 (6.87)	0.41 (1.16)	1.57 (1.81)
Total	3.00 (1.25)	58.39 (11.06)	2.36 (7.85)	2.06 (2.34)
Follow-up				
Intervention	3.75 (2.06)	65.00 (14.64)	9.00 (15.83)	1.32 (1.62)
Control	3.00 (1.67)	50.28 (7.17)	3.33 (9.85)	1.48 (1.89)
Total	3.30 (1.77)	56.97 (13.28)	5.91 (13.02)	1.41 (1.74)

a Per club session, based on a 12-week school term.

compared with control school costs. Costs to parents were broadly similar across time and condition, with the mean cost per session ranging from £1.32 ± £1.62 to £2.61 ± £2.81.

A comparison of existing extracurricular physical activity provision with estimated Action 3:30 costs suggests that Action 3:30 may offer a more economically viable option for schools than delivery of alternative active after-school clubs. The average cost to schools per pupil attending one 1-hour session of existing extracurricular physical activity at follow-up was found to cost £5.91 (see *Table 31*), compared with an estimated mainstream cost of £1.64 (95% CI £1.43 to £1.86) per pupil per Action 3:30 session (see *Table 31*). However, this cannot be confirmed without a full trial in which the variation in costs between schools is considered.

Summary

A partial economic evaluation was conducted on cost changes alone. Action 3:30 is a low-cost intervention, comparing favourably with other after-school activities in that respect, and helps children to engage in non-sedentary activities. There was no evidence of a potential effect of the intervention on MVPA and, therefore, the potential cost-effectiveness could not be determined.

Self-reported responses to HRQoL measures by participants in the intervention arm and the control arm were similar at baseline and follow-up. This finding is consistent with previous studies[57,62] in which HRQoL measures were found to be unresponsive among school children with 'healthy' profiles and supports the case for considering alternative HRQoL measures that are appropriate for use with this population.

The findings of this economic evaluation demonstrate that there is potential to examine cost variation in Action 3:30 intervention delivery across school settings and to estimate mainstream costs. The estimated cost of the Action 3:30 intervention is comparable with the cost of after-school physical activity interventions that have been reported in recent years. Findings indicate that Action 3:30 is inexpensive, with an estimated mainstream cost after 1 year of £1.64 per pupil per session, compared with the average school-level costs associated with existing extracurricular physical activity (£5.91 per pupil per session). As such, Action 3:30 may provide a more economically viable option for schools than existing school provision.

Chapter 6 Process evaluation

Process evaluations are essential to understanding whether or not interventions have been delivered in the way they were designed, and to identify the factors affecting delivery fidelity. We conducted a process evaluation of Action 3:30 using quantitative and qualitative approaches and the findings were framed within the RE-AIM framework.[12] The RE-AIM framework is a conceptual framework comprising five elements that relate to health behaviour interventions (reach, effectiveness, adoption, implementation and maintenance). The goal of the RE-AIM famework is to encourage programme planners, evaluators, readers of journal articles, funders and policy-makers to pay more attention to essential programme elements, including external validity, that can improve the sustainable adoption and implementation of effective, generalisable, evidence-based interventions.[12] This chapter is structured using each component of the RE-AIM framework as a section to focus the process evaluation findings on these important elements. In addition to quantitative measures, this chapter includes perspectives from pupils, TAs and school staff involved in Action 3:30, as well as external stakeholders, to present a balanced appraisal of the intervention and factors that may have affected its reach, delivery, efficacy and potential sustainability. Our stakeholder groups were pupils who received the intervention (focus groups were conducted with six boys and six girls from each of the four schools that delivered the intervention), the nine TAs who delivered the intervention in the four schools, seven key contacts from schools involved in the project, the lead trainer, and eight external stakeholders from a range of organisations involved with education, health promotion and school physical activity provision. Four key contacts were school staff with a responsibility for PE/after-school club co-ordination, one was a deputy head teacher, and one was a school business manager. No-one refused to participate. External stakeholders included representatives from Sport England, Public Health England, Youth Sport Trust, school sport partnerships and local authorities, and school sports co-ordinators from schools not involved in Action 3:30.

The duration of pupil focus groups ranged from 19 to 49 minutes. The lead trainer interview lasted 42 minutes. The two classroom teacher interviews lasted 4 and 6 minutes. The duration of TA interviews ranged from 45 to 60 minutes, key contact interviews ranged from 8 to 40 minutes and external stakeholder interviews ranged from 11 to 46 minutes. Quotations have been anonymised and are presented with school ID alongside informant group (e.g. School 25, boy; School 33, TA) or, in the case of external stakeholders, their informant group followed by their ID (e.g. external stakeholder 2).

Reach

Using the definitions provided by the RE-AIM framework,[12] and adapting the wording to apply it to the context of this process evaluation, *reach* is defined as:

> *The number, proportion and representativeness of individuals (TAs and pupils) who are willing to participate in Action 3:30 when offered the opportunity, as well as factors that may affect this.*

School recruitment

Of the 27 schools approached at initial recruitment, 12 consented to take part in the study (44.44%) (see *Table 5*). School key contacts cited the main reasons for signing up as to add to their after-school provision and to provide more physical activity opportunities to their pupils, especially for those less active. These reasons also aligned with school policies and/or priorities to get less-active children more active:

> *We actually have a role within school where there's one person who is trying or making sure that they're seeing those children that aren't getting involved in activities and trying to get them to go to clubs. So, Action 3:30 was brilliant because it was kind of doing half that job for us because it's getting those children who wouldn't necessarily go to a sports club to go to them and ticking those off to make sure that all children are active within the school.*
>
> *School 26, key contact*

The key contact from a school with a higher pupil premium (serving a more deprived area) also said that the study was appealing to their school because intervention delivery costs would be covered and the club would be free, a factor they knew was important for parental engagement:

> *I think the fact that it was free was what appealed to a lot of parents.*
>
> *School 32, key contact*

Pupil recruitment

Reasons for enrolling

Across the 12 schools recruited, 459 eligible pupils consented (41%) to take part in Action 3:30 and 228 (48%) of those were girls. Boys and girls signed up because they thought that the club would be fun or different, because it would improve their health or fitness, and because it was free:

> *I wanted to join more clubs. It sounded more active and so I joined it.*
>
> *School 32, girl*

> *I thought it was fun and I thought I would give it a go.*
>
> *School 33, girl*

For girls, either meeting new people or being with friends was a reason for enrolling, suggesting that friendships may be an important factor in girls' participation in new after-school clubs:

> *I signed up because my friends signed up because they thought it was going to be fun.*
>
> *School 25, girl*

Reasons for not enrolling

The main perceived reason why other children did not enrol was that they were not interested in Action 3:30 because they did not like sport and activity, they would rather be doing sedentary activities or they may take part in other clubs:

> *One of my friends said that they didn't like it because they're doing enough sport and they wouldn't have the time in the week.*
>
> *School 33, boy*

These reasons align with those most frequently selected by parents on the 'reason for non-consent' form (i.e. 'My child does enough already' and 'My child is not interested in Action 3:30').

Both key contacts and TAs said that parental engagement could be a barrier to participation because parents may be unable to collect their children from after-school clubs or may be unsupportive in other ways. It was suggested that doing more to involve parents at initial recruitment may be beneficial:

> *I think the only restriction that perhaps a few of them had with attending the club was parental support, to be honest, because I think there are some children whose parents just couldn't be bothered to let them do it.*
>
> *School 32, TA*

Some girls suggested that others may have felt nervous or shy because of not being with their friends, again suggesting that friendships are an important factor to consider when tailoring recruitment methods to appeal to girls:

> *A couple of my friends said that they didn't want to do it because they were a bit nervous because they didn't know who was going to join.*
>
> *School 33, girl*

This was also suggested as a potential barrier by one of the TAs, who linked this to children's perception of their ability or competence compared with that of others:

> *I think some of the problems they have, is that they're in the same group with other people very able. And so perhaps that's not knowing who else is going to be doing it, I suppose, is probably off-putting for some of the ones that don't feel confident.*
>
> *School 33, TA*

Recruitment method

The recruitment method was designed to appeal to children who were less active by promoting that the club would be inclusive, focus on enjoyment and include a range of physical activities rather than sport. This was reflected in some pupils' decision to sign up:

> *The way that they explained it, it sounded more like it would include everybody, not like leave everybody out.*
>
> *School 33, girl*

Some pupils mentioned that they signed up because they thought that the club would be sporty, which may suggest that it also appealed to the more active children or those who were interested in being active:

> *I like sports and I thought it would be sporty.*
>
> *School 25, girl*

The recruitment method allowed all eligible pupils to sign up to the study and involved randomly selecting pupils to take part. However, two of the intervention school key contacts expressed that they would have preferred to target less active children only, rather than randomly selecting:

> *We thought it was going to be targeting those children that aren't currently active in extracurricular clubs. It wasn't until we got a little bit further underway that we understood that it was going to be a complete random thing of whoever would go.*
>
> *School 33, key contact*

Table 9 (objective 2c) indicates that there was no difference in baseline physical activity levels between children who did and children who did not sign up to the study, suggesting that Action 3:30 was successful at appealing to pupils from across the physical activity spectrum, including those who were less active. This was corroborated by TAs:

> *I think there was a mixture, I think there was a lot of them that do clubs already and are very sporty already. But I think there was also a surprising number of ones that don't, actually, so obviously you do appeal to lots of them.*
>
> *School 33, TA*

Teaching assistant recruitment

Interviews with TAs and key contacts revealed that all nine of the TAs who delivered Action 3:30 volunteered to do so, and there did not seem to be any barriers to TAs taking part in those schools. In two of the intervention schools the project was advertised to all TAs in the school, and in the other two the TAs were asked by key contacts whether or not they would be interested in the opportunity. Two of the six allocated intervention schools were unable to deliver the intervention, one of which cited that it was unable to release staff for the training, which suggests that they did have willing staff. The other school was unresponsive, so it is not clear whether or not recruitment of TAs in that school was an issue that affected the school's ability to deliver the intervention.

The principal driver of TAs' signing up was professional development. Other reasons given were that it would be a different experience working with children whom they did not usually work with and that they had a personal interest in engaging children in physical activity:

> *That's the kind of thing that they sold it on, that you'd be going to a training course to run a club as an experiment and that there'd be a qualification at the end of it.*
>
> *School 32, TA*

Teaching assistants at two schools mentioned that they had wanted to deliver the club together and would not have signed up without the other TA. This could be advantageous or prohibitive if TAs would take part only with certain other staff:

> *Which was always our argument, we won't do it with anyone else, we'll do it together or we won't do it basically.*
>
> *School 27, TA*

Pupil attendance

Of those who started the club, 81 pupils (73.5%) attended > 50% of sessions, the highest being 88.2% in school 25 (see *Table 18*). Including those who signed up to Action 3:30 at baseline but did not attend any club sessions, this proportion was 66.3%. In either case, this exceeded the 50% progression criterion. The club clearly appealed to and engaged girls as well as boys, as 70% of girls attended at least 50% of sessions compared with 74.4% of boys. School staff perceived attendance to be excellent:

> *We had great attendance. Our kids were really on board with coming.*
>
> *School 32, TA*

> *The attendance of them staying is probably one of the best in the school.*
>
> *School 27, key contact*

Furthermore, a key contact highlighted that several of the regular attendees at their club were children who did not normally take part in after-school clubs:

> *Really happy that they've got children who wouldn't otherwise have gone involved but also that they, they're staying 'cause you don't always see that either.*
>
> *School 27, key contact*

Reasons for attending

Pupils expressed that they were always keen to attend Action 3:30 and were disappointed if they we unable to attend:

> *Every Tuesday I'd be like thank goodness it's Action 3:30 today but on Thursdays, I'd be a little bit depressed because I wouldn't be able to go.*
>
> *School 25, boy*

When asked for reasons that motivated them to attend, pupils said that they liked the leaders, said that the club was fun, non-competitive and something to do with friends and alluded to the club's autonomy-supportive nature (i.e. ideas being listened to, close relationships with friends, task adaptation):

> *Because of the amount of fun we had and the connection between everyone and we would have great ideas and how our friendship would get better.*
>
> *School 25, girl*

> *I liked when they improved all the games and they added more stuff.*
>
> *School 32, boy*

Barriers to attending

Scheduling conflicts with other clubs

Except for individual reasons, such as family commitments and sickness, the main barrier to pupil attendance was scheduling conflicts with other clubs. When pupils were asked why they could not attend all Action 3:30 sessions, many stated that they did other after-school activities either in or out of school and because of this some children attended only one session per week:

> *I could only meet on the Wednesday because on Mondays I have swimming.*
>
> *School 33, girl*

Teaching assistants and key contacts agreed that scheduling conflicts were likely to be the main reason for non-attendance. Schools found that attendance varied termly depending on the number of other clubs that had been offered at the start of each term:

> *You've got those that used to come on Tuesday but wouldn't necessarily come on Thursday because youth club was running.*
>
> *School 25, TA*

> *Some of them might have come at the start and then last term have gone to a different club but now they are coming back again.*
>
> *School 27, TA*

Parental support

Teaching assistants and key contacts mentioned that parental support was also a potential barrier to attendance. It was suggested that parents may not want or be able to come back to school to pick up their children, especially if they had other children who finished school earlier. In addition, because the Action 3:30 club ran twice per week and was free, parents may have felt less committed to ensuring that their child attended both sessions:

> *I think one of the factors was that some parents didn't want to come at 3.15 p.m. to pick up a younger sibling and then come back again at 4.15 p.m.*
>
> *School 32, key contact*

> *One of the other issues we see is when it's a free club, where there's completely no barrier to entry, you don't always get the commitment from people.*
>
> *School 33, key contact*

Summary

The quantitative and qualitative data collected about recruitment and attendance indicate that, once schools had signed up to the study, Action 3:30 was successful in reaching and engaging a variety of children, including girls and those who normally did not engage with after-school activity opportunities. Engaging TAs in the project was not a problem in four intervention schools but presented a barrier in a school that subsequently withdrew, suggesting that engaging TAs earlier in the process would be recommended. Appealing to parents and offering an alternative to existing provision were highlighted as key drivers of school interest. Barriers to attendance, particularly scheduling conflicts, may have limited the reach of Action 3:30 in intervention schools. The potential impact of reduced attendance at Action 3:30 clubs on intervention effects is addressed in *Chapter 7*.

Effectiveness

In the context of this process evaluation, *effectiveness* is defined as:

> *The impact of Action 3:30 on the children, club leaders and schools involved, as well as factors which affected, or may affect this.*

Effectiveness of the training

As part of the intervention, TAs attended a 5-day training course before the start of the club. The course was intended to teach TAs how to deliver fun, inclusive and active physical activity sessions to a group of children. When the TAs were asked what they had taken away from the training, one replied:

> *Well, how to motivate children; not only in sport, in general. And it's something that we can apply with any other session that we're running with children; giving them that sense of belonging, giving them that sense of autonomy.*
>
> *School 23, TA*

The training involved both practical and theory-based elements, which seemed an effective way of engaging all of the TAs and ensuring that different learning styles were catered for:

> *I liked the mix of doing obviously the paperwork side, the theory stuff.*
>
> *School 32, TA*

The training was also grounded in SDT to promote autonomy, competence and relatedness need satisfaction in the pupils. The training aimed to encourage TAs to adopt an autonomy-supportive teaching style and a positive motivational climate in which children felt a sense of belonging to the club, choice in the activities they do and increased confidence to be active. TAs felt that this was a crucial part of the training and that the content was understandable. TAs perceived their teaching style to be more autonomy-supportive after the training (6.48 ± 0.47) than before (5.83 ± 1.05) (see *Figure 3* – scores out of a possible 7). This is also reflected in the TA interviews, suggesting that the theoretical underpinning was successfully taught:

> *Well, how to motivate children; not only in sport, in general. And it's something that we can apply with any other session that we're running with children; giving them that sense of belonging, giving them that sense of autonomy and all those things. That's what I found interesting.*
>
> *School 25, TA*

Effectiveness of the intervention

As shown in *Table 19*, there was no empirical evidence of difference in daily MVPA between the intervention arm and the control arm at follow-up (adjusted difference in means −0.5 minutes, 95% CI −4.57 to 3.57 minutes). However, key contacts in intervention schools believed that, perhaps because of the design of the activities, the club had a positive impact on pupils' engagement in physical activity, especially for those who did not take part in other, conventional clubs:

> *In terms of those children that aren't accessing anything, I think the games in the multiskills-based thing is good because quite often those children have already decided that they don't want to take part in football or tag rugby or anything like that and maybe need some ideas in games just to be able to get active. So, in terms of getting children more active, I think it's been a positive thing.*
>
> *School 33, key contact*

> *Action 3:30 was brilliant because . . . it's getting those children who wouldn't necessarily go to a sports club to go to them and ticking those off to make sure that all children are active within the school.*
>
> *School 27, key contact*

In addition to aiming to increase MVPA levels, the intervention was intended to demonstrate effectiveness in increasing pupils' enjoyment of and autonomous motivation towards physical activity.

Enjoyment

Pupils enjoyed Action 3:30 very much. When asked to rate Action 3:30 out of 10, pupils were very enthusiastic about the club, with all rating it highly:

> *One hundred out of ten.*
>
> *School 27, girl*

> *I'd give it a ten.*
>
> *School 32, boy*

The pupils stated that they liked that Action 3:30 was fun, had plenty of variety, included lots of active team games and was a mix of two year groups. Pupils from all focus groups mentioned that they enjoyed the child-led focus of the club, which they described as having choice and being able to make up new rules and games. This shows evidence of intervention fidelity, as what pupils describe suggests that TAs followed the leader's manual and took on board the theory taught to them during training:

> *I had enough choice. When we were playing games, we were able to make choices to improve the games, an example, when we played dodge ball, we changed the rules a bit to make it better, it was more fun.*
>
> *School 25, girl*

Teaching assistants also felt that the child-led activities and active team games were the most enjoyed by pupils, and key contacts perceived pupil feedback to be very positive:

> *Most of them enjoyed the ones where they got to add in more rules or change it and we literally said, 'It's up to you.' They loved that.*
>
> *School 32, TA*

> *I think they've really enjoyed it . . . no one's ever said anything negative and the children that have attended have been really positive about it, especially when I spoke to them . . . it's nice to see that some of those children that didn't engage before are now engaging and being very positive about it.*
>
> *School 27, key contact*

Interim process evaluation measures during the intervention reflect the qualitative data presented above, as children also rated sessions as highly enjoyable at the time. *Figure 4* shows that the mean enjoyment rating exceeded 4 for each process evaluation visit (the maximum possible score being 5).

Barriers to enjoyment

Pupils expressed that they enjoyed Action 3:30 less when there was disruptive behaviour (which meant that less time could be spent on activities), when there was a lack of space to play a game properly and when playing individual games that tended to be less active. TAs from two schools expressed that they thought that the pupils did not particularly like the skill-based activities because they were too similar to PE; however, TAs from another school felt that their pupils enjoyed these activities because they could see an improvement in their own performance. One TA also felt that introducing too many activities in a single session decreased pupils' enjoyment because there was too much to learn.

During the focus groups, girls were specifically asked whether or not they felt that the club was suitable and enjoyable for them and whether or not they liked participating with the boys. Girls sometimes felt that boys were slightly dominating, disruptive and unfair, and they had mixed views about whether they would prefer a mixed or a girls-only club. However, being with the boys did not seem to be a major barrier to girls' enjoyment and engagement. TAs in all schools reported that girls were engaged in sessions throughout the intervention:

> *It was very equal, but I personally think that the girls were very, very engaged. You have children like [names of girls], they really got into it and they felt they could lead games and tell people and organise.*
>
> *School 25, TA*

Underpinning of self-determination theory

There was no evidence to suggest that the intervention had the potential to change quantitative measures of autonomous motivation for physical activity, or psychological need satisfaction for physical activity at follow-up (see *Table 23*). Somewhat conversely, the qualitative evidence suggested that the intervention may have resulted in autonomy, competence and relatedness need satisfaction of the pupils.

Autonomy

The focus groups with children suggested that they did feel autonomous during the Action 3:30 club, probably as a result of the autonomy-supportive teaching style that the TAs adopted after training. In addition, *Figure 3* presents data from the TA-self efficacy questionnaire and shows that TAs perceived their teaching style to be autonomy-supportive throughout the intervention (as shown by a mean score of at least 6 out of 7 post training and at each process evaluation visit). This was also reflected in the child autonomy-support questionnaire, as mean scores ranged from 5.91 to 6.04 (maximum score of 7.0) across the three process evaluation visits (see *Table 17*). Interviews with TAs also revealed that they offered their pupils plenty of choice and created an autonomy-supportive atmosphere:

> *We did a lot of breaking it down, getting them to reflect and then changing it, adapting it and they loved going back to the game.*
>
> *School 32, TA*

During focus groups, when children were asked what they liked about Action 3:30, many of them alluded to the fact that they had autonomy. Pupils felt that they had a say in the activities and games they played and were able to adapt them to make them better because TAs listened and took their ideas on board:

> *It was different because in PE we have to do it, whereas in Action 3:30 we get to say what we want to do.*
>
> *School 33, girl*

> *They encouraged us to ask questions and tried to understand the way we wanted to do it.*
>
> *School 32, boy*

Both free choice (e.g. 'what would you like to do?') and option choices (e.g. 'a or b') were offered to the pupils to promote autonomy. Sometimes pupils were able to freely adapt rules or make up new games and other times they voted to choose between games, a mix they seemed to enjoy:

> *. . . they always ask you, 'What could we improve in this game?' or 'What new things could we add in this game?'*
>
> *School 27, girl*

> *. . . everybody sat down, and everybody put their hand up for which games you wanted.*
>
> *School 32, girl*

Teaching assistants highlighted that giving autonomy to every pupil was sometimes difficult because, for example, not all pupils wanted to play the game that the majority voted for or not all pupils were able to express their ideas in every session:

> *. . . but it is difficult because you know we've got, say even if we've just got 19 children . . . we've got 19 answers and I choose one, so that's great for that one autonomy but the 18 . . . so you know it's tricky to hit all of them using that sometimes.*
>
> *School 27, TA*

Competence

The interviews with TAs and the focus groups with pupils suggested that both perceived that pupil competence had increased as a result of Action 3:30. TAs felt that their pupils had become more confident at taking part in physical activity and that they had improved their physical and social skills:

> *It was extremely rewarding to see them change in so many different ways with their physical activity, with their skills, with the way that they became sports people and encouraging.*
>
> *School 25, TA*

When pupils were asked about the difficulty of the activities, those in one school explained that TAs spilt the group based on ability and competence and asked the pupils which group they would rather play in, so that they felt more confident about joining in. Pupils seemed to like this structure because they felt supported and able to join in at their own pace:

> *. . . you had one side, that was the side where you don't feel very confident, but on the other side that was like the one where you felt really confident and knew you could do it. I think on the side where you didn't feel confident, [name of TA] was helping them out, and then on the side that I was on [name of other TA] was saying, 'Yeah, you're doing this right, don't worry'.*
>
> *School 33, girl*

Pupils in the other schools also felt that TAs adapted activities to suit their capabilities, their confidence had improved and Action 3:30 encouraged them to participate in more activities than before:

> *I like doing sports and all that and games, it's just that I was too frightened before I started that everyone would laugh at me. Then as I got better and as the sessions went by I felt like I could become more confident in it. Then that's how I started doing the activities more.*
>
> *School 33, boy*

Among those pupils who took part in the focus groups, it could be suggested that Action 3:30 influenced their competence in other physical activity settings, such as PE:

> *When I was doing PE before we were doing Action 3:30, I was a little like scared if we were doing something like rounders . . . but when I done Action 3:30 I got more confident.*
>
> *School 33, girl*

The process evaluation findings show that pupils felt more active and confident to participate in physical activity, which may suggest that the intervention was effective at increasing competence for some pupils.

Relatedness

Teaching assistants expressed that they thought Action 3:30 had a good club atmosphere and that pupils showed good teamwork and sportspersonship, supported each other and were able express themselves freely. TAs also felt that they developed a good rapport with the pupils:

> *They're well aware of each other as well. So, they knew the children that weren't necessarily getting the ball and maybe couldn't run in quite the same way, so they compensated their behaviour in a way.*
>
> *School 32, TA*

> *I think they do enjoy coming and they enjoy seeing us there and they like love to call out in the dinner hall.*
>
> *School 27, TA*

A friendly and inclusive atmosphere was created within clubs at each school, and both TAs and pupils made the club their own. In one school, children decided to answer the register with 'Action 3:30':

> *They felt that it was their group and they had that sense of belonging and all those things. I think that's when they really enjoyed it and got the most out of it. They took it on board. So, when we were doing register they'd shout out instead of saying, 'Yes,' or, 'Here,' they'd go, 'Action 3:30'.*
>
> *School 25, TA*

Pupils expressed that they were motivated to attend Action 3:30 because they developed new friendships, liked working as a team and felt encouraged and cared for by the Action 3:30 leaders:

> *Because of the amount of fun we had and the connection between everyone and we would have great ideas and how our friendship would get better.*
>
> *School 25, girl*

The qualitative data and observation visits suggest that relatedness was supported and experienced within Action 3:30, and a sense of belonging was alluded to by pupils in the focus groups.

Summary

There was extensive evidence that pupils enjoyed Action 3:30. The after-school programme successfully engaged both girls and boys, suggesting that the format of the sessions and the delivery style appealed to girls. Need satisfaction for pupil autonomy, relatedness and competence was met, according to data from child focus groups. However, there was no quantitative evidence of promise that the intervention could change autonomy, relatedness and competence need satisfaction. These findings and implications for measurement are covered greater detail in *Chapter 7*.

Adoption

Within the context of this process evaluation, *adoption* is defined as:

> *The number, proportion and representativeness of schools (settings) or TAs (agents) who are willing to initiate Action 3:30, including factors that may affect this.*

Adoption in the current project

Over 40% of schools approached were willing to take part. Each of the 12 schools that committed to take part in this feasibility trial did so in the hope that it would receive the intervention. The main barrier given from schools that were initially contacted to take part in the study but did not consent (data not presented here) was that they did not have the capacity for additional after-school provision. Interviews with external stakeholders corroborated this, as they thought that primary schools often already had plenty of after-school clubs and that having the capacity to provide more would be particularly challenging for smaller schools:

> *I think at the moment primary schools are at a place where they're building up their after-school offer on the whole. Some of them have felt they've probably reached capacity in some respects.*
>
> *External stakeholder 2*

Interviews with key contacts in non-intervention schools confirmed that their schools did already have plenty of after-school provision, but this was not a barrier to adopting the intervention:

> *We have got a large school site so, we do have several things that happen after school every day, but we have space to accommodate more.*
>
> *School 22, key contact*

Within the schools that delivered the Action 3:30 intervention, each of the TAs volunteered to do so, suggesting that offering TAs the opportunity to deliver after-school programmes such as Action 3:30 is feasible and can result in adoption. In one of the two intervention schools that were unable to deliver the intervention, the reason cited for this was difficulty releasing staff to attend training to be club leaders, and not a lack of willingness from staff:

> *We had a couple in place but then again, they have full-time jobs and so they couldn't go to the training. We then found someone else who couldn't go on two of the training days and then they wouldn't be fully trained.*
>
> *School 28, key contact*

Contrary to this, a key contact in a control school expressed that releasing staff would not have been an issue for them had they been chosen to receive the intervention:

> *No because it's CPD [continuing professional development] for them and if it's something that they're interested in thinking about building confidence, supporting PE and stuff and I'm not certain all our TAs have.*
>
> *School 26, key contact*

The difference between schools that were able to deliver the intervention and those that were not seems to have been related not to staff interest levels but rather to individual school factors, such as the level of staffing and school priorities. This suggests that more needs to be done at the school recruitment stage to understand school priorities and staff capacity considerations before the intervention is adopted at the school level.

Factors that could affect adoption

Interviews with key contacts and TAs in intervention schools highlighted certain key factors that they felt would affect whether or not Action 3:30 would be adopted by their school or by others, having had insight into the programme. The primary factor key contacts cited was whether or not delivery could be funded:

> *I think the only way that would happen would be if we started charging the children, because the school doesn't have any funds to fund teaching assistants to do clubs.*
>
> *School 32, key contact*

This view was echoed by one external stakeholder, a primary school PE lead, who identified that the cost compared with that of other provision was a crucial factor for schools when considering adopting any new programme:

> *[If you are] . . . going to be introducing something new, it would need the costing to be in line with what we already have in place.*
>
> *External stakeholder 8*

When asked how the programme could be enhanced to maximise adoption in schools, external stakeholders also suggested increasing the flexibility of delivery to allow schools to target different subgroups of pupils in line with their school objectives, or to allow different delivery formats (e.g. at a different time of day) that would fit better with existing school provision. Targeting certain children was also mentioned by both key contacts and TAs, and this is described further in *Maintenance*:

> *Might be inhibitive to some children, so you just might want to consider how the club can be flexibly delivered at different parts of the school day.*
>
> *External stakeholder 1*

Several additional factors were highlighted in external stakeholder interviews as influential in schools' decisions about whether or not to adopt new programmes. These broadly fell into three themes: needs-related, evidence-related and practical considerations.

Needs related

External stakeholders stressed the importance of addressing a gap in provision, which may mean adding an option that creates balance within the programmes they offer:

> *It won't just be about sport, it will be about delivering a balanced programme . . . Because each school might have a slightly different perspective on what they're wanting.*
>
> *External stakeholder 6*

School targets were also highlighted as key drivers of school needs. The notion of whole-school outcomes influencing adoption was supported in external stakeholder interviews, for example whether or not the programme could generate improvements in well-being for all students and not just for one class or year group:

> *If we start with the programme itself and its relevance the key thing about sustainability is that it always has to deliver what the school needs . . . the key to sustainability for most schools is that it has to deliver whole-school outcomes.*
>
> *External stakeholder 1*

Aligned with school needs and gaps in provision was a suggestion to provide schools with guidance on how the programme could (1) benefit them and (2) be used by them. By addressing a need, and by identifying how a programme could cater for it, schools may see the value of a programme more readily:

> *The content is well set in terms of allowing those kids to come into that non-threatening environment and I think if schools were given a bit of guidance on who this might be good for it'd be very simple.*
>
> *External stakeholder 2*

Evidence related

Repeated mention was made of the value of evidence in relation to the potential for adoption of new programmes. External stakeholders emphasised that credibility gained from evidence of impact is a strong driver of commissioning at a regional level via public health promotion teams within local councils:

> *So, with the strategy, we are looking for the evidence base and that's where programmes like yours come in. We tend to only want to commission things that have a good evidence base if possible.*
>
> *External stakeholder 7*

One external stakeholder, who was also a PE lead in a primary school, suggested that schools are more interested in evidence of reliability and consistency:

> *. . . we'd maybe look for that reliability and consistency. Because we have had companies that sent in different members of staff, you know with the children that's not ideal.*
>
> *External stakeholder 8*

Two stakeholders also mentioned credibility in a different context: credibility of affiliation to a respected institution, or 'brand credibility':

> *. . . the one thing that they want to be able to do is to put a logo on their headed paper and to be able to demonstrate to their investors and their governors' networks that they are working with a credible brand.*
>
> *External stakeholder 1*

A third angle on credibility was highlighted by several stakeholders, whereby existing coaching companies that work in schools already have accrued credibility of a different kind, as they have earned the trust of schools by working with them for some time. They suggested that alliances with these external companies might be more advantageous than offering schools a programme that replaces them:

> *. . . actually the company that we built a relationship with now, he was from [local partnership], so I had some background from him . . . and had confidence that he knew how our partnership worked.*
>
> *External stakeholder 8*

> *I think a conversation with a commercial provider . . . I mean if you think about it, University of Bristol carries with it a certain kudos, however, the coaching companies are in every school . . . So, they're already in there, they've already got some credibility so by buying in your product they would enhance what they're delivering, and it would also stop you having to think so much about how you can expand and grow.*
>
> *External stakeholder 6*

Practical considerations

The most frequently cited potential barrier to adoption suggested by external stakeholders was the burden of sending staff to 5 days of training during school hours:

> *I guess to take them out of school for the five days is one element and then it's picking up the after-school cost is a totally separate issue. So, whether or not they can physically afford to do that in addition to the coaching that they might already be paying for, it's a challenge, I would imagine.*
>
> *External stakeholder 6*

External stakeholders and key contacts drew links between the burden of the training programme and the school budgetary concerns, relevant in an economic climate where funding for TAs has been cut in many local authorities:

> *. . . releasing staff was difficult for training because the two staff that we decided on were TAs in resource base where they were one-to-one so that was a cost to the school because we had to make sure that they were replaced.*
>
> *School 27, key contact*

> *I think the availability and resources for TAs have been stripped back and cut hugely in the last 2, 3, 4 years and so actually those people in schools are now not really there or if they are they are stretched to the very limit of their capacities.*
>
> *External stakeholder 2*

However, this was not deemed a barrier in all intervention schools:

> *The release for the training was fine. Obviously, when you lose your teaching assistant it's not great, but you cope with it, it wasn't a huge amount of time.*
>
> *School 32, key contact*

Although the training format was burdensome for some schools, intervention school key contacts and TAs felt that 5 full days of training during school hours was appropriate in terms of both where the burden was placed and creating the right environment for learning:

> *I think having a day you get more time to discuss things. So, you've got more time to go over something if someone's unsure of it. Whereas if it was only a couple of hours, you more likely to rush through it maybe.*
>
> *School 33, TA*

Funding was a recurring theme throughout all interviews. Although there has been a recent doubling of the PE premium funding given to primary schools, which could be used to pay for staff training and after-school provision,[63] there is still very little clarity about what schools are choosing to spend this money on. It is possible that some schools are not aware of what the guidance says they can and should spend it on. Key contacts in two intervention schools stated that they would use PE premium money to run Action 3:30 as an independent club; however, others did not. The external stakeholders we interviewed for this study all believed that this money could be used to implement programmes such as Action 3:30 and that it would be sensible to highlight this when it came to promoting the programme more widely:

> *. . . if you're looking at who is going to buy it I think they would use sports premium to do so, so you need to link what it is with sports premium, with the Ofsted [Office for Standards in Education, Children's Services and Skills] framework, with the childhood obesity plan and then you're half-way there.*
>
> *External stakeholder 3*

Recommendations for how to promote adoption

We asked external stakeholders for suggestions of the best ways to promote the adoption of Action 3:30 or an after-school programme like it. The most prominent recommendations related to targeting decision-makers in schools with useful information, most notably by highlighting how adopting the programme could help schools to meet their targets:

> *I suppose again it goes back to what are their objectives because most people are looking for how can they improve what they do and how can they meet their objectives better.*
>
> *External stakeholder 7*

Mentioned in several interviews with school staff and external stakeholders was the value of staff training and continuing professional development (CPD) opportunities. External stakeholders suggested that this might be important for both staff and pupil well-being, especially in the context of promoting adoption of a programme that contains such staff training within it. This was often mentioned in conjunction with helping schools to meet their targets:

> *I can think of schools that would let their staff out to do that if they could see the benefit, I think a lot of this will be around how you sell it to them in the start to link it in with the benefits that are going to come to the children by doing it I would suggest.*
>
> *External stakeholder 3*

There was also a recommendation to demonstrate the evidence base and readiness to implement the programme at scale:

> *I think often these things are commissioned at scale, so you get groups of schools, partnerships of schools, who would commission something like this together. So, I think it might be quite important to consider that and show that it's ready to be purchased by a number of schools at the same time potentially.*
>
> *External stakeholder 4*

Several of the external stakeholders worked within a regional or national health promotion context, and intimated that a strategic route to accessing the decision-makers and sharing the pertinent information with them would be regional county sports partnership and local school sports partnership organisations, as these have a trusted position advising schools in their area. In addition, two external stakeholders suggested addressing calls for evidence.

Summary

More than half of the schools recruited to the study were above the local authority median for percentage free school meals (an indicator of familial socioeconomic position), suggesting that they represented catchments with a diverse range of socioeconomic backgrounds and were, therefore, representative of their region. All schools involved in the project began with the intention to adopt Action 3:30; however, after randomisation, two schools were unable to proceed because of the impracticality of releasing staff for training. In the four schools that delivered the clubs, adoption by TAs was excellent, indicating that TAs are viable delivery agents. Other barriers to adoption at the school level included congested after-school programmes and the cost of implementation. The unique training programme for TAs was viewed as CPD, a positive factor that aligns with many school priorities. External stakeholders suggested that the best way to promote a programme such as Action 3:30 is to demonstrate that the cost of delivery is at least comparable with that of existing provision; provide evidence of the potential impact (towards school goals or targets, on pupils and staff); provide guidance on how the programme could be used to generate that impact; and use existing regional sports partnership networks to provide decision-makers with this information.

Implementation

In the context of this process evaluation, *implementation* is defined as:

> *Absolute fidelity as well as factors affecting the fidelity of the delivery of Action 3:30 when compared with intended delivery, both at the individual level (TA adherence to protocols and leader's manual) and the structural level (school factors, resources, environment).*

Intended delivery of the intervention

Two TAs from each of the intervention schools were required to attend 25 hours of training. The training was designed to equip TAs to deliver Action 3:30 after-school clubs in line with the Action 3:30 core philosophy and session plan manual. The Action 3:30 after-school clubs were scheduled to run twice per week for 15 weeks. Sessions were designed to last 60 minutes and were intended to be delivered in the order they were numbered in the leader's manual. The joint foci of the club were enjoyment and being active. Sessions were designed to promote maximal participation, skill development, co-operation, problem-solving, physical activity and choice. Within the delivery of the club, TAs were trained to promote and foster autonomous versus controlled motivation drawn from SDT and satisfy the three psychological needs, namely autonomy, relatedness and competence. The following sections use evidence from quantitative and qualitative sources to explore, in detail, whether or not these fundamental intervention components were delivered as intended, and discuss the challenges to implementation and potential improvements.

Intervention fidelity

Dose adherence

Adherence was high in the four intervention schools that delivered the programme, with all schools delivering 30 sessions of 60 minutes each. One of these schools had an extended break for the whole of December because of conflicting school scheduling. As a result, its club ran later in the school calendar than the others and had less continuity.

The prescribed frequency and duration of the intervention was acceptable according to TAs in intervention schools:

> *From a leader's perspective for us it was fine. We knew it was going to run for that long and we were fine with it. It didn't bother us at all.*
>
> *School 25, TA*

Content adherence

To capture adherence, TAs were asked to complete a log book of delivery (see *Appendix 3*). Of all the sessions included in the leader's manual for TAs to deliver, TAs reported that 25% ($n = 30$ between the four schools) were delivered fully, most sessions were delivered partially ($n = 83$ between the four schools, 69.2%) and 5.8% of session plans were not delivered at all (four in one school, three in another). The reason given for non-delivery of sessions was a temporary space limitation at the school, which meant that the TAs chose activities from previous sessions that could be better delivered in line with the constraints of space on that day. This suggests that TAs felt suitably equipped to adapt sessions based on local needs, which was a key focus of the training programme.

To more robustly evaluate fidelity to the intervention content, trained researchers attended and observed three club sessions at each intervention school. All of the sessions that were observed were scored as either fully ($n = 8$, 67%) or partially ($n = 4$, 33%) delivered (see *Appendix 5*), the reason for partial delivery being a lack of time to fit in all of the activities.

Teaching assistants in one school felt that the format of the sessions was too similar to that of PE, and that children would rather move on to new activities than return to the same game after developing game-specific skills:

> *They didn't really enjoy stopping to do a little skill development, like one-to-one sort of games, like partnered games . . . Maybe because it felt too much like a PE lesson.*
>
> *School 27, TA*

Potentially as a result, TAs reported using the session plans as a guide rather than a script as their teaching skills developed and they became more confident in delivery:

> *We used it, initially, as the bible, so we went through it and it worked for us for that because there was just way too much content per session so then we took it as a starting point, didn't we?*
>
> *School 33, TA*

Factors affecting implementation fidelity

Training

The TA training was implemented as intended. Attendance at training was 100% for eight TAs and 80% for one TA. The timing of the sessions meant that there were no conflicts of schedules, and all TAs were able to stay for the full duration of each of the training days.

All of the training sessions were delivered fully, according to the lead trainer's log book. This was corroborated by the accounts of project staff who supported the delivery of the training days. Although TAs had a wide variety of experience levels, their engagement during the training was excellent according to the lead trainer who, in a post-training interview with project researchers, stated that they were one of the most engaged groups he had taught. He attributed this to well-explained course aims and a clear translation of Action 3:30 into relevant practice for the TAs: further evidence of training fidelity. When asked whether or not any content was missing from the training to equip club leaders with the knowledge and skills to deliver the intervention, he suggested that it was comprehensive. No barriers to implementation of the training were stated by either the TAs or the lead trainer:

> *I personally think you would struggle to add anything that's going to add value to it.*
>
> *Lead trainer*

Resources

As described in *Chapter 2*, *The Action 3:30 intervention*, in addition to the leader's manual (containing the 30 session plans), TAs were supplied with a training guide and £200 was provided to each intervention school to buy any equipment they needed to deliver Action 3:30. Based on recommendations from the original Action 3:30 feasibility trial,[18] an online video archive was also created. It is unclear whether or not or how TAs used the training guide after the training. One TA suggested that it was useful but did not expand on how. One TA expressed that they would have liked to have used the training guide more during the training, as that would have helped to embed the training concepts. TAs focused on the session plans as their main resource. Session plans, although sometimes content-heavy for the time allotted, were valued by the TAs because they were pre-prepared:

> *. . . the fact they were even there, made it more enjoyable . . . you can rock up and you know, know there's something you're going to be able to do and it'll be fine and they're going to enjoy it, rather than it being the pressure on to rock up and think, 'What are we going to do today then?'*
>
> *School 33, TA*

Because the session plans were written, a limitation of them was that some of the activities were difficult to visualise:

> *I think some of the games were like, 'I don't get that,' and I had to really break it down. I used to get a piece of paper and was like okay, spots, and drew spots, and then it was like hoops, right hoops and so we were almost teaching ourselves the game.*
>
> *School 25, TA*

The online archive containing demonstration videos of 22 of the session activities was used by TAs from three out of the four schools that delivered the club. However, tracking statistics reveal that videos were accessed more frequently towards the beginning of the delivery period. Videos corresponding with sessions that appeared early in the delivery manual (sessions 1–6) were accessed, on average, 23 times each by a range of TAs. Access numbers fell as the intervention continued, and the videos for sessions 13–30 were accessed only four times each on average, and by only two people. TAs stated that they found the videos most useful if the activity in the session plan was unfamiliar to them, but pointed out that many of the games learned in the training programme were those covered in the videos, which was not as helpful. Others expressed that because the videos showed only six to eight children performing an activity, they lacked relevance for conducting the activity among larger groups. However, TAs in one school perceived that they usually had insufficient time to watch the videos before sessions anyway.

The £200 provided to intervention schools to buy sports equipment needed to deliver the club was crucial to delivery, according to TAs:

> *That was extremely helpful, and it was needed and we wouldn't have been able to do some of the sessions without it.*
>
> *School 25, TA*

School support

School-level support within the intervention schools that delivered Action 3:30 varied. The TAs and key contacts perceived the school's main supporting role as one of logistics. However, differing levels of engagement from the school administration staff contributed to very different experiences of delivery for TAs. In two schools, TAs felt that their school prioritised the club and facilitated delivery and attendance:

> *We are lucky because there was one occasion where they wanted the hall space and we just went and said, 'Actually, do you remember we've got this?' And they went, 'OK, we'll go there'. So, nobody turned around and said, 'You can't have the hall today'. They knew on a Tuesday and Wednesday that was our hall space.*
>
> *School 32, TA*

Teaching assistants from the other two schools described administrations with less interest and poorer communication of key information, which contributed to them feeling less supported:

> *No one really took much notice, to be honest with you. In actual fact, one session we had to go from the Key Stage 2 hall to Key Stage 1 because they organised with some life team or something to be in school and they never put any thought into that actually we were going to be using the hall and those sorts of things.*
>
> *School 25, TA*

However, the TAs at one school went on to state that the school had shown support in other ways, and suggested that they would receive support if they asked for it. The key contact at the same school expressed that the autonomy demonstrated by the TAs running the club had been noted and was valued:

> *They sort of just run with it. They went on their training. I checked in with them. They haven't ever come to me and asked me anything, which has been fab because I'm really busy with my PE as well.*
>
> *School 27, key contact*

School policies and the physical environment (school context) could have affected the level of school support provided to Action 3:30 clubs in the intervention schools. The results of the school context assessments in both intervention and control schools are presented in *Chapter 4*.

Quality of delivery

Space and season

The most frequently cited factors that affected the delivery of Action 3:30 sessions were weather and space. Space, in particular, was cited as a main barrier to delivery fidelity, to the extent that some children reported safety concerns about playing in a limited space containing obstacles:

> *I think our biggest barrier for any club is always our space, but you just deliver whatever works for you.*
>
> *School 32, TA*

> *I hurt myself like loads of times on chairs.*
>
> *School 25, boy*

Weather was closely linked to the space issue, as running Action 3:30 during winter months often meant that the club had to be conducted indoors, where there was less space. Conversely, if the inside space was not available, then the club would need to be run outdoors in adverse weather, which could also have affected the quality of the session. Taking into consideration the season in which Action 3:30 is delivered may address some of these issues in schools that run the club:

> *. . . and it's been through the winter as well so it's not even like you could – we did go outside as much as we could. You just get on with it, don't you? You match your games to suit.*
>
> *School 32, TA*

Delivery style

Children's feedback characterised the delivery style of the club leaders as clear, fair, encouraging and supportive:

> *They're good teachers, they're really supportive and they always want to hear anything you say, they'll listen.*
>
> *School 25, boy*

Children also highlighted that TAs adapted games in the sessions to make them more fun, as well as enabling the children to dictate the adaptations, giving them a sense of autonomy:

> *I liked the games that they made. I liked that they tried to make different rules and they tried to make it different in order to make it more fun.*
>
> *School 27, girl*

Social factors

Other factors that may have affected the quality of delivery were identified in interviews and focus groups. TAs in two schools found that friendship issues, especially between girls and between siblings, seeped into the club and affected the dynamic of the session.

Knowing the children before the club started was also raised as an important factor that could affect club dynamics and, therefore, delivery:

> *We're privileged because we know our children really well but in other schools they might not necessarily know their children quite so well and that could have quite an impact on how the club runs but it is just something you can't foresee.*
>
> *School 32, TA*

Teaching assistants made little mention of disruptive behaviour adversely affecting delivery, except in one instance:

> *I think that the problem with that is it was the behaviour was actually what we expected from that particular – there were a couple of children that we knew would be that way, so we knew it would happen. I just think at that particular point that one particular day it was just really, really bad.*
>
> *School 25, TA*

Children expressed that disruptive behaviour did sometimes adversely affect their enjoyment, but that TAs dealt with it well overall. Children reported the use of a warning system, which was suggested in the training guide as a way to manage disruptive behaviour. This again provides evidence of good intervention fidelity:

> *Very well. Sometimes, they made them go next to them or they said, 'You're not playing for 5 minutes' which is good because some people were shouting, so they told them to quiet down. They had three warnings.*
>
> *School 32, girl*

The key contact in one school mentioned that a group of children with mixed levels of ability adversely affected the TAs' ability to deliver a high-quality club:

> *One of the main things is probably the difference is the ability of the group that's difficult to manage . . .*
>
> *School 33, key contact*

However, mixed-ability groups were not seen as a barrier by the TAs themselves as they used peer-to-peer learning, and this view was supported by the key contact from another school:

> *If they're all struggling, then you wouldn't have been able to manage it, would you, you need some that are a bit more able cause actually they can show other children . . .*
>
> *School 33, TA*

> *Sometimes there can be quite a mental block for children if they find it difficult or it's very competitive, so it's quite nice to have those children that are already keen to spur those other children on.*
>
> *School 27, KC*

Potential improvements

Teaching assistants, key contacts and children raised certain recommendations of ways in which the implementation of the programme could have been further optimised. The main improvements suggested were to the session plans, for example adding diagrams to make them easier to understand and visualise:

> *Sometimes when you read it it's hard to set it out, to visualise it. So, if you had a little picture of how it needs to look.*
>
> *School 25, TA*

Additionally, TAs and children alike would have liked to spend more time outside, a factor linked to enjoyment, space and safety, all of which are essential to the fidelity of delivery of the planned Action 3:30 sessions. These factors are addressed in more detail in *Maintenance*.

Summary

Overall, TA training was implemented as intended, with few suggested improvements. Intervention adherence was consistent across schools and acceptable. Among the resources provided, the leader's manual and money for sports equipment were used extensively by all TAs to facilitate consistent delivery of the intervention. The training guide that accompanied the training and the video archive were used to a lesser extent, although all TAs intimated that these were reassuring resources to have available. Limitations of the resources included confusing descriptions of some activities in the session plans, and a lack of videos for activities that were not covered in the training. The training was deemed comprehensive and supported high adherence to content. Adherence was primarily affected by resource utility and environmental factors. The overall fidelity of implementation of Action 3:30 core principles was high, despite different TA experiences.

Maintenance

Within the context of this process evaluation, *maintenance* is defined as:

> *Factors perceived to affect potential maintenance of Action 3:30.*

This section will present evidence of maintenance in Action 3:30 intervention schools, highlight the factors which may affect maintenance and propose potential improvements that may be useful to consider for future development and implementation of physical activity after-school programmes.

Evidence of maintenance

One intervention school decided to continue to run Action 3:30 post study. Both the key contact and the TAs expressed that they would be running Action 3:30 twice per week for the rest of the current term and the following academic year, and that they would be making minimal changes to the way that the club was run:

> *We might change the age range but no, other than that, I think we will just carry on.*
>
> *School 27, TA*

Key contacts from the other three intervention schools also expressed an interest in continuing the club, and the other TAs voiced a desire to run the club again if given the chance.

The TAs believed that the intervention resources provided ample activities and ideas to reuse, adapt and continue with. They also felt that the autonomy-supportive teaching style, adopted because of the training, was an important factor in the maintenance of the club. All TAs said that they would continue to include child-led activities if they were to continue, and one school was particularly interested in tailoring the club to the needs of the new intake of pupils and ensuring that there was a child-led focus:

> *. . . it's really great to be child-led I think . . . So, I think that whatever works for the children, they probably will have different children so it's probably good to try out those sessions first of all, see what the children like and then run with what they like.*
>
> *School 27, key contact*

Both the TAs and the key contact in school 27 discussed the possibility of delivering the club to younger pupils on one of the club days; they felt that the content was easily adaptable and felt that Key Stage 1 pupils have little opportunity to get involved with extracurricular activities:

> *. . . we'll run it slightly differently as we won't have two sessions for a week. We'll have one Key Stage 1 and one for Key Stage 2 . . . we would like to get Key Stage 1 more active because we haven't got any provision at the moment for that.*
>
> *School 27, key contact*

This was also echoed by other TAs, who thought that Action 3:30 would be well suited to a wide range of year groups and that the resources and delivery style were flexible enough to suit younger children who may not have the same opportunities to participate in active clubs:

> *I think there were some children that I personally work with who would benefit a lot from it seeing how much other children have got out of it. And I think it's suitable for all of primary school.*
>
> *School 25, TA*

> *. . . if you ran across Year 2 and Year 3 they're probably the age groups which don't really have that much opportunity to participate.*
>
> *School 32, TA*

External stakeholders were also of the opinion that flexibility of delivery was an important factor in the sustainability of physical activity programmes and that being able to target different age groups would be beneficial for schools:

> *Perhaps schools can use it as a resource to then target more throughout the year. So, they might have different groups accessing it at different times in the year.*
>
> *External stakeholder 2*

Interviews revealed that one school had decided to continue a very similar version of the Action 3:30 club, and that TAs and key contacts agreed that the resources and training provided enough of a foundation to continue Action 3:30 without the support of the study team. TAs, key contacts and external stakeholders all agreed that Action 3:30 was a flexible programme that would be suitable for a range of year groups. Together, this suggests that Action 3:30 may be a sustainable programme that could be maintained within schools for the foreseeable future. However, several barriers were raised that could prevent schools from maintaining the delivery of the club.

Factors affecting maintenance

Funding

The main cited barrier to maintaining Action 3:30 post study in the intervention schools was funding. Delivery was funded by the Action 3:30 research project for this study; however, going forward schools had to be able to identify funding (whether core budget, Sports Premium Fund or other external funds). All intervention school key contacts mentioned that they would have to find funding to cover staff costs, as TAs would be unlikely to be willing to deliver Action 3:30 on a voluntary basis, a view reinforced by TAs, as only one said that they would deliver voluntarily. The viability of paying TAs for delivery twice per week was raised and one school suggested that parents would need to be charged for delivery. Three schools mentioned the government's PE Premium as a way of funding the club.[20] The key contact in school 27 said that they would use this funding to continue Action 3:30.

The key contact in school 33 advocated that this funding could be used if they were to continue, but that delivery would be difficult to sustain once the funding runs out in 2020:

> *I think the only way that would happen would be if we started charging the children, because the school doesn't have any funds to fund teaching assistants to do clubs.*
>
> *School 32, key contact*

> *. . . at the moment we have this Sport Premium funding from the government and so we've got quite a lot of money to be able to spend. It's something that after 2020 we wouldn't be able to fund.*
>
> *School 33, key contact*

One external stakeholder, who was also a primary school PE lead, reduced the sustainability potential of after-school clubs to two components, which were cost and pupil enjoyment:

> *I guess from my school it basically comes down to cost and pupil enjoyment.*
>
> *External stakeholder 8*

When probed further, this stakeholder highlighted that an important factor for schools and parents alike was running costs being comparable with those of other activities on offer:

> *Well if they're charging the parents, then it needs to be a competitive rate in line with all the other things that we've got on offer currently.*
>
> *External stakeholder 8*

Equipment

As part of the study, intervention schools were provided with £200 to buy the required equipment. When asked about this, TAs expressed that the money had been crucial to delivering some of the session plans, despite the equipment list detailing only equipment that is typically found in schools. This suggests that if the programme were to be adopted and maintained in other schools, a lack of money to buy sufficient equipment may be a barrier in some:

> *That was extremely helpful, and it was needed, and we wouldn't have been able to do some of the sessions without it.*
>
> *School 25, TA*

Club days

The Action 3:30 intervention was delivered twice per week. Some of the TAs, key contacts and external stakeholders suggested that schools may find it more sustainable to deliver the club once per week, as a result of lack of funding, scheduling around other clubs, burden on TAs and commitment for parents. Nevertheless, TAs and the key contact from school 27 stated that they planned to continue to deliver the club on 2 days, which suggests that the intervention can be sustainable in its current format depending on school-specific issues:

> *That's the only thing, really, just the once a week instead of twice a week.*
>
> *School 25, TA*

> *I suppose that works with your staffing, doesn't it? And with the clubs you've got running in the school.*
>
> *School 32, TA*

> *If it's too frequent it's quite a big commitment so sometimes numbers drop off because of that.*
>
> *External stakeholder 3*

Training

Training is a key aspect of the maintenance of Action 3:30. TAs were provided with the skills, expertise and qualification required to deliver a physical activity club, which they can continue to use and/or develop. The qualitative findings show that school staff valued the need for CPD and perceived Action 3:30 as a good chance to upskill their TAs for the future:

> *We valued them going out and doing the training.*
>
> *School 27, key contact*

Many of the external stakeholders also voiced that schools are always interested in developing their existing staff, and so the Action 3:30 training model should be very appealing to schools because it helps them to achieve sustainability:

> *They would have a resource in place in the school that they would be able to use subsequently so I think using existing staff is a really good model.*
>
> *External stakeholder 3*

> *The primary schools are being challenged around the sustainability of how they use that funding. So, great focus is given, and encouragement is given around the agenda of upskilling their existing school workforce.*
>
> *External stakeholder 5*

External stakeholders described the TAs as a valuable resource to the school, which is good for sustainability. However, they also raised that if the TAs were to leave or change role, the Action 3:30 programme would be difficult to maintain if continued training was not provided for new staff. It was suggested that an approach could be taken whereby the existing TAs are also trained to be able to train new staff and therefore transfer their knowledge and skills. This would then increase the likelihood of the programme being maintainable:

> *So often just training two people is not sufficient, you need to maybe train four and keep them involved on a rotating basis in the programme if possible. So, you keep the skills up, but you also keep a number of people involved and whether there's some sort of train the trainer so those who are already there, if somebody new starts after the funding runs out, they have got a model to take it forward.*
>
> *External stakeholder 7*

Overall, the training model used in Action 3:30 is valuable to schools and is sustainable if the same TAs continue to use the training.

Targeting children

Targeting children to attend the club was raised by different stakeholder groups. As described in *Reach*, some key contacts initially thought that they would be able to target certain children at the recruitment phase. Key contacts and TAs said that, if the club were to continue, they would like to first advertise the club to certain children who they felt were less active and did not participate in other physical activity after-school clubs, before opening the club to others:

> *Probably what we'll do is we'll target and then we'll open it up to everyone.*
>
> *School 27, key contact*

> *Think there are certain things that we would tweak and change. It would be something that we could potentially run again . . . but we would target specific children from specific groups.*
>
> *School 33, key contact*

External stakeholders agreed that schools would probably want to target which children they deliver the club to or extend the club's reach to other pupils and agreed that ensuring the programme is flexible enough to cater to schools' needs is important for its sustainability:

> *You can just adjust it dependent on the children you've got in front of you. I think targeting and selecting, sympathetically selecting children could be developed a little bit more because we've always been a bit uncomfortable with the idea of just saying, you know, these are the kids that aren't doing anything.*
>
> *External stakeholder 2*

Teaching assistants also mentioned that they would prefer a smaller group if they were to run Action 3:30 again and so would reduce the recruitment target number to between 15 and 20, as some felt that their group was too big for their facilities:

> *I think they're thinking we will do it for about 20 rather than 30 when we do it for the school.*
>
> *School 27, TA*

Selecting the number and type of children seems an important consideration for the maintenance of Action 3:30 in schools. Using Action 3:30 to target children appears to be driven by school priorities around providing physical activity opportunities for those seen to be doing less or to have fewer opportunities. Maintenance of Action 3:30 is therefore contingent on its utility in meeting school targets.

Club focus

Although not raised as a barrier, the focus of Action 3:30 sessions was something that TAs and key contacts suggested would be tweaked to suit the children in the group to make the club sustainable. TAs and key contacts liked that Action 3:30 was centred around enjoyment, being active and having child-led activities, and suggested that they would like to focus more on these aspects of the programme rather than skill development:

> *Our focus is enjoyment so . . . we are not there to teach them cricket or to teach them . . . but we are there for them to have fun and learn some more social skills of being active and enjoy being active differently.*
>
> *School 27, TA*

> *I know it needs linked to skills but, but it would have been, you know sometimes I felt it was more about just enjoying it rather than trying to build skills, teach skills, cause that's what their PE lesson is more for.*
>
> *School 33, TA*

External stakeholders also agreed that the programme should be based on the children's needs, so schools may want to adapt the intervention resources to achieve a slightly different outcome or to better cater for the targeted group of children:

> *With the children that probably will be targeted for this, which are the less sporty, less active, less confident children . . . there may be ways of developing what's actually offered to them, so they could increase the amount of activities and sports covered within those sessions or make it a little bit more child-centred in terms of the contents.*
>
> *External stakeholder 2*

Evolving content

Several external stakeholders asserted that ensuring that programme content is regularly refreshed is essential to the sustainability of any successful after-school programme, and thus may be an important factor to consider for the maintenance of Action 3:30:

> *As soon as you start to take away the elements particularly around investing in people – so your focus on teaching assistants – and continuing to keep the content fresh and exciting for children, you start to see a rapid decline in how clubs are embedded and how programmes are embedded and sustained.*
>
> *External stakeholder 1*

Potential improvements

Potential improvements were discussed during interviews with TAs, key contacts and external stakeholders and during focus groups with pupils. Several themes emerged from the qualitative data, which were categorised into space and season, parent engagement and peer leaders.

Season and space

Both TAs and pupils stated that they would have preferred the intervention to have run through the spring/summer term, so that they could have used the outside facilities more and had more space for the big group games:

> *I think it would also be really nice to do, instead of in the winter months, do it [in] spring/summer months . . . I wondered maybe even if more children would attend those months.*
>
> *School 25, TA*

> *To improve benchball, you could have a bigger area. We could take benches outside.*
>
> *School 32, boy*

Space and season were also mentioned as barriers to implementation. Therefore, for maintenance, considering the season in which the club runs seems prudent.

Parent engagement

Parent engagement has been raised previously as a likely barrier to both recruitment and attendance of Action 3:30. Despite key contacts and TAs stating this as a potential barrier, they did not highlight many ways to increase engagement, except for trying to have face-to-face conversations with parents.

External stakeholders suggested that involving parents in the delivery of the club, potentially as volunteers, may be a way to increase parental engagement. However, this may not be a viable approach for schools and is likely to engage only the more proactive parents.

Although parental engagement may be a potential barrier to the sustainability of Action 3:30, the findings from this process evaluation do not suggest many ways to improve this. Future physical activity interventions aimed at primary school children should aim to better understand how to engage parents.

Creating peer leaders

One external stakeholder suggested involving children who had already participated in Action 3:30 in the continuation of the programme as a potential improvement. The external stakeholder proposed that letting children help with the delivery of the club and giving children ownership is an effective way to achieve sustainability:

> *The tipping point for us, or the landmark point for us, was when we gave ownership of the delivery of the clubs to children . . . Year 6 pupils who had ownership of the club, the delivery of the club, and were able to tinker with the activities and the way in which they were delivered and provided almost like a buddy relationship with the children that were involved and at that point the clubs really exploded, not just in*

> *terms of the amount that were delivered but, you know, even consistently now there's still over eight and a half thousand clubs running and they are largely due to the fact that they are delivered by children for children.*
>
> *External stakeholder 1*

This was also suggested by the key contact as a strategy that school 27 (which is continuing Action 3:30) may consider adopting:

> *Maybe we might even make some leaders because we've done that before, so some of the children who are doing it now could then go and help.*
>
> *School 27, key contact*

Summary

Evidence of maintenance was seen in this iteration of Action 3:30, as one school decided to continue running the club and the other intervention schools also expressed an interest in doing so. Interviews with key stakeholders suggested that there are several factors affecting the potential maintenance of Action 3:30 as an after-school programme in other schools. These included delivery costs comparable with those of existing provision, funding for delivery and equipment, continued TA training, the number of weekly sessions, and the versatility of the club to enable targeting while keeping children engaged by evolving the content.

Trial design and evaluation

In addition to the RE-AIM analyses, a number of key trial design issues arose from the qualitative work. These are discussed below under the headings of *Recruitment*, *School burden*, *Re-enrolment* and *Potential contamination*.

Recruitment

In general, the pupils were positive about the recruitment method. Pupils across the intervention schools stated that the study was clearly explained to them by the project staff and that they had the opportunity to ask questions:

> *I think it was clear . . . I understood all of it.*
>
> *School 27, girl*

Table 8 shows that when comparing the two recruitment methods (briefing only vs. briefing plus taster) there was no difference in the number of pupils who signed up. However, qualitative data show that pupils who received a taster session thought that this was a fun experience, which aided their decision to join Action 3:30. In addition, in one school that received only a briefing, TAs suggested providing a taster session for the pupils, which parents could also attend, as a potential improvement to the recruitment method. Therefore, although the quantitative data show no difference in recruitment rate by recruitment method, taster sessions generated enthusiasm for taking part in Action 3:30 or were suggested as a way to do so. Key contacts agreed that advertising wearing the accelerometers as part of the project was a key interest for the pupils and one of the reasons they decided to sign up.

School burden

Key contacts in both the intervention and the control schools alluded to the increased administrative burden during recruitment and data collection visits. Key contacts mentioned that arranging suitable times for project staff to visit, sending out paperwork and chasing the return of accelerometers and questionnaires were the main jobs that increased their workload. However, most stated that they did not find this particularly burdensome and that the workload was manageable. This was also the case for key contacts and school teachers in opt-out schools, where burden may have been higher because they had to

organise data collection with all pupils from two year groups. Three out of four key contacts from opt-out schools said that project staff gave advanced notice, communicated well and provided good resources during the project, which helped to mitigate the burden. School staff acknowledged that the opt-out consent process was an effective way of collecting data from two year groups and lowering the burden on parents. All key contacts agreed that the thank-you gifts provided during the opt-out phase helped to create interest for the study as well as encourage the return of accelerometers. Although it was helpful to collect qualitative data from school staff about the opt-out process, it should be noted that as a result of changes resulting from the introduction of General Data Protection Regulations legislation, an opt-out consent process will no longer be permitted in research with primary school age children in Europe. Therefore, the viability of this method is very limited. However, this is not the case for countries outside Europe and so this evidence could help to inform other similar school-based studies. In addition, TAs expressed that they had received enough support from project staff throughout the project, on training days and during the club, which also helped to mitigate burden.

Re-enrolment

A re-enrolment phase was conducted after approximately the 12th session of the intervention in all four of the intervention schools. *Table 15* refers to the number of children who were recruited at the re-enrolment phase in each school. As the table shows, re-enrolment had mixed efficacy at backfilling the available spaces in the club as intended. The re-enrolment process appeared to be similar to the school norm in two schools. In addition, key contacts and TAs from the other two schools understood the value of the process. In three out of the four schools, TAs expressed that the additional pupils positively influenced the existing group of children. Generally, TAs and key contacts did not feel that the process added to their workload too much and were happy to distribute the resources. However, the key contact and TAs from one school suggested that the resources could have been editable to reduce burden. Overall, the data suggest that the re-enrolment phase was not overly burdensome to schools and increased external validity.

Potential contamination

There was no evidence of potential contamination in this study. None of the key contacts and TAs was aware of any other schools in the local area that may have adopted an after-school programme similar to Action 3:30 because of seeing or hearing about their school running Action 3:30.

Chapter 7 Discussion

Summary of main findings

The primary goals of the Action 3:30 project were to assess the feasibility of conducting a cluster randomised controlled trial of the Action 3:30 project and to assess the evidence of promise in terms of potential for positively affecting the weekday physical activity of boys and girls. Four out of five stated progression criteria were met. There was a high level of interest in the project, with 44% of the approached schools agreeing to join the project and 43% of eligible pupils expressing an interest in the study by returning consent forms. We were also able to show that the programme appealed to boys and girls, as 50% of the pupils who were consented to join the study were girls, and that pupils would attend, with 70% of pupils attending at least half of the 30 sessions. Thus, in terms of running a trial, the first four progression criteria were all met. It is, however, important to highlight that the intervention ran in only four out of the six schools that were randomly allocated to receive the intervention. In one school, this was because the school was unable to release two TAs to attend the training programme owing to limited capacity within the school, whereas the other school withdrew from the study and did not engage in any correspondence about the project. This may suggest that, in the current challenging financial climate, some schools may find providing support for TAs to attend additional training programmes more difficult. Thus, although recognising this important limitation, the evidence shows that it is possible to conduct a trial and that the first four progression criteria, all of which were focused on the practicalities of conducting a trial, were all met. The fifth progression criterion focused on evidence of promise for increasing weekday MVPA for both boys and girls in the intervention arm when compared with the control arm. The data presented in this study have shown that children who attend the Action 3:30 clubs engage in levels of MVPA comparable with those of children who engage in other activities, thereby suggesting that Action 3:30 replaced current provision, but there was no evidence that it provided additional MVPA. The lack of evidence of promise in terms of weekday MVPA indicates that, although all other progression criteria were met, and although it was feasible to run a trial of the Action 3:30 intervention, there is insufficient evidence of additional physical activity to warrant further examination of the Action 3:30 programme in a larger, more expensive, cluster randomised controlled trial. In the light of the challenges and expense of such approaches, it could be that further information on the utility of the Action 3:30 in relation to usual provision could be useful if it were provided using less resource intensive evaluation approaches, such as natural experiment designs.

Physical activity profile of participants

Physical inactivity is a leading risk factor for mortality,[1] and, therefore, an aim of this study was to appeal to and recruit less active pupils who may be at highest risk in later life. *Table 9* shows that, among those schools that participated in the 'opt-out accelerometer' phase, there was only a small difference in mean MVPA between those who consented to join the study and those who did not, which is in line with previous literature.[64–66] Although mean MVPA was relatively high at baseline, only 60% of control pupils and 62% of intervention pupils met the current physical activity guidelines at baseline (see *Table 14*). Together, these findings indicate that a range of pupils across the physical activity spectrum were recruited, including less active children. The qualitative results support this conclusion, as TAs in all four intervention schools felt that their clubs included children with a range of abilities and habitual physical activity levels. This contrasts with the previous Action 3:30 feasibility study[18] and the work of others,[67] in which participating children were already very active, and highlights that the changes made to the recruitment methods for this feasibility trial to engage more less active children were implemented effectively. Process evaluation measures of perceived exertion during the intervention suggest that pupils found the sessions harder at the beginning of the intervention than they did later (see *Figure 4*), which can

be interpreted in a number of ways. Conceivably, pupils could have found later sessions easier because they had increased their fitness. However, as fitness was not measured, this cannot be established with any confidence. It should be noted that the perceived exertion scale used has been validated in a similar age group using a cycle ergometer exercise test and, therefore, the measure may not be generalisable to the mode of exercise in Action 3:30.[68]

Previous research suggests that enjoyment and being active with friends are key determinants of physical activity in children.[69,70] Intervention pupils in this study listed reasons such as 'inclusivity' and 'something fun to do with friends' for signing up to the study, highlighting that focusing on enjoyment seems to have had a positive effect on recruitment. McGoey *et al.*[11] conducted a systematic review evaluating physical activity interventions in children using the RE-AIM framework and concluded that too few studies report evidence of external validity, such as representativeness of participants. In this study we have addressed this limitation by comparing baseline physical activity levels of consenters with those of non-consenters to the study, showing evidence of a representative sample of pupils as well as a recruitment method effective at engaging less active children to an after-school physical activity programme.

Qualitative data showed that some TAs perceived the activities in Action 3:30 to be different from activities in PE lessons because the former were centred around having fun rather than learning specific skills. In addition, some girls expressed that they enjoyed Action 3:30 more than PE because they felt more confident in their abilities. These findings add to the work of Cairney *et al.*,[71] whose results suggested that higher perceived competence was associated with greater enjoyment of PE and that enjoyment of PE declined among girls from the ages of 9 to 12 years. Together this evidence suggests that activities that promote competence and are enjoyable, such as those in Action 3:30, could be incorporated into PE lessons to increase pupil enjoyment. More recent work by Cairney *et al.*[72] also highlights that there is a positive relationship between participation in organised physical activity and participation in discretionary free-play over time. A suggested explanation for this association is that participating in organised physical activity supports the development of physical literacy and fundamental movement skills, which in turn enables children to participate in more free-play pursuits. With a longer follow-up period, it might also be observed that participants in Action 3:30 increase their discretionary physical activity levels over time as a result of increased physical literacy; however, our follow-up period was too short to allow us to observe this.

With the recent doubling of the PE and Sport Premium, primary schools are expected to develop or add to the physical activity provision they already offer in order to help pupils achieve the government-recommended guideline of at least 60 minutes of MVPA per day (30 minutes of which should be in school).[63] This key focus was highlighted in our qualitative findings, as some key contacts stated that they adopted Action 3:30 to help their schools meet targets. Addressing gaps in provision is a main consideration for schools when spending their PE and sport premium[73] and is consistent with the theory of expanded, extended and enhanced opportunities in after-school programmes.[74] Therefore, primary schools may wish to adopt Action 3:30 because it helps to meet key government targets, in particular adding to their provision and engaging a range of pupils with a broad range of enjoyable activities.

Appeal of the Action 3:30 programme to girls

Despite the benefits of physical activity, it is well documented in the literature that girls are less active than boys[6,75] and that the age-related decline in physical activity occurs earlier in girls than in boys.[5] Therefore, an aim of the study was to appeal to girls at the recruitment stage and increase MVPA as a result of the intervention. Our results indicate that Action 3:30 appealed to girls as well as boys and was successful in engaging girls throughout. *Table 7* shows that 49% of the pupils recruited to the study were girls and *Table 18* demonstrates that, on average, girls attended a similar average number of sessions to boys (19 vs. 20 out of 30, respectively).

Previous literature suggests that enjoyment, self-efficacy and perceived competence are positively associated with physical activity in girls.[76] *Figure 4* indicates that pupils enjoyed the Action 3:30 sessions, which was reinforced in the focus groups with girls. We should note that because enjoyment was assessed quantitatively at only three time points in each school, this may fail to reflect the views of pupils who did not attend those sessions; however, children selected for the focus groups had varied attendance rates and so the views of pupils with low attendance were captured. In addition, our qualitative findings suggest that girls and boys felt a sense of autonomy support and improved competence to participate in other physical activities, although this was not borne out in the questionnaire-based measures of these SDT constructs. Together the evidence above indicates good intervention fidelity. Thus, the data presented show that the recruitment method was appropriately pitched and that the activities included in the sessions were suitable for both girls and boys. Therefore, Action 3:30 could be recommended to schools wanting to provide a physical activity offer that appeals to girls as well as boys.

Factors affecting attendance

Efforts were made to increase pupil attendance based on the findings from the previous Action 3:30 feasibility trial[18] by identifying the days of the week that the club would run during recruitment and ensuring that schools held the agreed time slots in their extracurricular timetables. Overall, attendance across all schools was good. *Table 18* shows that, on average, pupils attended 19 out of the 30 sessions, with 74% of pupils attending > 50% of the sessions. Attendance was similar to that in other studies[11] and much higher than for another after-school-based programme, in which only 5% of children attended 50% of sessions.[77] Our attendance results indicate successful reach and fidelity of the intervention and confirm the utility of Action 3:30 as a scalable physical activity intervention.

The qualitative findings revealed that scheduling conflicts with other clubs was the main barrier to pupil attendance. Some pupils stopped attending Action 3:30 sessions on one or both days because they were doing other extracurricular activities; however, in interviews, TAs and key contacts expressed that this was the norm within schools. This suggests that children may prefer to switch between after-school programmes. Our quantitative results add to this, as pupils in intervention schools attended slightly fewer after-school clubs (excluding Action 3:30) than control pupils (1.70 ± 1.38 vs. 1.44 ± 1.28, respectively). Findings should be interpreted with caution, however, as the 95% CI for the adjusted difference in means included zero. Together, this may suggest that Action 3:30 replaced pupil's existing provision rather than adding to it. Owing to the above findings, any intervention effect is likely to be attenuated and this may partly explain why an increase in MVPA was not achieved. Our previous work with primary school children[18] and adolescent girls[44] also found scheduling conflicts with other clubs to be the main reason for non-attendance. Our study is one of the few that documents reasons for non-attendance to after-school physical activity interventions in children. It is important for future studies to include measures to capture reasons for non-compliance and to perhaps consider when designing future interventions that children may prefer to switch between different activities.

Utility of Action 3:30 for continuing professional development

We have established through this study and our previous work[18] that training TAs to deliver an after-school programme is feasible within primary schools. The qualitative results revealed that TAs and schools valued the training because it equipped TAs with the knowledge, resources and qualification to provide a range of physical activity sessions, which they could continue to use after the intervention had finished. Although TAs in the four intervention schools liked the training format, one school was not able to provide the intervention as it could not release staff for 5 full days. Some external stakeholders also expressed that they thought that 5 days was too much of a commitment for schools. More work may be needed to establish the minimum time required to adequately train school staff to deliver Action 3:30 or similar after-school programmes.

The government now expects primary schools to use their PE and Sport Premium to provide their staff with CPD and resources to help them teach PE and sport more effectively.[63] In 2014/15, upskilling and training staff was the most common use of the PE and Sport Premium, with less emphasis on employing new sports coaches.[73] This suggests that schools may prefer to develop their own workforce rather than employ external companies to run their after-school clubs. Therefore, Action 3:30 could be adopted by schools to offer CPD to their staff and help meet government expectations.

Impact of the Action 3:30 programme on motivation

There was evidence that the TA training reinforced and potentially increased TAs adoption and implementation of autonomy-supportive teaching/coaching practices and styles. Observations showed that this style could be maintained throughout the intervention programme. This supports previous research showing that teachers (including PE teachers) can be trained to teach in a way that creates a positive motivational climate.[78,79] Furthermore, pupils also perceived their TAs to be using an autonomy-supportive style. However, there was no evidence that the intervention held promise to affect the motivation variables measured (motivation types or need satisfaction). This may be a true finding and the intervention may hold no promise to affect these outcomes. However, the pupil's scored their TAs as consistently highly autonomy-supportive and there was strong qualitative evidence from pupils and TAs for positive motivational outcomes. This conflict in findings may reflect a number of measurement issues. First, the scale used was validated in children in Years 5 and 6 (aged 9–11 years) but used in this project where children were aged 8–10 as it was impractical to further validate the scale in this age group prior to measurement. As such, the items may not have been clear to younger pupils and may not have been sufficiently worded to tap the qualitatively different types of motivation in this age group nor be sensitive to change.

Second, the baseline mean values for autonomous motivation and need satisfaction were high. This may indicate that the scales are not sufficiently sensitive to variation (i.e. being able to capture a diverse range of true scores) and that any potential effect on these variables could be limited by a ceiling effect.

Third, the measures assessed children's motivation and need satisfaction at the contextual level (i.e. thinking about physical activity in general), which is one of three levels of motivation hypothesised within Vallerand's hierarchical model of intrinsic and extrinsic motivation,[80] in addition to situational and global. Situational motivation refers to the motivation and need satisfaction that children felt towards and when experiencing the Action 3:30 sessions. Given the consistent qualitative quotations that point towards situational need satisfaction within the Action 3:30 intervention, the lack of promise seen using the quantitative measures may be indicate either (1) a mismatch in the way motivation was influenced (situational level) and measured (contextual level) or (2) that any effect on situational motivation was not sufficient to effect broader motivation for physical activity. It could be argued that, as Action 3:30 sessions form only a small part of a child's experience of physical activity (which includes school sport, PE, out-of-school sport, and being active with family and friends), they might not be expected to be able to shift broader motivation.

Overall, there is great need to develop more robust measures of the constructs within SDT for use with children to facilitate a better understanding of the effects of interventions which target them. Unfortunately, the funding landscape makes securing funds specifically to create and test these measures with children very difficult – yet without them our ability to measure the effects of our interventions on potential mediators is limited.

Cost of delivery compared with existing provision

The Action 3:30 intervention was found to be low-cost, with an estimated mainstream cost per school of £1482 per school and £62 per pupil, based on a class of 30 attending 30 1-hour sessions (£1.64 per pupil per session). The costs associated with children's physical activity interventions are rarely reported, but the estimated costs of Action 3:30 are comparable with those that have been reported in recent years.[57,61,62] The majority of extracurricular physical activity provision provided by schools in this study was funded by the school or parents and this finding is comparable with the results of an audit of after-school club provision for children in Years 5 and 6 from primary schools in England.[19] Notably, estimated Action 3:30 costs were found to compare favourably with the costs associated with existing extra-curricular physical activity delivered in study schools. In the UK, many primary schools fund external agencies to provide extracurricular physical activity. These findings are therefore likely to appeal to schools as they suggest that Action 3:30 is economically viable and helps to engage children in non-sedentary activities. As Action 3:30 was not shown to be effective at increasing MVPA, nor was the study statistically powered to, it is not possible to comment on intervention cost-effectiveness. This study identified no difference between the intervention arm and the control arm responses to HRQoL measures. This finding is consistent with previous studies in which HRQoL measures were found to be unresponsive among school children with 'healthy' profiles,[57] and supports the case for considering alternative HRQoL measures that are appropriate for a young and healthy population.

Implications for after-school delivery in the UK

Action 3:30 is a theory-informed intervention that is well liked by pupils and staff. Importantly, the programme was able to engage a wide range of pupils and it therefore provides a broader offer than existing provision, which tends to be dominated by team sports.[19] Including one-off training costs for staff, to deliver Action 3:30 costs approximately £2 per child per session, with this falling to £1.64 per child per session after the first year when the initial training and set-up costs have been met. This cost is considerably lower than the £5.90 per child per session average cost of existing provision that we found in this study. The findings, therefore, suggest that Action 3:30 is considerably less expensive than current provision, and as examination of the accelerometer data shows that children who attend Action 3:30 had levels of physical activity comparable with those of children who did not attend, it might be inferred that Action 3:30 achieves the same physical activity benefits as other clubs at a lower cost. A key focus of Action 3:30 is training TAs to build capacity within schools, thereby enabling the TAs to contribute to other aspects of physical activity provision, such as helping with or leading PE sessions within the school. This is an added benefit to schools that cannot be conferred by external providers. This approach is also consistent with a recent Office for Standards in Education, Children's Services and Skills (Ofsted) report that highlighted that extracurricular programmes, such as Action 3:30, are a good way to broaden opportunities for children to learn new skills and be physically active.[81] As such, the results of this study provide evidence that training existing staff to deliver physical activity via schemes such as Action 3:30 is a viable approach for primary schools that is consistent with Ofsted guidance, appealing to schools and staff members because it counts as professional development, and is less expensive than existing provision, with the added benefit of developing the skills of key workforce members.

Comparison with international data

A previous systematic review of physical activity interventions delivered in the after-school period has reported a pooled intervention effect of approximately 5 additional minutes per day of MVPA for children who attend after-school physical activity interventions.[82] The results reported here suggest that the Action 3:30 did not lead to additional MVPA and that children who attended Action 3:30 engaged in the same amount of MVPA as children in control schools. However, comparisons with the current evidence base are challenging as the bulk of the work in the extended school day has occurred in the USA, a different context

in which after-school provision is dominated by several large organisations such as the Young Men's Christian Association (YMCA). The US programmes have therefore focused on maximising the quality of the provision by training staff and providing resources as part of policy-level interventions to increase after-school staff's engagement with physical activity. [83] For example, Weaver *et al.*[84] assessed the effect of a professional development programme with the YMCA after-school staff and showed that the training programme increased the proportion of staff engaged in physical activity with children from 26% to 37%. The same study also highlighted that greater implementation of the strategies to help children to be physically active and consume better-quality snacks in the after-school period was associated with a greater percentage of boys engaging in 30 minutes of MVPA after school, with 42% of high-implementing settings meeting the threshold compared with 27% in low-implementing settings[85] (there were no differences in the MVPA of girls in high- and low-implementing settings). Collectively, this body of evidence supports improving the quality of the provision to help children be as active as possible during the after-school period. Translating these findings to the UK is challenging because the provision is very different, with multiple external and internal providers that are school specific and a range of revenue models in which some programmes are revenue-neutral, some cost money to provide and some provide income for the school. It is also important to highlight that there is a lack of a quality assessment framework for physical activity in the after-school setting in the UK and, as a result, there is no current mechanism for translating the US-based evidence to the UK context.

Implications for research

The data presented in this report have shown that training existing staff to deliver an after-school physical activity programme is a viable approach for schools but that the programme did not yield any increases in physical activity levels, with the process data suggesting that this is because the children may have simply switched from one programme to another. As previous research has shown that activities in the after-school period are important for helping children to meet the Chief Medical Officer recommendation of 1 hour of MVPA per day, the challenge is how to maximise physical activity in the programmes that children already attend.[17] Thus, it may be the case that research should focus on maximising the quality of the current provision by using approaches such as those adopted in the USA as opposed to creating new provision such as Action 3:30. Therefore, there is a need to identify the types of current provision, the quality of that provision and how it could be improved. TAs do not routinely receive training in physical activity provision and so the Action 3:30 approach is novel and shows that TAs delivering physical activity programmes is a viable method that is likely to be more cost-effective than using external sports coaches. It is, however, also important to recognise that Action 3:30 is a flexible approach in terms of delivery mode, and it may be that elements of the programme structure could be changed, such as delivering only once per week, which may be a useful option for a number of schools. We have used the RE-AIM framework as an overarching structure to inform the study design and guide the process evaluation. Use of the framework for the process evaluation has facilitated breaking down the analysis into all of the key issues that are essential to increasing the external validity of research. Future studies should consider using the RE-AIM framework[12] to evaluate interventions and present process evaluation results, as has been demonstrated in this study.

Utility of the opt-out consent and complier-average causal effect analyses

A novel aspect of this study was the use of a CACE analysis to incorporate data from participants who joined the study at a later enrolment point. This method was used to examine the feasibility of this alternative design, which was intended to mimic the usual organisational practices of schools, thereby increasing external validity. Those schools in which baseline and outcome data were collected for the whole year group contributed to a demonstration of how any benefit for those children joining the programme at the second enrolment could be estimated without bias. Those children who volunteered and were selected to join the programme at the first enrolment (determined prior to random allocation

and so known for schools in both arms) were excluded from this analysis. A CACE approach was taken, which analysed those enrolling at the second opportunity in the intervention schools against a comparable group of children in the control schools. It is not possible to identify that 'comparable group of children' using observed measures; the CACE approach uses a statistical model with the following assumptions to estimate the outcome in that group of children: (1) owing to the random allocation of schools to intervention and control arms, the proportion of children observed to enrol at the second opportunity in the intervention arm would have been mirrored by children in the control schools had they been given the opportunity; (2) children observed not to enrol in the intervention arm would have the same outcome as children in the control arm who would not have enrolled had their school been in the intervention arm; that is, outcome in these 'non-enrollers' is not affected by allocation to the intervention or control arm. Consideration was given to whether or not it was useful to combine this estimate with that for the first enrolment children using meta-analytic methods. Thus, the analyses have shown that the method is feasible and that such approaches can be conducted. However, as very few children were re-enrolled in the one intervention school with complete data, the utility of this method for this project was limited. Furthermore, as noted above, this approach was reliant on opt-out consent data. Collecting physical activity data using an opt-out consent approach yielded excellent recruitment rates of > 98% (see *Table 6*) and added only a very small, and acceptable, burden to schools (see *Chapter 6*). However, this approach may not be feasible in primary schools in the future as the new General Data Protection Regulation legislation limits the use of opt-out consent processes in the European Union.[86] Thus, the approach is technically feasible, but it is unlikely to be useful and relevant in this current legislative context.

School context

Although no meaningful differences were observed between the overall school context scores of intervention and control schools in this study, between-school variation in school context scores was high in relation to the physical environment component scores. With only four schools delivering the intervention in this study, it is hard to assess what impact the school context components may have had on intervention implementation or effectiveness. However, context has the potential to greatly influence aspects of intervention delivery and impact[58] and should be considered in large-scale school-based interventions. A key consideration for future research is how best to utilise school context data in ways that provide insight into the effect of school context on young people's physical activity and on the delivery or effectiveness of interventions.

Specific research recommendations

- Research should invest in interventions that maximise the quality of existing after-school physical activity provision rather than create new opportunities in an already-saturated market.
- Work is needed to develop a standardised quality assessment framework for after-school physical activity provision in the UK that would make comparison with international research (e.g. from the USA) more feasible and make it possible to evaluate the quality of existing after-school provision.
- Further exploration is needed of the impact that school context components may have on physical activity intervention implementation in educational settings.
- The RE-AIM framework should be used to evaluate interventions and present process results in order to promote rigour and provide a platform to more reliably examine the external validity of research.

Strengths and limitations

The major strength of this study is the rigorous design, which has enabled the assessment of clear research questions that have been mapped onto specific progression criteria. Rigour and transparency were further enhanced by reporting the study in accordance with the TIDieR (Template for Intervention Description and Replication) framework,[87] the COREQ guidelines[53] and the CONSORT criteria.[88]

A strength of the study was its reach. A whole-year-group approach was taken, as the study included all pupils in Years 4 (aged 8–9 years) and 5 (aged 9–10 years) in the 12 schools involved in the study. Physical activity data (either self-reported plus accelerometer or self-reported only) were collected for > 98% of eligible pupils pre baseline in the 'opt-out' phase of the study in order to compare pupils who did and pupils who did not sign up to the study. Both schools with a high percentage and schools with a low percentage of free school meals, indicating low and high deprivation, respectively, were recruited. Pupil recruitment rates at baseline were relatively high, a range of pupils consented to join the study, including less active children and girls, and attendance rates were high throughout the intervention. Further strengths are that an objective measure of physical activity (accelerometers worn for 7 days) was used and data provision rates were high for all measures at both baseline and follow-up. A re-enrolment point was offered approximately half-way through the intervention to increase the external validity of the study, which was received well by schools. Throughout the study, local advisory group meetings were held to take account of and learn from external stakeholders who had knowledge of local primary schools, and Children's Advisory Group meetings were held with participating pupils to ascertain how the programme was being received in the intervention schools.

A notable strength is that an extensive and robust mixed-methods process evaluation was conducted using the RE-AIM framework.[12] Engagement with a range of well-informed external stakeholders to explore the potential sustainability of a programme such as Action 3:30 provided valuable insights into the 'real world' suitability of the design and applicability of the programme; information that would be beneficial to anyone designing after-school interventions. The process evaluation results revealed that the intervention had good fidelity. Direct observations were used to strengthen the assessment of intervention fidelity, which aligned with the process evaluation results. One limitation of the process evaluation was that insights from stakeholders extolled the value of evidence for programmes such as Action 3:30 without actually describing what counts as evidence, which would be useful to guide future applied research in this area. This perhaps reinforces the importance of working to enhance existing provision rather than creating new provision without clear guidance on the type of evidence of most value to commissioners.

The small number of participating schools meant that the study was not powered to detect differences between the intervention arm and the control arm and cannot be deemed fully representative of the population of all schools. However, this was inherent in the feasibility randomised controlled trial design of the study, which looked only for evidence of promise. Two schools that were allocated to the intervention arm were unable to deliver the intervention and so their data could not be used in the follow-up analyses, which reduced the sample size further and the representativeness of the intervention arm. In one instance this was because of a lack of capacity to release staff for training owing to challenges in the school. We do not know why the other school withdrew from the study, as it ceased communication with the project team. Qualitative data were collected from the first of those schools to determine its reasons for dropping out, but data could not be collected from the other school and so its reasons for dropping out are unclear and the ability to learn from the situation in this school is removed. It therefore seems plausible that limited capacity may have also been a reason why other schools did not agree to join the study, but we do not have data to confirm this assumption. The study was limited to only two areas in the south-west region of the UK and within this region there was variation in interest in and response to the programme and so generalisability to other areas of the UK and a wider range of schools may also be limited.

Where possible, objective measures were used. However, by necessity, a reliance on self-reported data to measure SDT constructs and HRQoL, and to collect demographic information from parents, made our data susceptible to reporting bias. The self-report measures of SDT-based constructs showed no evidence of change. It is not clear if this is a function of the lack of an intervention effect or a weakness of the scales and, therefore, more work may be needed to assess whether or not these measures can be improved. It is also important to note that although accelerometers provide objective assessments of physical activity, we assessed only 1 week of behaviour at each assessment, and other activities outside these periods will be under-represented. Similarly, accelerometers do not provide information on the actual behaviours that participants perform and can under-represent some activities, such as cycling.[89] There are also limitations in the qualitative focus groups that were conducted with the participants in that these could not cover all possible topics as the time was limited. It would have been helpful to have been able to garner more information about other activities in which the children engaged and the impact that participating in additional activities may had on attendance and overall levels of physical activity.

Chapter 8 Conclusion

Regular physical activity has many important physical and mental health benefits. However, many children do not meet the government-recommended guidelines, and physical activity levels tend to decline as children go through primary school. The after-school period is a crucial time when children can accumulate part of the recommended 60 minutes of MVPA per day, and yet much existing after-school provision is dominated by team sports, which does not appeal to all children and can be expensive for schools to pay for external providers to deliver. The evidence presented in this report demonstrates that a TA-led after-school physical activity programme is feasible to implement in primary schools and is enjoyed by both pupils and TAs. The study was able to recruit a range of pupils, including girls and those who were less active. Attendance levels were high and maintained throughout the study, and intervention fidelity was also high.

The joint aims of this randomised feasibility trial were to explore whether or not sufficient evidence of promise existed to suggest that the Action 3:30 physical activity intervention could improve MVPA levels among primary school children and whether or not progression to a definitive trial would be warranted. No effect was observed in any of the primary or secondary accelerometer-derived outcomes when comparing intervention with control participants, and therefore the intervention was not effective at increasing MVPA in these children. Process data implied that participants attending Action 3:30 sessions were swapping physical activity from other contexts instead of adding physical activity where none existed before. However, the economic evaluation revealed that Action 3:30 is inexpensive to deliver compared with existing provision and so could be deemed a financially viable programme for primary schools to deliver, which would engage a range of pupils in physical activity and upskill core staff simultaneously.

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Russell Jago (https://orcid.org/0000-0002-3394-0176) (Professor of Paediatric Physical Activity and Public Health) was the principal investigator on the grant funding the work and **Simon J Sebire (https://orcid.org/0000-0001-7994-0844)** (Senior Lecturer in Physical Activity and Public Health), **Chris Metcalfe (https://orcid.org/0000-0001-8318-8907)** (Professor of Medical Statistics) and **Jane E Powell (https://orcid.org/0000-0002-1828-1184)** (Professor of Public Health Economics) were co-applicants.

Russell Jago, **Byron Tibbitts (https://orcid.org/0000-0001-5818-7080)** (Senior Research Associate, Trial Manager) and **Alice Porter (https://orcid.org/0000-0001-5281-7694)** (Field Worker) wrote the first draft of the report.

Byron Tibbitts and Alice Porter were responsible for the process evaluation and completed the first drafts of the process evaluation chapter, with support from Simon Sebire. Byron Tibbitts and Alice Porter collected all process evaluation data including conducting interviews and focus groups. Byron Tibbitts, Alice Porter, Russell Jago and Simon Sebire analysed the qualitative process evaluation data.

Chris Metcalfe and **Emily Sanderson (https://orcid.org/0000-0003-2268-4194)** (Research Associate in Medial Statistics) led the statistical analyses and reporting of the trial and served as the main links to the Bristol Randomised Trials Collaboration.

Jane E Powell and **Emma Bird (https://orcid.org/0000-0002-9603-3434)** (Senior Lecturer in Public Health) were responsible for the economic evaluation design and analyses and completed the first draft of the economic evaluation chapter.

All authors made contributions to sections of the report and critical comments on drafts of the monograph and approved the final submission.

Publications

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Data-sharing statement

All data requests should be submitted to the corresponding author for consideration. Access to available anonymised data may be granted following review.

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Appendix 1 Index of Multiple Deprivation score calculation

Variable to compute	Calculation	Interpretation	Reference
Index of Multiple Deprivation	Postcode Index of Multiple Deprivation score range: 1: ≤ 8.49 2: 8.5–13.79 3: 13.8–21.35 4: 21.36–34.17 5: ≥ 34.18	Where 1 is least deprived and 5 is most deprived	*English Indices of Deprivation: Postcode Lookup*[90]

Appendix 2 Deductive codes for qualitative analysis

Code	Question
Pupils	
Recruitment	Why pupils wanted to sign-up for the Action 3:30 project?
	What did pupils think of the recruitment method?
Attendance	Why pupils may not have been able to attend the Action 3:30 club?
	What motivated the pupils to attend?
Delivery	What pupils thought about the TAs who ran the Action 3:30 club?
	Did they like the delivery style?
Motivation	Did the TAs offer choice?
	Did pupils find the activities challenging?
	Did they feel that TAs gave them enough time on activities/moved onto the next activity at the right time?
	Did they feel part of a group/team?
	Did they have a good rapport with the TAs?
Enjoyment	Which sessions the pupils enjoyed the most and the least and why?
Improvement	Ways in which pupils thought the sessions could be improved?
	Did pupils think that sessions were appealing to girls, if not how could this be achieved?
School physical activity context	Where do pupils have their PE lessons?
	What equipment is used during PE lessons?
	What do teachers/staff do to promote being active to the pupils?
	What opportunities do pupils have to try new activities/sports?
TAs	
Recruitment	How and why TAs got involved in the project?
	What factors do they think could have affected recruitment of pupils to the project?
Training course	What did TAs think about the content, delivery style, organisation and quality of the training course?
	What did they think about the motivational section/elements of the training?
	How could the training course be improved?
Resources	Did the TAs find the training guide/folder a useful resource?
	Did they find the leader's manual a useful resource? Did they use and/or stick to the planned sessions?

Code	Question
Behaviour	What did the TAs think about the managing disruptive behaviour section/elements of the training?
	Did they use and find useful the section in the training guide?
	How did the TAs cope with managing disruptive behaviour during the intervention?
	Were there any particular issues regarding pupil behaviour?
Support	Did the TAs feel that they had enough support from the Action 3:30 team during the intervention?
	Did the school help support the club?
Attendance	Did the TAs deliver all 30 sessions?
	Were there any barriers to the TAs or the pupils' attendance?
	Did the school promote and support attendance?
	How was poor attendance dealt with?
Delivery	What factors may have affected delivery?
	How would they describe their delivery style?
	Were there any issues with trying to create autonomy support and motivation using their delivery style?
Motivation	To what degree were TAs able to support autonomy, competence and relatedness? How did they support these needs?
	Were they able to create autonomous motivation and provide autonomy support? Why and how?
Enjoyment	Which session did the TAs feel were the most and least enjoyed by the pupils?
	How do they think Action 3:30 was received by pupils and parents?
	Did they feel that girls enjoyed and were engaged with the sessions as much as the boys?
	Which sessions did the TAs enjoy delivering the most?
Equipment	Was the money given to buy new equipment enough?
	Was the equipment shared and exclusive access?
Potential contamination	Do they feel that there could have been contamination between schools that did and did not receive the intervention? What could have caused this?
Re-enrolment	What did they think about the timing of this?
	Did this affect the number of pupils attending?
	Was this a burden to the TAs/school?
	How they think this process could be improved?
Improvements	How they think the intervention could be improved
	How they think training could be improved

Code	Question
School key contacts	
Recruitment/initial involvement	How the contact became involved, thoughts on the recruitment process and why they became involved
Role in facilitating the project	How the contacts perceived what their role was in the project, how they found carrying out this role, there level of involvement in the project
Attendance	What did contacts think the attendance was like?
	What factor do they think may have affected attendance?
	How could attendance be improved?
	Did the contact/school help to promote/encourage attendance?
Delivery	What factors may have affected delivery?
	What they thought about the leaders delivering the club
Enjoyment	How do they think Action 3:30 was received by pupils and parents?
	Do they think that the leaders/staff and pupils involved enjoyed being part of the project?
Support	How did the contact/school help support the leaders/pupils/parents?
Potential contamination	Do they feel that there could have been contamination between schools that did and did not receive the intervention? What could have caused this?
Re-enrolment	What did they think about the timing of this?
	Was this a burden to the school?
	How they think this process could be improved?
Improvements	How they think the burden to the school could be lessened?
	How they think intervention could be improved?
Decision to continue to run Action 3:30	Do they know whether Action 3:30 will continue once the project has finished?
	What the factors affecting the decision to continue Action 3:30 may be?
Staff at opt-out accelerometer schools	
Burden	Do they think the opt-out accelerometer process was a burden to the school?
	How they think the burden could be lessened?
Opt-out consent	Did they think this was acceptable?
	Did they encounter any issues with this?
	Do they think this process could work in future school-based trials?
Activity monitors	What did they think of the process in which the accelerometers were issued? How could this be improved?
	Did they receive any queries from parents?
Issues	Did they or other teachers encounter any issues with chasing the equipment, answering questions or liaising with the Action 3:30 team?

Code	Question
External impact stakeholders	
Sustainability	Do they think that Action 3:30 is a programme that primary schools would adopt and why? What do they think are the factors that would affect the future sustainability of the programme?
Policy	Do they think that the intervention fits within current local physical activity policy and/or school funding structures?
Funding/commissioning	Do they think that Action 3:30 has the potential to get funded or commissioned in the future?
Dissemination	How do they feel would be the best way to disseminate our findings? Do they know of any dissemination opportunities? What do they think the barriers to dissemination may be?
Improvements	Do they think any aspects of Action 3:30 could be improved: intervention, training, re-enrolment?

Appendix 3 Teaching assistant log book

ACTION 3:30

Action 3:30 Log Book

[redacted]

Session Number (Please add title or short description of session)	Day of the week	Number of children who attended	Was the session delivered as planned? Please tick the appropriate box			Additional Comments
			Fully	Partially	Not at all	
1						
2						
3						
4						
5						
6						

This project is funded by the National Institute for Health Research [Public Health Research Programme] (project number 15/55/09)

NHS National Institute for Health Research

Session	Day	No. children	Fully	Partially	Not at all	Comments
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

This project is funded by the National Institute for Health Research [Public Health Research Programme] (project number 15/55/09)

NHS National Institute for Health Research

Appendix 4 Results of the child autonomy-support questionnaire before imputation

Time point	*n*[a]	Mean[b]	SD
PEV 1	68	5.99	0.93
PEV 2	77	5.89	1.05
PEV 3	65	6.02	0.97

PEV, process evaluation visit.
a Before multiple imputation.
b Sport Climate Questionnaire scoring.

Appendix 5 Observation results

School ID	Session number (title or short description)	Day of week	Number of children who attended	Was the session delivered as planned?			Additional comments
				Fully	Partially	Not at all	
School 25							
PEV 1	5 (dodgeball and toad in the hole)	Tuesday	15	✗			TAs did really good job of engaging all children; offered plenty of choice, which the children responded well to. Session was active. Minimal disruptive behaviour. Like that children answer the register with 'Action 3:30'
PEV 2	15 (kabadi and stepping stones)	Tuesday	15	✗			Session was active and engaging. TAs offered plenty of choice: asked children their opinion of whether or not the game/activity was working and how it could be changed to make it easier/harder/worked better. Allowed warm-up to carry on for longer because children were enjoying it but did not let this affect the other activities. Clearly indicated the aims of the session and referred to these throughout. Often used the pledge to manage behaviour (e.g. when not listening). Managed disruptive behaviour from two children well by sitting out with them while other TAs continued with group. STEP was used throughout. Also used water break to manage this well. Teething problems with getting main game to flow but this was resolved by discussing with the children. TAs were unsure what stepping stones should look like (would have liked video) but used initiative well. Before start of club children had started to play chain tag by themselves. Improvement in children all playing together: less about winning and more about teamwork. TAs were particularly impressed with one pupil's progress in club (increased confidence and enjoyment)

School ID	Session number (title or short description)	Day of week	Number of children who attended	Was the session delivered as planned?			Additional comments
				Fully	Partially	Not at all	
PEV 3	26 (hockey and tag rugby)	Tuesday	12	✗ (too much content but what was delivered was delivered fully – did only hockey, did not do tag rugby)			Went through social and physical focus at start and made sure children understood – referred to this throughout session. Warm-up game used step to adapt space and people – asked children how it could be stepped and took suggestions Disruptive behaviour dealt with well – diffused well by one TA speaking to child and other carrying on with activity and allowing child to re-join when ready Children clearly listened to rules and main game and offered suggestions before even asked, which indicates that leaders have done a good job of encouraging ideas throughout club. Gave good safety briefing and referred to this when one child was injured. Used STEP to change the space. Encouraged good teamwork Could have used STEP in skill development. Leaders evaluated time left and formed a plan for what else to include in the session. Drinks break given. Good reflection and feedback with the children at the end. Hockey got mixed response from the children – they enjoyed the teamwork but did not like that it was chaotic with everyone going for the putt

School ID	Session number (title or short description)	Day of week	Number of children who attended	Was the session delivered as planned?			Additional comments
				Fully	Partially	Not at all	
School 27							
PEV 1 (November 2017)	7 (mini-Olympics)	Thursday	18		✗ [did not manage to fit in relays (6-minute activity) or warm-down]		TAs offered choice during warm-up; however, did not do so during the main activity. Minimal disruptive behaviour. Children seemed to be having fun and enjoying working in teams. Could have added STEP process to main activity and introduced a count down when moving on to next activity. TAs mentioned that they often struggle to get all the activities done in the time but tend to spend more time on an activity if the children are enjoying it
PEV 2 (January 2018)	15 (kabadi and stepping stones)	Thursday	20		✗ (fitted in all activities; however, did not use STEP)		Gave children option to ask questions about each activity and asked one child to explain 'seaweed' to the rest of the class. Children seemed to enjoy the activities, which were all relatively high-active. Used numbers to choose teams. Minimal disruptive behaviour. Good improvisation of equipment Did not tell group the focus of the session. Too much waiting around at start at between activities. All three activities played were repeated without using STEP. Did not give children any choice within games. Some girls were disengaged and sat out. No positive reinforcement or constructive feedback

School ID	Session number (title or short description)	Day of week	Number of children who attended	Was the session delivered as planned?			Additional comments
				Fully	Partially	Not at all	
PEV 3	24 (child-led)	Monday	8 (many missing due to theatrical performance)	✗			Asked what warm-up they wanted to play – chose hide and seek, clearly a game the children had played before and enjoyed. Clear instructions and boundaries given by leaders. Gave children choice of which game to play – chose kick rounders, which was sensible for an outdoor/poor weather session. Leaders joined in (one in each team), which children liked. Allowed all children to have a go in each position when fielding. Used autonomy-supportive language such as 'it's your choice', encouraged teamwork/spirit. After one game, had group discussion on how to change the game/add rules. Used smaller ball to make it more difficult (STEP). Lots of children standing still in poor weather during game – could have discussed how to make it more active/engaging for all children. Activity 2 was a game made up by one child – played a dodgeball-inspired game, lots of sprinting involved – took suggestions on how to step the game – changed the rules and added equipment. Children enjoyed game and did not care about losing

School ID	Session number (title or short description)	Day of week	Number of children who attended	Was the session delivered as planned?			Additional comments
				Fully	Partially	Not at all	
School 33							
PEV 1 (December 2017)	9 (hoop basketball and handball)	Monday	20		✗ (did not do handball section of session and did mini-marathon at the end instead of following to session plan)		TAs provided choice and allowed children to make up some rules. Some evidence of STEP process but more could have been done – could have progressed the activities faster. Decided to do mini-Olympics again at the end of the session, rather than following the rest of session plan. Good at encouraging children to carry on despite some children not wanting to take part. Minimal disruptive behaviour, which was handled well. TAs said that they would have benefited from having more videos of the games that were not played during training
PEV 2 (January 2018)	20 (baseball and kick-rounders)			✗ (too much content in session but what was delivered was delivered fully)			TAs did great job of offering choice throughout all activities, and helped children to come up with how to develop their skills. Reflected on each activity before moving onto next. Clear instructions and good technical/ constructive feedback given. Minimal disruptive behaviour, which was handled well. Fast-paced, with not too much time waiting between activities. Saw improvement in striking in second time after practising. Allowed children to umpire the game themselves and decide who was bowling. Well positioned to see everyone throughout the session. Good improvisation of second game when running out of time (two teams batting at once and only one bat each rather than three)

School ID	Session number (title or short description)	Day of week	Number of children who attended	Was the session delivered as planned?			Additional comments
				Fully	Partially	Not at all	
							TAs said that games with less equipment are more effective – sometimes difficult when both the warm-up and main activities use lots of equipment and giving out equipment takes up time
PEV 3	28 (hockey and tag rugby)	Wednesday	22	✗ (too much content; did hockey but did not do tag rugby; what was delivered was delivered fully)			Good safety briefing. Children voted on warm-up (chose 'seaweed' – high active), used STEP to change the people Leaders reminded children of rules and how to use the space effectively. Split into two teams (high paced and low paced) so that those who were less confident could get more involved – this was based on previous feedback from last session. Children could choose which group to be in. Leaders split themselves between groups, offered praise, joined in and bought groups in to discuss how to STEP the game. In the challenge, leaders went round groups helping with technique and asking how they could STEP it if finding it too easy Asked children for feedback about hockey game and let them vote on the final game (chose dodgeball). Leader joined in to help one child who was less engaged. No STEP but high active and all children seemed engaged. Cool-down at end. One child did not join in with session until the last game, could have made more effort to re-engage earlier on, but disruptive behaviour dealt with well

School ID	Session number (title or short description)	Day of week	Number of children who attended	Was the session delivered as planned?			Additional comments
				Fully	Partially	Not at all	
School 32							
PEV 1 (December 2017)	7 (mini-Olympics)	Tuesday	22	✗			TAs provided choice during the warm-up and some choice during main activities. Warm-up lasted appropriate time. Put lots of emphasis on team work and not on scores/winning. All children were working at the same time so kept the session active. Children seemed to enjoy session. Some evidence of STEP process, but more could have been done. No disruptive behaviour. TAs suggested that some of the descriptions in the leader's manual were too lengthy and that they could better visualise with diagrams
PEV 2 (January 2018)	16 (child-led)	Tuesday	18	✗			Good use of STEP, countdowns and timing in warm-up. Leaders provided framework and equipment and let children come up with a game – one leader per group to facilitate discussions. No disruptive behaviour. Less active due to lots of chatting about games but children seemed to be engaged throughout. All children chose target-based games to play. Could have spent less time discussing game and more time practising. Discussed what the children liked/disliked and how it could be made more/less challenging. Children seemed to like teaching/helping others to learn their game. TAs said that they were happy to adapt sessions. They sometimes found the activity descriptions too lengthy and would have preferred more diagrams in the leader's manual

School ID	Session number (title or short description)	Day of week	Number of children who attended	Was the session delivered as planned?			Additional comments
				Fully	Partially	Not at all	
PEV 3 (February 2018)	22 (baseball and beat the ball)	Tuesday	23		✗ (too much content in session; completed half)		Active warm-up – leader reflected on game and took suggestions of adding a new rule. Leaders bring group in after each activity to calm group and clearly explain new activity Game rules were progressed from previous session. Leaders gave good critical feedback and praise. Bit slow-paced – was cold outside so could have sped up game and asked children fielding how they could keep moving/ warm – too much standing around During challenge leaders went round each group giving technical feedback and suggested ways to STEP. Provided children opportunity to improve on their previous score and praised everyone's performance Reflected on personal improvement at end of session. No disruptive behaviour. Children seem engaged throughout

PEV, process evaluation visit; STEP, Space Time Equipment People.

Appendix 6 School policy on physical education provision and physical activity

Item	School ID										Trial arm, yes (%)	
	Control schools						Intervention schools					
	21	22	23	26	31	34	25	27	32	33	Control ($n = 6$)	Intervention ($n = 4$)
Written policy that requires PE programme to follow specific PE standards or guidelines?	0	2	2	0	2	2	0	0	2	2	66.66	50.00
If no, is there a policy that is not formally written/recorded?	1			1							33.34	–
Written policy that requires a specific number of minutes per week or a specific number of days per week that students will have PE?	0	0	2	0	2	2	0	0	2	2	50.00	50.00
If no, is there a policy that is not formally written/recorded?	1			1				1			33.34	25.00
(Written) policy that encourages students to walk or cycle to school (e.g. Bike It)?	1	1	1	0	0	0	0	1	1	0	50.00	50.00
Offer cycle training (e.g. Bikeability)?	1	1	1	1	1	1	1	1	1	1	100	100
Employ any crossing patrol personnel?	0	1	1	0	0	0	0	0	0	0	33.34	0
(Written) policy that requires all school personnel to receive professional development on physical activity promotion?	0	0	1	0	1	0	0	0	1	0	33.34	25.00

Item	School ID										Trial arm, yes (%)	
	Control schools						Intervention schools					
	21	22	23	26	31	34	25	27	32	33	Control ($n = 6$)	Intervention ($n = 4$)
(Written) policy that encourages staff to be active (e.g. staff cycle schemes)?	0	0	0	0	0	0	1	0	0	0	0	25.00
Provide facilities which support staff to be active (e.g. showers, cycle parking)?	1	1	1	1	0	0	1	1	1	1	66.66	100
Budget allocation for PE equipment and supplies?	1	0	1	1	1	1	1	1	1	1	83.33	100
If yes, on average how much does the school spend on PE equipment per year?	£1500	Comes out of general budget	£2500	Some of £8500	not known	£500	Some of £13,971	£250, plus vouchers	Varies; needs are met	£500	–	
Involvement of PE teacher with PE budget decisions?[a]	2	2	1	2	1	2	1	1	2	2	–	
Score[b]	8	8	11	7	8	8	5	6	11	9	8.33 (1.37)	7.75 (2.75)

1/2, yes; 0, no.

a Not involved, 0; somewhat involved, 1; great deal involved, 2.

b Scored out of a possible 13 (13: strong attitude towards physical activity provision and appropriate policies to ensure that these are applied). Control and intervention summary scores are presented as mean (SD).

Appendix 7 School context: 'physical activity in the curriculum'

	School ID											
	Control schools						Intervention schools				Trial arm, yes (%)	
Item	21	22	23	26	31	34	25	27	32	33	Control ($n = 4$)	Intervention ($n = 8$)
PE used in other non-PE KS3 subjects?	1	1	1	1	1	1	1	1	1	0	100.00	75.00
If so, which subjects?	Science, maths, dance, forest schools	Science, English, maths, history, geography	Science, club Fridays, outdoor learning	Outdoor learning encouraged in all, often in maths, science and English. All do Fit in Five (5 minutes of physical activity per day)	Outdoor learning (across all subjects; science; personal, social, health and economic education)	Science, theraplay, maths	Forest school	Science, enrichment	Science, drama, geography, history, English, maths		–	–
Class teachers provide regular physical activity breaks in the school day (beyond PE and break)?[a]	2	0	0	1	2	1	1	1	1	1	66.66	100
School encourages class teachers to promote physical activity to pupils?	1	0	1	1	1	0	1	1	1	1	66.66	100
How often do teachers withhold pupils from PE to fulfil other academic requirements?[b]	2	2	2	2	2	1	2	2	1	1	100	100
How often is the delivery of PE compromised because of competing demands for PE space?[c]	2	1	2	–	2	0	2	1	1	2	66.66	100
Additional comments about how physical activity is prioritised		PE is important in school, children receive two lessons/week. Achievement in sport is celebrated in weekly assembly	We have spent the last 4 years prioritising competitive sport. We have become successful both locally and outside the county at events aimed at South West schools	Fit in Five ensures daily 5 minutes of physical activity. Play leaders at break times. Play equipment for playtimes	All teachers do 2 hours of PE per week. Children are active at break and lunch through less structured activities	Physical activity is thought of highly across our school but it pushed aside for demands with maths, SPAG, reading, writing, spelling and science	n/a	Competition is encouraged. We aim to take part in as many interschool events as possible. Vulnerable children are targeted for inclusion in clubs	Have led inset based on teachers needs. Student teachers encouraged to get involved in PE teaching		–	–
Score[d]	8	4	6	5	8	3	7	6	5	5	5.66 (2.07)	5.75 (0.96)

n/a, not applicable.
a 0 = no teachers do, 1 = some individuals do, 2 = teachers across the whole school do.
b 0 = often, 1 = sometimes, 2 = never.
c 0 = often, 1 = sometimes, 2 = never.
d Scored out of a possible 8 (8: strong evidence of physical activity promotion throughout the wider curriculum). Where otherwise not specified, 1 = yes, 0 = no.

Appendix 8 Baseline weekly extracurricular physical activity provision by school and condition

	Day of week				
School ID	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Intervention					
25					
Club	Street dance	Netball			
Duration (minutes)	45	45			
Cost to school	£30	£0			
Cost to parents	£2	£0			
27					
Club	Football	Structured play	Tag rugby	Cross country	
Duration (minutes)	60	90	60	45	
Cost to school	£0	£30/week	£0	£0	
Cost to parents	£0	£3	£3	£0	
32					
Club	Netball		Sports skills	Gymnastics	
Duration (minutes)	60		60	90	
Cost to school	£0		£0	£0	
Cost to parents	£7.50/term		£3	£8.50/term	
33					
Club	Football	Badminton		Multi-sports	Dodgeball
Duration (minutes)	60	60		60	60
Cost to school	£0	£0		£0	£0
Cost to parents	£0	£0		£3.50	£3.50
Control					
21					
Club	Future Stars[a]	Football skills	Gymnastics	Football	Dance
Duration (minutes)	60	60	45	60	45
Cost to school	£0	£0	£0	£0	£0
Cost to parents	£28/five sessions	£28/five sessions	£30/five sessions	£0	£30/five sessions
22					
Club	Football	Football/netball/ tag rugby			
Duration (minutes)	60	60/60/60			
Cost to school	£0	£0/£0/£2			
Cost to parents	£0	£0/£0/£2			

School ID	Day of week				
	Monday	Tuesday	Wednesday	Thursday	Friday
23					
Club			Dodgeball		
Duration (minutes)			60		
Cost to school			£0		
Cost to parents			£4		
26					
Club		Tennis		Athletics	
Duration (minutes)		45		45	
Cost to school		£0		£0	
Cost to parents		£0		£0	
31					
Club	Football			Rounders	Sports Xtra[b]
Duration (minutes)	60			60	60
Cost to school	£0			£0	£50/term
Cost to parents	£3			£1	£3
34					
Club	Football	Table tennis			
Duration (minutes)	65	65			
Cost to school	£0	£0			
Cost to parents	£0	£0			

a Future Stars Coaching is a sports coaching and mentoring organisation.
b Summer Sports (e.g. rounders/athletics/cricket) and problem-solving challenges.

Appendix 9 Follow-up weekly extracurricular physical activity provision by school and condition

	Day of week				
School ID	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Intervention					
25					
Club	Dance		Football		
Duration (minutes)	45		45		
Cost to school	£30		£30		
Cost to parents	£2		£0		
27					
Club	Football	Structured play	Tag rugby	Cross-country/ athletics	
Duration (minutes)	60	90	60	45/60	
Cost to school	£0	£45	£0	£0/£30	
Cost to parents	£0	£3	£0	£0/£0	
32					
Club	Dance			Gymnastics	
Duration (minutes)	60			90	
Cost to school	£0			£0	
Cost to parents	£0			£9/term	
33					
Club	Football/ dance	Gymnastics		Multisports/ netball	Dodgeball
Duration (minutes)	75/60	75		75/60	75
Cost to school	£0/£0	£0		£0/£0	£0
Cost to parents	£3.50/£0	£3.50		£3.50/£0	£3.50
Control					
21					
Club		Future Stars Coaching[a]			
Duration (minutes)		60			
Cost to school		£0			
Cost to parents		£28/five sessions			
22					
Club	Football	Football/netball	Football/ mulitsports		
Duration (minutes)	45	45/45	45/45		
Cost to school	£0	£0/£0	£0/£0		
Cost to parents	£4	£4/£0	£4/£4		

School ID	Day of week				
	Monday	Tuesday	Wednesday	Thursday	Friday
23					
Club			Football/netball		
Duration (minutes)			60/60		
Cost to school			£0/£0		
Cost to parents			£20/£20/5 sessions		
26					
Club	Lacrosse	Netball	Fitness skills	Future Stars Coaching[a]/football	
Duration (minutes)	45	45	60	60/50	
Cost to school	£0	£0	£0	£0/£0	
Cost to parents	£0	£0	£0	£0/£0	
31					
Club	Football	Netball			
Duration (minutes)	60	60			
Cost to school	£0	£0			
Cost to parents	£15/term	£5			
34					
Club		Football	Badminton	Hockey	
Duration (minutes)		45	45	45	
Cost to school		£35/session	£25/session	£0	
Cost to parents		£0	£0	£0	

a Future Stars Coaching is a sports coaching and mentoring organisation.

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