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Lessons learnt from the qualitative process evaluation of the Bristol Girls Dance Project (a cluster RCT): Implications for the design and implementation of after-school physical activity interventions

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ABSTRACT

Objective: To consider implementation issues associated with the delivery of the Bristol Girls Dance Project (BGDP) and identify key points for improvement that may aid the design of after-school PA interventions.

Design: Two-armed, cluster randomised control trial. The BGDP was a 20 week school-based intervention, consisting of two 75 minute after-school dance sessions per week, which aimed to support year 7 girls to be more physically active.

Setting: 18 secondary schools in the Greater Bristol area.

Participants: This article reports on qualitative data collected from Year 7 girls (n=59) from the intervention arm of the trial, and dance instructors (n=10) and school contacts (n=9) involved in the delivery of BGDP.

Methods: Data were obtained from nine focus groups with participants, and interviews with dance instructors and school contacts. Focus groups sought the views of girls on intervention engagement, teaching styles, and experiences of the intervention. Interviews explored views on the implementation and dissemination of BGDP. A framework analysis method was used to analyse data.

Results: Qualitative data elicited three themes associated with the delivery of BGDP: project design, session content, and intervention organisation that affected the success of BGDP. As a theme, 'project design' found issues associated with recruitment, timetabling, and session quantity to influence the effectiveness of BGDP. 'Session content' found that dance instructors delivered a range of content and that girls enjoyed a variety of dance styles (reflecting the heterogeneity of schools and participants). Themes within 'project organisation' suggested an 'open enrolment' policy and greater parental involvement would facilitate better attendance.

Conclusion: After-school PA interventions have potential for increasing PA levels among adolescent girls. However there is a need to consider the context in which interventions are delivered and implement them in ways that are appropriate to the needs and requirements of participants.

Trial registration: ISRCTN52882523

Strengths and Limitations

- Relevance beyond after-school dance interventions for researchers and practitioners designing and delivering after-school interventions.

- Study focuses on the significance of the context in which the intervention is delivered.

- Data obtained from in-depth qualitative interviews with participants and key stakeholders.

- Large sample of participants (n = 78) for the qualitative study and evidence of data saturation.

- Trial methodology limits generalisations.

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INTRODUCTION

Ensuring that all members of society are physically active is important for public health. Physical activity (PA) is associated with improved physical and mental well-being among children and young people [1-3]. A number of studies have shown that large proportions of young people do not engage in the recommended hour of moderate-to-vigorous PA per day [4] [5]. Girls are often found to be less active than boys across childhood and adolescence and, as such, there is a need for interventions to encourage more PA in girls, particularly during the transition into adolescence when the decline in female PA is at its highest [6-8]. Dance is an activity that is popular amongst adolescent girls in the UK and could therefore be a useful intervention strategy to increase girls' PA [9-12].

Schools are a good place to target interventions as attendance at school is a legal requirement. PA interventions delivered during the school-day have had limited effect [7 8 10 13], suggesting a need to consider alternative school-based interventions [12-14]. Several systematic reviews have highlighted the potential of extra-curricular PA interventions for young people, however, there is a lack of robust evaluations of these programmes [7 10]. Incorporating dance into after-school activities could therefore contribute to overall PA among girls failing to achieve the recommended UK PA guidelines [9 12]. As such, the Bristol Girls Dance Project (BGDP) examined the potential of an after-school dance-based intervention targeted at increasing PA levels of Year 7 (age11-12) girls.

BGDP was a 20-week school-based, two-armed cluster randomised control trial, consisting of two 75 minute after-school dance sessions per week, for Year 7 (11-12 years) girls. Eighteen schools were randomised to either control (n = 9) or intervention (n = 9) arm. The programme, which included several dance styles such as street, contemporary and cheerleading, was underpinned by Self Determination Theory (SDT) [15] and delivered by professional dance instructors. Full details of the trial protocol [11] and results have been published elsewhere [16]. Briefly however, there was no difference in PA levels between the intervention and control group girls during the last few weeks of the intervention or at six month follow-up. Findings reported elsewhere showed that intervention fidelity was generally good, with high levels of enjoyment among participants [17]. However, session attendance was highly variable with only one third of girls attending two thirds of the sessions. Attendance also declined during the project.

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Process evaluations are central to understanding how complex interventions work [18] by focussing on the processes of intervention delivery, receipt and fidelity [18 19]. When they are too narrowly focused however, they can neglect to evaluate the broader contextual factors associated with individual agency, and the social context in which an intervention is delivered [20]. It is important to understand how logistical arrangements, operations and implementation of intervention components contribute to intervention processes, and to also acknowledge the influence of dance instructors delivering the intervention in a specific context. Thus, there is a need to identify factors that enable intervention delivery, how these factors could be influenced, and the ways in which school-based PA interventions to promote behaviour change can be improved.

The aim of this paper is to use qualitative process evaluation data to document the lessons learnt from the BGDP and to identify key points for improvement that may increase attendance rates and improve overall delivery of future after-school school-based PA interventions.

METHODS

The present study uses interview data collected immediately after the intervention from dance instructors (n = 10) who delivered the intervention, and school contacts (n = 9) who facilitated intervention logistics in their school. Nine focus groups were also conducted with girls that received the BGDP intervention (n = 59, range = 3-8). Details of participant sampling and recruitment have been reported elsewhere [17]. For dance instructors, interviews explored views on the implementation and dissemination of BGDP. School contact interviews focussed on how the intervention was delivered and areas for improvement. Focus groups among girls explored intervention engagement, dance instructor teaching style, and experiences of the intervention. School contact interviews and participant focus groups were conducted in schools and dance instructor interviews were conducted in convenient locations for participants (cafes, for example). All interviews and focus groups were audio-recorded and transcribed verbatim. Transcripts were compared with the recordings and amended as necessary.

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Ethical approval was obtained from the School for Policy Studies ethics and research committee at the University of Bristol. Written parental consent was obtained for all children who participated in the study and informed consent was gained from the dance instructors and school contacts who participated in an interview.

Analysis

A framework analysis approach was used [21]. Initial codes were created openly using NVivo (Version 10, QSR International Pty Ltd) to categorise transcripts into components that were of potential significance to the research objective. Codes were produced independently by four qualitative researchers [JK, ME, SS & TM] who coded three transcripts each (one dance instructor, school contact and participant focus group). The initial codes formed a coding framework which was applied to the remaining transcripts. A pre-defined 'school context' code was included to identify differences in delivery between schools. Frameworks were subsequently triangulated to substantiate the relationships between all three informant groups. Illustrative quotes capturing the essence of each theme were identified and agreed by the researchers. A COREQ checklist for reporting of qualitative studies is included (Table 2).

RESULTS

Three main themes associated with BGDP delivery were identified: 1) project design; 2) session content; and 3) project organisation.

Project design

Project design encompasses sub-themes concerning BGDP logistical arrangements, including participant recruitment, timetabling, session quantity, and project duration.

Recruitment

Different methods of recruitment were required for each group of research participants (i.e., girls, dance instructors, and school contacts.

School contacts

School contacts cited varied reasons for their initial involvement in the project, with some describing a personal interest and others were asked by a colleague to act as a key contact.

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I was asked by the Head of Year 7 because he had too much on his plate.

<div align="right">

School contact 21
</div>

I think it was just sent generally to the school like a pack…there was quite a lot of information there so I just emailed 'em through.

<div align="right">

School contact 72
</div>

Two school contacts embraced a type of 'research altruism'. One noted how their own degree meant they were familiar with research and were keen to engage with a research project:

I also liked that it was part of a research project as well. I've been doing a university degree myself and dissertations and […] it's really important that these things are done to try and take things forward.

<div align="right">

School contact 23
</div>

Dance instructors

Dance instructor involvement in the project was motivated by numerous reasons. The research aspect of the project appealed to some dance instructors who viewed the project as an opportunity to disseminate their view of dance as a positive activity for young people:

I love to dance and I love to teach dance and to share my passion with as many people as possible. So any opportunity I'm interested in. I was really attracted to the project as a whole, the research that was involved.

<div align="right">

Dance instructor 61
</div>

Dance instructors also viewed their involvement as an opportunity to develop teaching experience via the delivery of new dance styles:

The fact that we were delivering different styles of dance that was also really good for me because I haven't really done much else in terms of teaching, so it kind of pushed me to try different things which I did and then gained more confidence so I've gained more skills.

<div align="right">

Dance instructor 61
</div>

Girls

<div align="right">

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</div>

For some girls, the opportunity to try a new activity and learn new dance styles motivated participation:

> *I kind of just decided myself because I wanted to go like start something that I hadn't done before.*
>
> > *Focus group 23*

> *I'm not a fan of dance but because I wanted to try something new so I tried it.*
>
> > *Focus group 62*

For some girls engagement was based on spending time with their peers:

> *I was looking at some [afterschool clubs] but I was only really going to do them if like someone, like a friend, did it with me.*

> *Because I didn't really want to go on my own and everyone else knew each other and I just turned up.*
>
> > *Focus group 61*

Girls were given a £10 gift voucher for returning completing each phase of data collection. In two schools gift vouchers appeared to be interpreted as incentives to attend dance sessions. Indeed, one girl noted that participants should not receive a voucher unless they attend dance sessions.

> *You get a voucher. People signed up because of that. But I don't think they really signed up because they wanted to do the dance.*
>
> > *Focus group 53*

In one focus group, being part of BGDP was experienced as a privilege because others were denied the opportunity:

> *It was like a privilege to like get into it because quite a lot of people like wanted to join but only a few of us did.*
>
> > *School contact 32*

Timetabling

Some schools arranged BGDP sessions at a similar time to other after-school clubs, this led to different clubs/activities competing for children's attendance. However, in some schools, the time between the end of the school day and the beginning of BGDP sessions was short, meaning participants struggled to arrive punctually. This resulted in some sessions being shorter than planned:

Partly it is to do with the set up at the school […] it's just a very annoying system that's in this school that because of the meetings that take place on a Tuesday and a Wednesday and we finish early on a Friday, Monday and Thursday are the only times available for any after school clubs. So all of the after school clubs run on a Monday and a Thursday. So you're all vying for kids.

School contact 62

After school finished we started five minutes later. That was not enough time. They needed ten minutes.

Dance instructor 51

Session Quantity and Project Duration

School contacts suggested that the quantity of sessions (40) was too high to sustain attendance over the course of 20 weeks. Two sessions per week was also seen as a burden for girls by school contacts, especially when competing against other sporting events and social commitments:

I just feel that two sessions per week, and the length of time that it runs for, is possibly a bit too much to keep the attendance up.

School contact 72

I think possibly because it was so…. on for such a long time they found it really hard to maintain their commitment because of other things that they like to do as well. I just feel that two sessions per week and the length of time that it runs for is possibly a bit too much to keep the attendance up.

School contact 72

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Many dance instructors felt that two sessions per week was not typical for after-school clubs. One session per week was favoured for maintaining attendance. One school contact suggested that delivering the intervention in short 'themed' sections may be beneficial for encouraging attendance and return to sessions.

They do things better in bite size... you'd have almost been better off breaking it down to five week projects and a meeting at the beginning of each one so everybody knew where they were.

School contact 62

Session Content

Session content relates to themes concerned with the delivery of sessions, including variety in session content and group work.

Variety in session content

The BGDP was designed to incorporate numerous dance styles. Session variety (which will be relevant for other forms of PA), was seen to be important for maintaining interest. The majority of dance instructors gave girls a choice of dance styles, an approach which gained approval from the girls:

She [dance instructor] asked us what types of things we wanted to do. Some people said contemporary, some people said breakdancing, so that's what we did which was good.

Focus group 53

Group Work

Generally, group work was viewed positively by instructors and girls. DIs felt girls enjoyed group work and it encouraged them to take ownership of the project:

With tasks and things like that I kind of just gave them the choice in their groups so they just kind of got on with that.

Dance instructor 32

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Girls found group work enjoyable and it appeared to help improve their dance and team working skills.

> *We like worked well in the group. There were like no arguments.*
>
> *Focus group 53*

Group work was seen to be beneficial to both instructors and girls. Notably, it gave girls a sense of ownership over the project and developed their leadership skills. For dance instructors, it helped them manage the varied levels of competence within the group, and was perceived be a useful strategy for managing inconsistent attendance.

> *When it came to choreography and teaching other people that's when they took their ownership more so of the club.*
>
> *Dance instructor 21 & 51*

There was a tendency for instructors to allow participants to choose their own groups at the beginning of the project and then mix the groups once they felt comfortable with one another.

> *The first sessions I normally, if I'm doing group work, let them go with who they want to go [with] and then like when they feel more confident I kind of change it up a bit so they get to know new people.*
>
> *Dance instructor 53*

Project organisation

Project organisation relates to open enrolment, parental involvement, facilities, and communication and management arrangements.

Open enrolment

All participant groups suggested that an 'open enrolment' policy, allowing girls to 'drop in' to sessions anytime during the 20 weeks would be a good way to maintain attendance levels. Teachers also stressed the importance of friends in ensuring continued attendance.

> *So we say 'it's netball on Tuesday, anyone can come along. If you played for the primary school come along and see what it's like [...] bring your friends'. If only three year sevens turn up we'll say 'right, you're challenge is, next week you have to bring a*

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partner'. And then when six turn up I say 'right, you have to bring a friend'. So that's
how we kind of do it. 'Grab your friends, all come together' because it's very much a
friendship thing.

School contact 42

Open enrolment was viewed as a feasible strategy as long as the project was mindful of new
people joining and causing disruption to the existing group (and its progress). For dance
instructors, this view was informed by previous experience.

Perhaps you might say 'you could join in after half term' or 'you can join in once we've
finished this dance'. That's what I do at some schools.

Dance instructor 62

Parental Involvement

School contacts suggested that increasing parental involvement in future after-school
interventions may be beneficial. Generally it was recommended that increased parent
awareness of the project may improve retention.

If you're going to roll it out, I think it has to be something a little bit more, towards the
parents, like 'you have to commit to it'. I think, yeah, that maybe just writing to the
parents and when the kids stop coming sending a letter to the parents and saying 'your
child hasn't attended and I would really like them to come back'.

School contact 61

The advantage of increased parental involvement was outlined by some girls who described
being encouraged to attend sessions by their parents.

Well when I said that I wanted to quit Active 7 she was like, 'it is healthy for you and
you should think about going again and don't stop it'.

Focus group 51

Similarly, dance instructors somewhat attributed attendance to parental encouragement and
one instructor thought girls appeared to be motivated to attend because their parents had told
them to.

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I think their parents kind of told them to be there.

Dance instructor 21 & 51

Facilities

Pupils found having the dance sessions on the school premises convenient. The school teaching space was appropriate because they did not have to travel.

It was always in the same room. Like say if we had to change rooms every single time I think that would have been a bit harder but I like it how it was just in one room.

Focus group 32

In some instances there were problems with the facilities. These included the room temperature and ventilation, access to toilets and changing facilities, and in one school a teaching space that had a viewing gallery. Having to change venue due to conflicting activities (e.g. exams) was also inconvenient and gave dance instructors the impression that their session was not as valued by the school as they wished.

There's a bit at the top [of the dance studio] [...] people used to stay here after school and they used to come in and like start watching [...] So everyone would have stopped because they got embarrassed.

Focus group 42

[Having to move venue] was always really confusing because you'd sometimes lose some girls because they couldn't find you or you'd lose time faffing around trying to figure out what room you were in.

Dance instructor 23

Communication and management arrangements

The majority of dance instructors described a good working relationship with their school contact. School contacts were seen to be supportive of the instructor and the study. In some cases, school contacts observed dance sessions; this was viewed positively by dance instructors.

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I emailed [the school contact] once about the level of noise the girls had, and then I saw him like a session or two later and he was like 'do you want me to have a quick pop in?' and I was like 'yes, that would be great'. So he was really up for it.

Dance instructor 21

One school contact was keen to learn from the dance instructor's teaching practices.

I just go down a couple of Tuesdays and join in with [dance instructor] because she's quite a good teacher and it's always good to learn some new stuff.

School contact 32

Conversely, in two schools DIs did not feel adequately supported by their school contact. This was largely attributed to poor communication and lack of knowledge of the year group.

Often I'd like ask her to come in, especially at the beginning, I said "can you come and sit in the lessons?" and she wouldn't reply to my emails.

Dance instructor 21 & 52

She didn't know any of the Year Sevens so that meant it was quite difficult for her to communicate with them about sessions.

Dance instructor 53

DISCUSSION

This study has elicited three key themes that affected delivery of the BGDP. The recruitment process, session content, and intervention organisation were identified as specific areas that could be improved. Each of these themes and the potential implications / solutions for them are presented in Table 1 and discussed below.

Different methods of recruitment were required for each respective stakeholder. Familiarity with participants taking part was perceived to be important among school contacts providing the link between schools, DIs, and the research team. This suggestion is pertinent given the complexities many school contacts faced when 'chasing' research participants to encourage them to attend (a task exacerbated by an unfamiliarity with the students). For girls, targeting peer groups was considered sensible and a realistic method for attracting participants. Our

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findings also suggest that espousing the credentials of the project to instil a type of project 'privilege' amongst girls may provide a further incentive for participation. This finding is consistent with previous research that suggests it may be useful to identify and garner the support of influential 'opinion makers' to espouse the credentials of the project and create a 'buzz' around it [22]. Such recruitment campaigns should be considered as part of the design of future after-school PA interventions [22].

A number of participants highlighted that the intervention intensity, both in terms of the number of sessions per week and the duration of the project, may have been too great a commitment to sustain adequate attendance and was somewhat discordant with usual school provision. One solution, as suggested by a school contact, was to implement the project in five week modules where different dance styles are implemented in each block. As such, future projects may wish to employ structures that mimic usual school provision, and ensure intervention implementers and school staff deliver after-school interventions via this approach.

Open-enrolment was highlighted as an approach that may have improved attendance and fluidity of delivery. However, it was noted that this would require dance instructors to carefully manage the dynamics of introducing new participants to the existing group, including the potential disruption this could cause. This suggestion is reasonable for mainstream delivery of the project, but the use of this strategy in a trial evaluation setting raises a problem in that participants receiving the intervention would change during the intervention period and, as such, intention-to-treat analyses would not be possible. This issue is therefore a reflection of broader debates in relation to the internal and external validity of public health interventions [23-25]. Although measures that maintain the rigour of a trial, such as limiting recruitment numbers, may increase internal validity, it may limit the external validity. Hence, although restricting the number of participants to those who signed up at baseline was a necessity, it may not reflect usual educational practice, whereby children are able to attend or 'drop-in' to after-school clubs at times convenient to them. Further work examining the use of modified intervention design for real-world public health interventions may be warranted [25-27].

Future delivery of after-school PA interventions may benefit from a greater awareness of existing school events. This could help avoid issues associated with projects overlapping with

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other activities and provide sufficient time for participants to reach sessions after finishing school. Identifying prospective timings convenient to girls is significant, given the multiple challenges already associated with implementing PA interventions during school hours [7 28 29].

The call for greater variety (e.g. a preference for differences in dance styles) in session content highlights the complexities of implementing interventions in distinct settings, and also raises a number of areas for consideration. Settings-based approaches to PA interventions have been highlighted elsewhere [30 31]. These findings support the need for a more "context based approach not only during data collection, but also for defining basic research constructs and questions" [32]. Findings highlight the significance of ensuring variety in session content, and in influencing participation and attendance across schools. Different dance styles appealed to different girls. While the programme set out to offer girls input into dance styles, music and pace of progression the effectiveness of this approach relies on employing dance instructors who are willing and able to teach a range of dance styles. While this was largely the case in the BGDP, it is important that the recruitment of intervention deliverers ensures that their skills allow them to deliver the planned content *and* be flexible to input from the participant group. The group work component of the intervention was valued by participants and dance instructors as it fostered ownership of the project, helped the instructor cope with various levels of competence within the group, developed girls' leadership skills and mitigated against inconsistent attendance. This finding is consistent with the broader literature associated with the principle of relatedness within Self Determination Theory [15].

Parents were identified as an important source of support for behaviour change that was not utilised in this study. This finding is consistent with previous work which has identified parents as a potentially important feature of PA behaviour change [33-38]. Parents represent a potential 'lever' that can be used to influence the PA levels of children, and as such work which specifically focusses on how to engage parents in providing positive support for extra-curricular PA programmes is warranted.

School culture impacts upon the intervention delivery

Through our extensive engagement with school contacts, dance instructors, and girls, we observed an implicit school 'ethos' or 'culture' which affected the intervention delivery and may have influenced some of themes discussed above. The main school culture factors that

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appeared to affect the acceptability of the study were the school's organisational structure and communication between staff, the school's expectations of pupil behaviour and attendance, and the role of the school contact. When approaching schools to recruit prospective participants, the research team received a mixed reception. Differences in attitudes were discernible from the outset, with some schools having a room booked and time set aside, and others forgetting the meeting had been arranged. Intervention logistics were also affected by distinct school cultures. Prior to recruitment, schools specified the days that intervention sessions would run so at the point of recruitment all girls knew the time and days on which they would receive dance sessions. In one case the school contact changed the days on which sessions were due to run. This school had the lowest average attendance, in part because many participants were not able to attend on the rescheduled day. Additionally, the same school contact set up a competing after-school club on the same day as the revised sessions. On paper, all schools encouraged consistent attendance, but in reality the expectations upon girls varied widely between schools [17]. Some school contacts expected girls to attend and were proactive in their approach in supporting them to do so. Others however, felt that their lack of familiarity with the girls made it difficult for them to encourage them, resulting in fewer, more ineffective attempts. All issues discussed above are reflective of the heterogeneity in the ethos of the participant schools. The findings highlight the fundamental importance of being aware of, and accounting for, the diversity of schools' needs in planning of after-school PA interventions[39].

STRENGTHS AND LIMITATIONS

This study provides new information on factors which may affect the delivery of after-school PA intervention. Although data used in this study are primarily focussed on dance, we hope that findings will have future utility for researchers or practitioners operating within the broader field of PA interventions. A major strength of this research lies in its in-depth exploration of the qualitative data, obtained from a range of stakeholders. Data analysis was conducted by a team of researchers experienced in qualitative research. Two researchers participated only in the analysis stage of the process evaluation, and hence afforded a degree of objectivity, untainted by previous involvement in data collection. The total number of participants (n=78) is large, and there was evidence of data saturation. It should be noted that the findings represent issues associated with trial implementation, rather than the actual

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experiences of after-school PA interventions. Hence, they should not be considered a checklist for challenges associated with PA interventions. A limitation is that the issues that we report are grounded only in the experiences of stakeholders involved in one intervention, which was delivered to girls only in a relatively small area of the South West. As such, while many of the issues are applicable to the planning and implementation of broader after-school PA interventions it is possible that other interventions with different participants would reach different conclusions. We encourage other intervention planners and delivers to conduct detailed and reflective process evaluations and further contribute to the knowledge base for which school-based interventions can be improved.

CONCLUSIONS

This study provides information on factors associated with BGDP delivery and identifies lessons which may be applied to future after-school PA interventions. Although after-school PA interventions hold promise in increasing PA levels among adolescent girls, there is a need to implement them in ways that are appropriate to the needs and requirements of schools and girls. Our findings suggest that implementation processes need to be contextually specific and the recommendations proposed in this study may have utility in achieving this objective.

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AUTHOR CONTRIBUTIONS

This project was convened by RJ, JP and SJS and RJ was the principal investigator of the grant. MJE was the Project manager and led all data collection efforts. JMK, SJS and MJE developed the interview and focus group guides and data were collected by JMK and MJE. Analysis was conducted by MJE, TM, JMK and SJS. The first draft of the paper was written by MJE, TM and RJ. All authors reviewed the paper for content, edited the paper and approved the final submission.

COMPETING INTERESTS

We have no competing interests to declare.

DATA SHARING

Data from the BGDP RCT study are not available to external collaborators until the NIHR (funders) monograph has been completed and accepted. However, we do encourage anyone who would like to collaborate with us to contact the corresponding author. From late 2017 we would be happy for external collaborators to access these data according to data transfer agreements that will have been developed by then. Information regarding this access will be made available on the study website from early 2016 (http://www.bristol.ac.uk/sps/research/researchprojectpages/BGDP/).

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Table 1: Recommendations for future physical activity programmes delivered during the extra-curricular period

Recruitment	*School Contacts*: To facilitate data collection, future recruitment of school contacts that are familiar with girls is recommended. *Dance Instructors*: Endorsements from dance instructors, schools, and dance agencies are suggested for recruitment of DIs. Recruitment workshops, whereby the project can be introduced to DIs, are also recommended. *Girls*: Targeting peer groups and espousing the credentials of project to instil a type of research 'privilege' are recommended for the future recruitment of participants.
Timetabling	An awareness and understanding of after-school events, extra-curricular activities, and the requirements of participants (including factoring in time to reach sessions from previous classes) is recommended to counter issues associated with project overlap.
Session Quantity	The delivery of interventions in "Blocks" is to be considered and changed for each new block.
Session Variety	Offer participants 'choice' over activities such as dance styles, and provide context-specific approaches to delivery, tailored to the needs and the requirements of the specific school.
Group Work	*Embedding group work into extra-curricular PA interventions is likely to be helpful and may help* participants to feel like they have ownership of the project
Open Enrolment	Open enrolment in which participants can 'drop in' to sessions anytime, rather than signing up to the intervention at its onset should be considered to mirror usual school provision.
Parental Involvement	Developing strategies for parental support for extra-curricular PA programmes should be incorporated into intervention design.
Facilities	The ability to respond to participant concerns regarding facilities (i.e. heating/drinks provision/changing facilities) and act upon them is encouraged in the future delivery of PA interventions.
Communication/ Management	Targeting school contacts who espouse a willingness to communicate and engage with DIs effectively, and support them to overcome any issues associated with session delivery and implementation, is recommended in future PA interventions.

23

Table 2. Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

No	Item	Guide questions/description
Domain 1: Research team and reflexivity		
Personal Characteristics		
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group? **JK, ME**
2.	Credentials	What were the researcher's credentials? *E.g. PhD, MD* **PhD**
3.	Occupation	What was their occupation at the time of the study? **Research Associate**
4.	Gender	Was the researcher male or female? **Female (JK); Male (ME)**
5.	Experience and training	What experience or training did the researcher have? **Coverage of qualitative methodology and interview technique in PhD**. **Formal training on qualitative research methods from at BSc/BA and MSc.**
Relationship with participants		
6.	Relationship established	Was a relationship established prior to study commencement? **No**
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.*g. personal goals, reasons for doing the research* **Both JK and ME had met the interviewees on several occasions. ME recruited them to the study and JK conducted process evaluation whilst they were delivering the intervention.**
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. *Bias, assumptions, reasons and interests in the research topic* **None**
Domain 2: study design		

No	Item	Guide questions/description
Theoretical framework		
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? *e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis* **Study was underpinned by self-determination theory. Qualitative analysis was conducted using a framework analysis**
Participant selection		
10.	Sampling	How were participants selected? *e.g. purposive, convenience, consecutive, snowball* **Purposive sampling for qualitative focus groups. All dance instructors delivering the intervention and all school contacts were interviewed/**
11.	Method of approach	How were participants approached? e.*g. face-to-face, telephone, mail, email* **Focus groups were conducted face to face** **Interviews with dance instructors conducted face to face** **One interview with a school contact was conducted via telephone. The remaining interviews were conducted face to face.**
12.	Sample size	How many participants were in the study? **Semi-structured interviews were conducted with all dance instructors who delivered the intervention (n=10) and school contacts (n=9) in intervention schools. A focus group (n=9) was conducted with girls who participated in each intervention school (n=59).**
13.	Non-participation	How many people refused to participate or dropped out? Reasons? Twelve participants withdrew from the study. • 6 no longer wanted to participate • 4 had illness(es) • 1 relocated • 1 excluded from school
Setting		
14.	Setting of data collection	Where was the data collected? *e.g. home, clinic, workplace*

25

No	Item	Guide questions/description
		All focus groups conducted in schools. One school contact interview conducted via phone, all remaining conducted in school. Dance instructor interviews conducted in a range of settings.
15.	Presence of non-participants	Was anyone else present besides the participants and researchers? **No**
16.	Description of sample	What are the important characteristics of the sample? *e.g. demographic data, date* Focus group: All Year 7 girls. Dance instructor interviews: All female School contacts: All teaching staff. One male, the remaining female.
Data collection		
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested? **Yes. No pilot conducted with final version of interview guide.**
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many? **No**
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data? **Audio recordings made for each interview/focus group.**
20.	Field notes	Were field notes made during and/or after the interview or focus group? **No.**
21.	Duration	What was the duration of the interviews or focus group? Average length Focus group: average length = 42.38 minutes (range = 30.35-50.23 minutes) Dance instructor interviews: average length = 67.20 minutes (range = 41.35-91.36 minutes) School contact interviews: average length = 29.35 minutes (range = 22.07-38.41 minutes)
22.	Data saturation	Was data saturation discussed? **Yes**
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction? **No**

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1   **Process evaluation of the Bristol Girls Dance Project**

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1

1 **Abstract**

2 **Background**

3 The Bristol Girls Dance Project was a cluster randomised controlled trial that aimed to

4 increase objectively measured moderate-to-vigorous physical activity (MVPA) levels of Year

5 7 (age 11-12) girls through a dance-based after-school intervention. The intervention was

6 delivered in nine schools and consisted of up to forty after-school dance sessions. This paper

7 reports on the main findings from the detailed process evaluation that was conducted.

8

9 **Methods**

10 Quantitative and qualitative data were collected from intervention schools. Dose and fidelity

11 were reported by dance instructors at every session. Intervention dose was defined as

12 attending two thirds of sessions and was measured by attendance registers. Fidelity to the

13 manual was reported by dance instructors. On four randomly selected occasions, participants

14 reported their perceived level of exertion and enjoyment. Reasons for non-attendance were

15 self-reported at the end of the intervention. Semi-structured interviews were conducted with

16 all dance instructors who delivered the intervention (n=10) and school contacts (n=9) in

17 intervention schools. A focus group was conducted with girls who participated in each

18 intervention school (n=9).

19

20 **Results**

21 The study did not affect girls' MVPA. An average of 31.7 girls participated in each school,

22 with 9.1 per school receiving the intervention dose. Mean attendance and instructors' fidelity

23 to the intervention manual decreased over time. The decline in attendance was largely

24 attributed to extraneous factors common to after-school activities. Qualitative data suggest

25 that the training and intervention manual were helpful to most instructors. Participant ratings

2

1 of session enjoyment were high but perceived exertion was low, however, girls found parts of

2 the intervention challenging.

3

4 **Conclusions**

5 The intervention was enjoyed by participants. Attendance at the intervention sessions was

6 low but typical of after-school activities. Participants reported that the intervention brought

7 about numerous health and social benefits and improved their dance-based knowledge and

8 skills. The intervention could be improved by reducing the number of girls allowed to

9 participate in each school and providing longer and more in-depth training to those delivering

10 the intervention.

11

12 **Trial registration**: ISRCTN52882523. Registered 25th April 2013.

13

14 **Key words:** Physical activity intervention, dance, secondary school, process evaluation,

15 adolescent, girls.

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1 **Background**

2 Physical activity (PA) during childhood is beneficial for physical and mental health [1-3]. A

3 high proportion of young people [4] do not achieve the UK government's recommendation of

4 at least 60 minutes of moderate-to-vigorous intensity PA (MVPA) per day [5]. The transition

5 between late childhood and early adolescence is a critical period of change during which PA

6 declines [6, 7] for girls in particular [6], thus more research focussed on maintaining and

7 increasing girls' PA during this transition is needed.

8 Whilst schools can be an important setting in which to promote youth PA [8], promoting PA

9 during the school day presents several difficulties such as limited curriculum time and

10 competition for school facilities [9-11]. As such, non-curriculum after-school interventions

11 offer an alternative means of promoting PA in schools [10, 11]. To date there have been

12 limited rigorous, controlled, after-school PA interventions [10].

13 Dance can be a high intensity activity that contributes towards meeting PA recommendations

14 [12, 13]. It is a popular form of PA among adolescent girls in the UK [14] and is an enjoyable

15 activity that provides an opportunity to socialise and learn new skills while being active [15].

16 Dance appeals to girls across socioeconomic status and is particularly successful in engaging

17 those from deprived areas whom would normally drop out of PA during secondary education

18 (11-16 years) [16]. Thus, delivering dance sessions during the after-school period could

19 potentially help to increase adolescent girls' PA.

20 We recently reported on the effectiveness of the Bristol Girls Dance Project (BGDP), known

21 locally as Active7, a cluster randomised controlled trial [17]. The study aimed to determine

22 the effectiveness of an after-school dance intervention on objectively-assessed

23 (accelerometer) mean weekday minutes of MVPA among 11-12 year old girls. There was

4

1   insufficient statistical evidence to suggest that the intervention was effective in increasing

2   girls MVPA.

3   Alongside the trial we conducted a rigorous process evaluation to examine the processes

4   underpinning the intervention which may help to explain its effects [18]. Process evaluations

5   assess the implementation (i.e., intervention fidelity and dose), the process through which any

6   change in outcomes may arise, and the context in which an intervention is delivered (which

7   may influence the implementation and impact) [19]. A detailed process evaluation of the

8   underpinning mechanisms can offer insight as to why an intervention was (in)effective [20].

9   Consistent with recent MRC guidelines [19], in this paper we report elements of the process

10 evaluation related to intervention dose, attendance, session fidelity, session enjoyment and

11 exertion. The influence of context in intervention delivery will be considered in a separate

12 paper. In addition to this, a separate theory-based process evaluation paper will be published

13 elsewhere exploring theoretical fidelity to self-determination theory (SDT) that underpinned

14 the intervention, links to which will be posted on the project website (www.active-7.org).

15 **Methods**

16 *Intervention design*

17 The trial protocol has been published [21]. Briefly, BGDP was a two-armed, cluster

18 randomised controlled trial in which 18 schools were randomised to either a control (n=9) or

19 intervention (n=9) arm. All Year 7 girls (11-12 years) in recruited schools were offered a

20 'taster' dance session to experience the intervention. Up to 33 girls per school were recruited

21 to the study. In total 571 girls participated (284 intervention and 287 control). Intervention

22 schools received up to 40 dance sessions that included a range of dance styles, consisting of

23 two 75 minute after-school sessions per week between January and July 2014. The sessions

24 were led by self-employed female dance instructors recruited to the study. Instructors

25 attended a one day training session before the intervention, and a half day "booster session"

5

1 mid-way through the intervention period. At both training sessions instructors were trained

2 (by SJS) in how to use the intervention manual and how to adopt an autonomy-supportive

3 teaching style in line with SDT [22, 23].

4 All instructors were given a *'Guide for dance instructors'* to facilitate delivery of the

5 intervention, which included plans for 40 sessions. The manual was developed by an expert

6 dance teacher/teacher trainer and trialled in a pilot study [24]. The post-pilot study qualitative

7 work led to improvements being made to the manual. The 40 session plans provided general

8 guidance on structure, progression, content, and suggestions on how to facilitate a suitable

9 motivational climate. The session plans became less detailed over the 40 sessions as the

10 instructors were provided more freedom to base sessions on girls' preferences and/or to work

11 towards a developing a performance.

12 **Data collection**

13 *Quantitative component*

14 The process evaluation data relates to the intervention schools only. Participants were

15 classified as receiving the intervention 'dose' if they attended at least two thirds of all

16 sessions provided in their school. Dose was measured using attendance registers completed

17 by dance instructors. At the end of the intervention, participants reported how true 13 reasons

18 for non-attendance (e.g., "*I prefer to spend time with my friends*") were for them on a 5-point

19 scale (0 = *Not true for me* to 4 = *Very true for me*). An open ended question was included for

20 girls to list other reasons for not attending. These data were obtained from 280 (99.6%) girls

21 in the intervention group, 84 girls gave 'other' reasons for not attending. Dance instructors

22 self-reported fidelity to the intervention manual ('*fully*', '*partially*' or '*not at all*') for each

23 session. To understand the receipt and impact of the intervention, participants in each school

24 reported their perceived level of exertion [25] using a 10-point scale (0 = '*not at all tired*' to

25 10 = '*very very tired*'), and their enjoyment [26] using a 5-point scale (1 = '*not at all*' to 5 =

6

1 '*a lot*'). This data was collected at the end of four randomly-selected sessions across the 40

2 sessions (i.e. one randomly selected session between sessions 5-12, 13-20, 21-29 and 30-36).

3

4 *Qualitative component*

5 Semi-structured interviews (mean duration = 67.2 minutes, range = 41.4 to 91.4 minutes)

6 were conducted with ten dance instructors who delivered the sessions in the intervention

7 schools. Two instructors (one reserve instructor, and one instructor who delivered sessions in

8 schools 21 and 51) each delivered half of the intervention sessions in one school (school 23).

9 The interviews explored experiences of the intervention training, intervention fidelity,

10 successes and challenges.

11 Semi-structured interviews (mean duration = 29.4 minutes, range = 22.1 to 38.4 minutes)

12 were conducted with nine school personnel who were the main contact between the research

13 team and the school (eight female, one male). School contacts discussed the logistics of the

14 project including recruitment, intervention delivery, data collection, and areas for

15 improvement. They also discussed factors that would affect disseminating the intervention on

16 a larger scale.

17 A focus group was conducted with girls that received the intervention in each intervention

18 school. Ten girls (including two reserves) per school were purposively selected to reflect the

19 views of girls from different tertiles of attendance (top tertile mean (SD) attendance = 27.8,

20 4.1; middle tertile = 17.1, 5.0; bottom tertile = 6.5, 1.7)). To ensure that girls were able to

21 share experiences of the intervention, girls who attended ≤3 sessions were excluded. 59 girls

22 participated in the focus groups (n=25, 16 & 18 high, moderate and low attenders

23 respectively). Focus group size ranged from 3-8 participants and the mean duration was 42.4

24 minutes (range = 30.4-50.2 minutes). Focus group topic guides explored factors that

1 influenced participation, views on session content and delivery, the dance instructor and

2 wider implementation.

3 All qualitative data were recorded using an encrypted digital recorder (Olympus DS-3500)

4 and audio recordings were transcribed verbatim. Transcripts were anonymised and compared

5 to the audio recordings to ensure accuracy. Written informed consent was obtained from all

6 school contacts and dance instructors, with written parental consent obtained for children.

7 The study was approved by the School for Policy Studies ethics committee at the University

8 of Bristol (ref: Bristol Girls Dance Project). Written parent consent was obtained for all

9 children who wished to participate in the study.

10 **Analysis**

11 *Quantitative data*

12 Frequencies, percentages, means and standard deviations were calculated to describe

13 recruitment, attendance, fidelity to the manual, reasons for non-attendance, exertion and

14 enjoyment data.

15 *Qualitative data*

16 The Framework Method, a form of thematic analysis defined by the systematic production of

17 a matrix that reduces data into a series of codes, was used to analyse the qualitative data [27].

18 Analysis was conducted by JMK, MJE, SJS, and TM. Following familiarisation with the

19 transcripts through repeated reading, initial codes were created to summarise and interpret

20 data. Inductively, the codes captured topics that emerged from the interviews. Deductively,

21 the analysis probed data to understand whether the intervention was delivered in line with

22 SDT [28]. A pre-defined 'school context' code was included to explore differences between

23 schools (both SDT and school context will be explored in separate papers). Initial codes were

24 produced independently by team members who each coded three different transcripts (one

8

1   dance instructor, school contact and focus group respectively). Codes were discussed in

2   weekly meetings, iteratively refined and combined to produce three coding frameworks. The

3   frameworks were applied to the remaining transcripts by JMK, MJE, and TM. Refinements

4   were discussed at meetings and frameworks were amended as new information arose.

5   Coded data were inserted into a framework matrix in Nvivo (Version 10, QSR International

6   Pty Ltd) to organise the data and help select illustrative quotes. To facilitate interpretation, a

7   convergence coding matrix [29] was used to compare codes across the three informant groups

8   to assess: '*agreement*' (i.e., codes from more than one group agree), '*partial agreement'* (i.e.,

9   agreement between some but not all groups), '*silence*' (i.e., code is found in one group but

10 not others), and '*dissonance*' (i.e., disagreement between informant group). Agreement was

11 identified between informant groups in 22 (29%) themes, partial agreement in 26 (34%)

12 themes, silence in 39 (51%) themes and dissonance in 6 (7%) of themes. JMK, MJE and TM

13 double coded two transcripts each, discussed them and agreed upon any discrepancies in

14 interpretation. To ensure trustworthiness four criteria were applied: credibility;

15 transferability; dependability and confirmability (Table 1) [30]. Findings are presented in a

16 mixed-methods format in which the main qualitative themes, supported with illustrative

17 quotes, are interpreted in light of the quantitative data. All qualitative data are attributed to

18 participants using the anonymised identification codes used during the study.

19 **Results**

20 Quantitative and qualitative results are presented alongside one another in two sections: 1)

21 implementation and 2) receipt of intervention. The sub sections contained within the two

22 sections are detailed in Table 2.

23 *1. Implementation*

1 This section reports results related to intervention dance instructor training, dose, and the

2 degree to which the session plan manual was adhered to.

3 *Dance instructor training*

4 The majority of dance instructors thought that the training, along with their existing

5 knowledge / expertise, adequately prepared them to deliver the intervention.

6 *I think you kind of covered it from every angle (Dance instructor 32).*

7 Bringing the group of instructors together led to an unanticipated but welcome creation of a

8 peer-support network.

9 *Although I knew some of [the other BGDP instructors] I didn't know some of them that well.*

10 *So kind of learning more about them, and what they do, and what styles they're interested in.*

11 *And also, just kind of on a personal level, building that network as a freelancer, it can be*

12 *quite isolating so that was quite nice to have that opportunity (Dance instructor 32).*

13 Similarly, the mid-intervention booster training was viewed as an opportunity to reflect on

14 the dance sessions delivered and an opportunity for peer sharing and learning.

15 *It was quite reassuring. Even though it's not nice to know that everyone else is having similar*

16 *difficulties, it's quite reassuring to think "actually, no, this is normal and people are having*

17 *similar things or if not worse" (Dance instructor 32).*

18 However, some practical elements of the induction training were considered inappropriate

19 given the instructors' experience. Also, some found the length of the 'booster' session to be

20 too short.

21 *In terms of the practical element, to be honest it's, you know, the games and things are things*

22 *I've been doing for the last 15 years (Dance instructor 42).*

10

1   *More time would have been useful. It felt quite rushed (Dance instructor 61).*

2   *Intervention dose*

3   All 40 dance sessions were delivered in four schools and between 37 and 39 sessions were

4   delivered in the other schools. On average, 31.7 (range = 26-33) girls participated in the study

5   in each school and 9.1 participants per school (range =1-20) attended two thirds of all

6   possible dance sessions.

7   Figure 1 displays attendance by school over the course of the intervention. Mean attendance

8   was 12.8 (SD = 7.0) girls per session (max = 32). Mean attendance at the first session was

9   24.3 (SD = 5.5) and steadily decreased to 10.3 (SD = 7.6) by the final session. School 23 had

10 the highest and school 53 had the lowest average attendance. There was considerable

11 variation in attendance between sessions in all schools and several sessions had zero

12 attendance. One reason for this occurring was due to the school contact not informing the

13 dance instructor that an alternative school-event was taking place (i.e., camp or sports day).

14 25 girls did not attended any sessions. 17 girls withdrew during the intervention (after

15 attending only one session), whilst five girls withdrew from the study after attending some

16 sessions (but did not provide data at any time points).

17 Whilst attendance was relatively low, some school contacts viewed the attrition rate as

18 similar to other after-school clubs.

19 *Everyone always starts like really enthusiastic… they're very much like, "Oh, I'll sign up for*

20 *that" and then "I'll just drop out half way through" (School contact 32).*

21 *That [decrease in attendance] was not a 'dance thing' or an 'Active7' thing, that's just 'a*

22 *thing' (School contact 62).*

23 However, two school contacts suggested that the decline in attendance was notably high.

11

1 *The attendance was horrendous. Really quite bad (School contact 42).*

2

3 Girls self-reported the reasons why they did not attend some sessions (Figure 2). While

4 endorsement of all reasons was relatively low, the most common reasons were that

5 participants had a different activity on the days Active7 ran, that sessions were not what they

6 expected when they enrolled, and that they preferred spending time with other friends outside

7 of the Active 7 dance class. For open responses, the most commonly cited reasons were

8 'injury/illness/tired' (n = 21), 'issues with the dance project' (n = 17), and 'other sports clubs'

9 (n = 12).

10 *Understanding high attendance*

11 In the school with the highest attendance (school 23), the dance instructor and school contact

12 described the school catchment area as influencing attendance, attitudes to the project, and

13 participant behaviour.

14 *I think it's just because the school's in a good area that the students are more ... well-*

15 *behaved, got better attendance (Dance instructor 23).*

16 *The type of students we've got in this school... they don't want to let people down so I think*

17 *they've got that in the back of their minds. They are aware that it's a good opportunity for*

18 *them, and they've got parental support so I think that's a major impact (School contact 23).*

19 The novelty of BGDP was also thought to partially explain the high attendance in school 23.

20 *We haven't really had something like this, like Active 7. That's why loads of people started*

21 *attending (Focus group 23).*

22 One of the two dance instructors in this school thought the participants particularly valued

23 their place in the project:

12

1 *I felt like they wanted to stay in the project but they also understood that this was exclusive to*

2 *them […] so I think they really valued their place in the class (Dance instructor 23).*

3 *Reaching those who needed the intervention most*

4 The intervention was seen to reach some girls who were perceived as in need of opportunities

5 like BGDP due to low activity levels, limited dance experience, or financial barriers to

6 participation.

7 *It's the quiet ones who are not making the school teams and so on, that's benefitted them*

8 *probably more than the really sporty ones (School contact 23).*

9 *My mum was just glad that something was actually free for once (Focus group 62).*

10 *The ones that were doing lots of things and that were naturally more talented didn't turn up*

11 *which was interesting, but that means that things for people who are from broken families,*

12 *who... have just transferred from another country... they perhaps are a bit oddballs and they*

13 *come together in those situations and they feel at home which is nice (Dance instructor 53).*

14 In contrast, for the school with the highest attendance, the dance instructor described the

15 majority of girls as already attending several after-school activities.

16 *A lot of the girls who I'm teaching are very sporty, go to dancing already, they're not really*

17 *the sort of key people that you're looking for the project (Dance instructor 23).*

18 For some girls, taking part in the BGDP replaced another form of PA.

19 *I'd have been part of the [school] basketball team. That's what I was doing before Active7.*

20 *And now that it's finished I'm going to join that again (Focus group 72).*

21 *Impact of attendance on intervention delivery*

13

1 Dance instructors found low attendance to be frustrating and some reflected personally on the

2 decline in numbers.

3 *I was quite angry, especially when I'd be sitting in the entrance and they'd just walk past me*

4 *and not acknowledge me or say anything, it was really difficult to go in and ... and be like*

5 *'hey, fun, ha-ha-ha!' (Dance instructor 53).*

6 Varying attendance resulted in the need to repeat the content of previous sessions to allow

7 absent girls to keep up with the progressive building of dance pieces.

8 *We were never able to complete anything [...] I always had to produce something different*

9 *every session because even when I had a couple of girls who were there all the time and*

10 *every week, I could probably get them to teach it in a session afterwards, but after that they'd*

11 *get bored of re-teaching it when there would be another new person at the next session*

12 *(Dance instructor 53).*

13 However, as attendance declined, the smaller groups of 'committed' participants were

14 preferred by those attending and the instructor. This facilitated teaching and the formation of

15 closer instructor-participant connections.

16 *Quite a lot of people left, but actually in the last term when it was just the 15, 16, they were*

17 *all incredibly committed [...] and their energy in class was great so it was actually a lot*

18 *better (Dance instructor 32).*

19 *Now there's not that many people [in the sessions] it's so much more relaxed and like*

20 *everyone can just be themselves (Focus group 61).*

21 *Fidelity to the intervention manual*

22 Figure 3 shows instructors' ratings of fidelity to the session plan manual. Overall 26.7 % of

23 sessions delivered were reported as being 'very much' like the manual, 47.1% were

14

‘somewhat’, and 25.9% were rated ‘not at all’. It appears that instructors adhered to the

manual most within the first five sessions and deviated from the manual more from session

six onwards. All but two instructors (who rated 50% & 76.9% of sessions as ‘not at all’ like

the manual), delivered the majority of their sessions ‘somewhat’ or ‘very much’ like that

outlined in manual.

Manual adherence was discussed in the interviews. Generally the manual was regarded as a

detailed, interesting and useful resource which encouraged participants to reflect on their

progress.

I kept asking this to the girls - because it says in the manual a lot and I think it's nice -“oh,

can you do that stretch a bit longer, have you noticed?” or “can you do that?”(Dance

instructor 23).

However, the majority of instructors felt that given their level of training and experience the

amount of detail was unnecessary.

When you've been teaching for 6, 7, 8 years... you've got that experience of working with

groups beforehand and you know what works and you know what doesn't work [...] [the

manual] could have maybe have been more... simplified and maybe, more suggestive (Dance

instructor 23).

Furthermore, some content in the initial session-plans contradicted how the instructors would

normally lead sessions which may partially explain the initial adherence to- followed by

greater departure from the manual.

Where it went wrong for me was [when] trying to stick to the manual I maybe did things that

near the beginning that I wouldn't have done and that maybe set things up slightly against me

in terms of managing behaviour (Dance instructor 42).

15

1 The dance instructors described using and adapting the session plans in various ways. Using

2 the manual as a 'guide' and allowing participant input was cited by several instructors.

3 *I used like what we were going to do etc. from [the manual] and then after that it was kind of*

4 *... the children were more comfortable with me, I knew their technique strengths and it was*

5 *kind of what I wanted to work on (Dance instructor 21&51).*

6 In line with the finding that varied attendance disrupted session delivery, attendance and

7 facility changes also disrupted adherence to the manual.

8 *I kind of stopped reading [the manual] after a while because every session I had different*

9 *kids, every session was in a different space or I couldn't get in a space. There was no way I*

10 *could follow it (Dance instructor 53).*

11 ***2. Receipt of the intervention***

12 This section considers levels of enjoyment and exertion of participants and the qualitative

13 perceptions of the impact on health, well-being and intentions to continue dancing.

14 *Enjoyment*

15 Enjoyment of the dance sessions was high in the majority of schools throughout the

16 intervention (mean = 4.3, SD = 0.3; range = 1 to 5) (Figure 4). The qualitative findings

17 support the quantitative data; group work, choreographing dance material and dancing to

18 popular music were highlighted as particularly enjoyable.

19 *It's like another fun activity you can do with your friends (Focus group 42).*

20 *Different music every lesson, like recent music and stuff. So that made it like more fun*

21 *because we like knew the songs and stuff (Focus group 23).*

22 The dance instructors also felt that participants enjoyed creating new dance material.

16

We did a lot of choreography, because that's what they really loved (Dance instructor 61).

Participants did not enjoy some dance styles, repetition of routines, and catching up to learn sequences from sessions they missed. The latter could be an explanation for decreasing attendance, as missed sessions may have led to a reluctance to attend future sessions when content has been missed.

I don't know whether it's the confidence thing or a lazy thing but they don't [...] want to try and catch up on what they've missed (Dance instructor 42).

I found [a particular style] quite boring. I enjoyed all the other ones... (Focus group 61).

Exertion

As shown in Figure 5, ratings of perceived exertion were low (mean = 3.7, SD = 0.9) throughout the intervention with some variation within and between schools. However, the quantitative data did not align with the qualitative perceptions of pupil exertion reported by dance instructors and pupils which often referred to sessions as physically tiring.

Some were tiring and some were like kind of easy but like after any of them I kind of felt good about myself (Focus group 53).

I liked it a lot but I just got really tired, like physically (Focus group 32).

Three dance instructors' views supported this perspective.

Quite a lot of them struggled with [some sessions], and I think that that's mainly to do with fitness levels because they struggled with the pace of it rather than the actual movement (Dance instructor 61).

Health, well-being, and psychological benefits

17

1 Participants in six schools reported various health benefits associated with participating in the

2 study, including greater energy, fitness, flexibility and weight loss.

3 *I couldn't do press ups. Now I can [...] I didn't know how to and I sort of couldn't. Now I can*

4 *do them (Focus group 53).*

5 Generally, girls believed that their confidence within dance and in non-dance settings

6 increased, which was also observed by the instructors.

7 *The fact that towards the end they wanted to do a different style each session, and they*

8 *wanted to create their own bit each session, has got to be a good indicator on something like*

9 *that [...] It's got to be a confidence thing (Dance instructor 62).*

10 *It like got me a bit more confident around my friends because usually I wouldn't really do like*

11 *dancing (Focus group 42).*

12 *Intentions to continue dancing*

13 One school contact suggested that the intervention increased the likelihood that girls would

14 continue dancing within the curriculum. Six dance instructors communicated the girls'

15 interest in continuing with BGDP into Year 8.

16 *Half of them are taking dance next year and I don't think, you know, some of them wouldn't*

17 *have said that was even an option at the start of the year that they were taking, so it has had*

18 *an impact on those girls that have stayed (School contact 61).*

19 *[Participants] were already asking 'okay, so are you coming back next year? It could be*

20 *Active8 – Activate! (Dance instructor 21).*

21 **Discussion**

18

1   This paper presents the findings of the BGDP process evaluation. Average attendance at the

2   BGDP sessions declined between the first and final session, with mean attendance falling

3   from 24.3 (77.11%) initially to 10.3 (26.06%) in the final session. The BGDP feasibility trial

4   (nine weeks in duration) reported a decrease in attendance, although the decline was less

5   steep (from approximately 90% initially to 60% by the final session) [24]. The qualitative

6   findings suggested that the decline in attendance was typical of after-school interventions but

7   higher than dance instructors' regular (often fee-paying) sessions. It is possible that girls who

8   enrol in fee-paying dance sessions feel more competent in dance upon enrolling and have a

9   greater sense of intention or perceived obligation to attend than girls in a less formal extra-

10   curricular environment who may sign up to try a new activity in a free and safe environment.

11   While the latter is highly desirable, more work is needed to understand how to retain those

12   girls in the programme. It is important to note that only one school achieved maximum

13   attendance at the first session. A decline in attendance can therefore only be partially

14   explained by the experience of the intervention. As such, efforts are required to understand

15   how to encourage those who sign up to after-school activities to attend initially. Participant

16   drop-out and variability in attendance has been recorded in other PA interventions involving

17   young people [31-33]. A number of previous PA intervention studies have reported declining

18   and/or fluctuating attendance, alongside high enjoyment ratings [32, 34, 35]. For example,

19   attendance in the ACT trial ranged from 40-51% [36]. It has been suggested that parental

20   support and transportation is pivotal to maintaining high attendance [37] and contacting

21   parents of children who had poor attendance has previously resulted in small improvements

22   in attendance [36].

23   The decline in attendance was not perceived as uniformly negative as all respondent groups

24   suggested that both the quality of sessions and group cohesion increased as attendance

25   declined. Girls who continued attending believed that their experience improved within the

19

1   smaller group. Smaller intervention group sizes may be favourable as they create an optimal

2   learning climate in which participants can have fun and enjoy themselves [38, 39].

3   Conversely larger groups have been found to adversely affect group dynamics and lead to

4   poor behaviour [31, 33]. While future interventions could consider reducing the initial cohort

5   size to create a committed smaller group, it may be that within school settings, larger initial

6   groups are needed to allow for smaller groups to arise from natural attrition. Additionally,

7   smaller, more exclusive groups, may not be appropriate in a school setting aimed at providing

8   opportunities for all children.

9   Enjoyment of the intervention sessions was high. However, enjoyment was only rated by

10   girls who attended the dance session on the day enjoyment was measured. While this

11   accurately reflects the high enjoyment of the girls who were retained in the intervention, it

12   does not reflect the views of those who dropped out (potentially because they did not enjoy

13   the sessions) and thus may have inflated perceptions of enjoyment. However, the reasons

14   girls gave for not attending did not align with factors seemingly associated with enjoyment,

15   but reflected competing commitments, social preferences and the sessions not matching their

16   expectations. Similarly, competition with alternative commitments and responsibilities was

17   the most prominent reason for non-attendance in previous child-focussed PA interventions

18   [33, 35].

19   Girls' perceived levels of exertion during the dance sessions were low. This echoes the

20   findings of the BGDP pilot study, in which exertion was 3.5 out of 10 [24]. Jago et al [40]

21   reported mean exertion levels of 5.9 out of 10 [38] for a four week Pilates intervention for 11

22   year old girls. In this study, anecdotal experiences of researchers attending the dance sessions

23   to collect data indicated, alongside the qualitative reports of girls and dance instructors, that

24   girls were exerting themselves considerably. The inconsistency of these findings could be due

20

1 to girls misunderstanding the scale or that the measure lacks validity in this population group

2 and in an after-school PA setting.

3 Fidelity to the intervention session manual varied between instructors and over the course of

4 the intervention. The majority of instructors used the manual to guide the initial sessions but

5 progressively deviated from the session plans to incorporate the views of the girls. The levels

6 of fidelity in this study appear to be slightly lower than that of others [31] [34]. However, a

7 core tenet of SDT [41], the theory underpinning the intervention, was for dance instructors to

8 provide opportunities for and be responsive to participant input (e.g., ideas on content and

9 pace of progression), which may explain departures from the session plans in the later phases

10 of the intervention. This will be considered in greater depth in a forthcoming publication. An

11 alternative explanation, supported by the qualitative findings, is that the inconsistent pupil

12 attendance prevented dance instructors from delivering the manual in the intended sequence.

13 The relevance of the dance instructor training and perceived use of the session plan manual

14 appeared to be affected by dance instructor experience. All instructors found elements of the

15 training and manual to be informative and key successes of the training included the

16 formation of a peer-support network and the mid-intervention booster session. Sharing ideas

17 and experiences related to programme delivery was valued by instructors and is a strategy

18 that has been used by Hall and colleagues [42], where dance instructors reported wanting a

19 longer booster session to optimise sharing of best-practice. For some, however, the training

20 content was considered to be too basic. Providing training for a diverse group of intervention

21 deliverers will inevitably lead to insufficient coverage for some, however it is vital that all

22 who deliver interventions are provided with the same information and guidance in order to

23 ensure consistency across intervention sites.

24 **Strengths and Limitations**

21

1   This paper provides an in-depth, mixed-methods process evaluation of the BGDP

2   intervention assessed from the perspectives of multiple stakeholders (i.e., participants,

3   implementers and facilitators). The qualitative data were analysed before the outcome data to

4   avoid bias in interpretation [43]. A school contact in all intervention schools was interviewed,

5   as were all dance instructors who delivered the intervention. Researcher bias in the selection

6   of focus group participants was minimised by the random selection of participants from

7   different attendance tertiles. An in-depth description of how the research addressed published

8   trustworthiness criteria is presented in Table 1.

9   This study has several limitations. Although we interviewed girls, school contacts and dance

10   instructors, it may have been useful to explore the perceptions of parents, particularly with

11   regards to issues surrounding attendance. Furthermore, some process evaluation components

12   are subject to social desirability bias in which responders may report what they think the

13   researcher wants to hear. This may be true of the interviews, reports of adherence to the

14   manual, and the measures of enjoyment and exertion.

15   **Conclusions**

16   The data presented in this paper show that, although the BGDP did not increase girls' PA

17   [17], dance-based after-school interventions can have a positive qualitative impact on

18   participants. Girls enjoyed the intervention and identified health and social benefits of taking

19   part. Attendance was relatively low and declined over time, however absence was largely the

20   result of competing activities (as opposed to a dislike of the intervention). The intervention

21   could be improved by having smaller groups, with a greater emphasis on encouraging

22   consistent attendance. This may improve the experience girls receive, reduce the need for

23   repetition, and facilitate faster skill progression. Collaborating with dance instructors who are

24   at different stages of their career to refine the session plan manual may improve the

25   appropriateness of the manual for instructors with a range of abilities and thus increase

22

1 fidelity. Additionally, a longer 'booster' session for instructors, mid-way through the

2 intervention, may provide greater opportunity to discuss problems and resolve ongoing

3 concerns.

4 **Competing interests**

5 The authors declare no competing interests.

6 **Authors' contributions**

7 RJ conceived the project with RJ, SJS and JP designing the study. SJS and RJ designed the

8 process evaluation with JMK assisting in its refinement. JMK and MJE collected the

9 qualitative and quantitative data. The analysis of the interviews was conducted by JMK, MJE,

10 TM, SJS and RJ. Quantitative analysis was undertaken by KT and PB. The first draft of this

11 paper was prepared by SJS, MJE, JMK and RJ. All other authors read, edited and approved

12 the final manuscript.

13

23

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5   None of the funders had involvement in the Trial Steering Committee, the data analysis, data

6   interpretation, data collection, or writing of the paper. ME, KT and PSB had access to all of

7   the data in the study and RJ had the final responsibility for the decision to submit for

8   publication. The views expressed in this publication are those of the authors and not

9   necessarily any of the funding bodies listed here.

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1 **Table 1. Description of how the qualitative component addressed features of**

2 **trustworthiness criteria**

Trustworthiness feature	Description
Credibility (internal validity)	Familiarity and rapport between the interviewer (JMK), dance instructors and participants was developed over four visits to each school. By observing dance sessions an understanding of the content and delivery was established. This insight informed the refinement of interview guides and may have encouraged honesty in the interviews. Researcher bias in the selection of participants was minimised by a random selection of focus group participants by attendance. Views from all intervention schools were gathered. During analysis, frequent study team de-briefings ensured different interpretations of data were considered.
Transferability (external validity) and dependability (reliability)	Findings should be understood within the study context. However, if similar findings are elicited in different schools or interventions, this could demonstrate a degree of transferability. By providing in-depth details of the methods we ensure that the study is repeatable.
Confirmability (Objectivity)	Researchers (JMK, SJS, TM, MJE) worked to ensure that the findings reflected the experiences of participants. SJS and RJ developed the project and SJS uses SDT in his research. JMK attended four dance sessions within each school and became familiar with each school setting. Therefore this may have influenced her interpretation of qualitative information. TM did not perform any school visits and does not have a background in SDT. Therefore he was able to assume a role of checking that interpretations reflected the data.

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1   **Table 2. Categories of implementation and receipt of intervention in the Active 7**

2   **process evaluation**

Implementation	Receipt of intervention
Intervention dose and attendance	Enjoyment
Understanding high attendance	Exertion
Reaching those who needed the intervention most	Perceived health, well-being, and psychological benefits
Impact of attendance on intervention delivery	Intentions to continue dancing
Dance instructor training	
Fidelity to the intervention manual	

31

1 **Figure Legends**

2 **Figure 1**. Attendance per dance session across all intervention schools

3 **Figure 2.** Self-reported reasons for not attending Active7 sessions

4 **Figure 3.** Fidelity to the intervention manual over the course of the intervention

5 **Figure 4.** Mean perceived enjoyment per school during the intervention

6 **Figure 5.** Mean perceived exertion levels per school on four occasions during the

7 intervention

32

Table 1: CONSORT 2010 checklist of information to include when reporting a cluster randomised trial

Section/Topic	Item No	Standard Checklist item	Extension for cluster designs	Page No *
Title and abstract				**1**
	1a	Identification as a randomised trial in the title	Identification as a cluster randomised trial in the title	**1**
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)[1,2]	See table 2	**NA (in main outcome paper)**
Introduction				**4-5**
Background and objectives	2a	Scientific background and explanation of rationale	Rationale for using a cluster design	**4-5**
	2b	Specific objectives or hypotheses	Whether objectives pertain to the the cluster level, the individual participant level or both	**4-5**
Methods				
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	Definition of cluster and description of how the design features apply to the clusters	**4**
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons		**NA**
Participants	4a	Eligibility criteria for participants	Eligibility criteria for clusters	**NA (in main outcome paper)**
	4b	Settings and locations where the data were collected		**5**
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	Whether interventions pertain to the cluster level, the individual participant level or both	**4 (further details in main outcome paper)**
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and	Whether outcome measures pertain to the cluster level, the individual participant level or both	**NA (in main outcome paper)**

		when they were assessed		
	6b	Any changes to trial outcomes after the trial commenced, with reasons		**NA**
Sample size	7a	How sample size was determined	Method of calculation, number of clusters(s) (and whether equal or unequal cluster sizes are assumed), cluster size, a coefficient of intracluster correlation (ICC or k), and an indication of its uncertainty	**5**
	7b	When applicable, explanation of any interim analyses and stopping guidelines		**NA**
Randomisation:				
Sequence generation	8a	Method used to generate the random allocation sequence		**NA (in main outcome paper)**
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	Details of stratification or matching if used	**NA**
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	Specification that allocation was based on clusters rather than individuals and whether allocation concealment (if any) was at the cluster level, the individual participant level or both	**NA**
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	Replace by 10a, 10b and 10c	**NA (in main outcome paper)**
	10a		Who generated the random allocation sequence, who enrolled clusters, and who assigned clusters to interventions	**NA (in main outcome paper)**
	10b		Mechanism by which individual participants were included in clusters for the purposes of the trial (such as complete	**NA**

		enumeration, random sampling)		
	10c	From whom consent was sought (representatives of the cluster, or individual cluster members, or both), and whether consent was sought before or after randomisation		**6**
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how		**NA (in main outcome paper)**
	11b	If relevant, description of the similarity of interventions		**NA**
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	How clustering was taken into account	**NA**
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses		**NA**
Results				
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	For each group, the numbers of clusters that were randomly assigned, received intended treatment, and were analysed for the primary outcome	**NA (in main outcome paper)**
	13b	For each group, losses and exclusions after randomisation, together with reasons	For each group, losses and exclusions for both clusters and individual cluster members	**NA (in main outcome paper)**
Recruitment	14a	Dates defining the periods of recruitment and follow-up		**NA (in main outcome paper)**
	14b	Why the trial ended or was stopped		**NA**
Baseline data	15	A table showing baseline demographic and clinical	Baseline characteristics for the individual and cluster levels as	**NA (in main**

			characteristics for each group	applicable for each group	**outcome paper)**
Numbers analysed	16		For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	For each group, number of clusters included in each analysis	**NA (in main outcome paper)**
Outcomes and estimation	17a		For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	Results at the individual or cluster level as applicable and a coefficient of intracluster correlation (ICC or k) for each primary outcome	**NA (in main outcome paper)**
	17b		For binary outcomes, presentation of both absolute and relative effect sizes is recommended		**NA**
Ancillary analyses	18		Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory		**NA**
Harms	19		All important harms or unintended effects in each group (for specific guidance see CONSORT for harms[3])		**NA (in main outcome paper)**
Discussion					
Limitations	20		Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses		**17-18** **(Full trial limitations reported in main outcome paper)**
Generalisability	21		Generalisability (external validity, applicability) of the trial findings	Generalisability to clusters and/or individual participants (as relevant)	**NA (in main outcome paper)**
Interpretation	22		Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence		**14-17**

Other information			
Registration	23	Registration number and name of trial registry	**2**
Protocol	24	Where the full trial protocol can be accessed, if available	**4**
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	**19**

* Note: page numbers optional depending on journal requirements

Table 2: Extension of CONSORT for abstracts[1,2] to reports of cluster randomised trials

Item	Standard Checklist item	Extension for cluster trials
Title	Identification of study as randomised	**Identification of study as cluster randomised**
Trial design	Description of the trial design (e.g. parallel, cluster, non-inferiority)	
Methods		
Participants	Eligibility criteria for participants and the settings where the data were collected	**Eligibility criteria for clusters**
Interventions	Interventions intended for each group	
Objective	Specific objective or hypothesis	**Whether objective or hypothesis pertains to the cluster level, the individual participant level or both**
Outcome	Clearly defined primary outcome for this report	**Whether the primary outcome pertains to the cluster level, the individual participant level or both**
Randomization	How participants were allocated to interventions	**How clusters were allocated to interventions**
Blinding (masking)	Whether or not participants, care givers, and those assessing the outcomes were blinded to group assignment	
Results		
Numbers randomized	Number of participants randomized to each group	**Number of clusters randomized to each group**
Recruitment	Trial status[1]	
Numbers analysed	Number of participants analysed in each group	**Number of clusters analysed in each group**
Outcome	For the primary outcome, a result for each group and the estimated effect size and its precision	**Results at the cluster or individual participant level as applicable for each primary outcome**
Harms	Important adverse events or side effects	
Conclusions	General interpretation of the results	
Trial registration	Registration number and name of trial register	
Funding	Source of funding	

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[1] Relevant to Conference Abstracts

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[1] Hopewell S, Clarke M, Moher D, Wager E, Middleton P, Altman DG, et al. CONSORT for reporting randomised trials in journal and conference abstracts. *Lancet* 2008, 371:281-283

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Lessons learnt from the qualitative process evaluation of the Bristol Girls Dance Project (a cluster RCT): Implications for the design and implementation of after-school physical activity interventions

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Lessons learnt from the qualitative process evaluation of the Bristol Girls Dance Project (a cluster RCT): Implications for the design and implementation of after-school physical activity interventions

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ABSTRACT

Objective: To consider implementation issues associated with the delivery of Bristol Girls Dance Project (BGDP) and identify improvements that may aid the design of after-school physical activity interventions.

Design: Two-armed cluster randomised control trial. The BGDP was a 20 week school-based intervention, consisting of two 75 minute after-school dance sessions per week, which aimed to support Year 7 girls to be more physically active.

Setting: 18 secondary schools in the Greater Bristol area (as an indication of deprivation, children eligible for the pupil premium in participant schools ranged from 6.9-53.3%).

Participants: 571 Year 7 girls participated. This article reports on qualitative data collected from 59 girls in the intervention arm of the trial, 10 dance instructors and nine school contacts involved in the delivering of the BGDP.

Methods: Data were obtained from nine focus groups with girls, and interviews with dance instructors and school contacts. Focus groups sought views of girls on intervention engagement, teaching styles, and experiences of the intervention. Interviews explored views on the implementation and dissemination. Framework analysis was used to analyse data.

Results: Qualitative data elicited three themes associated with the delivery of BGDP that affected implementation: project design, session content, and intervention organisation. As a theme, 'project design' found issues associated with recruitment, timetabling, and session quantity to influence the effectiveness of BGDP. 'Session content' found that dance instructors delivered a range of content and that girls enjoyed a variety of dance styles. Themes within 'project organisation' suggested an 'open enrolment' policy and greater parental involvement may facilitate better attendance.

Conclusion: After-school PA interventions have potential for increasing PA levels among adolescent girls. However there is a need to consider the context in which interventions are delivered and implement them in ways that are appropriate to the needs and requirements of participants.

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Strengths and Limitations

- Relevance beyond after-school dance interventions for researchers and practitioners designing and delivering after-school interventions.

- Study focuses on the significance of the context in which the intervention is delivered.

- Data obtained from in-depth qualitative interviews with participants and key stakeholders.

- Large sample of participants (n = 78) for the qualitative study and evidence of data saturation.

- Trial methodology limits generalisations.

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INTRODUCTION

Ensuring that all members of society are physically active is important for public health. Physical activity (PA) is associated with improved physical and mental well-being among children and young people [1-3]. A number of studies have shown that large proportions of young people do not engage in the recommended hour of moderate-to-vigorous PA (MVPA) per day [4 5]. Girls are often found to be less active than boys across childhood and adolescence and, as such, there is a need for interventions to encourage more PA in girls, particularly during the transition into adolescence when the decline in female PA is at its highest [6-8]. Girls tend to be more sedentary and also engage in less MVPA than boys[9]. A study examining barriers faced by girls to PA suggests that safety concerns, the competitive nature of many activities, inaccessible facilities, and body-image concerns are key perceived barriers to girls being active[10]. Additionally, girls face more restrictions than boys in terms of their freedom to play outdoors[8]. Dance is an activity that could resolve a number of these barriers and as such it is popular amongst adolescent girls in the UK, and could therefore be an appropriate activity to increase girls' PA[11-14].

Schools are a good place to target interventions as attendance is a legal requirement. PA interventions delivered during the school-day have had limited effect [7 8 12 15], suggesting a need to consider alternative school-based interventions [14-16]. Pate and O'Neill suggest that the quest for academic excellence combined with resource limitations restricts opportunities for physical activity within the school day[17]. Several systematic reviews have highlighted the potential of extra-curricular PA interventions for young people, however there is a lack of robust evaluations of these programmes [7 12]. Incorporating dance into after-school activities could contribute to overall PA among girls failing to achieve the recommended UK PA guidelines [11 14]. As such, the Bristol Girls Dance Project (BGDP) examined the potential of an after-school dance-based intervention targeted at increasing PA levels of Year 7 (age11-12) girls.

A feasibility trial was conducted to assess the potential of a dance-based intervention[18]. This formative work found that it was possible to recruit adolescent girls to an after-school dance intervention and that such an intervention could yield positive effects on their PA. The process evaluation reported fluctuating attendance and low perceived exertion levels within sessions. Additionally, post-intervention qualitative work suggested that a reduction in the

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time allocated for 'creative' tasks, better behaviour management guidance, and exposure to a wider range of dance styles would improve the intervention[18]. The intervention was refined in light of these findings and tested in a fully powered cluster randomised controlled trial[19], on which the present paper reports.

BGDP was a 20-week school-based two-armed cluster randomised control trial. The intervention consisted of two 75 minute after-school dance sessions per week for Year 7 (11-12 years) girls in the intervention arm. Intervention sessions were delivered by professional dance instructors who attended training led by study staff. The training introduced instructors to the study aims and rationale, the BGDP intervention sessions, and the underpinning Self-Determination Theory (SDT)[20 21]. Session plans underpinning the BGDP sessions encouraged dance instructors to use a variety of dance styles throughout the course of the intervention (encouraging participant choice in this was strongly encouraged).

The BGDP aimed to increase autonomous motivation for dance and PA amongst participants. The dance instructor training and BGDP session plan manual were integral to this aim. The SDT-focused element of the training explored the practical application of the theory to dance sessions. Instructors were provided the opportunity to use autonomy-supportive styles of instruction, seek clarification and obtain feedback from study staff. Behaviour management was discussed and further details included in the session plan manual. Halfway through the intervention period the instructors attended a half-day booster session that recapped study aims, the application of SDT in sessions, and provided a forum to discuss issues that arose during session delivery.

Full details of the trial protocol [13] and results have been published elsewhere [22]. Briefly however, there was no difference in PA levels between the intervention and control group girls during the last few weeks of the intervention or at six month follow-up. Findings reported elsewhere showed that intervention fidelity was generally good, with high levels of enjoyment among participants [23]. However, session attendance was highly variable with only one third of girls attending two thirds of the sessions. Attendance also declined during the project.

Process evaluations are central to understanding how complex interventions work [24] by focussing on the processes of intervention delivery, receipt and fidelity [24 25]. When they are

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too narrowly focused however, they can neglect to evaluate the broader contextual factors associated with individual agency, and the social context in which an intervention is delivered [26]. It is important to understand how logistical arrangements, operations and implementation of intervention components contribute to intervention processes, and to also acknowledge the influence of dance instructors delivering the intervention in a specific context. Thus, there is a need to identify factors that enable effective intervention delivery and establish how these factors can be influenced. The aim of this paper is to use qualitative process evaluation data to document the lessons learnt from the BGDP and to identify key points for improvement that may increase attendance rates and improve overall delivery of future after-school school-based PA interventions.

METHODS

18 schools participated in the study. All schools were located within 25 miles of Bristol city centre, and fell under the Bristol City, Bath and North East Somerset, or North Somerset Council areas. Schools were urban and suburban and in terms of deprivation they were slightly less deprived than the national average. Between 6.9 and 53.3% (average = 26.2%) of pupils in study schools were eligible for the 'pupil premium', a form of governmental funding aimed at increasing the attainment of disadvantaged pupils (higher percentage equals greater deprivation).[27] The national average is 27.8% of secondary pupils.

All Year 7 girls eligible to take part in physical education were invited to participate (n=1877). There was space for 33 girls to take part in each school. Recruitment consisted of a 'taster' session that provided exposure to a typical intervention session, a briefing, and written information for girls and parents/guardians. 633 girls returned parental consent forms, of which 571 were selected at random (due to the maximum limit of 33 girls per school). Participants completed four sets of measurements (accelerometer, psychosocial questionnaire and height and weight) at three time-points (baseline, T1 (end of intervention period), and T2 (baseline + 52 weeks)). Girls received a £10 thank you voucher for completing each measurement stage. Schools were randomised to control (n = 9) or intervention (n = 9) arm after baseline measures, with 284 girls in the intervention and 287 in the control arm.

The present study draws on interview data collected soon after the intervention ended from dance instructors (n = 10) who delivered the intervention and school contacts (n = 9) who

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facilitated intervention logistics in their school. School contacts were the study team's main point of contact with the school. These individuals were four PE staff, one Year 7 teacher, three dance teachers, and one drama teacher. Nine focus groups were conducted with girls that received the intervention (n = 59, range = 3-8). Ten girls from each intervention school, reflecting different tertiles of attendance, were invited. This was in order to capture a range of participant views. Girls who attended ≤3 sessions were not included as they would be unable to answer a significant proportion of the topic guide questions. Further details of participant sampling and recruitment are reported elsewhere[23]. For dance instructors, interviews explored views on the implementation and dissemination of BGDP. School contact interviews focussed on how the intervention was delivered and areas for improvement. Focus groups among girls explored intervention engagement, dance instructor teaching style, and experiences of the intervention. School contact interviews and participant focus groups were conducted in schools and dance instructor interviews were conducted in convenient locations for participants (cafes, for example). All interviews and focus groups were audio-recorded and transcribed verbatim. Transcripts were compared with the recordings and amended as necessary.

Ethical approval was obtained from the School for Policy Studies ethics and research committee at the University of Bristol. Written parental consent was obtained for all children who participated in the study and informed consent was gained from the dance instructors and school contacts who participated.

<u>Analysis</u>

A framework analysis was used[28]. The framework method is a seven stage procedure for analysing qualitative data, characterised by detailed line-by-line coding and the charting of data into a framework matrix[28]. Initial codes were created openly using NVivo (Version 10, QSR International) to categorise transcripts into components that were of potential significance to the research objective. Codes were produced independently by four qualitative researchers [JK, ME, SS & TM] who coded three transcripts each (one dance instructor, school contact and participant focus group). Initial codes formed a coding framework which was applied to the remaining transcripts. A pre-defined 'school context' code was included to identify differences in delivery between schools. Frameworks were subsequently triangulated to substantiate the relationships between all three informant groups. The qualitative research team met weekly to discuss and iteratively refine the codes, which led to the production of

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the three coding frameworks (one for each respondent group). Illustrative quotes capturing the essence of each theme were identified and agreed by the researchers. A COREQ checklist for reporting of qualitative studies is included (Table 1).

Table 1. Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

No	Item	Guide questions/description
Domain 1: Research team and reflexivity		
Personal Characteristics		
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group? **JK, ME**
2.	Credentials	What were the researcher's credentials? *E.g. PhD, MD* **PhD**
3.	Occupation	What was their occupation at the time of the study? **Research Associate**
4.	Gender	Was the researcher male or female? **Female (JK); Male (ME)**
5.	Experience and training	What experience or training did the researcher have? **Coverage of qualitative methodology and interview technique in PhD**. **Formal training on qualitative research methods from at BSc/BA and MSc.**
Relationship with participants		
6.	Relationship established	Was a relationship established prior to study commencement? **No**
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.*g. personal goals, reasons for doing the research* **Both JK and ME had met the interviewees on several occasions. ME recruited them to the study and JK conducted process evaluation whilst they were delivering the intervention.**
8.	Interviewer	What characteristics were reported about the interviewer/facilitator?

No	Item	Guide questions/description
	characteristics	e.g. *Bias, assumptions, reasons and interests in the research topic* **None**
Domain 2: study design		
Theoretical framework		
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? *e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis* **Study was underpinned by self-determination theory. Qualitative analysis was conducted using a framework analysis**
Participant selection		
10.	Sampling	How were participants selected? *e.g. purposive, convenience, consecutive, snowball* **Purposive sampling for qualitative focus groups. All dance instructors delivering the intervention and all school contacts were interviewed/**
11.	Method of approach	How were participants approached? e.g. *face-to-face, telephone, mail, email* **Focus groups were conducted face to face** **Interviews with dance instructors conducted face to face** **One interview with a school contact was conducted via telephone. The remaining interviews were conducted face to face.**
12.	Sample size	How many participants were in the study? **Semi-structured interviews were conducted with all dance instructors who delivered the intervention (n=10) and school contacts (n=9) in intervention schools. A focus group (n=9) was conducted with girls who participated in each intervention school (n=59).**
13.	Non-participation	How many people refused to participate or dropped out? Reasons? Twelve participants withdrew from the study. • 6 no longer wanted to participate • 4 had illness(es)

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No	Item	Guide questions/description
		• 1 relocated
		• 1 excluded from school
Setting		
14.	Setting of data collection	Where was the data collected? e.*g. home, clinic, workplace* **All focus groups conducted in schools. One school contact interview conducted via phone, all remaining conducted in school. Dance instructor interviews conducted in a range of settings.**
15.	Presence of non-participants	Was anyone else present besides the participants and researchers? **No**
16.	Description of sample	What are the important characteristics of the sample? *e.g. demographic data, date* Focus group: All Year 7 girls. Dance instructor interviews: All female School contacts: All teaching staff. One male, the remaining female.
Data collection		
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested? **Yes. No pilot conducted with final version of interview guide.**
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many? **No**
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data? **Audio recordings made for each interview/focus group.**
20.	Field notes	Were field notes made during and/or after the interview or focus group? **No.**
21.	Duration	What was the duration of the interviews or focus group? Average length Focus group: average length = 42.38 minutes (range = 30.35-50.23 minutes) Dance instructor interviews: average length = 67.20 minutes (range = 41.35-91.36 minutes) School contact interviews: average length = 29.35 minutes (range = 22.07-38.41 minutes)
22.	Data saturation	Was data saturation discussed?

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No	Item	Guide questions/description
		Yes
		Were transcripts returned to participants for comment and/or correction?
23.	Transcripts returned	**No**

We aimed to address issues that could be edited to improve future roll-out of similar interventions. Specifically, the issues addressed in this paper are:

- Why participants (school teachers, girls and dance instructors) took part in the study
- The acceptability of the design and content of the dance sessions
- Feedback on the intervention structure (session quantity and duration, for example)
- Views on the organisation of the study

RESULTS

Three main themes associated with BGDP delivery were identified in the qualitative analysis. These related to: 1) project design; 2) session content; and 3) project organisation. The findings are presented by theme, and the sub-themes include illustrative quotes from the different participant groups.

<u>Project design</u>

Project design encompasses sub-themes concerning BGDP logistical arrangements, including participant recruitment, timetabling, session quantity, and project duration.

<u>Recruitment</u>

Different methods of recruitment were required for each participant group (i.e., girls, dance instructors, and school contacts).

School contacts

No expectations or requirements were expressed by the study team regarding what school contacts would need to do for the study, beyond a general breakdown of what the school's participation entails. Similarly, no school contact sought detailed instruction on what their role would necessitate. School contacts cited various reasons for their involvement in the

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project, with some describing a personal interest and others being asked by a colleague to act as a key contact.

> *I was asked by the Head of Year 7 because he had too much on his plate.*
>
> *School contact 21*

> *I think it was just sent generally to the school like a pack…there was quite a lot of information there so I just emailed 'em through.*
>
> *School contact 72*

Two school contacts embraced a type of 'research altruism'. One noted how their own degree meant they were familiar with research and were keen to engage with a research project:

> *I also liked that it was part of a research project as well. I've been doing a university degree myself and dissertations and […] it's really important that these things are done to try and take things forward.*
>
> *School contact 23*

Dance instructors

Dance instructor involvement in the project was motivated by numerous reasons. The research aspect of the project appealed to some instructors who viewed the project as an opportunity to disseminate their view of dance as a positive activity for young people:

> *I love to dance and I love to teach dance and to share my passion with as many people as possible. So any opportunity I'm interested in. I was really attracted to the project as a whole, the research that was involved.*
>
> *Dance instructor 61*

Dance instructors also viewed their involvement as an opportunity to develop teaching experience via the delivery of new dance styles:

> *The fact that we were delivering different styles of dance that was also really good for me because I haven't really done much else in terms of teaching, so it kind of pushed me to try different things which I did and then gained more confidence so I've gained more skills.*

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Dance instructor 61

Girls

For some girls, the opportunity to try a new activity and learn new dance styles motivated participation:

> *I kind of just decided myself because I wanted to go like start something that I hadn't done before.*
>
> > *Focus group 23*

> *I'm not a fan of dance but because I wanted to try something new so I tried it.*
>
> > *Focus group 62*

For some girls involvement was based on spending time with their peers:

> *I was looking at some [afterschool clubs] but I was only really going to do them if like someone, like a friend, did it with me.*

> *Because I didn't really want to go on my own and everyone else knew each other and I just turned up.*
>
> > *Focus group 61*

Girls were given a £10 gift voucher for returning completing each phase of data collection. In two schools gift vouchers were interpreted as incentives to attend dance sessions by some. Indeed, one girl noted that participants should not receive a voucher unless they attend dance sessions.

> *You get a voucher. People signed up because of that. But I don't think they really signed up because they wanted to do the dance.*
>
> > *Focus group 53*

In one focus group, being part of BGDP was experienced as a privilege because others were denied the opportunity (due to the limit of 33 girls per school):

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It was like a privilege to like get into it because quite a lot of people like wanted to join but only a few of us did.

School contact 32

Timetabling

Some schools arranged BGDP sessions at a similar time to other after-school clubs, this led to different clubs/activities competing for attendance. However, in some schools, the time between the end of the school day and the beginning of BGDP sessions was short, meaning participants struggled to arrive punctually. This resulted in some sessions being short:

Partly it is to do with the set up at the school […] it's just a very annoying system that's in this school that because of the meetings that take place on a Tuesday and a Wednesday and we finish early on a Friday, Monday and Thursday are the only times available for any after school clubs. So all of the after school clubs run on a Monday and a Thursday. So you're all vying for kids.

School contact 62

After school finished we started five minutes later. That was not enough time. They needed ten minutes.

Dance instructor 51

Session quantity and project duration

School contacts suggested that the quantity of sessions (n=40) was too high to sustain attendance over the course of 20 weeks. Two sessions per week was also seen as a burden for girls by school contacts, especially when competing against other sporting events and social commitments:

I just feel that two sessions per week, and the length of time that it runs for, is possibly a bit too much to keep the attendance up.

School contact 72

I think possibly because it was so… on for such a long time they found it really hard to maintain their commitment because of other things that they like to do as well. I just

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feel that two sessions per week and the length of time that it runs for is possibly a bit too much to keep the attendance up.

School contact 72

Many dance instructors felt that two sessions per week was not typical for after-school clubs. One session per week was favoured for maintaining attendance. One school contact suggested that delivering the intervention in short 'themed' sections may be beneficial for encouraging attendance and return to sessions.

They do things better in bite size... you'd have almost been better off breaking it down to five week projects and a meeting at the beginning of each one so everybody knew where they were.

School contact 62

Session content

Session content relates to themes concerned with the delivery of sessions, including variety in session content and group work.

Variety in session content

The BGDP was designed to incorporate numerous dance styles. Session variety, was seen to be important for maintaining interest. The majority of dance instructors gave girls a choice of dance styles, an approach which gained approval from the girls:

She [dance instructor] asked us what types of things we wanted to do. Some people said contemporary, some people said breakdancing, so that's what we did which was good.

Focus group 53

Group Work

Generally, group work was viewed positively by instructors and girls. Dance instructors felt girls enjoyed group work and it encouraged them to take ownership of the project:

With tasks and things like that I kind of just gave them the choice in their groups so they just kind of got on with that.

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Dance instructor 32

Girls found group work enjoyable and it appeared to help improve their dance and team working skills.

We like worked well in the group. There were like no arguments.

Focus group 53

Group work was seen to be beneficial to both instructors and girls. Notably, it gave girls a sense of ownership over the project and developed their leadership skills. For dance instructors, it helped them manage the varied levels of competence within the group, and was perceived be a useful strategy for managing inconsistent attendance.

When it came to choreography and teaching other people that's when they took their ownership more so of the club.

Dance instructor 21 & 51

There was a tendency for instructors to allow participants to choose their own groups at the beginning of the project and then mix the groups once they felt comfortable with one another.

The first sessions I normally, if I'm doing group work, let them go with who they want to go [with] and then like when they feel more confident I kind of change it up a bit so they get to know new people.

Dance instructor 53

Project organisation

Project organisation relates to open enrolment, parental involvement, facilities, and communication and management arrangements.

Open enrolment

All participant groups suggested that an 'open enrolment' policy, allowing girls to 'drop in' to sessions anytime during the 20 weeks would be a good way to maintain attendance. Teachers stressed the importance of friends in ensuring continued attendance.

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So we say 'it's netball on Tuesday, anyone can come along. If you played for the primary school come along and see what it's like [...] bring your friends'. If only three year sevens turn up we'll say 'right, you're challenge is, next week you have to bring a partner'. And then when six turn up I say 'right, you have to bring a friend'. So that's how we kind of do it. 'Grab your friends, all come together' because it's very much a friendship thing.

School contact 42

Open enrolment was viewed as a feasible strategy as long as the project was mindful of new people joining and causing disruption to the existing group (and its progress).

Perhaps you might say 'you could join in after half term' or 'you can join in once we've finished this dance'. That's what I do at some schools.

Dance instructor 62

Parental Involvement

School contacts suggested that increasing parental involvement in future after-school interventions may be beneficial. Generally it was recommended that increased parent awareness of the project may improve retention.

If you're going to roll it out, I think it has to be something a little bit more, towards the parents, like 'you have to commit to it'. I think, yeah, that maybe just writing to the parents and when the kids stop coming sending a letter to the parents and saying 'your child hasn't attended and I would really like them to come back'.

School contact 61

The advantage of increased parental involvement was outlined by some girls who described being encouraged to attend sessions by their parents.

Well when I said that I wanted to quit Active 7 she was like, 'it is healthy for you and you should think about going again and don't stop it'.

Focus group 51

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Similarly, dance instructors somewhat attributed attendance to parental encouragement and one instructor thought girls appeared to be motivated to attend because their parents told them to.

> *I think their parents kind of told them to be there.*
>
> *Dance instructor 21 & 51*

Facilities

Pupils found having the dance sessions on school premises convenient. The school teaching space was appropriate because they did not have to travel.

> *It was always in the same room. Like say if we had to change rooms every single time I think that would have been a bit harder but I like it how it was just in one room.*
>
> *Focus group 32*

In some instances there were problems with the facilities. These included the room temperature and ventilation, access to toilets and changing facilities, and in one school a teaching space that had a viewing gallery. Having to change venue due to conflicting activities (e.g. exams) was also inconvenient and gave dance instructors the impression that their session was not as valued by the school as they wished.

> *There's a bit at the top [of the dance studio] [...] people used to stay here after school and they used to come in and like start watching [...] So everyone would have stopped because they got embarrassed.*
>
> *Focus group 42*

> *[Having to move venue] was always really confusing because you'd sometimes lose some girls because they couldn't find you or you'd lose time faffing around trying to figure out what room you were in.*
>
> *Dance instructor 23*

Communication and management arrangements

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The majority of dance instructors described a good working relationship with their school contact. School contacts were seen to be supportive of the instructor and the study. In some cases, school contacts observed dance sessions; this was viewed positively by dance instructors.

> *I emailed [the school contact] once about the level of noise the girls had, and then I saw him like a session or two later and he was like 'do you want me to have a quick pop in?' and I was like 'yes, that would be great'. So he was really up for it.*
>
> *Dance instructor 21*

One school contact was keen to learn from the dance instructor's teaching practices.

> *I just go down a couple of Tuesdays and join in with [dance instructor] because she's quite a good teacher and it's always good to learn some new stuff.*
>
> *School contact 32*

Conversely, in two schools dance instructors did not feel adequately supported by their school contact. This was largely attributed to poor communication and lack of knowledge of the year group.

> *Often I'd like ask her to come in, especially at the beginning, I said "can you come and sit in the lessons?" and she wouldn't reply to my emails.*
>
> *Dance instructor 21 & 52*

> *She didn't know any of the Year Sevens so that meant it was quite difficult for her to communicate with them about sessions.*
>
> *Dance instructor 53*

DISCUSSION

This study elicited three key themes that affected delivery of the BGDP. The recruitment process, session content, and intervention organisation were identified as specific areas where improvements could be made. Each of these themes and the potential implications / solutions for them are presented in Table 2 and discussed below.

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Table 2: Recommendations for future physical activity programmes delivered during the extra-curricular period

Issue	Problem (or potential problem) encountered	Potential solution
Recruitment	*School contacts*: Many contacts were not familiar with the participants (as they had not taught them yet) which made data collection (particularly the return of accelerometers) difficult. School contacts not communicating with dance instructors (over intervention issues) and the study team (over data collection).	To facilitate data collection, future recruitment of school contacts that are familiar with the participants (e.g., Head of their year group) is recommended. A calendar of tasks and requirements – with details on estimated time input - for school contacts may better prepare them for the role. A protected time allocation (weekly or monthly) for school contacts would ensure they can communicate with intervention deliverers and study staff, thus better equipping them for the time demands of the role and giving more time to resolve any problems.
	Dance instructors: It was difficult to recruit appropriate intervention deliverers for the requirements of participants (may specialise in one form of dance, teach different age groups/genders/abilities etc.). Intervention deliverers unable to deliver all intervention sessions.	Endorsements from other dance instructors, schools, and dance agencies are useful for recruitment. Recruitment workshops, whereby the project can be introduced to DIs, are also recommended. Observation of intervention deliverers before recruitment is desirable but time and cost dependant. Reserve deliverers should be recruited to cover absences and in the event of deliverers withdrawing from the study, these can be called upon as replacements.
	Girls: Confusion of receipt of voucher for participation in measurements with being paid to attend the intervention sessions. Friend involvement is an important factor influencing the recruitment of	Participants must be explicitly told (verbally and in writing) of the exact purpose of incentives to participate in data collection and what they will be received for. Our results suggest that recruiting existing friendship groups and promoting the importance and esteem of the university-led research in the participants' schools may help to achieve a greater buy-in from potential participants.

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	participants.	Avoiding recruiting children in the first few weeks of term may be beneficial as they are likely to be more 'settled' into their friendship groups by this time.
Timetabling	Clash of timing of school activities and intervention sessions. Children require sufficient time to get changed and arrive punctually for the scheduled intervention start time.	A calendar of after-school events, extra-curricular activities, and the requirements of participants (including factoring in time to reach sessions from previous classes) should be sought to reduce overlap of activities. School contacts should be encouraged to avoid scheduling intervention sessions on days that other activities run (or are likely to run in future – based on previous years' scheduling).
Session quantity	Two sessions per week was seen as too great a commitment for some participants. The total number of sessions (n=40) was also considered too many for some.	The delivery of interventions in 'blocks' of sessions – covering different themes – should be considered ahead of future delivery. The frequency of sessions and the overall number of sessions must be thoughtfully considered in light of the participants (age, existing ability and any other potentially important variables), achieving sufficient exposure to the intervention in order to achieve behaviour changes, and the timetable of schools.
Session variety	Participants want to cover different material/activities. Activity choice should reflect participants' desires whilst being achievable under the deliverer's skill set and capability.	Offer participants genuine 'choice' over activities such as dance styles, and provide context-specific approaches to delivery, tailored to the needs and the requirements of the specific school.
Group work	*Group work is liked by participants.*	*Embedding group work into interventions is likely to be helpful and may improve participants' sense of ownership if they are able to select their own groups.*
Open enrolment	One phase of participant enrolment (pre-baseline measurements) may unnaturally restrict participation.	Open enrolment, whereby participants can 'drop in' to sessions anytime, rather than signing up to the intervention at the onset only, should be considered to mirror usual school provision. Allowing participants to join midway through the intervention period may improve retention, increase diversity, and give more people exposure to the intervention. In a trial setting this may be difficult logistically unless *all* potential participants take part in baseline measures.
Parental	Parents are an important influence over	Developing strategies for parental support for extra-curricular PA programmes

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involvement	children and are likely to (or have the potential to) affect attendance.	should be incorporated into intervention design. Increased parental awareness of study aims and commitments may improve recruitment rates and attendance.
Facilities	School-based interventions are limited by the facilities a school has.	The ability to respond to participant desires regarding adaptable facilities (i.e. heating, drinks provision, changing facilities) and act upon them is encouraged in the future delivery of PA interventions. Choice over when windows/doors are opened, heating turned on, or whether a session is conducted outside (if feasible) should be discussed with participants. School facilities are used for different purposes at different times of the year (i.e., for school productions at Christmas and examinations in the summer). Attempts to protect the use of facilities for intervention sessions should be considered, but is likely to be difficult.
Communication/ management	Poor communication between any two stakeholders (study team, school contact and intervention deliverer) can have negative consequences for sessions.	Recruiting school contacts who want to be involved rather than being pressurised may foster better communication (however, this would be difficult to achieve in reality, other than targeting relevant subject staff). Writing formal guidelines on regular updates between dance instructor and school contact/study team may resolve ongoing problems and/or re-engage children who have stopped attending. Any added burden on those delivering the intervention or school contacts should be given extensive consideration and avoided if possible.

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Different methods of recruitment were required for each stakeholder group. Familiarity with participants taking part was important among school contacts providing the link between schools, dance instructors, and the research team. This suggestion is pertinent given the complexities many school contacts faced when 'chasing' research participants to encourage attendance (a task exacerbated by an unfamiliarity with the students). In future, it would be helpful to specify in detail what the role of school contact entails, highlighting the time needed for individual tasks and when they need to be completed (although over-burdening the contact with information should be treated with caution). Asking school contacts to allocate time for liaison with study staff/intervention deliverers may better prepare them for the role and improve delivery. For girls, targeting peer groups was considered sensible and a realistic method for attracting participants. Our findings also suggest that espousing the credentials of the project to instil a type of project 'privilege' may provide a further incentive for participation. This finding is consistent with previous research that suggests it is useful to identify and garner the support of influential 'opinion makers' to create a 'buzz' around the study [29]. Such recruitment campaigns should be considered as part of the design of future after-school PA interventions [29]. Assigning self-employed dance instructors to schools can be logistically difficult as many work on short-term contracts and continuously bid for work. This makes attending two sessions per week over a 20 week period a difficult commitment. Indeed, one instructor had to be replaced mid-way through the intervention. We would advise recruiting a bank of reserve instructors to ensure cover is always available.

School contacts selected the days and start/end times for intervention sessions. Dance instructors were assigned to schools to proximity and availability on session days. Subsequently, however, many schools had competing after-school activities on the same day as intervention sessions. Additionally, some children and dance instructors complained about sessions starting too soon after the school day ends. As such, greater consideration needs to be given to the scheduling of sessions, with the study manager and school contacting working through a set of potentialities to find a convenient and protected time.

A number of participants suggested that the intervention intensity, both in terms of the number of sessions per week and the duration of the intervention period, may have been too great a commitment to sustain attendance and was somewhat discordant with usual school provision. One solution suggested by a school contact, was to implement the project in five week modules where different dance styles are implemented in each block. As such, future

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projects may wish to employ structures that mimic usual school provision, and ensure intervention implementers and school staff deliver after-school interventions via this approach.

Open-enrolment was highlighted as an approach that may improve attendance and fluidity of delivery. However, it was noted that this would require dance instructors to carefully manage the dynamics of introducing new participants to the existing group, including the potential disruption this could cause. This suggestion is reasonable for mainstream delivery of the project, but the use of this strategy in a trial setting raises a problem in that participants receiving the intervention would change during the intervention period and, as such, intention-to-treat analyses would not be possible. This issue is therefore a reflection of broader debates in relation to the internal and external validity of public health interventions [30-32]. Although measures that maintain the rigour of a trial, such as limiting recruitment numbers, may increase internal validity, it may limit the external validity. Hence, although restricting the number of participants to those who signed up at baseline was a necessity, it may not reflect usual practice, whereby children are able to attend or 'drop-in' to after-school clubs at times convenient to them. Further work examining the use of modified intervention design for real-world public health interventions may be warranted [32-34].

Future delivery of after-school PA interventions may benefit from a greater awareness of existing school events. Study staff may wish to ask schools for the current and previous year's schedule of activities and check this against the planned intervention sessions, in the hope of identifying any current or future overlaps. Whilst this will not stop all withdrawals, it may reduce instances of children signing-up when they are likely to drop out at a later date (thus leaving space for children who may follow the intervention through to the end). Identifying prospective timings convenient to girls is significant, given the multiple challenges already associated with implementing PA interventions during school hours [7 35 36].

The call for greater variety (e.g. a preference for differences in dance styles) in session content highlights the complexities of implementing interventions in distinct settings. Settings-based approaches to PA interventions have been highlighted elsewhere [37 38]. These findings support the need for a more "context based approach not only during data collection, but also for defining basic research constructs and questions" [39]. Findings highlight the significance of ensuring variety in session content and for influencing participation and

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attendance across schools. Different dance styles appealed to different girls. While the programme set out to offer girls input into dance styles, music and pace of progression, the effectiveness of this approach relies on employing dance instructors who are willing and able to teach a range of dance styles. While this was largely the case in the BGDP, it is important that the recruitment of intervention deliverers ensures that their skills allow them to deliver the planned content *and* be flexible to input from the participant group. The group work component of the intervention was valued by participants and dance instructors as it fostered ownership of the project, helped the instructor cope with various levels of competence within the group, developed girls' leadership skills and mitigated against inconsistent attendance. This finding is consistent with the broader literature associated with the principle of relatedness within Self Determination Theory [40].

Parents were identified as an important source of support for behaviour change that was not utilised in this study. This finding is consistent with previous work which has identified parents as a potentially important feature of PA behaviour change [41-46]. Parents represent a potential 'lever' that can be used to influence the PA levels of children, and as such work that specifically focusses on how to engage parents in providing positive support for extra-curricular PA programmes is warranted.

School culture impacts upon the intervention delivery

Through our extensive engagement with school contacts, dance instructors, and girls, we observed (but did not formally assess) an implicit school 'ethos' or 'culture' which affected the intervention delivery and may have influenced the themes discussed above. The main school culture factors that appeared to affect the acceptability of the study were the school's organisational structure and communication between staff, the school's expectations of pupil behaviour and attendance, and the role of the school contact. When approaching schools to recruit participants, differences in attitudes were discernible from the outset, with some schools having a room booked and time set aside, and others forgetting the meeting had been arranged. Intervention logistics were also affected by distinct school cultures. Prior to recruitment, schools specified the days that intervention sessions would run so at the point of recruitment all girls knew the time and days on which they would receive dance sessions. In one case the school contact changed the days on which sessions ran. This school had the lowest average attendance, in part because many participants were not able to attend on the rescheduled day. Additionally, the same school contact set up a competing after-school club

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on the same day as the revised sessions. On paper, all schools encouraged consistent attendance, but in reality the expectations upon girls varied widely between schools [23]. Some school contacts expected girls to attend and were proactive in their approach in supporting them to do so. Others felt that their lack of familiarity with the girls made it difficult for them to encourage them, resulting in fewer, more ineffective attempts. All issues discussed above are reflective of the heterogeneity in the ethos of the participant schools. The findings highlight the fundamental importance of being aware of, and accounting for, the diversity of schools' needs in planning after-school PA interventions [47].

We encourage researchers to give greater consideration to the 'school context' [26]. Determining what contextual factors are important for a given study are difficult to establish pre-intervention and any formal assessment of the impact of school context will be difficult. Researchers should keep field notes of interactions with school and record issues that facilitate or hinder the study and intervention. Such a pool of knowledge from different studies and contexts may be the foundations on which more formal assessments of school context can in the future be made.

STRENGTHS AND LIMITATIONS

This study provides new information on factors which affect the delivery of after-school PA intervention. Although data used in this study are primarily focussed on dance, we hope the findings will have future utility for researchers or practitioners operating within the broader field of PA interventions. A major strength of this research lies in the in-depth exploration of qualitative data obtained from a range of stakeholders. Data analysis was conducted by a team of researchers experienced in qualitative research. Two researchers participated only in the analysis stage of the process evaluation, and hence afforded a degree of objectivity, untainted by previous involvement in data collection. The total number of participants (n=78) is large, and there was evidence of data saturation. It should be noted that the findings represent issues associated with trial implementation, rather than the actual experiences of after-school PA interventions. Hence, they should not be considered a checklist for challenges associated with PA interventions. A limitation is that the issues that we report are grounded only in the experiences of stakeholders involved in one intervention, which was delivered to girls only in a relatively small area of the South West. As such, while many issues are applicable to the planning and implementation of broader after-school PA interventions it is possible that other interventions would reach different conclusions. We

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encourage other intervention planners and delivers to conduct detailed and reflective process evaluations and further contribute to the knowledge base for which school-based interventions can be improved.

CONCLUSIONS

This study provides information on factors associated with BGDP delivery and identifies lessons which may be applied to future after-school PA interventions. Although after-school PA interventions hold promise in increasing PA levels among adolescent girls, there is a need to implement them in ways that are appropriate to the needs and requirements of schools and girls. Our findings suggest that implementation processes need to be contextually specific and the recommendations proposed in this study may have utility in achieving this objective.

AUTHOR CONTRIBUTIONS

This project was convened by RJ, JP and SJS and RJ was the principal investigator of the grant. MJE was the Project manager and led all data collection efforts. JMK, SJS and MJE developed the interview and focus group guides and data were collected by JMK and MJE. Analysis was conducted by MJE, TM, JMK and SJS. The first draft of the paper was written by MJE, TM and RJ. All authors reviewed the paper for content, edited the paper and approved the final submission.

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1 **Process evaluation of the Bristol Girls Dance Project**

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1 **Abstract**

2 **Background**

3 The Bristol Girls Dance Project was a cluster randomised controlled trial that aimed to

4 increase objectively measured moderate-to-vigorous physical activity (MVPA) levels of Year

5 7 (age 11-12) girls through a dance-based after-school intervention. The intervention was

6 delivered in nine schools and consisted of up to forty after-school dance sessions. This paper

7 reports on the main findings from the detailed process evaluation that was conducted.

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9 **Methods**

10 Quantitative and qualitative data were collected from intervention schools. Dose and fidelity

11 were reported by dance instructors at every session. Intervention dose was defined as

12 attending two thirds of sessions and was measured by attendance registers. Fidelity to the

13 manual was reported by dance instructors. On four randomly selected occasions, participants

14 reported their perceived level of exertion and enjoyment. Reasons for non-attendance were

15 self-reported at the end of the intervention. Semi-structured interviews were conducted with

16 all dance instructors who delivered the intervention (n=10) and school contacts (n=9) in

17 intervention schools. A focus group was conducted with girls who participated in each

18 intervention school (n=9).

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20 **Results**

21 The study did not affect girls' MVPA. An average of 31.7 girls participated in each school,

22 with 9.1 per school receiving the intervention dose. Mean attendance and instructors' fidelity

23 to the intervention manual decreased over time. The decline in attendance was largely

24 attributed to extraneous factors common to after-school activities. Qualitative data suggest

25 that the training and intervention manual were helpful to most instructors. Participant ratings

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1 of session enjoyment were high but perceived exertion was low, however, girls found parts of

2 the intervention challenging.

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4 **Conclusions**

5 The intervention was enjoyed by participants. Attendance at the intervention sessions was

6 low but typical of after-school activities. Participants reported that the intervention brought

7 about numerous health and social benefits and improved their dance-based knowledge and

8 skills. The intervention could be improved by reducing the number of girls allowed to

9 participate in each school and providing longer and more in-depth training to those delivering

10 the intervention.

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12 **Trial registration**: ISRCTN52882523. Registered 25th April 2013.

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14 **Key words:** Physical activity intervention, dance, secondary school, process evaluation,

15 adolescent, girls.

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1 **Background**

2 Physical activity (PA) during childhood is beneficial for physical and mental health [1-3]. A

3 high proportion of young people [4] do not achieve the UK government's recommendation of

4 at least 60 minutes of moderate-to-vigorous intensity PA (MVPA) per day [5]. The transition

5 between late childhood and early adolescence is a critical period of change during which PA

6 declines [6, 7] for girls in particular [6], thus more research focussed on maintaining and

7 increasing girls' PA during this transition is needed.

8 Whilst schools can be an important setting in which to promote youth PA [8], promoting PA

9 during the school day presents several difficulties such as limited curriculum time and

10 competition for school facilities [9-11]. As such, non-curriculum after-school interventions

11 offer an alternative means of promoting PA in schools [10, 11]. To date there have been

12 limited rigorous, controlled, after-school PA interventions [10].

13 Dance can be a high intensity activity that contributes towards meeting PA recommendations

14 [12, 13]. It is a popular form of PA among adolescent girls in the UK [14] and is an enjoyable

15 activity that provides an opportunity to socialise and learn new skills while being active [15].

16 Dance appeals to girls across socioeconomic status and is particularly successful in engaging

17 those from deprived areas whom would normally drop out of PA during secondary education

18 (11-16 years) [16]. Thus, delivering dance sessions during the after-school period could

19 potentially help to increase adolescent girls' PA.

20 We recently reported on the effectiveness of the Bristol Girls Dance Project (BGDP), known

21 locally as Active7, a cluster randomised controlled trial [17]. The study aimed to determine

22 the effectiveness of an after-school dance intervention on objectively-assessed

23 (accelerometer) mean weekday minutes of MVPA among 11-12 year old girls. There was

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1 insufficient statistical evidence to suggest that the intervention was effective in increasing

2 girls MVPA.

3 Alongside the trial we conducted a rigorous process evaluation to examine the processes

4 underpinning the intervention which may help to explain its effects [18]. Process evaluations

5 assess the implementation (i.e., intervention fidelity and dose), the process through which any

6 change in outcomes may arise, and the context in which an intervention is delivered (which

7 may influence the implementation and impact) [19]. A detailed process evaluation of the

8 underpinning mechanisms can offer insight as to why an intervention was (in)effective [20].

9 Consistent with recent MRC guidelines [19], in this paper we report elements of the process

10 evaluation related to intervention dose, attendance, session fidelity, session enjoyment and

11 exertion. The influence of context in intervention delivery will be considered in a separate

12 paper. In addition to this, a separate theory-based process evaluation paper will be published

13 elsewhere exploring theoretical fidelity to self-determination theory (SDT) that underpinned

14 the intervention, links to which will be posted on the project website (www.active-7.org).

15 **Methods**

16 *Intervention design*

17 The trial protocol has been published [21]. Briefly, BGDP was a two-armed, cluster

18 randomised controlled trial in which 18 schools were randomised to either a control (n=9) or

19 intervention (n=9) arm. All Year 7 girls (11-12 years) in recruited schools were offered a

20 'taster' dance session to experience the intervention. Up to 33 girls per school were recruited

21 to the study. In total 571 girls participated (284 intervention and 287 control). Intervention

22 schools received up to 40 dance sessions that included a range of dance styles, consisting of

23 two 75 minute after-school sessions per week between January and July 2014. The sessions

24 were led by self-employed female dance instructors recruited to the study. Instructors

25 attended a one day training session before the intervention, and a half day "booster session"

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1   mid-way through the intervention period. At both training sessions instructors were trained

2   (by SJS) in how to use the intervention manual and how to adopt an autonomy-supportive

3   teaching style in line with SDT [22, 23].

4   All instructors were given a *'Guide for dance instructors'* to facilitate delivery of the

5   intervention, which included plans for 40 sessions. The manual was developed by an expert

6   dance teacher/teacher trainer and trialled in a pilot study [24]. The post-pilot study qualitative

7   work led to improvements being made to the manual. The 40 session plans provided general

8   guidance on structure, progression, content, and suggestions on how to facilitate a suitable

9   motivational climate. The session plans became less detailed over the 40 sessions as the

10   instructors were provided more freedom to base sessions on girls' preferences and/or to work

11   towards a developing a performance.

12   **Data collection**

13   *Quantitative component*

14   The process evaluation data relates to the intervention schools only. Participants were

15   classified as receiving the intervention 'dose' if they attended at least two thirds of all

16   sessions provided in their school. Dose was measured using attendance registers completed

17   by dance instructors. At the end of the intervention, participants reported how true 13 reasons

18   for non-attendance (e.g., "*I prefer to spend time with my friends*") were for them on a 5-point

19   scale (0 = *Not true for me* to 4 = *Very true for me*). An open ended question was included for

20   girls to list other reasons for not attending. These data were obtained from 280 (99.6%) girls

21   in the intervention group, 84 girls gave 'other' reasons for not attending. Dance instructors

22   self-reported fidelity to the intervention manual ('*fully*', '*partially*' or '*not at all*') for each

23   session. To understand the receipt and impact of the intervention, participants in each school

24   reported their perceived level of exertion [25] using a 10-point scale (0 = '*not at all tired*' to

25   10 = '*very very tired*'), and their enjoyment [26] using a 5-point scale (1 = '*not at all*' to 5 =

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1   '*a lot*'). This data was collected at the end of four randomly-selected sessions across the 40

2   sessions (i.e. one randomly selected session between sessions 5-12, 13-20, 21-29 and 30-36).

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4   *Qualitative component*

5   Semi-structured interviews (mean duration = 67.2 minutes, range = 41.4 to 91.4 minutes)

6   were conducted with ten dance instructors who delivered the sessions in the intervention

7   schools. Two instructors (one reserve instructor, and one instructor who delivered sessions in

8   schools 21 and 51) each delivered half of the intervention sessions in one school (school 23).

9   The interviews explored experiences of the intervention training, intervention fidelity,

10 successes and challenges.

11 Semi-structured interviews (mean duration = 29.4 minutes, range = 22.1 to 38.4 minutes)

12 were conducted with nine school personnel who were the main contact between the research

13 team and the school (eight female, one male). School contacts discussed the logistics of the

14 project including recruitment, intervention delivery, data collection, and areas for

15 improvement. They also discussed factors that would affect disseminating the intervention on

16 a larger scale.

17 A focus group was conducted with girls that received the intervention in each intervention

18 school. Ten girls (including two reserves) per school were purposively selected to reflect the

19 views of girls from different tertiles of attendance (top tertile mean (SD) attendance = 27.8,

20 4.1; middle tertile = 17.1, 5.0; bottom tertile = 6.5, 1.7)). To ensure that girls were able to

21 share experiences of the intervention, girls who attended ≤3 sessions were excluded. 59 girls

22 participated in the focus groups (n=25, 16 & 18 high, moderate and low attenders

23 respectively). Focus group size ranged from 3-8 participants and the mean duration was 42.4

24 minutes (range = 30.4-50.2 minutes). Focus group topic guides explored factors that

7

1 influenced participation, views on session content and delivery, the dance instructor and

2 wider implementation.

3 All qualitative data were recorded using an encrypted digital recorder (Olympus DS-3500)

4 and audio recordings were transcribed verbatim. Transcripts were anonymised and compared

5 to the audio recordings to ensure accuracy. Written informed consent was obtained from all

6 school contacts and dance instructors, with written parental consent obtained for children.

7 The study was approved by the School for Policy Studies ethics committee at the University

8 of Bristol (ref: Bristol Girls Dance Project). Written parent consent was obtained for all

9 children who wished to participate in the study.

10 **Analysis**

11 *Quantitative data*

12 Frequencies, percentages, means and standard deviations were calculated to describe

13 recruitment, attendance, fidelity to the manual, reasons for non-attendance, exertion and

14 enjoyment data.

15 *Qualitative data*

16 The Framework Method, a form of thematic analysis defined by the systematic production of

17 a matrix that reduces data into a series of codes, was used to analyse the qualitative data [27].

18 Analysis was conducted by JMK, MJE, SJS, and TM. Following familiarisation with the

19 transcripts through repeated reading, initial codes were created to summarise and interpret

20 data. Inductively, the codes captured topics that emerged from the interviews. Deductively,

21 the analysis probed data to understand whether the intervention was delivered in line with

22 SDT [28]. A pre-defined 'school context' code was included to explore differences between

23 schools (both SDT and school context will be explored in separate papers). Initial codes were

24 produced independently by team members who each coded three different transcripts (one

8

1   dance instructor, school contact and focus group respectively). Codes were discussed in

2   weekly meetings, iteratively refined and combined to produce three coding frameworks. The

3   frameworks were applied to the remaining transcripts by JMK, MJE, and TM. Refinements

4   were discussed at meetings and frameworks were amended as new information arose.

5   Coded data were inserted into a framework matrix in Nvivo (Version 10, QSR International

6   Pty Ltd) to organise the data and help select illustrative quotes. To facilitate interpretation, a

7   convergence coding matrix [29] was used to compare codes across the three informant groups

8   to assess: '*agreement*' (i.e., codes from more than one group agree), '*partial agreement'* (i.e.,

9   agreement between some but not all groups), '*silence*' (i.e., code is found in one group but

10 not others), and '*dissonance*' (i.e., disagreement between informant group). Agreement was

11 identified between informant groups in 22 (29%) themes, partial agreement in 26 (34%)

12 themes, silence in 39 (51%) themes and dissonance in 6 (7%) of themes. JMK, MJE and TM

13 double coded two transcripts each, discussed them and agreed upon any discrepancies in

14 interpretation. To ensure trustworthiness four criteria were applied: credibility;

15 transferability; dependability and confirmability (Table 1) [30]. Findings are presented in a

16 mixed-methods format in which the main qualitative themes, supported with illustrative

17 quotes, are interpreted in light of the quantitative data. All qualitative data are attributed to

18 participants using the anonymised identification codes used during the study.

19 **Results**

20 Quantitative and qualitative results are presented alongside one another in two sections: 1)

21 implementation and 2) receipt of intervention. The sub sections contained within the two

22 sections are detailed in Table 2.

23 *1. Implementation*

9

1 This section reports results related to intervention dance instructor training, dose, and the

2 degree to which the session plan manual was adhered to.

3 *Dance instructor training*

4 The majority of dance instructors thought that the training, along with their existing

5 knowledge / expertise, adequately prepared them to deliver the intervention.

6 *I think you kind of covered it from every angle (Dance instructor 32).*

7 Bringing the group of instructors together led to an unanticipated but welcome creation of a

8 peer-support network.

9 *Although I knew some of [the other BGDP instructors] I didn't know some of them that well.*

10 *So kind of learning more about them, and what they do, and what styles they're interested in.*

11 *And also, just kind of on a personal level, building that network as a freelancer, it can be*

12 *quite isolating so that was quite nice to have that opportunity (Dance instructor 32).*

13 Similarly, the mid-intervention booster training was viewed as an opportunity to reflect on

14 the dance sessions delivered and an opportunity for peer sharing and learning.

15 *It was quite reassuring. Even though it's not nice to know that everyone else is having similar*

16 *difficulties, it's quite reassuring to think "actually, no, this is normal and people are having*

17 *similar things or if not worse" (Dance instructor 32).*

18 However, some practical elements of the induction training were considered inappropriate

19 given the instructors' experience. Also, some found the length of the 'booster' session to be

20 too short.

21 *In terms of the practical element, to be honest it's, you know, the games and things are things*

22 *I've been doing for the last 15 years (Dance instructor 42).*

10

1   *More time would have been useful. It felt quite rushed (Dance instructor 61).*

2   *Intervention dose*

3   All 40 dance sessions were delivered in four schools and between 37 and 39 sessions were

4   delivered in the other schools. On average, 31.7 (range = 26-33) girls participated in the study

5   in each school and 9.1 participants per school (range =1-20) attended two thirds of all

6   possible dance sessions.

7   Figure 1 displays attendance by school over the course of the intervention. Mean attendance

8   was 12.8 (SD = 7.0) girls per session (max = 32). Mean attendance at the first session was

9   24.3 (SD = 5.5) and steadily decreased to 10.3 (SD = 7.6) by the final session. School 23 had

10   the highest and school 53 had the lowest average attendance. There was considerable

11   variation in attendance between sessions in all schools and several sessions had zero

12   attendance. One reason for this occurring was due to the school contact not informing the

13   dance instructor that an alternative school-event was taking place (i.e., camp or sports day).

14   25 girls did not attended any sessions. 17 girls withdrew during the intervention (after

15   attending only one session), whilst five girls withdrew from the study after attending some

16   sessions (but did not provide data at any time points).

17   Whilst attendance was relatively low, some school contacts viewed the attrition rate as

18   similar to other after-school clubs.

19   *Everyone always starts like really enthusiastic… they're very much like, "Oh, I'll sign up for*

20   *that" and then "I'll just drop out half way through" (School contact 32).*

21   *That [decrease in attendance] was not a 'dance thing' or an 'Active7' thing, that's just 'a*

22   *thing' (School contact 62).*

23   However, two school contacts suggested that the decline in attendance was notably high.

11

1   *The attendance was horrendous. Really quite bad (School contact 42).*

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3   Girls self-reported the reasons why they did not attend some sessions (Figure 2). While

4   endorsement of all reasons was relatively low, the most common reasons were that

5   participants had a different activity on the days Active7 ran, that sessions were not what they

6   expected when they enrolled, and that they preferred spending time with other friends outside

7   of the Active 7 dance class. For open responses, the most commonly cited reasons were

8   'injury/illness/tired' (n = 21), 'issues with the dance project' (n = 17), and 'other sports clubs'

9   (n = 12).

10 *Understanding high attendance*

11 In the school with the highest attendance (school 23), the dance instructor and school contact

12 described the school catchment area as influencing attendance, attitudes to the project, and

13 participant behaviour.

14 *I think it's just because the school's in a good area that the students are more ... well-*

15 *behaved, got better attendance (Dance instructor 23).*

16 *The type of students we've got in this school… they don't want to let people down so I think*

17 *they've got that in the back of their minds. They are aware that it's a good opportunity for*

18 *them, and they've got parental support so I think that's a major impact (School contact 23).*

19 The novelty of BGDP was also thought to partially explain the high attendance in school 23.

20 *We haven't really had something like this, like Active 7. That's why loads of people started*

21 *attending (Focus group 23).*

22 One of the two dance instructors in this school thought the participants particularly valued

23 their place in the project:

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1   *I felt like they wanted to stay in the project but they also understood that this was exclusive to*

2   *them […] so I think they really valued their place in the class (Dance instructor 23).*

3   *Reaching those who needed the intervention most*

4   The intervention was seen to reach some girls who were perceived as in need of opportunities

5   like BGDP due to low activity levels, limited dance experience, or financial barriers to

6   participation.

7   *It's the quiet ones who are not making the school teams and so on, that's benefitted them*

8   *probably more than the really sporty ones (School contact 23).*

9   *My mum was just glad that something was actually free for once (Focus group 62).*

10   *The ones that were doing lots of things and that were naturally more talented didn't turn up*

11   *which was interesting, but that means that things for people who are from broken families,*

12   *who... have just transferred from another country... they perhaps are a bit oddballs and they*

13   *come together in those situations and they feel at home which is nice (Dance instructor 53).*

14   In contrast, for the school with the highest attendance, the dance instructor described the

15   majority of girls as already attending several after-school activities.

16   *A lot of the girls who I'm teaching are very sporty, go to dancing already, they're not really*

17   *the sort of key people that you're looking for the project (Dance instructor 23).*

18   For some girls, taking part in the BGDP replaced another form of PA.

19   *I'd have been part of the [school] basketball team. That's what I was doing before Active7.*

20   *And now that it's finished I'm going to join that again (Focus group 72).*

21   *Impact of attendance on intervention delivery*

13

1 Dance instructors found low attendance to be frustrating and some reflected personally on the

2 decline in numbers.

3 *I was quite angry, especially when I'd be sitting in the entrance and they'd just walk past me*

4 *and not acknowledge me or say anything, it was really difficult to go in and ... and be like*

5 *'hey, fun, ha-ha-ha!' (Dance instructor 53).*

6 Varying attendance resulted in the need to repeat the content of previous sessions to allow

7 absent girls to keep up with the progressive building of dance pieces.

8 *We were never able to complete anything [...] I always had to produce something different*

9 *every session because even when I had a couple of girls who were there all the time and*

10 *every week, I could probably get them to teach it in a session afterwards, but after that they'd*

11 *get bored of re-teaching it when there would be another new person at the next session*

12 *(Dance instructor 53).*

13 However, as attendance declined, the smaller groups of 'committed' participants were

14 preferred by those attending and the instructor. This facilitated teaching and the formation of

15 closer instructor-participant connections.

16 *Quite a lot of people left, but actually in the last term when it was just the 15, 16, they were*

17 *all incredibly committed [...] and their energy in class was great so it was actually a lot*

18 *better (Dance instructor 32).*

19 *Now there's not that many people [in the sessions] it's so much more relaxed and like*

20 *everyone can just be themselves (Focus group 61).*

21 *Fidelity to the intervention manual*

22 Figure 3 shows instructors' ratings of fidelity to the session plan manual. Overall 26.7 % of

23 sessions delivered were reported as being 'very much' like the manual, 47.1% were

14

1 'somewhat', and 25.9% were rated 'not at all'. It appears that instructors adhered to the

2 manual most within the first five sessions and deviated from the manual more from session

3 six onwards. All but two instructors (who rated 50% & 76.9% of sessions as 'not at all' like

4 the manual), delivered the majority of their sessions 'somewhat' or 'very much' like that

5 outlined in manual.

6 Manual adherence was discussed in the interviews. Generally the manual was regarded as a

7 detailed, interesting and useful resource which encouraged participants to reflect on their

8 progress.

9 *I kept asking this to the girls - because it says in the manual a lot and I think it's nice -"oh,*

10 *can you do that stretch a bit longer, have you noticed?" or "can you do that?"(Dance*

11 *instructor 23).*

12 However, the majority of instructors felt that given their level of training and experience the

13 amount of detail was unnecessary.

14 *When you've been teaching for 6, 7, 8 years... you've got that experience of working with*

15 *groups beforehand and you know what works and you know what doesn't work [...] [the*

16 *manual] could have maybe have been more... simplified and maybe, more suggestive (Dance*

17 *instructor 23).*

18 Furthermore, some content in the initial session-plans contradicted how the instructors would

19 normally lead sessions which may partially explain the initial adherence to- followed by

20 greater departure from the manual.

21 *Where it went wrong for me was [when] trying to stick to the manual I maybe did things that*

22 *near the beginning that I wouldn't have done and that maybe set things up slightly against me*

23 *in terms of managing behaviour (Dance instructor 42).*

15

1   The dance instructors described using and adapting the session plans in various ways. Using

2   the manual as a 'guide' and allowing participant input was cited by several instructors.

3   *I used like what we were going to do etc. from [the manual] and then after that it was kind of*

4   *... the children were more comfortable with me, I knew their technique strengths and it was*

5   *kind of what I wanted to work on (Dance instructor 21&51).*

6   In line with the finding that varied attendance disrupted session delivery, attendance and

7   facility changes also disrupted adherence to the manual.

8   *I kind of stopped reading [the manual] after a while because every session I had different*

9   *kids, every session was in a different space or I couldn't get in a space. There was no way I*

10   *could follow it (Dance instructor 53).*

11   *2. Receipt of the intervention*

12   This section considers levels of enjoyment and exertion of participants and the qualitative

13   perceptions of the impact on health, well-being and intentions to continue dancing.

14   *Enjoyment*

15   Enjoyment of the dance sessions was high in the majority of schools throughout the

16   intervention (mean = 4.3, SD = 0.3; range = 1 to 5) (Figure 4). The qualitative findings

17   support the quantitative data; group work, choreographing dance material and dancing to

18   popular music were highlighted as particularly enjoyable.

19   *It's like another fun activity you can do with your friends (Focus group 42).*

20   *Different music every lesson, like recent music and stuff. So that made it like more fun*

21   *because we like knew the songs and stuff (Focus group 23).*

22   The dance instructors also felt that participants enjoyed creating new dance material.

16

1 *We did a lot of choreography, because that's what they really loved (Dance instructor 61).*

2 Participants did not enjoy some dance styles, repetition of routines, and catching up to learn

3 sequences from sessions they missed. The latter could be an explanation for decreasing

4 attendance, as missed sessions may have led to a reluctance to attend future sessions when

5 content has been missed.

6 *I don't know whether it's the confidence thing or a lazy thing but they don't [...] want to try*

7 *and catch up on what they've missed (Dance instructor 42).*

8 *I found [a particular style] quite boring. I enjoyed all the other ones... (Focus group 61).*

9 *Exertion*

10 As shown in Figure 5, ratings of perceived exertion were low (mean = 3.7, SD = 0.9)

11 throughout the intervention with some variation within and between schools. However, the

12 quantitative data did not align with the qualitative perceptions of pupil exertion reported by

13 dance instructors and pupils which often referred to sessions as physically tiring.

14 *Some were tiring and some were like kind of easy but like after any of them I kind of felt good*

15 *about myself (Focus group 53).*

16 *I liked it a lot but I just got really tired, like physically (Focus group 32).*

17 Three dance instructors' views supported this perspective.

18 *Quite a lot of them struggled with [some sessions], and I think that that's mainly to do with*

19 *fitness levels because they struggled with the pace of it rather than the actual movement*

20 *(Dance instructor 61).*

21 *Health, well-being, and psychological benefits*

17

1   Participants in six schools reported various health benefits associated with participating in the

2   study, including greater energy, fitness, flexibility and weight loss.

3   *I couldn't do press ups. Now I can [...] I didn't know how to and I sort of couldn't. Now I can*

4   *do them (Focus group 53).*

5   Generally, girls believed that their confidence within dance and in non-dance settings

6   increased, which was also observed by the instructors.

7   *The fact that towards the end they wanted to do a different style each session, and they*

8   *wanted to create their own bit each session, has got to be a good indicator on something like*

9   *that [...] It's got to be a confidence thing (Dance instructor 62).*

10   *It like got me a bit more confident around my friends because usually I wouldn't really do like*

11   *dancing (Focus group 42).*

12   *Intentions to continue dancing*

13   One school contact suggested that the intervention increased the likelihood that girls would

14   continue dancing within the curriculum. Six dance instructors communicated the girls'

15   interest in continuing with BGDP into Year 8.

16   *Half of them are taking dance next year and I don't think, you know, some of them wouldn't*

17   *have said that was even an option at the start of the year that they were taking, so it has had*

18   *an impact on those girls that have stayed (School contact 61).*

19   *[Participants] were already asking 'okay, so are you coming back next year? It could be*

20   *Active8 – Activate! (Dance instructor 21).*

21   **Discussion**

18

1   This paper presents the findings of the BGDP process evaluation. Average attendance at the

2   BGDP sessions declined between the first and final session, with mean attendance falling

3   from 24.3 (77.11%) initially to 10.3 (26.06%) in the final session. The BGDP feasibility trial

4   (nine weeks in duration) reported a decrease in attendance, although the decline was less

5   steep (from approximately 90% initially to 60% by the final session) [24]. The qualitative

6   findings suggested that the decline in attendance was typical of after-school interventions but

7   higher than dance instructors' regular (often fee-paying) sessions. It is possible that girls who

8   enrol in fee-paying dance sessions feel more competent in dance upon enrolling and have a

9   greater sense of intention or perceived obligation to attend than girls in a less formal extra-

10 curricular environment who may sign up to try a new activity in a free and safe environment.

11 While the latter is highly desirable, more work is needed to understand how to retain those

12 girls in the programme. It is important to note that only one school achieved maximum

13 attendance at the first session. A decline in attendance can therefore only be partially

14 explained by the experience of the intervention. As such, efforts are required to understand

15 how to encourage those who sign up to after-school activities to attend initially. Participant

16 drop-out and variability in attendance has been recorded in other PA interventions involving

17 young people [31-33]. A number of previous PA intervention studies have reported declining

18 and/or fluctuating attendance, alongside high enjoyment ratings [32, 34, 35]. For example,

19 attendance in the ACT trial ranged from 40-51% [36]. It has been suggested that parental

20 support and transportation is pivotal to maintaining high attendance [37] and contacting

21 parents of children who had poor attendance has previously resulted in small improvements

22 in attendance [36].

23 The decline in attendance was not perceived as uniformly negative as all respondent groups

24 suggested that both the quality of sessions and group cohesion increased as attendance

25 declined. Girls who continued attending believed that their experience improved within the

19

1 smaller group. Smaller intervention group sizes may be favourable as they create an optimal

2 learning climate in which participants can have fun and enjoy themselves [38, 39].

3 Conversely larger groups have been found to adversely affect group dynamics and lead to

4 poor behaviour [31, 33]. While future interventions could consider reducing the initial cohort

5 size to create a committed smaller group, it may be that within school settings, larger initial

6 groups are needed to allow for smaller groups to arise from natural attrition. Additionally,

7 smaller, more exclusive groups, may not be appropriate in a school setting aimed at providing

8 opportunities for all children.

9 Enjoyment of the intervention sessions was high. However, enjoyment was only rated by

10 girls who attended the dance session on the day enjoyment was measured. While this

11 accurately reflects the high enjoyment of the girls who were retained in the intervention, it

12 does not reflect the views of those who dropped out (potentially because they did not enjoy

13 the sessions) and thus may have inflated perceptions of enjoyment. However, the reasons

14 girls gave for not attending did not align with factors seemingly associated with enjoyment,

15 but reflected competing commitments, social preferences and the sessions not matching their

16 expectations. Similarly, competition with alternative commitments and responsibilities was

17 the most prominent reason for non-attendance in previous child-focussed PA interventions

18 [33, 35].

19 Girls' perceived levels of exertion during the dance sessions were low. This echoes the

20 findings of the BGDP pilot study, in which exertion was 3.5 out of 10 [24]. Jago et al [40]

21 reported mean exertion levels of 5.9 out of 10 [38] for a four week Pilates intervention for 11

22 year old girls. In this study, anecdotal experiences of researchers attending the dance sessions

23 to collect data indicated, alongside the qualitative reports of girls and dance instructors, that

24 girls were exerting themselves considerably. The inconsistency of these findings could be due

20

1   to girls misunderstanding the scale or that the measure lacks validity in this population group

2   and in an after-school PA setting.

3   Fidelity to the intervention session manual varied between instructors and over the course of

4   the intervention. The majority of instructors used the manual to guide the initial sessions but

5   progressively deviated from the session plans to incorporate the views of the girls. The levels

6   of fidelity in this study appear to be slightly lower than that of others [31] [34]. However, a

7   core tenet of SDT [41], the theory underpinning the intervention, was for dance instructors to

8   provide opportunities for and be responsive to participant input (e.g., ideas on content and

9   pace of progression), which may explain departures from the session plans in the later phases

10   of the intervention. This will be considered in greater depth in a forthcoming publication. An

11   alternative explanation, supported by the qualitative findings, is that the inconsistent pupil

12   attendance prevented dance instructors from delivering the manual in the intended sequence.

13   The relevance of the dance instructor training and perceived use of the session plan manual

14   appeared to be affected by dance instructor experience. All instructors found elements of the

15   training and manual to be informative and key successes of the training included the

16   formation of a peer-support network and the mid-intervention booster session. Sharing ideas

17   and experiences related to programme delivery was valued by instructors and is a strategy

18   that has been used by Hall and colleagues [42], where dance instructors reported wanting a

19   longer booster session to optimise sharing of best-practice. For some, however, the training

20   content was considered to be too basic. Providing training for a diverse group of intervention

21   deliverers will inevitably lead to insufficient coverage for some, however it is vital that all

22   who deliver interventions are provided with the same information and guidance in order to

23   ensure consistency across intervention sites.

24   **Strengths and Limitations**

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1   This paper provides an in-depth, mixed-methods process evaluation of the BGDP

2   intervention assessed from the perspectives of multiple stakeholders (i.e., participants,

3   implementers and facilitators). The qualitative data were analysed before the outcome data to

4   avoid bias in interpretation [43]. A school contact in all intervention schools was interviewed,

5   as were all dance instructors who delivered the intervention. Researcher bias in the selection

6   of focus group participants was minimised by the random selection of participants from

7   different attendance tertiles. An in-depth description of how the research addressed published

8   trustworthiness criteria is presented in Table 1.

9   This study has several limitations. Although we interviewed girls, school contacts and dance

10   instructors, it may have been useful to explore the perceptions of parents, particularly with

11   regards to issues surrounding attendance. Furthermore, some process evaluation components

12   are subject to social desirability bias in which responders may report what they think the

13   researcher wants to hear. This may be true of the interviews, reports of adherence to the

14   manual, and the measures of enjoyment and exertion.

15   **Conclusions**

16   The data presented in this paper show that, although the BGDP did not increase girls' PA

17   [17], dance-based after-school interventions can have a positive qualitative impact on

18   participants. Girls enjoyed the intervention and identified health and social benefits of taking

19   part. Attendance was relatively low and declined over time, however absence was largely the

20   result of competing activities (as opposed to a dislike of the intervention). The intervention

21   could be improved by having smaller groups, with a greater emphasis on encouraging

22   consistent attendance. This may improve the experience girls receive, reduce the need for

23   repetition, and facilitate faster skill progression. Collaborating with dance instructors who are

24   at different stages of their career to refine the session plan manual may improve the

25   appropriateness of the manual for instructors with a range of abilities and thus increase

22

1   fidelity. Additionally, a longer 'booster' session for instructors, mid-way through the

2   intervention, may provide greater opportunity to discuss problems and resolve ongoing

3   concerns.

4   **Competing interests**

5   The authors declare no competing interests.

6   **Authors' contributions**

7   RJ conceived the project with RJ, SJS and JP designing the study. SJS and RJ designed the

8   process evaluation with JMK assisting in its refinement. JMK and MJE collected the

9   qualitative and quantitative data. The analysis of the interviews was conducted by JMK, MJE,

10   TM, SJS and RJ. Quantitative analysis was undertaken by KT and PB. The first draft of this

11   paper was prepared by SJS, MJE, JMK and RJ. All other authors read, edited and approved

12   the final manuscript.

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1 **Table 1. Description of how the qualitative component addressed features of**

2 **trustworthiness criteria**

Trustworthiness feature	Description
Credibility (internal validity)	Familiarity and rapport between the interviewer (JMK), dance instructors and participants was developed over four visits to each school. By observing dance sessions an understanding of the content and delivery was established. This insight informed the refinement of interview guides and may have encouraged honesty in the interviews. Researcher bias in the selection of participants was minimised by a random selection of focus group participants by attendance. Views from all intervention schools were gathered. During analysis, frequent study team de-briefings ensured different interpretations of data were considered.
Transferability (external validity) and dependability (reliability)	Findings should be understood within the study context. However, if similar findings are elicited in different schools or interventions, this could demonstrate a degree of transferability. By providing in-depth details of the methods we ensure that the study is repeatable.
Confirmability (Objectivity)	Researchers (JMK, SJS, TM, MJE) worked to ensure that the findings reflected the experiences of participants. SJS and RJ developed the project and SJS uses SDT in his research. JMK attended four dance sessions within each school and became familiar with each school setting. Therefore this may have influenced her interpretation of qualitative information. TM did not perform any school visits and does not have a background in SDT. Therefore he was able to assume a role of checking that interpretations reflected the data.

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1 **Table 2. Categories of implementation and receipt of intervention in the Active 7**

2 **process evaluation**

Implementation	Receipt of intervention
Intervention dose and attendance	Enjoyment
Understanding high attendance	Exertion
Reaching those who needed the intervention most	Perceived health, well-being, and psychological benefits
Impact of attendance on intervention delivery	Intentions to continue dancing
Dance instructor training	
Fidelity to the intervention manual	

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1 **Figure Legends**

2 **Figure 1**. Attendance per dance session across all intervention schools

3 **Figure 2.** Self-reported reasons for not attending Active7 sessions

4 **Figure 3.** Fidelity to the intervention manual over the course of the intervention

5 **Figure 4.** Mean perceived enjoyment per school during the intervention

6 **Figure 5.** Mean perceived exertion levels per school on four occasions during the

7 intervention

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STUDY PROTOCOL

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Bristol girls dance project (BGDP): protocol for a cluster randomised controlled trial of an after-school dance programme to increase physical activity among 11–12 year old girls

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Abstract

Background: Many children do not meet current UK physical activity (PA) guidelines. Girls are less active than boys throughout childhood, and the age-related decline in PA, particularly from early adolescence, is steeper for girls than for boys. Dance is the favourite form of PA among UK secondary school aged girls. Delivering dance sessions after school could make a significant contribution to girls' PA. Therefore, after-school dance sessions may be an appropriate and cost-effective activity through which adolescent girls' PA levels can be increased.

Design: Two-arm cluster randomised control trial and economic evaluation conducted in 18 secondary schools across the greater Bristol area. All Year 7 girls in participating schools will receive a 'taster' dance session and subsequently be invited to participate in the project. There is space for up to 33 girls to participate in each school. Schools will be randomly assigned in equal numbers to intervention or control arms after baseline data has been collected. The nine intervention schools will receive a 20 week after-school dance-based intervention, consisting of 40×75 minute sessions, delivered by external dance instructors. Control schools will not receive the dance intervention. All measures will be assessed at baseline (time 0), at the end of the intervention period (time 1) and six months after the intervention has ended (time 2). Our primary interest is to determine the effectiveness and cost-effectiveness of the intervention to affect the objectively-assessed (accelerometer) mean weekday minutes of moderate-to-vigorous PA (MVPA) accumulated by Year 7 girls one year after the baseline measurement (time 2).

Discussion: This paper describes the protocol for the Bristol Girls Dance Project cluster randomized controlled trial and economic evaluation, which is attempting to increase MVPA among Year 7 girls in UK secondary schools.

Trial registration: ISRCTN52882523.

Keywords: Adolescent, Physical activity, Dance, Intervention, After-school

Background

Physical activity (PA) is associated with lower levels of a number of health-based risk factors including insulin, glucose, blood pressure, body mass and is also associated with improved emotional well-being and self-esteem among young people [1]. Despite the benefits of regular PA, many young people do not meet the current UK recommendation of an hour of PA on most days of the

week [2]. PA levels decline during childhood, with the start of secondary school a key period of change [3]. Girls are less active than boys throughout childhood and the age-related decline in PA, particularly from early adolescence, is steeper for girls than boys [3].

Organised after-school PA programmes that focus on increasing PA opportunities for a wide group of adolescents could be an effective means of engaging inactive adolescents in PA [4]. A systematic review reported that there had been five evaluations of after-school PA interventions that had employed objective evaluation methods

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[5]. Of the five studies, three interventions reported positive effects on PA while a fourth pilot study reported a trend towards increased PA when compared to the control group. Four of the five interventions were well received by the children and their parents. With the exception of one study conducted in Spain [6], all studies were conducted in the USA. Thus, although many UK secondary schools offer organised after-school PA programmes, a rigorous and systematic evaluation of this type of intervention has not been conducted.

Interventions that have been based on psychological theory have been more successful than those that have not, and psychological theories can provide key advances for intervention design as they facilitate the identification of key mediators and mechanisms of behaviour change [7]. Self-determination theory (SDT) [8] may be particularly appropriate for understanding adolescents' PA [9] because it focusses on understanding the quality of individuals' motivation (e.g. how self-determined their reasons for PA are). SDT contends that finding ways in which adolescents can develop a sense of choice and ownership over their own PA (autonomy), feel competent engaging in PA (competence), and feel supported within a broader social context (relatedness) will foster more self-determined forms of motivation (e.g. participating for fun or personally valued benefits) which are in turn positively associated with PA [8,10]. SDT therefore suggests that PA interventions which target enjoyable and valued activities and foster perceptions of ownership, competence and belonging, are more likely to result in a sustained behaviour change.

Dance is the favourite form of PA among UK adolescent girls [11] and is a desirable activity in which they can engage [12]. Dance overcomes many barriers to adolescent girls' participation in PA as it is usually group-based (less likely to lead to public display and offers social interaction), non-competitive, and usually takes place indoors (not affected by weather). Dance therefore provides an appropriate medium through which to increase girls' PA and apply SDT as it is has the potential to be intrinsically motivating and build girls' perceived autonomy, competence and relatedness. Many girls who would normally drop out of other forms of PA during secondary school will engage in dance when it is available [13].

The applicability of a UK dance-based intervention to increase PA has not been tested. Delivering dance sessions after school, and focussing on increasing girls' desire to engage in dance and their ability to take part with or without adult instruction, could make a significant contribution to girls' PA levels.

Feasibility trial

The Bristol Girls Dance Project (BGDP) feasibility study [14] was a three-arm, parallel group, cluster randomized controlled pilot trial and economic evaluation, with schools as the unit of allocation. Seven secondary schools were recruited and all Year 7 girls who were physically able to participate in Physical Education (PE) classes were invited to participate. For practical reasons the sample was limited to 30 girls per school. Three intervention schools received two 90-minute after-school dance classes per week, for nine weeks. Following extensive formative work [12,14-16], the sessions were based on hip-hop and street dance genres. All participants were asked to wear an Actigraph accelerometer for seven days at baseline (Week 0), during the last two weeks of the intervention (Week 8 or 9) and 3 months after the intervention ended (Week 20). The feasibility trial demonstrated that it is possible to recruit Year 7 girls and record the cost of the programme. An embryonic resource-use checklist was developed for use in the main trial economic evaluation. We also showed that girls would attend the dance sessions and it was feasible to collect PA data from the girls at three time points. The feasibility work suggested that it would be possible to achieve a mean increase of 10 additional minutes of MVPA per weekday (i.e. 50 minutes per week) if the session intensity was increased and inactive creative time reduced.

Evidence of cost-effectiveness is important for knowing where to invest scarce resources and commission programmes to maximise health outcomes in the population [17,18]. However, gathering the evidence is a challenge [19] where behaviour change is associated with health outcomes that have wider cultural and environmental determinants [20,21]. The feasibility trial demonstrated that it was possible to cost the dance programme, but the cost-effectiveness was not ascertained.

Aims of the current study

The current study builds on the feasibility trial by examining the effect of a dance intervention on the MVPA levels of Year 7 girls. The specific research aims of the BGDP trial are as follows:

Primary aim

1. Determine the effectiveness of the BGDP intervention to improve the objectively-assessed (accelerometer) mean weekday minutes of MVPA accumulated by Year 7 girls one year after the baseline measurement (T2 = time 0 + 52 weeks).

Secondary aims

2. Determine the effectiveness of the BGDP intervention to improve the following secondary outcomes among Year 7 girls at T2:
   a) Mean weekend day minutes of MVPA;

b) Mean weekday accelerometer counts per minute (providing an objective measure of the volume of overall PA in which participants engage);

c) Mean weekend day accelerometer counts per minute;

d) The proportion of girls meeting the recommendation of 60 minutes of MVPA per day;

e) Mean accelerometer-derived minutes of weekday sedentary time;

f) Mean EQ-5D-Y scores (EuroQol 5D Youth survey - a standardised instrument for measuring health outcomes);

g) Programme costs (school level).

3. Determine the effectiveness of the BGDP intervention during the intervention period (weeks 19–20 of the intervention – first follow-up) on all primary and secondary outcome variables.

4. Determine the extent to which any effects on primary and secondary outcomes are mediated by autonomous and controlled motivation towards PA and perceptions of autonomy, competence and relatedness in PA [8].

5. Determine the cost-effectiveness/utility of the intervention from a public sector perspective over the time frame of the study.

Design

BGDP is a two-armed cluster randomised control trial in 18 secondary schools. The trial includes process, economic, quantitative and qualitative evaluations. The 18 schools will be recruited from state secondary schools (excluding Special Educational Needs, dance academies and privately/independently funded schools) operating within three Local Authorities: Bristol City Council, North Somerset Council, and Bath and North East Somerset Council. We aim to recruit up to 33 Year 7 girls from each school, with a minimum of 25 participants in each (450–594 participants overall). Schools must have at least 30 Year 7 girls, and be able and willing to allocate space for two after-school sessions per week for 20 weeks.

All schools fulfilling the inclusion criteria will be invited to participate and the first 18 schools that agree to participate will be enrolled. Additional schools will be placed in a reserve pool. If fewer than 25 girls are recruited in a given school, we will recruit a different school. Nine schools will be randomly assigned to the intervention arm and nine to the control arm.

Participant recruitment

Following school recruitment, a participant recruitment campaign will be initiated in all 18 schools. A taster session will be provided for all Year 7 girls who are able to engage in PE classes. The sessions will be delivered by an external dance instructor. At the end of the taster session students will be told about the study (including details of the randomisation and data collection commitments). All girls will be provided with information packs for themselves and their parents, and will be asked to return informed consent forms. If more than 33 consent forms are returned in each school, 33 girls will be randomly selected to participate using a computer-generated algorithm. If a girl drops out of the study prior to baseline data collection she will be replaced by the first randomly chosen reserve, with this process repeated as necessary. No replacements will be made after baseline collection. All participants will receive a £10 gift voucher on completion (return of accelerometer) of each of the data collection phases (£30 in total). The study has been granted ethical approval from the funder, sponsor and the School for Policy Studies ethics committee at the University of Bristol. Written informed parental consent will be obtained for all participants.

Sample size

Sample size calculations were performed to detect a mean difference of ten minutes of weekday MVPA between the intervention and control groups. The un-inflated sample size required for analysis to detect a difference of 10 minutes/day MVPA - assuming a standard deviation of 18 minutes [14] with 90% power and 5% two-sided alpha is 68 per arm. We estimated the 95% Confidence Interval (CI) for the school-associated Intraclass Correlation (ICC) in the pilot study to be < 0.001 to 0.087. If we assume that 20% of participants will not provide primary outcome data, the mean cluster size for analysis will be 24, resulting in a design effect of 3.0 using the upper 95% confidence limit for ICC. Thus, we will recruit a total of 18 schools and at least 450 girls.

Randomisation

Randomisation will occur at the school level after baseline data has been collected. Balance between trial arms will be achieved with respect to Local Authority membership, mean minutes of participant MVPA at baseline, school size, and deprivation. Deprivation will be assessed as the percentage of pupils in the school eligible for the Department of Education's Pupil Premium (additional funding given to schools to support disadvantaged pupils and bridge the attainment gap between them and their peers).

Intervention description

Schools randomised to the intervention arm will receive a 20-week dance intervention, consisting of 2×75 minute after-school sessions per week (40 sessions in total), running between January and June 2014. Dance sessions

will be led by an external dance instructor who will deliver a standardised programme which was developed in the feasibility trial. Instructors will attend a training programme before the intervention begins and a 'booster session' after the first term of delivery. The dance programme focuses on building participants' perceived autonomy to be active and perceived dance competence in a social, autonomy-supportive environment. The programme provides exposure to a wide range of dance styles. Participants in intervention schools will each be given a 'dance diary' which they will be encouraged to complete between sessions. The diaries will help children to reflect on their learning and encourage them to set their own goals.

Control school provision

Schools in the control arm will not receive the dance intervention and will continue with their normal schedule. Control schools will receive a £500 donation to the general school fund once all data has been collected from participants.

Measures

Data will be collected from all participants (intervention and control) at three time-points.

1. Time 0 (T0) (baseline), September-November 2013.
2. Time 1 (T1) (baseline +19-20 weeks), June 2014.
3. Time 2 (T2) (baseline + 52 weeks), September-November 2014.

The following measures will be measured at each time point: 1) accelerometer-assessed PA; 2) self-completed psychosocial questionnaire containing variables that we hypothesise to function as mediators (including self-esteem measures); 3) self-completion of the EQ-5D-Y health questionnaire, and; 4) height and weight. Details of each measurement are outlined below. In addition at T0, for descriptive purposes, all parents will be asked to report their home postcode; which will be used to estimate the index of multiple deprivation for the primary residence. Girls will also be asked to self-report their level of dance experience using categories of 'none', 'some' or 'a lot'.

Accelerometer assessed PA

Participants will wear an Actigraph GT3X+ accelerometer for seven days. Periods of ≥60 minutes of zero values will be defined as accelerometer'non-wear' time and discarded. Participants will be included in the analysis if they provide ≥3 days (weekday or weekend) of data with at least 500 minutes of data between 06:00 and 23:00.

Mean minutes of daily MVPA will be established using the threshold developed by Evenson et al. [22], which has been shown to be an accurate threshold for this age group [23]. The following accelerometer variables will be derived:

Primary outcome

1. Mean MVPA on weekdays a year after baseline measurement (T2).

Secondary outcomes

2. Mean weekend day minutes of MVPA (T1 and T2);
3. Mean weekday minutes of MVPA (T1 and T2);
4. Mean weekday accelerometer counts per minute (providing an indication of the volume of activity in which the girls engage) (T1 and T2);
5. Mean weekend day accelerometer counts per minute (T1 and T2);
6. Proportion of girls meeting the recommendation of 60 minutes of MVPA per day (T1 and T2);
7. Mean minutes of sedentary time per weekday (≤100 counts per minute) (T1 and T2).

Psychosocial questionnaire

All participants will be asked to complete a 66 item questionnaire at each time point. The questionnaire, which will be programmed onto a tablet computer, will assess psychosocial variables that could be influenced by the intervention and/or mediate the effect of the intervention on MVPA. Aligned with SDT, autonomous (8 items) and controlled motivation (7 items) [24] and perceptions of autonomy (6 items), competence (6 items) and relatedness (5 items) [25,26] within PA will be measured. Self-esteem (9 items) [27] will also be measured. All measures were piloted in the feasibility trial [14] and displayed evidence of internal consistency among Year 7 girls. Following reverse scoring of negatively worded items, subscale mean scores will be calculated.

As shown in Figure 1, we hypothesise that autonomous and controlled motivation for PA, and perceptions of autonomy, competence and relatedness in PA will mediate the effect of the intervention on weekday MVPA.

Costs/economic outcome data

The EuroQol 5D Youth survey (EQ-5D-Y), validated for use in children and adolescents [28], will be applied as a secondary outcome measure of health related quality of life in the trial. The EQ-5D-Y questionnaire is a standardised instrument for measuring health outcomes in youth. Public sector resources used at each stage of programme delivery will be recorded retrospectively using the resource use checklist tool developed during

Figure 1 Hypothesised mediation model.
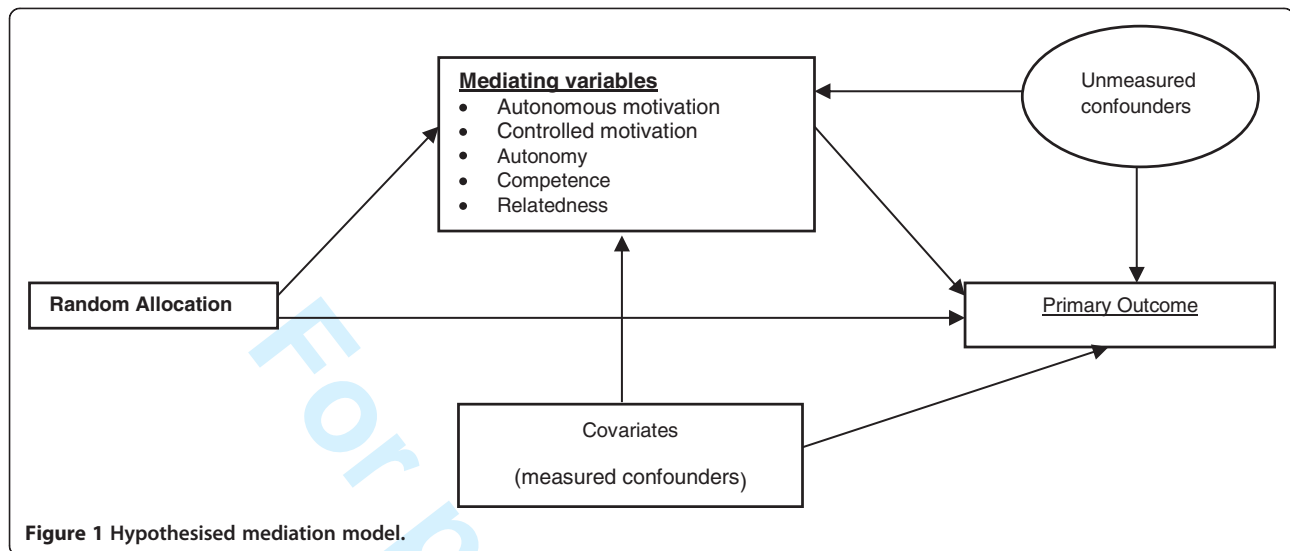
the feasibility study. Time sheet, expenses and travel data records will all be utilised. Costs will be estimated using the checklist tool developed for this purpose and prices from published or established sources. Costs will be uprated in line with inflation to 2014–15 prices.

Process evaluation

A process evaluation will be conducted in the nine intervention schools. The process evaluation will report on consent, recruitment, attendance and adherence rates. The dose of the intervention (i.e. number of planned sessions delivered) will be recorded for each school. Intervention fidelity will be assessed by: a) dance instructors' completion of a log-book indicating whether they delivered planned core components of each session (*fully*, *partially* or *not at all*); and b) observation/audio recording of four random sessions delivered by each dance instructor. Observers will rate the degree to which the instructors delivered the core components of the session. Audio recordings will be rated using a validated tool [29], to measure the extent to which dance teachers' teaching style was autonomy-supportive. At the end of the four observed sessions in each school, participants will be asked to complete a perceived exertion [30] and enjoyment [31] questionnaire.

To assess any contamination of the control group from dance classes locally, we will collect data on extra-curricular provision (including dance) in all 18 schools. School-level data will be collected from school staff at each measurement point. Additionally, girls will be asked if they attend dance classes outside of school at each measurement point. Any girls who withdraw from the intervention will be asked to complete an exit questionnaire to explore their reasons for withdrawal.

Statistical analysis

The analysis and presentation of the trial will be in accordance with CONSORT guidelines, with the primary comparative analyses being conducted on an intention-to-treat (ITT) basis and due emphasis placed on confidence intervals for the between-arm comparisons. To take appropriate account of the hierarchical nature of the data, we will use multivariable mixed effects linear regression to estimate difference in the primary outcome for intervention group versus control, adjusting for baseline MVPA and randomisation variables. In a secondary analysis, we will further adjust for variables that were imbalanced between the trial arms at baseline. To assess the potential effect of missing data on the outcomes, in sensitivity analyses we will impute data using standard multiple imputation approaches.

We will investigate the effect of adherence to the intervention using instrumental variable regression, with adherence defined as girls attending 25 of the 40 sessions. Appropriate interaction terms will be entered into the primary regression analyses for mean weekday MVPA in order to conduct pre-specified subgroup analyses that will include baseline level of dance experience ('none', 'some' or 'a lot'), socioeconomic position (based on the index of multiple deprivation for the home post-code – continuous variable), and baseline weekday minutes of MVPA (continuous variable). Since the trial is powered to detect overall differences between the groups rather than interactions of this kind, these analyses are considered exploratory and results will be presented using confidence intervals and interpreted with due caution.

We will explore whether the effect of the intervention on the primary and secondary outcomes is mediated by

autonomous and controlled motivation for PA and/or perceptions of autonomy, competence and relatedness need satisfaction in PA. This will be achieved by methods based on the processes of Emsley and colleagues [32].

Quantitative process evaluation data (e.g. attendance rates) will be analysed using appropriate descriptive statistics for normally distributed variables (using the mean and standard deviation) and variables without such a distribution (using the median and inter-quartile ranges). Ratings of instructor's teaching styles will be made from audio recordings combined with real time observation notes. Each item will be rated in every 5 minute lesson period, these values will be summed and divided by the number of five-minute intervals in the lesson. Item scores will be summed to provide quantitative scores for five teaching elements; Relatedness support, Structure before the activity, Structure during the activity, autonomy support and controlling teaching behaviour.

Economic analyses

Economic analysis will be set within a cost 'effectiveness' framework. The mean incremental costs associated with intervention delivery at the school level will be estimated from a public sector perspective [14]. Public sector costs will be related to incremental change in accelerometer-derived MVPA minutes per weekday and incremental change in EQ-5D-Y scores to estimate cost per minute of MVPA, cost per Quality-adjusted Life Year (QALY), average cost per school and average cost per user, with the associated CIs reported. EQ-5D-Y will be administered at T0, T1 and T2. We will also extend the balance sheet framework to include the proportion of participants meeting the 60-minute per day MVPA recommendation. Programme costs will also be determined at the school level.

Confidence intervals for the *incremental cost-effectiveness ratio* (ICER) will be calculated using bootstrapping at the school level. If appropriate we will produce cost-effectiveness acceptability curves for a range of thresholds and conduct threshold analysis to compare our cost per QALY estimates with National Institute for Health and Care Excellence (NICE) benchmark values. The time frame for the health economic evaluation is the length of the study, as the focus is to consolidate learning from our feasibility study in a full trial, and not to attempt to make long term predictions of cost-effectiveness at this stage. Uncertainty will be explored using sensitivity analyses and findings will be presented for a range of decision makers at the societal and funder levels, including Local Authorities and the National Health Service (NHS), from a public sector perspective.

End of study qualitative assessment

Qualitative methods will be used at the end of the intervention to ascertain elements of the intervention that worked well, potential improvements, and factors that might affect future dissemination/roll-out.

A focus group will be conducted with a selection of participants at all nine intervention schools. Participants will be purposively sampled to represent a range of attendance levels, with approximately 6–8 participants per group. The focus groups will address facilitators, barriers to participants' engagement, perceived impact and their views on promoting the dance project for a larger roll-out.

Semi-structured telephone interviews will be conducted with all dance instructors, addressing their experiences of delivering the intervention, barriers and facilitators, and factors central to supporting their continued involvement if the programme was implemented more widely. Semi-structured interviews will also be conducted with the primary contact at each intervention school, focusing on the logistical and organisational factors affecting delivery within school and how best to market the project for wider implementation. Interviews and focus group recordings will be transcribed verbatim and analysed via NVivo software, using thematic analysis [33].

Current status of trial (23/09/2013)

18 schools have been recruited, with four reserves. Dance instructors have been recruited to deliver the taster and after-school dance sessions. Baseline data is currently being collected. Randomisation of schools to control and intervention arms will be conducted in October 2013, and schools will be informed of their arm allocation soon after. The after-school dance sessions will be delivered between January and June/July 2014 in the nine intervention schools.

Discussion

This paper describes the rationale and methods that will be used for the BGDP cluster randomised controlled trial. The trial is attempting to increase levels of PA amongst Year 7 girls in the greater Bristol area, UK.

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PARTICIPANT FOCUS GROUP EXIT INTERVIEW GUIDE

Section	Questions	Timings
Introduction	**Explain purpose of the interview:**	**2-3 mins**
	The reason we want to talk to you is because we think that you will be able to help us improve Active7 for the future and we value your opinions. We are going to talk about your experience of taking part in Active7 and your views on promoting Active7 to other schools.	
	Explain audio recording and data storage procedures:	
	Before we get started, I'd like to tell you that I will be recording the conversation. The recording is to help us remember what we talked about. You can ask for the recording to be stopped at any time. The recording will be written up and we will remove any personal information like names, place names, school names etc. At this point the audio files will be deleted; so none of the information that is written down and recorded can be connected to you in any way.	
	Explain group guidelines and confidentiality:	
	We have got some group guidelines for us all to follow. (Display and read out guidelines). Lastly, we want everyone to be able to talk freely so it is important that everything that is said today stays in this room. This means that what is said is confidential.	
	Answer any questions	
	Commence audio recording	
Icebreaker	*Can we go round the group one at a time and say our name and a word or two to describe what it was like being part of Active7? I'll go first – Jo and exciting.*	**~1 min**
Barriers and facilitators of participation	*Now I'd like us to start by finishing off some sentences. I will go through each sentence and I'd like you to individually write down how you would finish the sentence on these post-it notes and stick it onto the question. If you have more than one way to finish the sentence you can write another post-it note. We will then discuss each answer in more detail.*	**~7 mins**
	• *I enjoyed or liked being part of Active7 because…*	
	• *I didn't enjoy or like being part of Active7 because…*	

1

- *I found it easy to come to Active7 sessions because…*
- *I found it difficult to come to Active7 sessions because…*

More in-depth exploration of the above:

- X can you tell me a little bit more about why you enjoyed/ didn't enjoy Y?
- Does anyone agree/disagree with X?
- X can you tell me a little bit more about why you found it easy to come to the Active7 sessions because of Y?
- Does anyone agree/disagree with X?

Specific examples of success stories or challenges.

PROMPTS (in case the following are not covered in the post-it note task):

- What did everyone think about X?
- Did anyone like/dislike X?
- Cost (did this make it easier to attend?)
- Dance styles
- Opportunity to perform
- Types of music
- Dance diaries
- Days on which Active7 ran
- Activities/events which affected sessions i.e., school camp, other clubs, sports days etc.
- Number of sessions each week
- Length of sessions

Session experiences	**Relatedness** - Did you all know each other before you started the dance sessions? - Did your relationships with one another change as the weeks went on? - Was everyone supportive of each other? *Specific examples of success stories or challenges.* **Competence** - How did you find the dance sessions physically? (E.g. did they make you feel hot, sweaty or out of breath?) PROMPT: Did the sessions become easier (physically) over time? - How difficult or complicated did you find the dance steps or routines? PROMPT: Did the sessions feel like they became less complicated over time?	**~7 mins**

2

	• What do you think you have learnt (if anything) from being part of Active7? PROMPTS: • New/improved dance skills? • What can you do now that you couldn't do before? • Change in amount of physical activity? • Change in confidence? *Specific examples of success stories or challenges.* **Attendance** • How would you describe the attendance (number of people who came to the sessions) at the dance sessions? (E.g. high, low, variable?) • Did it change over the 20 weeks? • Do you have any idea why attendance was like it was? • Why do you think some girls stopped coming to Active7? • (For those girls who continued to attend) How did it make you feel as the numbers declined?	

Dance instructor	**Overall impressions**
	
	• What did you think about your dance instructor in general? Why?
	• Is there anything you would change about your dance instructor's teaching style? If yes, what?
	• Did your instructor give you choices? E.g. dance steps, music, choreographing own routines.
	• What did you think about being given choice?
	• What did you think of the creative tasks (where you were allowed to make up your own sections of dance) throughout the sessions?
	• Do you think you had some control over what you did?
	
	Specific examples of success stories or challenges.
	
	PROMPTS:
	
	• Things liked/ liked less
	• Things liked less:
	  - Why do you think the instructor may have done X,Y or Z. i.e., making injured people join in / refusing water breaks. Can you think of any reason why she did that?
	
	  - Is this different in other classes they go to? If so, how? If not, why do they think/want A7 to be different?
	
	• Teaching style (E.g. encouraging / motivational / enthusiastic / good
		~10 mins

3

	knowledge of dance / left pupils out/ went too fast/ too slow/ made it too hard/didn't know our names/wasn't interested in us).	
Signposting	• What did you think of the information we gave to you about local dance opportunities? (E.g. helpful?) TAKE EXAMPLE • Is anyone thinking of starting a new dance class now that Active7 has finished? • Has anybody already started a new dance class? • Did your dance teacher advise you on other local dance sessions / clubs in the area?	**2-3 mins**
Dissemination (creative or sorting task)	**Introduction** *We are thinking about doing Active7 again in more schools. After the last 20 weeks, you are now experts in what it is like to be a part of Active7 so the last part of our discussion will look at how we might improve Active7 for other girls your age. Using the post-it notes from the first task I'd like you to work together to put them in order of importance, (so what's the most important thing to you about Active7, what is the main reason you come along etc.). And as we do this task I'd like us to talk about how we could change the more negative things or improve the positive things if we did the project in more schools.* (THIS WAS USED TWICE AND SUBSEQUENTLY THE FOLLOWING TEXT WAS USED): *After the last twenty weeks you are now experts in what it's like to be part of Active7 so what I'd like to know is what you would change or what you think we should change if we were to do the project again?* **Cost** • If we were to run the programme again would you be willing to pay to attend? • How much would you be willing to pay? PROMPT: £5 per week (2 sessions) and then £1 per session. **E.g.** *'For number 1 you have chosen...'* 1. Fun (interviewer probe – *how could we make it more fun if we did this project again?*) 2. Making up own routines (interviewer probe – *What is it about making up routines that you particularly enjoyed?*)	**~10 mins**

4

8. Closing	**Thank the participants**	**2-3 mins**
	That's all the questions I have for you today. You have helped me a lot and we will use your input to improve Active7 in the future.	
	Provide opportunity for participants to add any additional information	
	Before we finish could we go round the group and each say one thing that could help improve Active7in the future?	
	Provide opportunity for participant to ask questions	
	Do you have any questions for me?	
	Thank you very much for your time and attention. I appreciate you sharing your thoughts and opinions with me!	

5

DANCE SPECIALIST EXIT INTERVIEW QUESTIONS

Section	Questions (prioritise questions in yellow)	Timings
Introduction	Explain purpose of the interview ▪ Understand experiences of delivering the Active7 dance sessions ▪ Discuss elements of Active7 that worked well ▪ Identify potential improvements to the project ▪ Discuss factors that might affect how we take the Active7 project from here and run it on a larger scale. Explain audio recording and data storage procedures *Before we get started, I'd like to tell you that I will be recording the conversation to help us remember what we discussed. You can ask for the recording to be stopped at any time. After the interview, the recording will be written up and we will remove any identifiable information like names, place names, school names etc. At this point the audio files will be deleted; so none of the information that is written down and recorded can be connected to you in any way.* Position interviewee as the experts of their experience *There are no right or wrong answers we are trying to understand your views on how the Active7 project worked, after all you are the expert! Please be as honest as possible.* Answer any questions Complete consent form Commence audio recording	**2-3mins**
Ice breaker	To start us thinking about your involvement in Active7 can you tell me what attracted you to the Active7 project?	**~1 min**
Instructor induction day (N.B. Stress that this is concerned with only the intervention induction not taster induction)	Overall impressions • Did the December induction day prepare you adequately to deliver the Active7 sessions? • How did you find working with the other dance instructors? Were you able to make any new connections as a result of working on the project? • Were there any elements of the induction session that could have been improved? PROMPTS: • Length of time • Structure • Balance of theory (SDT and evaluation description) and practical	**~7mins**

1

	• Would you have liked more role play for dealing with difficult situations?	
Booster session	• How did you find the April booster session? • Did you change anything as a result of the booster session?	**~2mins**

Dance session delivery	**Session plan manual** (Use session plans as a prompt)
	• What did you think of the session plans in the manual?
	PROMPT: Things liked/ liked less/Improvements
	• How did you use the session plan manual?
	PROMPT: Did you adapt the session plans? Examples?
	• Were you able to adapt the session plans to the girls' ability/differentiate depending on girls ability? If so, how?
	• Do you think the manual could be improved in any way?
	
	Session delivery
	• Could you give me an example of a particular success story you had in working with the girls in your school?
	• Can you give an example of where delivery was challenging?
	PROMPTS:
	  • Length of the sessions
	  • Number of pupils per class
	  • Suitability of the dance space
	  • Rooms being double booked/occupied for exams
	
	  • What did you think of the number of sessions per week?
	  • What dance styles did you cover?
	  • How comfortable/confident did you feel teaching the different dance styles?
	  • How did you decide on the dance styles you used?
	
	Covered sessions
		~20mins

2

- Did you need to cancel or find cover for any of your sessions?
- If yes,
- How did this process work? (I.e. what did you have to do?)
- How well do you think the process of covering sessions worked?
- How did the girls react to having a session covered by someone else?
- Did you cover any sessions in other schools?
- If yes, how did you find covering another instructor's session?
- How did the girls react to having a session covered by someone else?

Active7 hand-over (two Dis only only)

- How did the process of handing the sessions over to X work?
- Do you think this process went smoothly?
- Is there any way we could make this transition smoother if the project was carried out in more schools on a larger scale?

Self-Determination Theory
At the induction Simon presented some ideas about motivation and how to motivate the girls, including supporting their choice and ownership, sense of belonging and sense of improved skills.
Overall

- Were you able to include any of the motivational ideas that we included in the manual and induction day into the Active7 sessions you delivered? How? And were they useful? (TAKE MANUAL AS PROMPT)
- How similar do you think these motivational ideas were to your own delivery/instruction style?
- What did you do in order to try and sustain the pupils' engagement in dance and physical activity?
- Did you see the girls' motivation change throughout the course of the sessions? (E.g., did their reasons for coming seem to change)

Autonomy

- Were you able to offer children choices during the Active7 sessions? How? If challenging – why?

3

- Did the girls have a sense of ownership over the dance sessions? How did they respond to this?

- Can you give an example of where supporting the girls' choice and ownership was challenging?

Relatedness

- What was your relationship with the girls like? Did it change? How?

- Can you give me an example of this relationship?

- How did the girls get on as a group? Were they supportive of each other? Example?

- Did they clash? Example?

- Did you see the group evolve over time?

Competence

- How do you think the girls views of their dance ability changed?

- How did you deal with the varied level of skill that the girls had?

- Can you tell me about a particular example of a challenge a girl had? How did you try to help them overcome this challenge?

Pupils response to intervention	• How did the girls respond to:
	
	   • Twice weekly lessons
	
	   • Length of sessions
	
	   • Dance styles/ skills
	
	   • Performance opportunity
	
	• Do you think the girls feel different about being active now, compared to when the sessions started? Example?
	
	• Did you see any personality or physical changes in the girls over the course of the intervention?
	
	• Did you see any change in the girls in relation to:
	
	   ○ Confidence/Self-perceptions
	
	   ○ Have you heard things from teachers / parents about any spill-over effects Active7 has had on the girls outside the sessions (e.g., academics)?
		5-10mins

4

	○ What more information/ support could the Active7 team provide to maintain and or increase participation once the intervention has finished? • Did you experience any behavioural issues? Examples? • What impact did these behavioural issues have on the sessions/ other girls? • What coping strategies did you use to cope with behavioural issues? • How effective do you think these coping strategies were? Examples… • How useful were the behavioural guidelines? (Use manual as prompt) Examples… • How supportive was the school contact when behavioural issues arose? Examples… Attendance and drop out • What did you think of the level of attendance at the dance sessions? Expected/unexpected? • *If attendance was low -* • Do you have any feel for why attendance may have been low/high? PROMPT: Was attendance affected by other events/activities such as school camp, other clubs, sports day etc.? • Did you have any girls drop out? Reasons why?	
Roll out of the programme	**Introduction** *At the end of the project we may consider running Active7 on a larger scale, for example in more schools around the country. On a larger scale instructors would still receive the training and booster sessions and this would likely be run by experts in local areas.* **General** • Do you think running this project on a larger scale would work? Yes/no ask for reasons… • How would the instructor training work best? (It could be the same as	**~10 mins**

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	it is now but run by a different local expert).	
	• How can we attract the best dance instructors in different areas?	
	Extending the programme length:	
	The current programme was aimed at Year 7 girls and was limited to 40 sessions.	
	• What changes would be needed to keep the girls interested beyond the 40 sessions – perhaps when the girls have moved into year 8?	
	• What strategies do you use to motivate girls to continue attending dance sessions in classes you run elsewhere?	
	Open enrollment	
	In the study we had to limit who could participate to the girls who provided consent and data when we first visited schools (Sept/Oct 2013).	
	• If this programme were to run outside of a research context would you allow girls to join once the programme had started? If so, would you allow girls to join at any time or only at set landmarks, such as the start of a term?	
	Previous after-school experience:	
	• Have you run after-school dance sessions before? If so, are there any lessons that you could bring from those experiences that could be used to improve the Active-7 after-school programme?	
	• In other work you have done in schools, who paid for your time? School, council, arts charity or the parents? If the parents what was the cost per child per session?	
	Views on payment	
	• Was the per-session payment you received in-line with what you are used to?	
	• Would you be less likely to attend a training/induction session if you did not receive payment?	
Communication	**School communication**	**~5mins**
	• How did you find working within your school?	
	• Did you have much contact with the school?	
	• Did you find the school supportive?	

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	• Could you give me an example of a particular success story you had in working with your school?	
	• Can you give an example of where working with your school was challenging?	
	• Was there anything that could have been done by project staff to improve the relationship you had with the school?	
	Active7 team communication	
	• How did you find working with the study team throughout the project?	
	PROMPTS: Resolving any issues / problems which arose	
	• How did you find being involved with the evaluation measures/visits from the research team?	
	PROMPTS: Frequency of visits	
	PROMPTS: Impact on teaching from instructor observations and child completed questionnaires	
Closing	Finally, is there anything that we have not discussed today that you think could have been done to improve the Active7 intervention?	**2-3mins**
	Thank participant	
	Provide opportunity for participant to add any additional information	
	That's all the questions I have for you today.	
	Is there anything else you'd like to tell us about the things we talked about today or the four week programme?	
	Provide opportunity for participant to ask questions	
	Do you have any questions for me?	

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SCHOOL CONTACT EXIT INTERVIEW GUIDE

Section	Questions	Timings
Introduction	*Explain purpose of the interview* ▪ Discuss elements of the intervention that worked well ▪ Potential improvements ▪ Factors that might affect how we take the Active7 project from here and run it on a larger scale. Explain audio recording and data storage procedures *Before we get started, I'd like to tell you that I will be recording the conversation to help us remember what we discussed. You can ask for the recording to be stopped at any time. The recording will be written up and we will remove any identifying information (names, place names, school names etc). At this point the audio files will be deleted; so none of the information that is written down and recorded can be connected to you in any way.* Answer any questions Complete consent form Commence audio recording	**2-3 mins**
Background/ice-breaker questions	• What is your role within the school? • How did you come to be involved in Active7? • What was the incentive for you to participate? • How involved have you been? (E.g. what did your role as the contact involve etc.)?	**2 mins**
Communication	**Communication with dance instructor** • What involvements with the dance instructor(s) did you have? • How did you find working with the dance instructor throughout the programme? • How could communication with the dance instructor have been improved? PROMPTS: • Resolving any issues / problems which arose in relation	

	to the dance project (e.g. arranging the dance sessions) **Communication with study team** • How did you find working with study manager and the other Active7 team throughout the programme? • How could working with the study team be improved? PROMPTS: • Resolving any issues / problems which arose in relation to the research or dance sessions (e.g. arranging data collection visits)	

Logistical issues	**General**
	• Logistically, how did you find Active7 ran in your school?
	• Were there any issues or problems? If yes, what type of issues or problems arose?
	  • Are these problems common to other extra-curricular activities?
	  • Potential improvements which could have resolved these problems?
	• Were there any behavioural issues related to Active7?
	• What did you think of the level of attendance at the dance sessions?
	PROMPTS
	  • Expected/unexpected?
	  • Do you have any feel for what factors may have contributed towards the level of attendance?
	  • Was attendance affected by other events/activities such as school camp, other clubs, sports day etc.?
	  • How could attendance have been increased?
	• What did you think about the length of the sessions (1 hour and a quarter)?
	• What did you think about the number of sessions per week (2 per week)?
	• Were there any problems with room bookings?
		~10 mins

	Specific examples of success stories or challenges. **Questions for school contact in school** where two instructors were used - How did you feel about having a new instructor? - How did the process of handing the sessions over to X work? - Could this process be improved? - Do you think having more than one instructor deliver the project could work if the project was rolled out? - Looking back is there anything the Active7 team could have done to help hand the sessions over between the instructors? **Data collection** - What were your experiences of the data collection process? (Arranging and the actual process of collecting data from the girls) - How could the process of data collection be improved? *Specific examples of success stories or challenges.*	
Impact	- What impact do you think the dance programme had on the girls taking part? (E.g. physical, dance-specific, socially?) - Did they seem excited by it? - Was there a difference in their behaviour/confidence during the project? *Specific examples of success stories or challenges.*	~2 mins
Sustainability	What information/ support could we provide to maintain or increase dance participation now the dance sessions have finished?	1-2 mins
Roll out of programme	**Introduction** *At the end of the project we may consider running Active7 on a larger scale, for example in more schools around the country. The difference between Active7 now and the rolled out project*	~10 mins

is that there would not be any research components, for example we would not need to do data collection and it would be run by a not-for-profit company not researchers.

General
- Do you think running this project on a larger scale would work? Yes/no ask for reasons…
- Would there be any school barriers/ facilitators for a larger roll out?

Extending the programme length:
The current programme was aimed at Year 7 girls and was limited to 40 sessions.
- What changes would be needed to keep the girls interested beyond the 40 sessions – perhaps when the girls move into year 8?
- What strategies do you use to motivate girls to continue attending optional after-school activities?

Open enrolment
In the study we had to limit who could participate to the 33 girls who provided consent and data when we first visited schools (Sept/Oct 2013).
- If the programme was run outside of a research context would instructors be allowed to add new pupils into their sessions if they drop out?
- If so, how would this work? (e.g. reserve list?)
- Would you allow girls to join at any time or only at set landmarks, such as the start of a term?
- Does this happen in other extra-curricular activities in your school?

Logistics
- If Active7 wasn't part of a research project, how would the girls be recruited?

PROMPT
- By the school only or would the taster session be useful?
- How would you usually recruit to extracurricular

		activities?	
		Cost	
		• In other after-school activities you have in your schools, who pays for the instructors time? School, council, arts charity or the parents? If the parents what was the cost per child per session?	
		• If there was no focus on measuring PA, would this make a difference to recruitment of girls?	
		• Would your school be willing to offer Active7 again?	
		• Is your school planning to continue offering after-school dance next term? If not, why not?	
		• Who would be the best person to approach in school about a larger project?	
		• Which year group would you recommend we target with this larger project?	
		• Is a dance project for other years needed for Active7 to feed into?	
		• Would the involvement with the school contact be less or more in a larger project?	
Closing		**Thank participant**	**1-2 mins**
		• Thank you so much for taking the time to speak to me and for your help co-ordinating Active7 so far.	
		Provide opportunity for participant to add any additional information	
		• That's all the questions I have for you today.	
		• Is there anything else you'd like to tell me about the things we talked about today?	
		Provide opportunity for participant to ask questions	
		• Do you have any questions for me?	

Table 1: CONSORT 2010 checklist of information to include when reporting a cluster randomised trial

Section/Topic	Item No	Standard Checklist item	Extension for cluster designs	Page No *
Title and abstract				**1**
	1a	Identification as a randomised trial in the title	Identification as a cluster randomised trial in the title	**1**
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)[1,2]	See table 2	**NA (in main outcome paper)**
Introduction				**4-5**
Background and objectives	2a	Scientific background and explanation of rationale	Rationale for using a cluster design	**4-5**
	2b	Specific objectives or hypotheses	Whether objectives pertain to the the cluster level, the individual participant level or both	**4-5**
Methods				
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	Definition of cluster and description of how the design features apply to the clusters	**4**
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons		**NA**
Participants	4a	Eligibility criteria for participants	Eligibility criteria for clusters	**NA (in main outcome paper)**
	4b	Settings and locations where the data were collected		**5**
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	Whether interventions pertain to the cluster level, the individual participant level or both	**4 (further details in main outcome paper)**
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and	Whether outcome measures pertain to the cluster level, the individual participant level or both	**NA (in main outcome paper)**

		when they were assessed		
	6b	Any changes to trial outcomes after the trial commenced, with reasons		**NA**
Sample size	7a	How sample size was determined	Method of calculation, number of clusters(s) (and whether equal or unequal cluster sizes are assumed), cluster size, a coefficient of intracluster correlation (ICC or k), and an indication of its uncertainty	**5**
	7b	When applicable, explanation of any interim analyses and stopping guidelines		**NA**
Randomisation:				
Sequence generation	8a	Method used to generate the random allocation sequence		**NA (in main outcome paper)**
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	Details of stratification or matching if used	**NA**
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	Specification that allocation was based on clusters rather than individuals and whether allocation concealment (if any) was at the cluster level, the individual participant level or both	**NA**
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	Replace by 10a, 10b and 10c	**NA (in main outcome paper)**
	10a		Who generated the random allocation sequence, who enrolled clusters, and who assigned clusters to interventions	**NA (in main outcome paper)**
	10b		Mechanism by which individual participants were included in clusters for the purposes of the trial (such as complete	**NA**

		enumeration, random sampling)		
	10c	From whom consent was sought (representatives of the cluster, or individual cluster members, or both), and whether consent was sought before or after randomisation	**6**	
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how		**NA (in main outcome paper)**
	11b	If relevant, description of the similarity of interventions		**NA**
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	How clustering was taken into account	**NA**
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses		**NA**
Results				
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	For each group, the numbers of clusters that were randomly assigned, received intended treatment, and were analysed for the primary outcome	**NA (in main outcome paper)**
	13b	For each group, losses and exclusions after randomisation, together with reasons	For each group, losses and exclusions for both clusters and individual cluster members	**NA (in main outcome paper)**
Recruitment	14a	Dates defining the periods of recruitment and follow-up		**NA (in main outcome paper)**
	14b	Why the trial ended or was stopped		**NA**
Baseline data	15	A table showing baseline demographic and clinical	Baseline characteristics for the individual and cluster levels as	**NA (in main**

		characteristics for each group	applicable for each group	**outcome paper)**	
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	For each group, number of clusters included in each analysis	**NA (in main outcome paper)**	
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	Results at the individual or cluster level as applicable and a coefficient of intracluster correlation (ICC or k) for each primary outcome	**NA (in main outcome paper)**	
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended		**NA**	
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory		**NA**	
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms[3])		**NA (in main outcome paper)**	
Discussion					
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses		**17-18** **(Full trial limitations reported in main outcome paper)**	
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	Generalisability to clusters and/or individual participants (as relevant)	**NA (in main outcome paper)**	
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence		**14-17**	

Other information			
Registration	23	Registration number and name of trial registry	**2**
Protocol	24	Where the full trial protocol can be accessed, if available	**4**
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	**19**

* Note: page numbers optional depending on journal requirements

Table 2: Extension of CONSORT for abstracts[1,2] to reports of cluster randomised trials

Item	Standard Checklist item	Extension for cluster trials
Title	Identification of study as randomised	**Identification of study as cluster randomised**
Trial design	Description of the trial design (e.g. parallel, cluster, non-inferiority)	
Methods		
Participants	Eligibility criteria for participants and the settings where the data were collected	**Eligibility criteria for clusters**
Interventions	Interventions intended for each group	
Objective	Specific objective or hypothesis	**Whether objective or hypothesis pertains to the cluster level, the individual participant level or both**
Outcome	Clearly defined primary outcome for this report	**Whether the primary outcome pertains to the cluster level, the individual participant level or both**
Randomization	How participants were allocated to interventions	**How clusters were allocated to interventions**
Blinding (masking)	Whether or not participants, care givers, and those assessing the outcomes were blinded to group assignment	
Results		
Numbers randomized	Number of participants randomized to each group	**Number of clusters randomized to each group**
Recruitment	Trial status[1]	
Numbers analysed	Number of participants analysed in each group	**Number of clusters analysed in each group**
Outcome	For the primary outcome, a result for each group and the estimated effect size and its precision	**Results at the cluster or individual participant level as applicable for each primary outcome**
Harms	Important adverse events or side effects	
Conclusions	General interpretation of the results	
Trial registration	Registration number and name of trial register	
Funding	Source of funding	

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[1] Relevant to Conference Abstracts

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[1] Hopewell S, Clarke M, Moher D, Wager E, Middleton P, Altman DG, et al. CONSORT for reporting randomised trials in journal and conference abstracts. *Lancet* 2008, 371:281-283

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[3] Ioannidis JP, Evans SJ, Gotzsche PC, O'Neill RT, Altman DG, Schulz K, Moher D. Better reporting of harms in randomized trials: an extension of the CONSORT statement. *Ann Intern Med* 2004; 141(10):781-788.

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Lessons learnt from the Bristol Girls Dance Project cluster RCT: Implications for designing and implementing after-school physical activity interventions

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Lessons learnt from the Bristol Girls Dance Project cluster RCT: Implications for designing and implementing after-school physical activity interventions

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ABSTRACT

Objective: To consider implementation issues associated with the delivery of Bristol Girls Dance Project (BGDP) and identify improvements that may aid the design of after-school physical activity interventions.

Design: Two-armed cluster randomised control trial. The BGDP was a 20 week school-based intervention, consisting of two 75 minute after-school dance sessions per week, which aimed to support Year 7 girls to be more physically active.

Setting: 18 secondary schools (nine intervention, nine control) in the Greater Bristol area (as an indication of deprivation, children eligible for the pupil premium in participant schools ranged from 6.9-53.3%).

Participants: 571 Year 7 girls. This article reports on qualitative data collected from 59 girls in the intervention arm of the trial, 10 dance instructors and nine school contacts involved in the delivering of the BGDP.

Methods: Data were obtained from nine focus groups with girls (one per intervention school), and interviews with dance instructors and school contacts. Focus groups sought views of girls' motivation to participate, teaching styles, and experiences of the intervention. Interviews explored views on implementation and dissemination. Framework analysis was used to analyse data.

Results: Qualitative data elicited three themes associated with the delivery of BGDP that affected implementation: project design, session content, and project organisation. 'Project design' found issues associated with recruitment, timetabling, and session quantity to influence the effectiveness of BGDP. 'Session content' found that dance instructors delivered a range of content and that girls enjoyed a variety of dance. Themes within 'project organisation' suggested an 'open enrolment' policy and greater parental involvement may facilitate better attendance.

Conclusion: After-school PA interventions have potential for increasing PA levels among adolescent girls. There is a need to consider the context in which interventions are delivered and implement them in ways that are appropriate to the needs of participants.

Trial registration: ISRCTN52882523

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Strengths and Limitations

- Relevance beyond after-school dance interventions for researchers and practitioners designing and delivering after-school interventions.

- Study focuses on the significance of the context in which the intervention is delivered.

- Data obtained from in-depth qualitative interviews with participants and key stakeholders.

- Large sample of participants (n = 78) for the qualitative study and evidence of data saturation.

- Trial methodology limits generalisations.

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INTRODUCTION

Ensuring that all members of society are physically active is important for public health. Physical activity (PA) is associated with improved physical and mental well-being among children and young people [1-3]. A number of studies have shown that large proportions of young people do not engage in the recommended hour of moderate-to-vigorous PA (MVPA) per day [4 5]. Girls are often found to be less active than boys across childhood and adolescence and, as such, there is a need for interventions to encourage more PA in girls, particularly during the transition into adolescence when the decline in female PA is at its highest [6-8]. Girls tend to be more sedentary and also engage in less MVPA than boys[9]. A study examining barriers faced by girls to PA suggests that safety concerns, the competitive nature of many activities, inaccessible facilities, and body-image concerns are key perceived barriers to girls being active[10]. Additionally, girls face more restrictions than boys in terms of their freedom to play outdoors[8]. Dance is an activity that could resolve a number of these barriers and as such it is popular amongst adolescent girls in the UK, and could therefore be an appropriate activity to increase girls' PA[11-14].

Schools are a good place to target interventions as attendance is a legal requirement. PA interventions delivered during the school-day have had limited effect [7 8 12 15], suggesting a need to consider alternative school-based interventions [14-16]. Pate and O'Neill suggest that the quest for academic excellence combined with resource limitations restricts opportunities for physical activity within the school day[17]. Several systematic reviews have highlighted the potential of extra-curricular PA interventions for young people, however there is a lack of robust evaluations of these programmes [7 12]. Incorporating dance into after-school activities could contribute to overall PA among girls failing to achieve the recommended UK PA guidelines [11 14]. As such, the Bristol Girls Dance Project (BGDP) examined the potential of an after-school dance-based intervention targeted at increasing PA levels of Year 7 (age11-12) girls.

A feasibility trial was conducted to assess the potential of a dance-based intervention[18]. This formative work found that it was possible to recruit adolescent girls to an after-school dance intervention and that such an intervention could yield positive effects on their PA. The process evaluation reported fluctuating attendance and low perceived exertion levels within sessions. Additionally, post-intervention qualitative work suggested that a reduction in the

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time allocated for 'creative' tasks, better behaviour management guidance, and exposure to a wider range of dance styles would improve the intervention[18]. The intervention was refined in light of these findings and tested in a fully powered cluster randomised controlled trial[19], on which the present paper reports.

BGDP was a 20-week school-based two-armed cluster randomised control trial. The intervention consisted of two 75 minute after-school dance sessions per week for Year 7 (11-12 years) girls in the intervention arm. Intervention sessions were delivered by professional dance instructors who attended training led by study staff. The training introduced instructors to the study aims and rationale, the BGDP intervention sessions, and the underpinning Self-Determination Theory (SDT)[20 21]. Session plans underpinning the BGDP sessions encouraged dance instructors to use a variety of dance styles throughout the course of the intervention (encouraging participant choice in this was strongly encouraged).

The BGDP aimed to increase autonomous motivation for dance and PA amongst participants. The dance instructor training and BGDP session plan manual were integral to this aim. The SDT-focused element of the training explored the practical application of the theory to dance sessions. Instructors were provided the opportunity to use autonomy-supportive styles of instruction, seek clarification and obtain feedback from study staff. Behaviour management was discussed and further details included in the session plan manual. Halfway through the intervention period the instructors attended a half-day booster session that recapped study aims, the application of SDT in sessions, and provided a forum to discuss issues that arose during session delivery.

Full details of the trial protocol [13] and results have been published elsewhere [22]. Briefly however, there was no difference in PA levels between the intervention and control group girls during the last few weeks of the intervention or at six month follow-up. Findings reported elsewhere showed that intervention fidelity was generally good, with high levels of enjoyment among participants [23]. However, session attendance was highly variable with only one third of girls attending two thirds of the sessions. Attendance also declined during the project.

Process evaluations are central to understanding how complex interventions work [24] by focussing on the processes of intervention delivery, receipt and fidelity [24 25]. When they are

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too narrowly focused however, they can neglect to evaluate the broader contextual factors associated with individual agency, and the social context in which an intervention is delivered [26]. It is important to understand how logistical arrangements, operations and implementation of intervention components contribute to intervention processes, and to also acknowledge the influence of dance instructors delivering the intervention in a specific context. Thus, there is a need to identify factors that enable effective intervention delivery and establish how these factors can be influenced. The aim of this paper is to use qualitative process evaluation data to document the lessons learnt from the BGDP and to identify key points for improvement that may increase attendance rates and improve overall delivery of future after-school school-based PA interventions.

METHODS

18 schools participated in the study. All schools were located within 25 miles of Bristol city centre, and fell under the Bristol City, Bath and North East Somerset, or North Somerset Council areas. Schools were urban and suburban and in terms of deprivation they were slightly less deprived than the national average. Between 6.9 and 53.3% (average = 26.2%) of pupils in study schools were eligible for the 'pupil premium', a form of governmental funding aimed at increasing the attainment of disadvantaged pupils (higher percentage equals greater deprivation).[27] The national average is 27.8% of secondary pupils. Four of the nine intervention schools had above average levels of deprivation.

All Year 7 girls eligible to take part in physical education were invited to participate (n=1877). There was space for 33 girls to take part in each school. Recruitment consisted of a 'taster' session that provided exposure to a typical intervention session, a briefing, and written information for girls and parents/guardians. 633 girls returned parental consent forms, of which 571 were selected at random (due to the maximum limit of 33 girls per school). Participants completed four sets of measurements (accelerometer, psychosocial questionnaire and height and weight) at three time-points (baseline, T1 (end of intervention period), and T2 (baseline + 52 weeks)). Girls received a £10 thank you voucher for completing each measurement stage. Schools were randomised to control (n = 9) or intervention (n = 9) arm after baseline measures, with 284 girls in the intervention and 287 in the control arm.

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The present study draws on interview data collected soon after the intervention ended from dance instructors (n = 10) who delivered the intervention and school contacts (n = 9) who facilitated intervention logistics in their school. School contacts were the study team's main point of contact with the school. These individuals were four PE staff, one Year 7 teacher, three dance teachers, and one drama teacher. Nine focus groups were conducted with girls that received the intervention (n = 59, range = 3-8). Ten girls from each intervention school, reflecting different tertiles of attendance, were invited. This was in order to capture a range of participant views. Girls who attended ≤3 sessions were not included as they would be unable to answer a significant proportion of the topic guide questions. Further details of participant sampling, recruitment and reasons for why children stopped attending intervention sessions are reported elsewhere[23]. For dance instructors, interviews explored views on the implementation and dissemination of BGDP. School contact interviews focussed on how the intervention was delivered and areas for improvement. Focus groups among girls explored motivations to participate, dance instructor teaching style, and experiences of the intervention. Interview guides are included as Supplementary Files 1, 2 and 3 for participant focus groups, dance instructors and school contact interviews, respectively. School contact interviews and participant focus groups were conducted in schools and dance instructor interviews were conducted in convenient locations for participants (cafes, for example). All interviews and focus groups were audio-recorded and transcribed verbatim. Transcripts were compared with the recordings and amended as necessary.

Ethical approval was obtained from the School for Policy Studies ethics and research committee at the University of Bristol. Written parental consent was obtained for all children who participated in the study and informed consent was gained from the dance instructors and school contacts who participated. A CONSORT extension for Cluster Trials Checklist has been completed.

Analysis

A framework analysis was used[28]. The framework method is a seven stage procedure for analysing qualitative data, characterised by detailed line-by-line coding and the charting of data into a framework matrix[28]. Initial codes were created openly using NVivo (Version 10, QSR International) to categorise transcripts into components that were of potential significance to the research objective. Codes were produced independently by four qualitative researchers [JK, ME, SS & TM] who coded three transcripts each (one dance instructor,

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school contact and participant focus group). Initial codes formed a coding framework which was applied to the remaining transcripts. A pre-defined 'school context' code was included to identify differences in delivery between schools. Frameworks were subsequently triangulated to substantiate the relationships between all three informant groups. The qualitative research team met weekly to discuss and iteratively refine the codes, which led to the production of the three coding frameworks (one for each respondent group). Illustrative quotes capturing the essence of each theme were identified and agreed by the researchers. A COREQ checklist for reporting of qualitative studies is included (Table 1).

Table 1. Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

No	Item	Guide questions/description
Domain 1: **Research team** **and reflexivity**		
Personal Characteristics		
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group? **JK, ME**
2.	Credentials	What were the researcher's credentials? *E.g. PhD, MD* **PhD**
3.	Occupation	What was their occupation at the time of the study? **Research Associate**
4.	Gender	Was the researcher male or female? **Female (JK); Male (ME)**
5.	Experience and training	What experience or training did the researcher have? **Coverage of qualitative methodology and interview technique in PhD**. **Formal training on qualitative research methods from at BSc/BA and MSc.**
Relationship with participants		
6.	Relationship established	Was a relationship established prior to study commencement? **No**

No	Item	Guide questions/description
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. *personal goals, reasons for doing the research* **Both JK and ME had met the interviewees on several occasions. ME recruited them to the study and JK conducted process evaluation whilst they were delivering the intervention.**
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. *Bias, assumptions, reasons and interests in the research topic* **None**
Domain 2: study design		
Theoretical framework		
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? *e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis* **Study was underpinned by self-determination theory. Qualitative analysis was conducted using a framework analysis**
Participant selection		
10.	Sampling	How were participants selected? *e.g. purposive, convenience, consecutive, snowball* **Purposive sampling for qualitative focus groups. All dance instructors delivering the intervention and all school contacts were interviewed/**
11.	Method of approach	How were participants approached? e.*g. face-to-face, telephone, mail, email* **Focus groups were conducted face to face** **Interviews with dance instructors conducted face to face** **One interview with a school contact was conducted via telephone. The remaining interviews were conducted face to face.**
12.	Sample size	How many participants were in the study? **Semi-structured interviews were conducted with all dance instructors who delivered the intervention (n=10) and school contacts (n=9) in intervention schools. A focus group (n=9) was**

No	Item	Guide questions/description
		conducted with girls who participated in each intervention school (n=59).
13.	Non-participation	How many people refused to participate or dropped out? Reasons? Twelve participants withdrew from the study. • 6 no longer wanted to participate • 4 had illness(es) • 1 relocated • 1 excluded from school
Setting		
14.	Setting of data collection	Where was the data collected? e.*g. home, clinic, workplace* **All focus groups conducted in schools. One school contact interview conducted via phone, all remaining conducted in school. Dance instructor interviews conducted in a range of settings.**
15.	Presence of non-participants	Was anyone else present besides the participants and researchers? **No**
16.	Description of sample	What are the important characteristics of the sample? *e.g. demographic data, date* Focus group: All Year 7 girls. Dance instructor interviews: All female School contacts: All teaching staff. One male, the remaining female.
Data collection		
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested? **Yes. No pilot conducted with final version of interview guide.**
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many? **No**
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data? **Audio recordings made for each interview/focus group.**
20.	Field notes	Were field notes made during and/or after the interview or focus group? **No.**
21.	Duration	What was the duration of the interviews or focus group? Average length Focus group: average length = 42.38 minutes (range = 30.35-50.23

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No	Item	Guide questions/description
		minutes)
		Dance instructor interviews: average length = 67.20 minutes (range = 41.35-91.36 minutes)
		School contact interviews: average length = 29.35 minutes (range = 22.07-38.41 minutes)
22.	Data saturation	Was data saturation discussed? **Yes**
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction? **No**

We aimed to address issues that could be edited to improve future roll-out of similar interventions. Specifically, the issues addressed in this paper are:

- Why participants (school teachers, girls and dance instructors) took part in the study
- The acceptability of the design and content of the dance sessions
- Feedback on the intervention structure (session quantity and duration, for example)
- Views on the organisation of the study

RESULTS

Three main themes associated with BGDP delivery were identified in the qualitative analysis. These related to: 1) project design; 2) session content; and 3) project organisation. The findings are presented by theme, and the sub-themes include illustrative quotes from the different participant groups.

<u>Project design</u>

Project design encompasses sub-themes concerning BGDP logistical arrangements, including participant recruitment, timetabling, session quantity, and project duration.

<u>Recruitment</u>

Different methods of recruitment were required for each participant group (i.e., girls, dance instructors, and school contacts).

School contacts

No expectations or requirements were expressed by the study team regarding what school contacts would need to do for the study, beyond a general breakdown of what the school's participation entails. Similarly, no school contact sought detailed instruction on what their role would necessitate. School contacts cited various reasons for their involvement in the project, with some describing a personal interest and others being asked by a colleague to act as a key contact.

> *I was asked by the Head of Year 7 because he had too much on his plate.*
>
> *School contact 21*

> *I think it was just sent generally to the school like a pack…there was quite a lot of information there so I just emailed 'em through.*
>
> *School contact 72*

Two school contacts embraced a type of 'research altruism'. One noted how their own degree meant they were familiar with research and were keen to engage with a research project:

> *I also liked that it was part of a research project as well. I've been doing a university degree myself and dissertations and […] it's really important that these things are done to try and take things forward.*
>
> *School contact 23*

Dance instructors

Dance instructor involvement in the project was motivated by numerous reasons. The research aspect of the project appealed to some instructors who viewed the project as an opportunity to disseminate their view of dance as a positive activity for young people:

> *I love to dance and I love to teach dance and to share my passion with as many people as possible. So any opportunity I'm interested in. I was really attracted to the project as a whole, the research that was involved.*
>
> *Dance instructor 61*

Dance instructors also viewed their involvement as an opportunity to develop teaching experience via the delivery of new dance styles:

The fact that we were delivering different styles of dance that was also really good for me because I haven't really done much else in terms of teaching, so it kind of pushed me to try different things which I did and then gained more confidence so I've gained more skills.

Dance instructor 61

Girls

For some girls, the opportunity to try a new activity and learn new dance styles motivated participation:

I kind of just decided myself because I wanted to go like start something that I hadn't done before.

Focus group 23

I'm not a fan of dance but because I wanted to try something new so I tried it.

Focus group 62

For some girls involvement was based on spending time with their peers:

I was looking at some [afterschool clubs] but I was only really going to do them if like someone, like a friend, did it with me.

Because I didn't really want to go on my own and everyone else knew each other and I just turned up.

Focus group 61

Girls were given a £10 gift voucher for completing each phase of data collection. In two schools gift vouchers were interpreted as incentives to attend dance sessions by some. Indeed, one girl noted that participants should not receive a voucher unless they attend dance sessions.

You get a voucher. People signed up because of that. But I don't think they really signed up because they wanted to do the dance.

Focus group 53

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In one focus group, being part of BGDP was experienced as a privilege because others were denied the opportunity (due to the limit of 33 girls per school):

It was like a privilege to like get into it because quite a lot of people like wanted to join but only a few of us did.

School contact 32

Timetabling

Some schools arranged BGDP sessions at a similar time to other after-school clubs, this led to different clubs/activities competing for attendance. However, in some schools, the time between the end of the school day and the beginning of BGDP sessions was short, meaning participants struggled to arrive punctually. This resulted in some sessions being short:

Partly it is to do with the set up at the school [...] it's just a very annoying system that's in this school that because of the meetings that take place on a Tuesday and a Wednesday and we finish early on a Friday, Monday and Thursday are the only times available for any after school clubs. So all of the after school clubs run on a Monday and a Thursday. So you're all vying for kids.

School contact 62

After school finished we started five minutes later. That was not enough time. They needed ten minutes.

Dance instructor 51

Session quantity and project duration

School contacts suggested that the quantity of sessions (n=40) was too high to sustain attendance over the course of 20 weeks. Two sessions per week was also seen as a burden for girls by school contacts, especially when competing against other sporting events and social commitments:

I just feel that two sessions per week, and the length of time that it runs for, is possibly a bit too much to keep the attendance up.

School contact 72

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I think possibly because it was so... on for such a long time they found it really hard to maintain their commitment because of other things that they like to do as well. I just feel that two sessions per week and the length of time that it runs for is possibly a bit too much to keep the attendance up.

School contact 72

Many dance instructors felt that two sessions per week was not typical for after-school clubs. One session per week was favoured for maintaining attendance. One school contact suggested that delivering the intervention in short 'themed' sections may be beneficial for encouraging attendance and return to sessions.

They do things better in bite size... you'd have almost been better off breaking it down to five week projects and a meeting at the beginning of each one so everybody knew where they were.

School contact 62

Session content

Session content relates to themes concerned with the delivery of sessions, including variety in session content and group work.

Variety in session content

The BGDP was designed to incorporate numerous dance styles. Session variety, was seen to be important for maintaining interest. The majority of dance instructors gave girls a choice of dance styles, an approach which gained approval from the girls:

She [dance instructor] asked us what types of things we wanted to do. Some people said contemporary, some people said breakdancing, so that's what we did which was good.

Focus group 53

Group Work

Generally, group work was viewed positively by instructors and girls. Dance instructors felt girls enjoyed group work and it encouraged them to take ownership of the project:

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With tasks and things like that I kind of just gave them the choice in their groups so they just kind of got on with that.

Dance instructor 32

Girls found group work enjoyable and it appeared to help improve their dance and team working skills.

We like worked well in the group. There were like no arguments.

Focus group 53

Group work was seen to be beneficial to both instructors and girls. Notably, it gave girls a sense of ownership over the project and developed their leadership skills. For dance instructors, it helped them manage the varied levels of competence within the group, and was perceived be a useful strategy for managing inconsistent attendance.

When it came to choreography and teaching other people that's when they took their ownership more so of the club.

Dance instructor 21 & 51

There was a tendency for instructors to allow participants to choose their own groups at the beginning of the project and then mix the groups once they felt comfortable with one another.

The first sessions I normally, if I'm doing group work, let them go with who they want to go [with] and then like when they feel more confident I kind of change it up a bit so they get to know new people.

Dance instructor 53

Project organisation

Project organisation relates to open enrolment, parental involvement, facilities, and communication and management arrangements.

Open enrolment

All participant groups suggested that an 'open enrolment' policy, allowing girls to 'drop in' to sessions anytime during the 20 weeks would be a good way to maintain attendance. Teachers stressed the importance of friends in ensuring continued attendance.

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So we say 'it's netball on Tuesday, anyone can come along. If you played for the primary school come along and see what it's like […] bring your friends'. If only three year sevens turn up we'll say 'right, you're challenge is, next week you have to bring a partner'. And then when six turn up I say 'right, you have to bring a friend'. So that's how we kind of do it. 'Grab your friends, all come together' because it's very much a friendship thing.

School contact 42

Open enrolment was viewed as a feasible strategy as long as the project was mindful of new people joining and causing disruption to the existing group (and its progress).

Perhaps you might say 'you could join in after half term' or 'you can join in once we've finished this dance'. That's what I do at some schools.

Dance instructor 62

Parental Involvement

School contacts suggested that increasing parental involvement in future after-school interventions may be beneficial. Generally it was recommended that increased parent awareness of the project may improve retention.

If you're going to roll it out, I think it has to be something a little bit more, towards the parents, like 'you have to commit to it'. I think, yeah, that maybe just writing to the parents and when the kids stop coming sending a letter to the parents and saying 'your child hasn't attended and I would really like them to come back'.

School contact 61

The advantage of increased parental involvement was outlined by some girls who described being encouraged to attend sessions by their parents.

Well when I said that I wanted to quit Active 7 she was like, 'it is healthy for you and you should think about going again and don't stop it'.

Focus group 51

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Similarly, dance instructors somewhat attributed attendance to parental encouragement and one instructor thought girls appeared to be motivated to attend because their parents told them to.

> *I think their parents kind of told them to be there.*
>
> *Dance instructor 21 & 51*

Facilities

Pupils found having the dance sessions on school premises convenient. The school teaching space was appropriate because they did not have to travel.

> *It was always in the same room. Like say if we had to change rooms every single time I think that would have been a bit harder but I like it how it was just in one room.*
>
> *Focus group 32*

In some instances there were problems with the facilities. These included the room temperature and ventilation, access to toilets and changing facilities, and in one school a teaching space that had a viewing gallery. Having to change venue due to conflicting activities (e.g. exams) was also inconvenient and gave dance instructors the impression that their session was not as valued by the school as they wished.

> *There's a bit at the top [of the dance studio] [...] people used to stay here after school and they used to come in and like start watching [...] So everyone would have stopped because they got embarrassed.*
>
> *Focus group 42*

> *[Having to move venue] was always really confusing because you'd sometimes lose some girls because they couldn't find you or you'd lose time faffing around trying to figure out what room you were in.*
>
> *Dance instructor 23*

Communication and management arrangements

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The majority of dance instructors described a good working relationship with their school contact. School contacts were seen to be supportive of the instructor and the study. In some cases, school contacts observed dance sessions; this was viewed positively by dance instructors.

> *I emailed [the school contact] once about the level of noise the girls had, and then I saw him like a session or two later and he was like 'do you want me to have a quick pop in?' and I was like 'yes, that would be great'. So he was really up for it.*
>
> *Dance instructor 21*

One school contact was keen to learn from the dance instructor's teaching practices.

> *I just go down a couple of Tuesdays and join in with [dance instructor] because she's quite a good teacher and it's always good to learn some new stuff.*
>
> *School contact 32*

Conversely, in two schools dance instructors did not feel adequately supported by their school contact. This was largely attributed to poor communication and lack of knowledge of the year group.

> *Often I'd like ask her to come in, especially at the beginning, I said "can you come and sit in the lessons?" and she wouldn't reply to my emails.*
>
> *Dance instructor 21 & 52*

> *She didn't know any of the Year Sevens so that meant it was quite difficult for her to communicate with them about sessions.*
>
> *Dance instructor 53*

DISCUSSION

This study elicited three key themes that affected delivery of the BGDP. The recruitment process, session content, and intervention organisation were identified as specific areas where improvements could be made. Each of these themes and the potential implications / solutions for them are presented in Table 2 and discussed below.

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Table 2: Recommendations for future physical activity programmes delivered during the extra-curricular period

Issue	Problem (or potential problem) encountered	Potential solution
Recruitment	*School contacts*: Many contacts were not familiar with the participants (as they had not taught them yet) which made data collection (particularly the return of accelerometers) difficult. School contacts not communicating with dance instructors (over intervention issues) and the study team (over data collection).	To facilitate data collection, future recruitment of school contacts that are familiar with the participants (e.g., Head of their year group) is recommended. A calendar of tasks and requirements – with details on estimated time input - for school contacts may better prepare them for the role. A protected time allocation (weekly or monthly) for school contacts would ensure they can communicate with intervention deliverers and study staff, thus better equipping them for the time demands of the role and giving more time to resolve any problems.
	Dance instructors: It was difficult to recruit appropriate intervention deliverers for the requirements of participants (may specialise in one form of dance, teach different age groups/genders/abilities etc.). Intervention deliverers unable to deliver all intervention sessions.	Endorsements from other dance instructors, schools, and dance agencies are useful for recruitment. Recruitment workshops, whereby the project can be introduced to DIs, are also recommended. Observation of intervention deliverers before recruitment is desirable but time and cost dependant. Reserve deliverers should be recruited to cover absences and in the event of deliverers withdrawing from the study, these can be called upon as replacements.
	Girls: Confusion of receipt of voucher for participation in measurements with being paid to attend the intervention sessions. Friend involvement is an important factor influencing the recruitment of	Participants must be explicitly told (verbally and in writing) of the exact purpose of incentives to participate in data collection and what they will be received for. Our results suggest that recruiting existing friendship groups and promoting the importance and esteem of the university-led research in the participants' schools may help to achieve a greater buy-in from potential participants.

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	participants.	Avoiding recruiting children in the first few weeks of term may be beneficial as they are likely to be more 'settled' into their friendship groups by this time.
Timetabling	Clash of timing of school activities and intervention sessions. Children require sufficient time to get changed and arrive punctually for the scheduled intervention start time.	A calendar of after-school events, extra-curricular activities, and the requirements of participants (including factoring in time to reach sessions from previous classes) should be sought to reduce overlap of activities. School contacts should be encouraged to avoid scheduling intervention sessions on days that other activities run (or are likely to run in future – based on previous years' scheduling).
Session quantity	Two sessions per week was seen as too great a commitment for some participants. The total number of sessions (n=40) was also considered too many for some.	The delivery of interventions in 'blocks' of sessions – covering different themes – should be considered ahead of future delivery. The frequency of sessions and the overall number of sessions must be thoughtfully considered in light of the participants (age, existing ability and any other potentially important variables), achieving sufficient exposure to the intervention in order to achieve behaviour changes, and the timetable of schools.
Session variety	Participants want to cover different material/activities. Activity choice should reflect participants' desires whilst being achievable under the deliverer's skill set and capability.	Offer participants genuine 'choice' over activities such as dance styles, and provide context-specific approaches to delivery, tailored to the needs and the requirements of the specific school.
Group work	*Group work is liked by participants.*	*Embedding group work into interventions is likely to be helpful and may improve participants' sense of ownership if they are able to select their own groups.*
Open enrolment	One phase of participant enrolment (pre-baseline measurements) may unnaturally restrict participation.	Open enrolment, whereby participants can 'drop in' to sessions anytime, rather than signing up to the intervention at the onset only, should be considered to mirror usual school provision. Allowing participants to join midway through the intervention period may improve retention, increase diversity, and give more people exposure to the intervention. In a trial setting this may be difficult logistically unless *all* potential participants take part in baseline measures.
Parental	Parents are an important influence over	Developing strategies for parental support for extra-curricular PA programmes

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involvement	children and are likely to (or have the potential to) affect attendance.	should be incorporated into intervention design. Increased parental awareness of study aims and commitments may improve recruitment rates and attendance.
Facilities	School-based interventions are limited by the facilities a school has.	The ability to respond to participant desires regarding adaptable facilities (i.e. heating, drinks provision, changing facilities) and act upon them is encouraged in the future delivery of PA interventions. Choice over when windows/doors are opened, heating turned on, or whether a session is conducted outside (if feasible) should be discussed with participants. School facilities are used for different purposes at different times of the year (i.e., for school productions at Christmas and examinations in the summer). Attempts to protect the use of facilities for intervention sessions should be considered, but is likely to be difficult.
Communication/ management	Poor communication between any two stakeholders (study team, school contact and intervention deliverer) can have negative consequences for sessions.	Recruiting school contacts who want to be involved rather than being pressurised may foster better communication (however, this would be difficult to achieve in reality, other than targeting relevant subject staff). Writing formal guidelines on regular updates between dance instructor and school contact/study team may resolve ongoing problems and/or re-engage children who have stopped attending. Any added burden on those delivering the intervention or school contacts should be given extensive consideration and avoided if possible.

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Different methods of recruitment were required for each stakeholder group. Familiarity with participants taking part was important among school contacts providing the link between schools, dance instructors, and the research team. This suggestion is pertinent given the complexities many school contacts faced when 'chasing' research participants to encourage attendance (a task exacerbated by an unfamiliarity with the students). In future, it would be helpful to specify in detail what the role of school contact entails, highlighting the time needed for individual tasks and when they need to be completed (although over-burdening the contact with information should be treated with caution). Asking school contacts to allocate time for liaison with study staff/intervention deliverers may better prepare them for the role and improve delivery. For girls, targeting peer groups was considered sensible and a realistic method for attracting participants. Our findings also suggest that espousing the credentials of the project to instil a type of project 'privilege' may provide a further incentive for participation. This finding is consistent with previous research that suggests it is useful to identify and garner the support of influential 'opinion makers' to create a 'buzz' around the study [29]. Such recruitment campaigns should be considered as part of the design of future after-school PA interventions [29]. Assigning self-employed dance instructors to schools can be logistically difficult as many work on short-term contracts and continuously bid for work. This makes attending two sessions per week over a 20 week period a difficult commitment. Indeed, one instructor had to be replaced mid-way through the intervention. We would advise recruiting a bank of reserve instructors to ensure cover is always available.

School contacts selected the days and start/end times for intervention sessions. Dance instructors were assigned to schools to proximity and availability on session days. Subsequently, however, many schools had competing after-school activities on the same day as intervention sessions. Additionally, some children and dance instructors complained about sessions starting too soon after the school day ends. As such, greater consideration needs to be given to the scheduling of sessions, with the study manager and school contacting working through a set of potentialities to find a convenient and protected time.

A number of participants suggested that the intervention intensity, both in terms of the number of sessions per week and the duration of the intervention period, may have been too great a commitment to sustain attendance and was somewhat discordant with usual school provision. One solution suggested by a school contact, was to implement the project in five week modules where different dance styles are implemented in each block. As such, future

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projects may wish to employ structures that mimic usual school provision, and ensure intervention implementers and school staff deliver after-school interventions via this approach.

Open-enrolment was highlighted as an approach that may improve attendance and fluidity of delivery. However, it was noted that this would require dance instructors to carefully manage the dynamics of introducing new participants to the existing group, including the potential disruption this could cause. This suggestion is reasonable for mainstream delivery of the project, but the use of this strategy in a trial setting raises a problem in that participants receiving the intervention would change during the intervention period and, as such, intention-to-treat analyses would not be possible. This issue is therefore a reflection of broader debates in relation to the internal and external validity of public health interventions [30-32]. Although measures that maintain the rigour of a trial, such as limiting recruitment numbers, may increase internal validity, it may limit the external validity. Hence, although restricting the number of participants to those who signed up at baseline was a necessity, it may not reflect usual practice, whereby children are able to attend or 'drop-in' to after-school clubs at times convenient to them. Further work examining the use of modified intervention design for real-world public health interventions may be warranted [32-34].

Future delivery of after-school PA interventions may benefit from a greater awareness of existing school events. Study staff may wish to ask schools for the current and previous year's schedule of activities and check this against the planned intervention sessions, in the hope of identifying any current or future overlaps. Whilst this will not stop all withdrawals, it may reduce instances of children signing-up when they are likely to drop out at a later date (thus leaving space for children who may follow the intervention through to the end). Identifying prospective timings convenient to girls is significant, given the multiple challenges already associated with implementing PA interventions during school hours [7 35 36].

The call for greater variety (e.g. a preference for differences in dance styles) in session content highlights the complexities of implementing interventions in distinct settings. Settings-based approaches to PA interventions have been highlighted elsewhere [37 38]. These findings support the need for a more "context based approach not only during data collection, but also for defining basic research constructs and questions" [39]. Findings highlight the significance of ensuring variety in session content and for influencing participation and

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attendance across schools. Different dance styles appealed to different girls. While the programme set out to offer girls input into dance styles, music and pace of progression, the effectiveness of this approach relies on employing dance instructors who are willing and able to teach a range of dance styles. While this was largely the case in the BGDP, it is important that the recruitment of intervention deliverers ensures that their skills allow them to deliver the planned content *and* be flexible to input from the participant group. The group work component of the intervention was valued by participants and dance instructors as it fostered ownership of the project, helped the instructor cope with various levels of competence within the group, developed girls' leadership skills and mitigated against inconsistent attendance. This finding is consistent with the broader literature associated with the principle of relatedness within Self Determination Theory [40].

Parents were identified as an important source of support for behaviour change that was not utilised in this study. This finding is consistent with previous work which has identified parents as a potentially important feature of PA behaviour change [41-46]. Parents represent a potential 'lever' that can be used to influence the PA levels of children, and as such work that specifically focusses on how to engage parents in providing positive support for extra-curricular PA programmes is warranted.

School culture impacts upon the intervention delivery

Through our extensive engagement with school contacts, dance instructors, and girls, we observed (but did not formally assess) an implicit school 'ethos' or 'culture' which affected the intervention delivery and may have influenced the themes discussed above. The main school culture factors that appeared to affect the acceptability of the study were the school's organisational structure and communication between staff, the school's expectations of pupil behaviour and attendance, and the role of the school contact. When approaching schools to recruit participants, differences in attitudes were discernible from the outset, with some schools having a room booked and time set aside, and others forgetting the meeting had been arranged. Intervention logistics were also affected by distinct school cultures. Prior to recruitment, schools specified the days that intervention sessions would run so at the point of recruitment all girls knew the time and days on which they would receive dance sessions. In one case the school contact changed the days on which sessions ran. This school had the lowest average attendance, in part because many participants were not able to attend on the rescheduled day. Additionally, the same school contact set up a competing after-school club

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on the same day as the revised sessions. On paper, all schools encouraged consistent attendance, but in reality the expectations upon girls varied widely between schools [23]. Some school contacts expected girls to attend and were proactive in their approach in supporting them to do so. Others felt that their lack of familiarity with the girls made it difficult for them to encourage them, resulting in fewer, more ineffective attempts. All issues discussed above are reflective of the heterogeneity in the ethos of the participant schools. The findings highlight the fundamental importance of being aware of, and accounting for, the diversity of schools' needs in planning after-school PA interventions [47].

We encourage researchers to give greater consideration to the 'school context' [26]. Determining what contextual factors are important for a given study are difficult to establish pre-intervention and any formal assessment of the impact of school context will be difficult. Researchers should keep field notes of interactions with school and record issues that facilitate or hinder the study and intervention. Such a pool of knowledge from different studies and contexts may be the foundations on which more formal assessments of school context can in the future be made.

STRENGTHS AND LIMITATIONS

This study provides new information on factors which affect the delivery of after-school PA intervention. Although data used in this study are primarily focussed on dance, we hope the findings will have future utility for researchers or practitioners operating within the broader field of PA interventions. A major strength of this research lies in the in-depth exploration of qualitative data obtained from a range of stakeholders. Data analysis was conducted by a team of researchers experienced in qualitative research. Two researchers participated only in the analysis stage of the process evaluation, and hence afforded a degree of objectivity, untainted by previous involvement in data collection. The total number of participants (n=78) is large, and there was evidence of data saturation. It should be noted that the findings represent issues associated with trial implementation, rather than the actual experiences of after-school PA interventions. Hence, they should not be considered a checklist for challenges associated with PA interventions. A limitation is that the issues that we report are grounded only in the experiences of stakeholders involved in one intervention, which was delivered to girls only in a relatively small area of the South West. As such, while many issues are applicable to the planning and implementation of broader after-school PA interventions it is possible that other interventions would reach different conclusions. We

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encourage other intervention planners and delivers to conduct detailed and reflective process evaluations and further contribute to the knowledge base for which school-based interventions can be improved.

CONCLUSIONS

This study provides information on factors associated with BGDP delivery and identifies lessons which may be applied to future after-school PA interventions. Although after-school PA interventions hold promise in increasing PA levels among adolescent girls, there is a need to implement them in ways that are appropriate to the needs and requirements of schools and girls. Our findings suggest that implementation processes need to be contextually specific and the recommendations proposed in this study may have utility in achieving this objective.

AUTHOR CONTRIBUTIONS

This project was convened by RJ, JP and SJS and RJ was the principal investigator of the grant. MJE was the Project manager and led all data collection efforts. JMK, SJS and MJE developed the interview and focus group guides and data were collected by JMK and MJE. Analysis was conducted by MJE, TM, JMK and SJS. The first draft of the paper was written by MJE, TM and RJ. All authors reviewed the paper for content, edited the paper and approved the final submission.

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COMPETING INTERESTS

We have read and understood BMJ policy on declaration of interests and declare that the authors have no competing interests.

DATA SHARING

No additional data available.

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PARTICIPANT FOCUS GROUP EXIT INTERVIEW GUIDE

Section	Questions	Timings
Introduction	**Explain purpose of the interview:** *The reason we want to talk to you is because we think that you will be able to help us improve Active7 for the future and we value your opinions. We are going to talk about your experience of taking part in Active7 and your views on promoting Active7 to other schools.* **Explain audio recording and data storage procedures:** *Before we get started, I'd like to tell you that I will be recording the conversation. The recording is to help us remember what we talked about. You can ask for the recording to be stopped at any time. The recording will be written up and we will remove any personal information like names, place names, school names etc. At this point the audio files will be deleted; so none of the information that is written down and recorded can be connected to you in any way.* **Explain group guidelines and confidentiality:** *We have got some group guidelines for us all to follow. (Display and read out guidelines). Lastly, we want everyone to be able to talk freely so it is important that everything that is said today stays in this room. This means that what is said is confidential.* Answer any questions Commence audio recording	**2-3 mins**
Icebreaker	*Can we go round the group one at a time and say our name and a word or two to describe what it was like being part of Active7? I'll go first – Jo and exciting.*	**~1 min**
Barriers and facilitators of participation	*Now I'd like us to start by finishing off some sentences. I will go through each sentence and I'd like you to individually write down how you would finish the sentence on these post-it notes and stick it onto the question. If you have more than one way to finish the sentence you can write another post-it note. We will then discuss each answer in more detail.* - *I enjoyed or liked being part of Active7 because…* - *I didn't enjoy or like being part of Active7 because…*	**~7 mins**

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	• *I found it easy to come to Active7 sessions because...*
	• *I found it difficult to come to Active7 sessions because...*
	
	More in-depth exploration of the above:
	
	    • X can you tell me a little bit more about why you enjoyed/ didn't enjoy Y?
	    • Does anyone agree/disagree with X?
	    • X can you tell me a little bit more about why you found it easy to come to the Active7 sessions because of Y?
	    • Does anyone agree/disagree with X?
	Specific examples of success stories or challenges.
	
	PROMPTS (in case the following are not covered in the post-it note task):
	
	    • What did everyone think about X?
	    • Did anyone like/dislike X?
	    • Cost (did this make it easier to attend?)
	    • Dance styles
	    • Opportunity to perform
	    • Types of music
	    • Dance diaries
	    • Days on which Active7 ran
	    • Activities/events which affected sessions i.e., school camp, other clubs, sports days etc.
	    • Number of sessions each week
	    • Length of sessions	

Session experiences	**Relatedness**
	
	    • Did you all know each other before you started the dance sessions?
	    • Did your relationships with one another change as the weeks went on?
	    • Was everyone supportive of each other?
	Specific examples of success stories or challenges.
	
	Competence
	
	    • How did you find the dance sessions physically? (E.g. did they make you feel hot, sweaty or out of breath?)
	PROMPT: Did the sessions become easier (physically) over time?
	
	    • How difficult or complicated did you find the dance steps or routines?
	PROMPT: Did the sessions feel like they became less complicated over time?
		~7 mins

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	• What do you think you have learnt (if anything) from being part of Active7?	
	PROMPTS:	
	• New/improved dance skills?	
	• What can you do now that you couldn't do before?	
	• Change in amount of physical activity?	
	• Change in confidence?	
	Specific examples of success stories or challenges.	
	Attendance	
	• How would you describe the attendance (number of people who came to the sessions) at the dance sessions? (E.g. high, low, variable?)	
	• Did it change over the 20 weeks?	
	• Do you have any idea why attendance was like it was?	
	• Why do you think some girls stopped coming to Active7?	
	• (For those girls who continued to attend) How did it make you feel as the numbers declined?	
Dance instructor	**Overall impressions**	**~10 mins**
	• What did you think about your dance instructor in general? Why?	
	• Is there anything you would change about your dance instructor's teaching style? If yes, what?	
	• Did your instructor give you choices? E.g. dance steps, music, choreographing own routines.	
	• What did you think about being given choice?	
	• What did you think of the creative tasks (where you were allowed to make up your own sections of dance) throughout the sessions?	
	• Do you think you had some control over what you did?	
	Specific examples of success stories or challenges.	
	PROMPTS:	
	• Things liked/ liked less	
	• Things liked less: - Why do you think the instructor may have done X,Y or Z. i.e., making injured people join in / refusing water breaks. Can you think of any reason why she did that? - Is this different in other classes they go to? If so, how? If not, why do they think/want A7 to be different?	

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	• Teaching style (E.g. encouraging / motivational / enthusiastic / good knowledge of dance / left pupils out/ went too fast/ too slow/ made it too hard/didn't know our names/wasn't interested in us).	
Signposting	• What did you think of the information we gave to you about local dance opportunities? (E.g. helpful?) <mark>TAKE EXAMPLE</mark> • Is anyone thinking of starting a new dance class now that Active7 has finished? • Has anybody already started a new dance class? • Did your dance teacher advise you on other local dance sessions / clubs in the area?	**2-3 mins**
Dissemination (creative or sorting task)	**Introduction** *We are thinking about doing Active7 again in more schools. After the last 20 weeks, you are now experts in what it is like to be a part of Active7 so the last part of our discussion will look at how we might improve Active7 for other girls your age. Using the post-it notes from the first task I'd like you to work together to put them in order of importance, (so what's the most important thing to you about Active7, what is the main reason you come along etc.). And as we do this task I'd like us to talk about how we could change the more negative things or improve the positive things if we did the project in more schools.* (THIS WAS USED TWICE AND SUBSEQUENTLY THE FOLLOWING TEXT WAS USED): *After the last twenty weeks you are now experts in what it's like to be part of Active7 so what I'd like to know is what you would change or what you think we should change if we were to do the project again?* **Cost** • If we were to run the programme again would you be willing to pay to attend? • How much would you be willing to pay? PROMPT: £5 per week (2 sessions) and then £1 per session. **E.g.** *'For number 1 you have chosen...'* 1. Fun (interviewer probe – *how could we make it more fun if we did this project again?*)	**~10 mins**

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	2. Making up own routines (interviewer probe – *What is it about making up routines that you particularly enjoyed?*)	
8. Closing	**Thank the participants**	**2-3 mins**
	That's all the questions I have for you today. You have helped me a lot and we will use your input to improve Active7 in the future.	
	Provide opportunity for participants to add any additional information	
	Before we finish could we go round the group and each say one thing that could help improve Active7in the future?	
	Provide opportunity for participant to ask questions	
	Do you have any questions for me?	
	Thank you very much for your time and attention. I appreciate you sharing your thoughts and opinions with me!	

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DANCE SPECIALIST EXIT INTERVIEW QUESTIONS

Section	Questions (prioritise questions in yellow)	Timings
Introduction	Explain purpose of the interview - Understand experiences of delivering the Active7 dance sessions - Discuss elements of Active7 that worked well - Identify potential improvements to the project - Discuss factors that might affect how we take the Active7 project from here and run it on a larger scale. Explain audio recording and data storage procedures *Before we get started, I'd like to tell you that I will be recording the conversation to help us remember what we discussed. You can ask for the recording to be stopped at any time. After the interview, the recording will be written up and we will remove any identifiable information like names, place names, school names etc. At this point the audio files will be deleted; so none of the information that is written down and recorded can be connected to you in any way.* Position interviewee as the experts of their experience *There are no right or wrong answers we are trying to understand your views on how the Active7 project worked, after all you are the expert! Please be as honest as possible.* Answer any questions Complete consent form Commence audio recording	**2-3mins**
Ice breaker	To start us thinking about your involvement in Active7 can you tell me what attracted you to the Active7 project?	**~1 min**
Instructor induction day (N.B. Stress that this is concerned with only the intervention induction not taster induction)	Overall impressions - Did the December induction day prepare you adequately to deliver the Active7 sessions? - How did you find working with the other dance instructors? Were you able to make any new connections as a result of working on the project? - Were there any elements of the induction session that could have been improved? PROMPTS: - Length of time - Structure - Balance of theory (SDT and evaluation description) and practical	**~7mins**

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	Would you have liked more role play for dealing with difficult situations?	
Booster session	• How did you find the April booster session? • Did you change anything as a result of the booster session?	**~2mins**
Dance session delivery	**Session plan manual** <u>(Use session plans as a prompt)</u> • What did you think of the session plans in the manual? PROMPT: Things liked/ liked less/Improvements • How did you use the session plan manual? PROMPT: Did you adapt the session plans? Examples? • Were you able to adapt the session plans to the girls' ability/differentiate depending on girls ability? <u>If so, how?</u> • Do you think the manual could be improved in any way? **Session delivery** • Could you give me an example of a particular success story you had in working with the girls in your school? • Can you give an example of where delivery was challenging? PROMPTS: • Length of the sessions • Number of pupils per class • Suitability of the dance space • Rooms being double booked/occupied for exams • What did you think of the number of sessions per week? • What dance styles did you cover? • How comfortable/confident did you feel teaching the different dance styles? • How did you decide on the dance styles you used? **Covered sessions**	**~20mins**

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- Did you need to cancel or find cover for any of your sessions?
- If yes,
- How did this process work? (I.e. what did you have to do?)
- How well do you think the process of covering sessions worked?
- How did the girls react to having a session covered by someone else?
- Did you cover any sessions in other schools?
- If yes, how did you find covering another instructor's session?
- How did the girls react to having a session covered by someone else?

Active7 hand-over (two Dis only only)

- How did the process of handing the sessions over to X work?
- Do you think this process went smoothly?
- Is there any way we could make this transition smoother if the project was carried out in more schools on a larger scale?

Self-Determination Theory
At the induction Simon presented some ideas about motivation and how to motivate the girls, including supporting their choice and ownership, sense of belonging and sense of improved skills.
Overall

- Were you able to include any of the motivational ideas that we included in the manual and induction day into the Active7 sessions you delivered? How? And were they useful? (TAKE MANUAL AS PROMPT)
- How similar do you think these motivational ideas were to your own delivery/instruction style?
- What did you do in order to try and sustain the pupils' engagement in dance and physical activity?
- Did you see the girls' motivation change throughout the course of the sessions? (E.g., did their reasons for coming seem to change)

Autonomy

- Were you able to offer children choices during the Active7 sessions? How? If challenging – why?

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- Did the girls have a sense of ownership over the dance sessions? How did they respond to this?
- Can you give an example of where supporting the girls' choice and ownership was challenging?

Relatedness

- What was your relationship with the girls like? Did it change? How?
- Can you give me an example of this relationship?
- How did the girls get on as a group? Were they supportive of each other? Example?
- Did they clash? Example?
- Did you see the group evolve over time?

Competence

- How do you think the girls views of their dance ability changed?
- How did you deal with the varied level of skill that the girls had?
- Can you tell me about a particular example of a challenge a girl had? How did you try to help them overcome this challenge?

Pupils response to intervention	• How did the girls respond to:
	     • Twice weekly lessons
	     • Length of sessions
	     • Dance styles/ skills
	     • Performance opportunity
	 • Do you think the girls feel different about being active now, compared to when the sessions started? Example?
	 • Did you see any personality or physical changes in the girls over the course of the intervention?
	 • Did you see any change in the girls in relation to:
	     o Confidence/Self-perceptions
	     o Have you heard things from teachers / parents about any spill-over effects Active7 has had on the girls outside the sessions (e.g., academics)?
		5-10mins

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<table>
<tr><td></td><td></td><td>o   What more information/ support could the Active7 team provide to maintain and or increase participation once the intervention has finished?

• What did you experience any behavioural issues? Examples?</td><td></td></tr>
</table>

o What more information/ support could the Active7 team provide to maintain and or increase participation once the intervention has finished?

- Did you experience any behavioural issues? Examples?

- What impact did these behavioural issues have on the sessions/ other girls?

- What coping strategies did you use to cope with behavioural issues?

- How effective do you think these coping strategies were? Examples…

- How useful were the behavioural guidelines? (Use manual as prompt) Examples…

- How supportive was the school contact when behavioural issues arose? Examples…

Attendance and drop out

- What did you think of the level of attendance at the dance sessions? Expected/unexpected?

- *If attendance was low -*

- Do you have any feel for why attendance may have been low/high? PROMPT: Was attendance affected by other events/activities such as school camp, other clubs, sports day etc.?

- Did you have any girls drop out? Reasons why?

Roll out of the programme	**Introduction** *At the end of the project we may consider running Active7 on a larger scale, for example in more schools around the country. On a larger scale instructors would still receive the training and booster sessions and this would likely be run by experts in local areas.* **General** • Do you think running this project on a larger scale would work? Yes/no ask for reasons… • How would the instructor training work best? (It could be the same as	**~10 mins**

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it is now but run by a different local expert).

- How can we attract the best dance instructors in different areas?

Extending the programme length:

The current programme was aimed at Year 7 girls and was limited to 40 sessions.

- What changes would be needed to keep the girls interested beyond the 40 sessions – perhaps when the girls have moved into year 8?
- What strategies do you use to motivate girls to continue attending dance sessions in classes you run elsewhere?

Open enrollment

In the study we had to limit who could participate to the girls who provided consent and data when we first visited schools (Sept/Oct 2013).

- If this programme were to run outside of a research context would you allow girls to join once the programme had started? If so, would you allow girls to join at any time or only at set landmarks, such as the start of a term?

Previous after-school experience:

- Have you run after-school dance sessions before? If so, are there any lessons that you could bring from those experiences that could be used to improve the Active-7 after-school programme?
- In other work you have done in schools, who paid for your time? School, council, arts charity or the parents? If the parents what was the cost per child per session?

Views on payment

- Was the per-session payment you received in-line with what you are used to?
- Would you be less likely to attend a training/induction session if you did not receive payment?

Communication	**School communication**	**~5mins**
	• How did you find working within your school?	
	• Did you have much contact with the school?	
	• Did you find the school supportive?	

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	- Could you give me an example of a particular success story you had in working with your school? - Can you give an example of where working with your school was challenging? - Was there anything that could have been done by project staff to improve the relationship you had with the school? **Active7 team communication** - How did you find working with the study team throughout the project? PROMPTS: Resolving any issues / problems which arose - How did you find being involved with the evaluation measures/visits from the research team? PROMPTS: Frequency of visits PROMPTS: Impact on teaching from instructor observations and child completed questionnaires	
Closing	Finally, is there anything that we have not discussed today that you think could have been done to improve the Active7 intervention? **Thank participant** **Provide opportunity for participant to add any additional information** *That's all the questions I have for you today.* *Is there anything else you'd like to tell us about the things we talked about today or the four week programme?* **Provide opportunity for participant to ask questions** *Do you have any questions for me?*	**2-3mins**

7

SCHOOL CONTACT EXIT INTERVIEW GUIDE

Section	Questions	Timings

Introduction	*Explain purpose of the interview*
	  ▪ Discuss elements of the intervention that worked well
	  ▪ Potential improvements
	  ▪ Factors that might affect how we take the Active7 project from here and run it on a larger scale.
	
	Explain audio recording and data storage procedures
	Before we get started, I'd like to tell you that I will be recording the conversation to help us remember what we discussed. You can ask for the recording to be stopped at any time. The recording will be written up and we will remove any identifying information (names, place names, school names etc). At this point the audio files will be deleted; so none of the information that is written down and recorded can be connected to you in any way.
	
	Answer any questions
	Complete consent form
	Commence audio recording
		2-3 mins

Background/ice-breaker questions	● What is your role within the school?
	  ● How did you come to be involved in Active7?
	  ● What was the incentive for you to participate?
	  ● How involved have you been? (E.g. what did your role as the contact involve etc.)?
		2 mins

Communication	**Communication with dance instructor**
	  ● What involvements with the dance instructor(s) did you have?
	  ● How did you find working with the dance instructor throughout the programme?
	  ● How could communication with the dance instructor have been improved?
	PROMPTS:
	  ● Resolving any issues / problems which arose in relation	

	to the dance project (e.g. arranging the dance sessions) **Communication with study team** • How did you find working with study manager and the other Active7 team throughout the programme? • How could working with the study team be improved? PROMPTS: • Resolving any issues / problems which arose in relation to the research or dance sessions (e.g. arranging data collection visits)	

Logistical issues	**General**
	• Logistically, how did you find Active7 ran in your school?
	• Were there any issues or problems? If yes, what type of issues or problems arose?
	  • Are these problems common to other extra-curricular activities?
	  • Potential improvements which could have resolved these problems?
	• Were there any behavioural issues related to Active7?
	• What did you think of the level of attendance at the dance sessions?
	PROMPTS
	  • Expected/unexpected?
	  • Do you have any feel for what factors may have contributed towards the level of attendance?
	  • Was attendance affected by other events/activities such as school camp, other clubs, sports day etc.?
	  • How could attendance have been increased?
	• What did you think about the length of the sessions (1 hour and a quarter)?
	• What did you think about the number of sessions per week (2 per week)?
	• Were there any problems with room bookings?
		~10 mins

	Specific examples of success stories or challenges.
	
	Questions for school contact in school where two instructors were used
	   • How did you feel about having a new instructor?
	   • How did the process of handing the sessions over to X work?
	   • Could this process be improved?
	   • Do you think having more than one instructor deliver the project could work if the project was rolled out?
	   • Looking back is there anything the Active7 team could have done to help hand the sessions over between the instructors?
	
	Data collection
	   • What were your experiences of the data collection process? (Arranging and the actual process of collecting data from the girls)
	   • How could the process of data collection be improved?
	Specific examples of success stories or challenges.	

Impact	• What impact do you think the dance programme had on the girls taking part? (E.g. physical, dance-specific, socially?)
	     - Did they seem excited by it?
	     - Was there a difference in their behaviour/confidence during the project?
	Specific examples of success stories or challenges.
		~2 mins

Sustainability	What information/ support could we provide to maintain or increase dance participation now the dance sessions have finished?	**1-2 mins**
Roll out of programme	**Introduction** *At the end of the project we may consider running Active7 on a larger scale, for example in more schools around the country. The difference between Active7 now and the rolled out project*	**~10 mins**

is that there would not be any research components, for example we would not need to do data collection and it would be run by a not-for-profit company not researchers.

General
- Do you think running this project on a larger scale would work? Yes/no ask for reasons…
- Would there be any school barriers/ facilitators for a larger roll out?

Extending the programme length:
The current programme was aimed at Year 7 girls and was limited to 40 sessions.
- What changes would be needed to keep the girls interested beyond the 40 sessions – perhaps when the girls move into year 8?
- What strategies do you use to motivate girls to continue attending optional after-school activities?

Open enrolment
In the study we had to limit who could participate to the 33 girls who provided consent and data when we first visited schools (Sept/Oct 2013).
- If the programme was run outside of a research context would instructors be allowed to add new pupils into their sessions if they drop out?
- If so, how would this work? (e.g. reserve list?)
- Would you allow girls to join at any time or only at set landmarks, such as the start of a term?
- Does this happen in other extra-curricular activities in your school?

Logistics
- If Active7 wasn't part of a research project, how would the girls be recruited?

PROMPT
- By the school only or would the taster session be useful?
- How would you usually recruit to extracurricular

	activities?	
	Cost	
	• In other after-school activities you have in your schools, who pays for the instructors time? School, council, arts charity or the parents? If the parents what was the cost per child per session?	
	• If there was no focus on measuring PA, would this make a difference to recruitment of girls?	
	• Would your school be willing to offer Active7 again?	
	• Is your school planning to continue offering after-school dance next term? If not, why not?	
	• Who would be the best person to approach in school about a larger project?	
	• Which year group would you recommend we target with this larger project?	
	• Is a dance project for other years needed for Active7 to feed into?	
	• Would the involvement with the school contact be less or more in a larger project?	
Closing	**Thank participant** • Thank you so much for taking the time to speak to me and for your help co-ordinating Active7 so far. **Provide opportunity for participant to add any additional information** • That's all the questions I have for you today. • Is there anything else you'd like to tell me about the things we talked about today? **Provide opportunity for participant to ask questions** • Do you have any questions for me?	**1-2 mins**

Table 1: CONSORT 2010 checklist of information to include when reporting a cluster randomised trial

Section/Topic	Item No	Standard Checklist item	Extension for cluster designs	Page No *
Title and abstract				**1**
	1a	Identification as a randomised trial in the title	Identification as a cluster randomised trial in the title	**1**
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)[1,2]	See table 2	**NA (in main outcome paper)**
Introduction				**4-5**
Background and objectives	2a	Scientific background and explanation of rationale	Rationale for using a cluster design	**4-5**
	2b	Specific objectives or hypotheses	Whether objectives pertain to the the cluster level, the individual participant level or both	**4-5**
Methods				
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	Definition of cluster and description of how the design features apply to the clusters	**4**
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons		**NA**
Participants	4a	Eligibility criteria for participants	Eligibility criteria for clusters	**NA (in main outcome paper)**
	4b	Settings and locations where the data were collected		**5**
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	Whether interventions pertain to the cluster level, the individual participant level or both	**4 (further details in main outcome paper)**
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and	Whether outcome measures pertain to the cluster level, the individual participant level or both	**NA (in main outcome paper)**

		when they were assessed		
	6b	Any changes to trial outcomes after the trial commenced, with reasons		**NA**
Sample size	7a	How sample size was determined	Method of calculation, number of clusters(s) (and whether equal or unequal cluster sizes are assumed), cluster size, a coefficient of intracluster correlation (ICC or k), and an indication of its uncertainty	**5**
	7b	When applicable, explanation of any interim analyses and stopping guidelines		**NA**
Randomisation:				
Sequence generation	8a	Method used to generate the random allocation sequence		**NA (in main outcome paper)**
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	Details of stratification or matching if used	**NA**
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	Specification that allocation was based on clusters rather than individuals and whether allocation concealment (if any) was at the cluster level, the individual participant level or both	**NA**
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	Replace by 10a, 10b and 10c	**NA (in main outcome paper)**
	10a		Who generated the random allocation sequence, who enrolled clusters, and who assigned clusters to interventions	**NA (in main outcome paper)**
	10b		Mechanism by which individual participants were included in clusters for the purposes of the trial (such as complete	**NA**

		enumeration, random sampling)		
	10c	From whom consent was sought (representatives of the cluster, or individual cluster members, or both), and whether consent was sought before or after randomisation		**6**
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how		**NA (in main outcome paper)**
	11b	If relevant, description of the similarity of interventions		**NA**
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	How clustering was taken into account	**NA**
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses		**NA**
Results				
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	For each group, the numbers of clusters that were randomly assigned, received intended treatment, and were analysed for the primary outcome	**NA (in main outcome paper)**
	13b	For each group, losses and exclusions after randomisation, together with reasons	For each group, losses and exclusions for both clusters and individual cluster members	**NA (in main outcome paper)**
Recruitment	14a	Dates defining the periods of recruitment and follow-up		**NA (in main outcome paper)**
	14b	Why the trial ended or was stopped		**NA**
Baseline data	15	A table showing baseline demographic and clinical	Baseline characteristics for the individual and cluster levels as	**NA (in main**

			characteristics for each group	applicable for each group	**outcome paper)**
Numbers analysed	16		For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	For each group, number of clusters included in each analysis	**NA (in main outcome paper)**
Outcomes and estimation	17a		For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	Results at the individual or cluster level as applicable and a coefficient of intracluster correlation (ICC or k) for each primary outcome	**NA (in main outcome paper)**
	17b		For binary outcomes, presentation of both absolute and relative effect sizes is recommended		**NA**
Ancillary analyses	18		Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory		**NA**
Harms	19		All important harms or unintended effects in each group (for specific guidance see CONSORT for harms[3])		**NA (in main outcome paper)**
Discussion					
Limitations	20		Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses		**17-18** **(Full trial limitations reported in main outcome paper)**
Generalisability	21		Generalisability (external validity, applicability) of the trial findings	Generalisability to clusters and/or individual participants (as relevant)	**NA (in main outcome paper)**
Interpretation	22		Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence		**14-17**

Other information				
Registration	23	Registration number and name of trial registry		**2**
Protocol	24	Where the full trial protocol can be accessed, if available		**4**
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders		**19**

* Note: page numbers optional depending on journal requirements

Table 2: Extension of CONSORT for abstracts[1,2] to reports of cluster randomised trials

Item	Standard Checklist item	Extension for cluster trials
Title	Identification of study as randomised	**Identification of study as cluster randomised**
Trial design	Description of the trial design (e.g. parallel, cluster, non-inferiority)	
Methods		
Participants	Eligibility criteria for participants and the settings where the data were collected	**Eligibility criteria for clusters**
Interventions	Interventions intended for each group	
Objective	Specific objective or hypothesis	**Whether objective or hypothesis pertains to the cluster level, the individual participant level or both**
Outcome	Clearly defined primary outcome for this report	**Whether the primary outcome pertains to the cluster level, the individual participant level or both**
Randomization	How participants were allocated to interventions	**How clusters were allocated to interventions**
Blinding (masking)	Whether or not participants, care givers, and those assessing the outcomes were blinded to group assignment	
Results		
Numbers randomized	Number of participants randomized to each group	**Number of clusters randomized to each group**
Recruitment	Trial status[1]	
Numbers analysed	Number of participants analysed in each group	**Number of clusters analysed in each group**
Outcome	For the primary outcome, a result for each group and the estimated effect size and its precision	**Results at the cluster or individual participant level as applicable for each primary outcome**
Harms	Important adverse events or side effects	
Conclusions	General interpretation of the results	
Trial registration	Registration number and name of trial register	
Funding	Source of funding	

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[1] Relevant to Conference Abstracts

REFERENCES

[1]   Hopewell S, Clarke M, Moher D, Wager E, Middleton P, Altman DG, et al. CONSORT for reporting randomised trials in journal and conference abstracts. *Lancet* 2008, 371:281-283

[2]   Hopewell S, Clarke M, Moher D, Wager E, Middleton P, Altman DG at al (2008) CONSORT for reporting randomized controlled trials in journal and conference abstracts: explanation and elaboration. *PLoS Med* 5(1): e20

[3]   Ioannidis JP, Evans SJ, Gotzsche PC, O'Neill RT, Altman DG, Schulz K, Moher D. Better reporting of harms in randomized trials: an extension of the CONSORT statement. *Ann Intern Med* 2004; 141(10):781-788.