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Original article

Adolescents' perspectives on a school-based physical activity intervention: a mixed method study

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Abstract

Purpose: To examine adolescent experiences and perspectives of the GoActive intervention (ISRCTN31583496) using mixed methods process evaluation to determine satisfaction with intervention components and interpret adolescents' experiences of the intervention process in order to provide insights for future intervention design.

Methods: Participants ($n = 1542$; 13.2 ± 0.4 years, mean ± SD) provided questionnaire data at baseline (shyness, activity level) and post-intervention (intervention acceptability, satisfaction with components). Between-group differences (boys *vs.* girls and shy/inactive *vs.* others) were tested with linear regression models, accounting for school clustering. Data from 16 individual interviews (shy/inactive) and 11 focus groups with 48 participants (mean = 4; range 2–7) were thematically coded. Qualitative and quantitative data were merged in an integrative mixed methods convergence matrix, which denoted convergence and dissonance across datasets.

Results: Effect sizes for quantitative results were small and may not represent substantial between-group differences. Boys (*vs.* girls) preferred class-based sessions ($\beta = 0.2$, 95% confidence interval (CI): 0.1–0.3); qualitative data suggested that this was because boys preferred competition, which was supported quantitatively ($\beta = 0.2$, 95%CI: 0.1–0.3). Shy/inactive students did not enjoy the competition ($\beta = -0.3$, 95%CI: −0.5 to −0.1). Boys enjoyed trying new activities more ($\beta = 0.1$, 95%CI: 0.1–0.2); qualitative data indicated a desire to try new activities across all subgroups but identified barriers to choosing unfamiliar activities with self-imposed choice restriction leading to boredom. Qualitative data highlighted critique of mentorship; adolescents liked the idea, but older mentors did not meet expectations.

Conclusion: We interpreted adolescent perspectives of intervention components and implementation to provide insights into future complex interventions aimed at increasing young people's physical activity in school-based settings. The intervention component mentorship was liked in principle, but implementation issues undesirably impacted satisfaction; competition was disliked by girls and shy/inactive students. The results highlight the importance of considering gender differences in preference of competition and extensive mentorship training.

Keywords: Adolescent; Intervention; Mixed methods; Physical activity; Process evaluation

1. Introduction

Understanding primary recipients' experiences of and perspectives on interventions can help determine the effectiveness of intervention components and produce new insights regarding intervention design. There is limited published research related to experiences of those directly involved in receiving these interventions,[1–3] particularly using qualitative research methods. Process evaluations of school-based interventions have focussed mainly on other stakeholder groups, particularly parents and teachers. They note the importance of child engagement and

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autonomy over their own behavior,[4] embedding diet and physical activity (PA) across the curriculum and school,[4] school resources,[4] parental and community engagement,[1,4] and the importance of adult role models[1,4] in delivering school-based PA interventions. However, such stakeholder perspectives cannot replace the sharing of views and experiences by those adolescents who were participating in the intervention, which may help to determine the effectiveness of components and could result in new insights regarding influences on PA participation.

In recent decades, literature and policy have emphasized the importance of capturing views, experiences, and actions of those who are the focus of the research.[5] Moore et al.[6] state that the success of an intervention is dependent on the response of the intended audience. This is traditionally considered "dose received",[7] and more specifically, "dose received: satisfaction".[8] It is argued that "dose received" is a passive term privileging quantitative measures.[6] Moore et al.[6] advocate for the critical assessment of aspects of dose received, including "acceptability" and "satisfaction", to examine participants' relationships to mechanisms through which the intervention works. Additionally, they call for the inclusion of qualitative methods as an effective approach to illuminating participant experiences.

The GoActive intervention was a 12-week PA promotion program aiming to increase the objectively measured average daily moderate-to-vigorous PA among 13- to14-year-old adolescents (Year 9).[9,10] GoActive was evaluated in a cluster randomized controlled trial across 16 schools in the UK, recruiting 2858 participants at baseline. Additional details on the GoActive intervention and its evaluation have been described previously.[9,10] Although GoActive was designed as a whole-population approach aiming to overcome stigmatization and potential detrimental mental health consequences of targeting particular subgroups in health promotion strategies,[11] we wanted to ensure that the intervention was acceptable to those least likely to engage in PA. Therefore, the intervention was developed to include the opinions of those with characteristics that were deemed to be common in individuals who were hard to reach in PA promotions, including girls and those with low activity levels and high levels of shyness.[10] Therefore, participants included in our process evaluation were purposively sampled to account for perspectives of individuals with these characteristics.

The GoActive intervention includes: (1) GoActive sessions, (2) older-year group mentors, (3) in-class Year 9 leaders, and (4) the GoActive website. Using elements of Self-determination Theory (SDT),[12] GoActive aims to increase PA through increased social support, self-efficacy, self-esteem, and friendship quality. The program (Table 1) uses various behavior change techniques that align with GoActive's 6 key components: Choice, Mentorship, Competition, Flexibility, Rewards, and Novelty.[13]

The provision of choice, mentorship, competition, and rewards were linked to 2 facets of motivation informed by SDT: extrinsic motivation, stemming from external or internal pressure (e.g., peer pressure or guilt, respectively), and intrinsic motivation, characterized by engaging in behaviors of one's own accord, often linked to fun, enjoyment, or interest.[12,14] Motivation occurs when basic psychological needs are met through 3 constructs: autonomy (acting in a self-directed way), competence (interacting effectively with the environment), and relatedness (connectedness with others).[12,14] Promoting activity choice may affect intrinsic motivation through satisfaction of activities and co-participation, whereas peer leadership and mentorship were proposed to influence autonomy and relatedness by creating opportunities for students to organize and lead activity sessions. Formative work revealed that adolescents expressed a desire to

Table 1
Behavior change techniques[46] applied through intervention componentsin the GoActive intervention.

GoActive component	Behavior change technique label	Application in the GoActive intervention
Novelty, choice, mentorship	1.1 Goal-setting (behavior)	Form group sets goal to try 1 new activity per week. Mentors encourage Year 9 students to plan when and with whom they will try the activity.
Competition	2.3 Self-monitoring of behavior	Year 9 students record their participation in weekly new activities by entering points online.
Mentorship	3.1 Social support (unidentified)	Mentors, in-class Year 9 leaders, form teachers, and peers provide encouragement and support.
	4.1 Instruction on how to perform behavior	Quick Cards (laminated print-out resources) and mentors provide activity instructions/tips.
	6.1 Demonstration of the behavior	Mentors are encouraged to model the behavior. Quick Cards show examples of adolescents engaging in the behavior.
Competition	6.2 Social comparison	Points are awarded for trying activities. Anonymized individual points ranking will allow individual-level comparison. Class-level competition will be open via school graphs denoting form group leader boards.
Rewards	10.1 Material incentive (behavior)	Year 9 students will be informed of the GoActive reward system.
	10.2 Material reward (behavior)	Year 9 students will be rewarded for obtaining points.
	10.4 Social reward	Rewards are given out in front of peers. Awards are handed out at full-year assembly at program's end.
	14.9 Reduce reward frequency	Year 9 students receive individual rewards on reaching point milestones (i.e., a sports bag (15 points), t-shirt (50 points), or hoodie (150 points)).
Mentorship	10.5 Social incentive	Year 9 students are informed that verbal praise will be provided.
	12.2 Restructuring the social environment	A regular, short (~20 min) intervention session is incorporated into the school timetable.
	13.1 Identification of self as role model	Weekly elected Year 9 peer leaders act as role models. They support and encourage fellow students to try the chosen activities.

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try new activities,[10,15] partly so that skill levels were perceived as being equivalent those of peers.[10] Promoting novel activities targeted perceived competence through assumptions of an even level of skill across all participants. The flexibility of the intervention was designed to target both autonomy and relatedness, as students were encouraged to be active with friends and family outside of school.

In understanding intrinsic motivation, it is important to consider why people persist with particular behaviors or activities and why factors in the social context have the potential to facilitate or undermine the motivation.[16] Cognitive Evaluation Theory, a sub-theory of SDT, suggests that social factors such as peer behavior could affect students' motivation to participate in PA. Aiming to explain the effects of determinants of internal motivation, Cognitive Evaluation Theory may help to explain how rewards and related competition may target intrinsic motivation.[12]

In this paper, we aim to describe GoActive intervention experiences of adolescents. The specific objectives are:

1. To explore how participants experienced the GoActive intervention and to analyze their satisfaction with intervention components designed to increase their PA levels.
2. To describe suggested insights on future intervention design and implementation from adolescents participating in the intervention.

2. Methods

A mixed methods process evaluation was embedded in the main GoActive trial. Ethical approval for the trial was obtained from the University of Cambridge Psychology Research Ethics Committee (PRE.2015.126). Secondary (high) schools in both Essex and Cambridgeshire, UK, were purposively sampled to achieve heterogeneity in socioeconomic status. All Year 9 students (13−14 years old) in 16 participating schools were eligible to participate; students and their parents received study information following an assembly at each school. Parental opt-out consent was sought, and written student assent was obtained by researchers trained in Good Clinical Practice prior to baseline measurements (September−December 2016). Following UK Medical Research Council[17] guidance on avoiding interpretation bias, this paper presents 1 aspect of the process evaluation results ahead of the main trial outcome.

2.1. Data collection

2.1.1. Quantitative data

Data on student age, gender, ethnicity, family socioeconomic position, shyness, and PA were derived from self-report questionnaires at baseline. As a proxy for socioeconomic position, family affluence was assessed using 6 items based on the Family Affluence Scale (FAS) and was defined as *low* (FAS score = 0−6), *medium* (FAS score = 7−9), or *high* (FAS score = 10−13).[18] Shyness was assessed using 5 items in the Emotionality, Activity and Sociability Temperament scale[19]; activity was assessed using the Youth Physical Activity Questionnaire.[20] Activity frequency was calculated as sessions per week for all reported activities, and tertiles were derived. Only data from participants attending schools receiving the GoActive intervention ($n = 8$ schools) are included in these analyses.

Quantitative process evaluation data were collected from post-intervention questionnaires adapted from those used in the feasibility study (available as supplementary material).[10] Likert scales assessed intervention enjoyment with separate items assessing whether the intervention was fun or boring, with response categories as "*strongly agree*" (1) to "*strongly disagree*" (4). Likert scales were also used to assess participant satisfaction with the individual components—"*Do not like it at all*" (1) to "*Like it a lot*" (5).

2.1.2. Qualitative data

Qualitative data were collected from all 8 intervention schools toward the end of the 12-week intervention; individual and focus-group interviews were conducted by the same experienced qualitative researcher (SJ).

A total of 11 semi-structured focus groups comprising Year 9 students were conducted in a school space familiar to the students (total group $n = 48$; mean group size $n = 4$; range 2−7). In order to gain information-rich responses for qualitative data, purposeful sampling took place by encouraging the student participants to describe their diverse experiences. Focus group participants were grouped by level of participation (determined by tertiles of website points entered) and purposively sampled to aim for a mix of gender. An interview guide was developed and iteratively updated as new issues emerged while conducting focus groups.[13] Focus groups for 6 schools were mixed gender (Table 2). Critical reflection after the first few focus groups were conducted led to separating the remaining focus groups by gender, where possible,

Table 2
Characteristics of schools and number of participants involved in the study.

School label	Website usage classification	*n* and gender (focus group)		*n* and gender (individual interview; shy and inactive participants)
		Focus Group 1	Focus Group 2	
A	Medium	1 boy, 3 girls		2 boys
B	Low	3 boys, 2 girls		2 girls
C	Medium	2 girls	1 girl, 2 boys	1 boy, 1 girl
D	High	4 boys	2 girls	1 boy, 1 girl
E	High	1 boy, 4 girls		1 boy, 1 girl
F	Low	4 girls		2 girls
G	Low	5 girls		2 boys
H	Medium	7 girls	7 boys	1 boy, 1 girl
Total		48		16

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to maximize the chances of participants' feeling comfortable in sharing their experiences openly. Focus group sessions lasted 22−46 min.

Shy/inactive participants were identified by using shyness data and self-reported PA participation data from baseline. Students in the highest tertile for shyness[19] and the lowest tertile for self-reported PA frequency were invited for individual interviews[20]; 16 such interviews were conducted. The individual interviews lasted 10−26 min. Interviews were semi-structured and followed a flexible interview guide specifically designed for the interviews (available as Supplementary Material).

Qualitative data were audio recorded, transcribed verbatim and managed using QSR NVivo11 (Version 10.0; QSR International, Victoria, Australia).[21]

2.2. Analysis

Qualitative data were analyzed using a realist thematic approach in reporting the meanings and reality of participants' experiences.[22] Two researchers (STJ and ERL) independently coded a subsample of transcripts. Data were organized into manageable segments of text,[23] and patterns and connections among them were identified.[24] All codes were compared, discussed, and agreed upon prior to coding all other interviews. Codes were revisited and abridged into broader themes. At first, individual and focus group data were analyzed separately, but due to the identification of common themes, the 2 datasets were subsequently reviewed together by STJ and ERL to identify and map overarching themes. STJ used a deductive thematic approach to provide a focused analysis of the GoActive components.

Between-group differences (boys *vs.* girls and shy/inactive *vs.* others) in participant demographic characteristics, intervention enjoyment, and satisfaction with individual components were tested with multilevel linear regression models clustered by school; Stata (Version 14.0; StataCorp LP, College Station, TX, USA) was used for quantitative analyses.[25]

Qualitative and quantitative data were merged during analysis and interpreted using a mixed methods convergence matrix. Components were assessed for either convergence (agreement between both sets of results) or dissonance (disagreement between the sets of results on either the relevance or direction of the determinant/theme under consideration).[26]

3. Results

Table 3 provides an overview of the characteristics of participants included for quantitative analysis. Quantitative results (Table 4) indicate that for most components, overall responses were around the midpoint of the scale but tended towards positive. However, for mentorship and leadership, responses dipped below the central scale point, indicating less acceptability of these components. Small differences in intervention acceptability and satisfaction were seen between genders and shy/inactive subgroups, with boys consistently preferring most intervention components compared to girls. Although the magnitude of these differences were relatively small and may not represent meaningful differences between groups, the qualitative findings provided context for these observed differences. Participants were purposively sampled for invitation to focus groups based on tertiles of website usage (as a proxy for intervention engagement). However, the quantitative results are not stratified by participation; instead, it was used to ensure a balanced mixture of participation levels in qualitative work to represent views across differing participation levels in the study.

Table 3
Characteristics of participants included in the analysis.

	Boys	Girls	Shy and Inactive	Others
Participants (*n*(%))	773 (51)	745 (49)	221 (14)	1321 (86)
Age (years, mean ± SD)	13.2 ± 0.4	13.2 ± 0.4	13.2 ± 0.4	13.2 ± 0.4
Ethnic group (*n*(%))				
White	646 (83)	635 (85)	184 (83)	1104 (84)
Mixed/multiple background	52 (7)	44 (7)	10 (5)	87 (7)
Asian or Asian British	38 (5)	27 (4)	20 (10)	46 (4)
Black or Black British	23 (3)	18 (2)	2 (1)	39 (3)
Other ethnic group	12 (2)	17 (2)	3 (1)	28 (2)
SEP (*n* (%))				
Low (i.e., FAS score 0−6)	132 (17)	135 (18)	39 (18)	213 (17)
Medium (i.e., FAS score 7−9)	324 (41)	345 (46)	119 (54)	550 (42)
High (i.e., FAS score 10−13)	334 (42)	272 (36)	63 (28)	543 (41)
Participants visiting website (*n* (%))	366 (46)	348 (46)	93 (42)	621 (47)

Notes: 24 participants included in the shy and inactive/others comparison did not report their gender or selected "prefer not to say". 2 boys and 4 girls did not report their ethnicity; 2 "Shy and inactive" participants and 16 "Others" did not report ethnicity data. 1 boy and 1 girl did not report their SEP; 15 "Others" did not report SEP.
Abbreviations: FAS = family affluence scale; SEP = social economic position.

Quantitative and qualitative results on the GoActive components are discussed below and summarized in the mixed methods convergence matrix (Table 4).

3.1. Reflections on the GoActive sessions

Participants reflected on a number of key GoActive components, including their enjoyment of the intervention (e.g., fun), competition, choice, and novelty. Analysis of participant responses indicated that many of these overlapped and ultimately impacted upon enjoyment and participation.

3.1.1. Enjoyment

Shy/inactive participants reported finding GoActive less fun than the remaining participants. This was supported by the qualitative data where participants identified sociability and fun as main features of GoActive sessions. Some participants saw the sessions as an opportunity to socialise with their form group (tutor group, roll-call/registration class), and with students outside of their usual friendship circle:

Researcher: So 2 months ago, would you have spoken to these people in your form group?

Interview participant 1 (I1): No, not really, I normally keep my head down and read my book or something in form. But

Table 4
Mixed methods convergence matrix. Component assessed on a 5-point Likert scale ranging from "*Do not like it at all"* (1) to "*Like it a lot*" (5). Acceptability assessed on a 4-point Likert scale ranging from "*strongly agree*" (1) to "*strongly disagree*" (4).

	Boy mean ± SD	Girl mean ± SD	Difference β (95%CI)	Shy/Inactive mean ± SD	Others mean ± SD	Difference β (95%CI)	Convergence and qualitative interpretation
Component (Scale 1−5)							
Class sessions (tutor time)	3.4 ± 1.3	3.2 ± 1.2	**0.2 (0.1 to 0.3)**	3.0 ± 1.2	3.3 ± 1.3	−0.4 (−0.9 to 0.1)	*Congruence:* Participants liked using form time but acknowledged the limited time. Some suggested using lessons or having the mentors come in more often.
Suggesting new activities	3.2 ± 1.1	3.1 ± 1.0	**0.1 (0.1 to 0.3)**	3.0 ± 0.9	3.1 ± 1.1	−0.2 (−0.5 to 0.1)	*Dissonance:* Qualitative findings suggest that Year 9 students did not wish to suggest new activities: potentially linked with self-consciousness/embarrassment.
Activity choice	3.3 ± 1.1	3.1 ± 1.0	**0.2 (0.1 to 0.3)**	3.0 ± 0.9	3.2 ± 1.1	−0.2 (−0.5 to 0.2)	*Dissonance:* Interviews revealed that choices did not appeal and were self-limited. Qualitative data from interviews showed boys preferring choice, but girls indicated a wish to try new activities more than the boys did.
Novel activities	3.3 ± 1.1	3.2 ± 1.0	**0.1 (0.1 to 0.2)**	3.1 ± 1.0	3.3 ± 1.1	−0.2 (−0.6 to 0.1)	*Congruence:* Quantitative results are neutral, which may indicate hesitation. Qualitative findings provide justification for these hesitations.
Class competition	3.2 ± 1.2	3.0 ± 1.1	**0.2 (0.2 to 0.3)**	2.8 ± 1.1	3.1 ± 1.1	**−0.3 (−0.5 to −0.1)**	*Congruence:* Boys referred to the fun of competition much more than girls. Girls indicated that competition, often enjoyed by boys, was at times a barrier to girls' participation in the intervention.
Mentors	2.9 ± 1.1	2.7 ± 1.0	0.2 (−0.1 to 0.4)	2.8 ± 0.9	2.8 ± 1.1	−0.1 (−0.3 to 0.2)	*Dissonance:* Participants liked the idea of working with older mentors; however, expectations were not met.
In-class leaders	2.9 ± 1.1	2.8 ± 1.0	**0.2 (0.1 to 0.3)**	2.8 ± 0.9	2.9 ± 1.0	−0.1 (−0.4 to 0.2)	*Dissonance:* Qualitative findings indicate that Year 9 students did not want to be leaders amongst their peers. Where this element was not implemented, some suggested that it be implemented and that the leaders should be 'popular' (influencers).
Rewards (points)	3.1 ± 1.2	3.0 ± 1.1	**0.2 (0.1 to 0.3)**	2.9 ± 1.0	3.1 ± 1.1	−0.2 (−0.4 to 0.1)	*Dissonance:* Participants liked the idea but may have conflicting thoughts on gaining individual points and adding points to their account, which may indicate why they did not like individual points.
Rewards (prizes)	3.2 ± 1.2	3.2 ± 1.1	−0.1 (−0.3 to 0.2)	3.0 ± 1.0	3.3 ± 1.2	**−0.3 (−0.6 to −0.1)**	*Congruence:* Participants liked the idea of rewards but discussed barriers to implementation which impacted their satisfaction of the rewards provided.
Acceptability of intervention (Scale 1−4)							
Was it fun?	2.4 ± 0.9	2.5 ± 0.8	−0.1 (−0.3 to 0.1)	2.6 ± 0.9	2.4 ± 0.9	**0.2 (0.1 to 0.4)**	*Dissonance:* Qualitative results were resoundingly positive compared to the average feeling from the quantitative data.
Was it boring?	2.6 ± 0.9	2.5 ± 0.9	**0.1 (0.1 to 0.3)**	2.4 ± 0.9	2.6 ± 0.9	**−0.2 (−0.3 to −0.1)**	*Congruence:* Qualitative findings revealed the rationale behind 'boring' statements related to lack of activity variability.

Notes: *Convergence* = agreement between both sets of results; *Dissonance* = disagreement between the sets of results on either the relevance or the direction of the determinant/theme under consideration. Bold type is used when confidence intervals do not cross 0. Differences tested using multilevel linear regression adjusted for school clustering.
Abbreviation: CI = confidence interval.

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it's kind of quite fun, it's something different, and I think, because we're all on the same team as such, we all kind of get along and want to play.

When asked about the appeal of participating, the participant responded:

I1: I don't know, I think it's just the fact I can go up there with my friends and you can have a mess around, have a laugh and try and hit people with the dodgeball (laughs).

(School A, individual interview, I1)

Some students recognized that the fun and enjoyment of the activities were a mechanism affecting behavior change:

Student 1 (S1): When our form like misbehave loads, and then we have to do silent reading, but as soon as GoActive came into place, like they started misbehaving less and less, the more GoActive happened. So I think, because they're enjoying it, they stopped messing about so they could go out and do more fun things in form.

(School E, focus group 1)

Qualitative data helped clarify differentiated experiences between subgroups; fun was connected to sociability, but not always, and only for the "right" kind of interactions. Socializing with people was a positive intervention element for some, but others would have preferred to socialize only with a particular group of people, potentially those outside the intervention. Some girls suggested that at times they preferred to be sociable without participating in the activity, or would rather study, prioritizing this over 1 morning of PA per week.

3.1.2. Using form time

The GoActive sessions were designed to allow for diversity in a range of co-participants, and for variability in timing and locations for activity. Flexibility was also presented as a choice as to when to run a session in a school day. All schools except one used morning form time to run GoActive. Qualitative data indicated that students preferred to engage in a GoActive session, which gave them something to do rather than engage in traditional form time activities (e.g., sitting and talking, reading, or personal reflection activities):

S3: I like trying new things and I find it (the intervention) really fun and it's just fun, and it's better than just sitting there and doing nothing, because that's what we always do in form.

(School A, focus group 1)

3.1.3. Competition

Boys preferred the class competition compared to girls, and the main sample enjoyed class competition more than shy/inactive students (Table 4). Similarly, the general consensus from the focus groups was that the competitive element of the activities was a source of fun for boys. Boys stated, "Boys are more competitive than the girls." Competition was always linked to the social nature of activities for boys, including teams within forms, and competing against other form groups within the school. One boy commented:

S1: In our form we've done competitions against other forms, so the boys from 1 form and the boys from another form, we went into the sports hall and played dodgeball, that was fun.

(School E, focus group 1)

Girls often discussed the competition shown by the boys when participating in the sessions: "You could see it, like they wanted to win, you could tell they did." (School A, focus group, F1S1) However, quantitative results showed that girls and shy/inactive participants did not enjoy competition. Interview discussions revealed that this was, instead, a deterrent to participation.

3.1.4. Choice and novelty

Questionnaire data suggest that boys liked choosing new activities more than girls did. Qualitative data revealed that choices were limited by the Year 9 students themselves; students were too shy and displayed apathy towards suggesting an activity, or they were discontented with the selected activities. Engagement varied depending on the activity offered:

I2: I think it's because like dodgeball, it's competitive, it's fun and we all know how to do it, and it's a pretty easy game to learn, and it's pretty easy to get people to do it with you as well.

(School B, individual interview, I2)

Other participants reiterated that their form group would prefer to do activities that were familiar and that they had participated in previously:

S5: In our class not so much, they just wanted to do football or dodgeball or, you know, that sort of, things that they like and do normally.

(School E, focus group, 1)

Boys and shy/inactive participants stated that some of the activities on the GoActive website "didn't appeal" and specified that they would rather engage in "a sport that makes you do like more running" (School H, individual interview, I2). For boys, the desire for higher-intensity activities was matched with a desire for competition:

S2: I think yoga's too calm . . .

S3: There's no competitive side to it.

(School B, focus group 1)

Conversely, girls seemed interested in trying different activities (e.g., yoga, Zumba, and Pilates). A class vote to decide on an activity usually resulted in 1 person or a small group, usually boys, determining the activity for the entire class. More often than not, football was selected. However, on the rare occasion when girls were able to choose and run an

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activity, not many students participated. In 1 focus group, a group of girls described their experiences:

S3: We tried yoga, but there was only a few people that actually wanted to do it, and everyone else kind of just took the mick and just sat on the floor.

S5: Yeah, we tried Zumba, but nobody, there were about 3 people that were really going for it, but then nobody else was.

(School E, focus group 1)

Although no significant between-group differences were seen in preference for choosing new activities between shy/inactive participants and others, when discussing variety in choosing an activity, 1 shy/inactive participant stated, "I don't mind, it's just whatever's chosen I'll just play." (School C, individual interview, I1) However, self-imposed choice restriction or repetition also resulted in boredom and disengagement:

I1: Some people just got sort of like bored because it was just like we're doing the same thing every single week, so we'd just sort of like talk because there's just not really anything to do.

(School C, individual interview, I1)

One group of participants suggested that those who do a lot of sport may be less keen to do an organized sporting activity within school time. To ameliorate some of these concerns, participants suggested embedding activity sessions into their routine or curriculum, calling for a more structured approach. The *ad hoc* nature of GoActive was perceived not to fit within the traditional prescribed and timetabled structure of the school day:

I1: No, or if they gave us any information as to how to get there, you know, you know, there wasn't a timetable or anything so it wasn't very helpful.

(School F, individual interview, I1)

Participants suggested set weeks to do particular activities, timetabled to fit into the school day. Participants expressed a desire for consistency and momentum in running the intervention:

I1: We could do like more activities more frequently, because I feel like doing it, like once every now and again wasn't as good.

(School H, individual interview, I1)

3.2. Reflections on mentorship

3.2.1. Mentors

Questionnaire data showed that mentorship (from older students) and in-class leaders were the least acceptable components, and qualitative discussions identified mentors as a barrier to participating. Qualitative data showed that girls were more critical of their mentors than boys despite no gender difference in questionnaire responses. Girls expressed issues with disorganisation and a lack of consistency in attendance, resulting in the form group not doing any GoActive activities:

S2: A couple of times they've shown us the cards with the different selection of activities and we'll talk about which ones we want to do and generally there's only football that we want to do and that everyone's happy with. But then they don't book a place to do it or they don't have a football next time so we don't end up doing it.

(School D, focus group 2)

Participants additionally reported that teachers/tutors and mentors seemed confused with their roles within the intervention. One student explained, S3: "I think our form tutors were relying on the mentors to come and get us but because our mentors didn't, our form tutors just forgot that we had to do it." (School H, focus group 2)

Qualitative data revealed disparity in student thoughts about mentor enthusiasm. Many students felt that their mentors were unenthusiastic and showed a lack of care and seriousness. Conversely, some boys expressed positive affirmations, such as mentors' providing verbal encouragement:

I1: They said, "Come on, it'll be fun. You'll get points on the website and stuff and you could win prizes from that." Saying like, "Even if you don't do as well as others, you've still participated so that's the best part of it", stuff like that.

(School D, individual interview, I1)

Positive descriptions placed value on mentor participation, keen observation, helpfulness, ability to provide advice, and teaching of the rules as appreciated actions of mentors:

S1: Because they taught us the rules, yeah.

S2: And they participated.

S1: And they got involved on the teams.

Researcher: And do you think that helps?

S2: Makes the game more interesting.

(School H, focus group 1)

It was evident that students valued consistency and organization:

S5: They turned up, our mentors, they turned up every week, which was really good, and they had a new sport plan every week.

(School E, focus group 1)

In an effort to increase participation time in activity, participants suggested that mentors should have a plan in place to select the activity and organise equipment so that Year 9 student time was spent participating in the activity rather than getting and setting up equipment. Participants suggested additional training to establish clarity in the week-to-week organisational routine:

S1: Some sort of like, not really training for form tutors and Year 10 leaders but a sort of discussion where you introduce it more formally and set out sort of expectations where

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you want them to try and get everyone to participate and help to lead the activities.

(School D, focus group 2)

Participants also suggested the inclusion of additional lead-in time, as 1 participant commented:

S1: I'd like to like introduce it more into our tutor, like not just bam go straight into it, like introduce it slowly so maybe start talking about it more because we have discussion lessons on Thursdays, normally it's about the assemblies but like sometimes it's not much to talk about, about assembly because we've already had the assembly, but I think we should like start discussing it bit-by-bit and start to like try and get involved and like discuss ideas to everyone gets a bit of understanding, so then they're more likely to like like it, yeah.

(School G, focus group 1)

3.2.2. In-class Year 9 leaders

Quantitative results indicate that boys preferred having in-class leaders more than girls did, but qualitative discussions revealed that there was inconsistency in identifying and appointing in-class leaders. Participants stated there was a reluctance to be a leader:

S5: Ours was a bit confusing because no one really wanted to be the leader, I don't know why but, yeah, no one wanted to do it.

(School E, focus group 1)

One shy/inactive participant suggested that self-consciousness might provide a rationale as to why there was a lack of people interested in being an in-class leader, a sentiment shared by a few other students:

I1: I think it just makes people self-conscious because people want to hide in the group.

(School F, individual interview, I1)

Participants from 1 form group reported that their teacher resorted to selecting a new boy and girl each week to be in-class leaders. A participant from another form felt that adoption of this approach would be beneficial:

I2: Our form teacher normally forces them to put their hand up so. It's like, "So you haven't actually put your hand up for anything yet so you're it!" (laughs)

(School E, individual interview, I2)

Those within the form group whom the teacher considered "good" at particular activities were the first to be selected as leaders for that activity. Some participants said that because of this practice, they were less likely to volunteer themselves as a leader because they did not feel as if they had sufficient skills:

I1: I don't know, like I don't normally get like too involved with those things, and there's like, I feel like there's more people, the people that might have done better in doing it.

(School H, individual interview, I1)

Disparity in implementation, both between and within schools, led to discussions about the value of having in-class leaders, but views were primarily negative. Participants stated that having in-class leaders would have made no difference to their enjoyment of the intervention. Some participants suggested that the behavior of the cohort was the rationale for their scepticism about the idea of having in-class leaders:

S1: I don't think it'd help, some people are just a bit defiant and they'll only listen to like the people who are certain, they wouldn't take us probably serious enough.

(School A, focus group 1)

3.3. Responses to monitoring and rewards

3.3.1. Website use

Participants reported 3 main issues with using the GoActive intervention website: (1) they did not receive enough information about how to use the site, (2) they found the website hard to access, and (3) they lost their username and/or password:

S2: We never really got to use it though because we weren't sure. . .because we never got explained how to do it properly really or anything.

S3: Yeah, in form we never like knew how to get on it or how to use it so none of us used it because we didn't know what to do.

(School H, focus group 1)

3.3.2. Points

Boys preferred gaining points in the intervention compared to girls. Students received small rewards (e.g., Frisbees), for reaching certain points thresholds. Qualitative data suggested that all participants enjoyed keeping track of their PA and acknowledged the potential for it to act as a motivator for behavior change:

S5: Yeah, I think it did, sometimes if I thought, like, "Should I go and do something or should I not?" Well, actually, if I go and do it then I can go and log a point on.

(School E, focus group 1)

One shy/inactive participant reinforced this:

I1: I can like keep track of, I can see myself like how active I've been and it'd probably encourage me to do more activity.

(School D, individual interview, I1)

Participants admitted to forgetting to log their points and expressed irritation with needing to add multiple activities concurrently to ensure they were up to date:

S4: Yeah, because I'm going to have to add on like 60 things because I've forgotten them for so long, and then like I get reminded and then I've forgotten the password or whatever, and then you have to email them and it's a bit. . .

(School E, focus group 1)

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After the initial attraction of the intra-form group competition tapered off, participants acknowledged that website use was not continued. There was limited discussion of the point tallies that other form groups had accumulated through the GoActive website or of intra-form group competition as reflected in school graphs. One participant described the effect of the school graphs on their form:

S1: I'd logged my points like after every week.... And then my class, everyone, like most people in my class logged them because we were like trying to like win the competition to have the most points in a form. I think everyone, like, most people did that. It was like a good way of recording it.

(School D, focus group 2)

3.3.3. Rewards

Boys liked the rewards more than girls did, but most participants described the rewards positively, intimating that they were a means of motivation to do PA:

S2: I know a couple of people did like once they knew that there was like a reward system, thought okay, I'll try harder now to get rewards.

(School D, focus group 1)

Confusion mounted over who was in charge of reward distribution. Although the intervention protocol indicated that mentors would distribute rewards, this was not implemented at every school because form teachers or GoActive contact teachers were sometimes tasked with reward distribution. Although rewards were distributed to the GoActive schools at the start of the intervention, participants discussed disappointment with the time it took to receive the reward after logging points and claiming the prize:

S2: I'm disappointed with that to be honest....I logged all my points to get my stuff ages ago and they haven't come yet.

(School D, focus group 1)

Lack of action on the reward distribution meant that students lacked the desire and care to log points and use the GoActive intervention website:

S3: At the end no one (Year 9 students) really cared because like, you know how you could win things like jumpers? At the very beginning I won a jumper and I asked for it, and they were like, "Yeah, I'll get it for you."

Researcher: Who?

S3: Our mentors.

S4: We were never given ours.

(School E, focus group 1)

Conversation arose from 1 school about the timing of the intervention and rewards. For those who felt as if they started the intervention "late", they deemed the rewards "unachievable". This was reflected in limited or no use of the website.

Smartphone apps were suggested as a way of overcoming some of the barriers to logging points; this would also remove the need to rely on remembering the password and username. A points-logging reminder could be an added feature that might ensure a more accurate accumulation of points over the course of the intervention and potentially beyond. A conversation from 1 focus group addressed this possibility:

S3: It would be a really good idea, an app.

S5: Yeah, like saying, a reminder saying like, "Add points now", or a certain day where you get, I don't know reminded to add the points, I think, like people spend ages like every day on their phone like looking at it for 5 min, you could easily add points then, and then it would stop people from forgetting and stuff.

S5: Yeah, because it would keep you logged on, so then people wouldn't forget their passwords and keep having to go back and...you'd literally just have to go in, do your balance, and then you're done.

(School E, focus group 1)

4. Discussion

This mixed methods process evaluation interpreted adolescent perspectives on intervention components and implementation to provide insights for the design and implementation of future interventions and garnered additional insights into qualitative or quantitative techniques alone. The results demonstrate 2 apparent overarching issues. First, although components may have been liked in principle, varying degrees of implementation undesirably impacted participant satisfaction (e.g., self-limited activity choice led to feelings of boredom). Second, some components were differentially liked by subgroups (e.g., competition was disliked by girls and shy/inactive participants).

4.1. Design and implementation of intervention components

Gender disparity was consistent throughout components. The whole-school approach of GoActive aimed to avoid stigmatization of targeting particular groups;[11] however, results indicate that separate activities for boys and girls may warrant further investigation. Traditionally, boys and girls are separated for sport and physical education in the UK, and students may be most comfortable with an activity in a gender-segregated context. Activity choice appeared largely driven by boys, a finding potentially indicative of environments where boys' views have greater emphasis, which could be related to school culture, intervention design, implementation, or focus group dynamics. Activity choice in our intervention design was intended to target autonomous motivation, but boys dominated class discussion in choosing activities for the class. Although some girls made suggestions for activity selection, the social context of the form group and the dominant voices of the boys seemingly deterred girls from persevering with their choices. This may be due to a number of factors, including social context, comfortability, and empowerment of

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autonomy, but it is noteworthy that these Year 9 students did not actually express the desire to exert autonomy over the choices provided. Additionally, girls' novel activity choices led to a lack of participation, which may have deterred others from making suggestions in case it proved an unpopular choice. In turn, rather than supporting feelings of autonomy, the process of choices' becoming limited may be linked to feelings of incompetence and disengagement. Therefore, despite being designed to be inclusive, the intervention may have perpetuated existing disparities by not increasing perceived competence and autonomy among girls. Focusing more on empowering Year 9 students to assert autonomy and make a choice may have been beneficial. Additionally, the provision of activity choice from set options on the GoActive website may have further limited autonomy by not encouraging participant input.[27]

Many findings presented here reinforce the importance of sensitivity to gender differences in activity preference. While competition is likely to have a place in intervention design as a primary driver of participation and enjoyment for boys, many girls retreat from competition, instead opting for novel activities as an opportunity for fun and enjoyment without competition.[28] Although we hypothesized that incorporating novel activities would improve perceived competence, participants often selected familiar activities, which may have been strategic in avoiding the demonstration of a lack of perceived competence. Overall, participants did consider the sessions fun if there was a social element; however, some girls intimated that participating in GoActive sessions kept them from being sociable elsewhere. Although social aspects of the intervention appeared important, qualitative data indicated that peer support, particularly relating to in-class leaders or mentors, was not always well received. This missed opportunity to develop a sense of belonging and connection has important implications on a participant's intrinsic motivation.

Mentorship is commonly incorporated into adolescent PA promotion strategies.[29–31] While mentorship was liked in principle, implementation difficulties negatively influenced acceptability as student expectations of mentors were not met. However, when mentorship was done well, the sessions flourished, and the feedback was positive. Mentors may require more substantive training, and their contributions should be clearly supported, and potentially monitored, by the school. Mentorship was intended to increase relatedness and social cohesion, with older students tasked with fostering a sense of connection and positive social climate to facilitate participant interest in PA.[32] However, participants seldom reported feelings of connectedness from mentor interaction, and some of the mentors may have perpetuated social environments that were less conducive to PA. We also encouraged the use of weekly in-class leaders, which was intended to promote autonomy; this was met with reluctance by participants. This may be linked to embarrassment, self-consciousness, or fear of judgement from peers,[33,34] and it is possible that being led by someone who is perceived as being good at an activity may have put off those who perceived themselves to be less competent. Providing specific mentorship training that addresses the importance of developing a sense of connection and creating a positive and inclusive social context appear to be important for future behavioral interventions incorporating these elements. When successfully implemented, mentorship can facilitate positive feelings of relatedness which, in turn, has an impact on an individual's motivation to make a positive health-behavioral change.[16]

Consistent with previous findings in behavior research,[35,36] rewards were considered a positive aspect of the GoActive intervention. There were issues with the implementation of the reward system, which was operationalised through a website. Despite their assumed digital literacy,[37] many participants reported wanting prescriptive details about how to use the website. Results indicate that a rewards system is worthwhile, but it is currently unclear how it can be operationalised most effectively. Our experience suggests that complex functionality and infrastructure are necessary for rewards tracking; the students had a preference for an app and highlighted the importance of the immediacy and attainability of rewards. Using rewards to influence behavior is a controversial method in health promotion and is contrary to some elements of SDT,[12] as it has been suggested that all types of reward may undermine intrinsic motivation.[38] Rewards may be successfully used in behavior change, but they need to be for behavior that is desirable, enjoyable and perceived as important[36]; it appears that these criteria were not met in this case because the intervention did not do enough to encourage students to perceive activity as important. For some students, GoActive seems to have constituted desirable behavior and been enjoyable, but implementation may have been a barrier to facilitating this.

4.2. Relation to theory

Despite intervention components aligning with the basic needs for competence, autonomy, and relatedness, results suggest that implementation issues and gender differences may have limited or even reversed the intended effect. Gender differences were identified and potentially led to the perpetuation of disparities in perceived competence and autonomy regarding PA among girls, that we had aimed to avoid with a whole-population approach. Both autonomy and competence are experiences that are readily affected by conditions in the social environment; facing non-optimal, overwhelming challenges can lead to feelings of incompetence and disengagement.[16] It appears that elements of the intervention (such as competition and choice) may have undermined girls' autonomy and perceived competence and led to disengagement. Largely, among boys, choice may have facilitated autonomous motivation; and when done well, mentorship and class-based activity appeared to impact relatedness positively. Rewards were generally liked as a strategy, but, along with competition, these elements did not adequately support perceived competence and autonomy and risked further marginalising girls and shy/inactive individuals. The results from our study highlight the importance, and the difficulty, of creating activity and needs-supporting environments and demonstrate how easy it is to inadvertently perpetuate activity-thwarting environments due to issues with intervention implementation.

4.3. Implications for research and practice

Due to the limited success of school-based PA promotion to date,[39,40] there needs to be a step-change in our approach to

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intervention design and implementation. The challenge of designing a replicable intervention offering the flexibility needed across settings is clearly highlighted in other trials, in which small-scale feasibility and pilot studies appeared to be successful; however, these replications may experience implementation issues when scaled up.[41–43] There are likely to be multiple reasons for this phenomenon, including the greater distance from the research team to the target population and the limited time the research team has for individual focus on each school. Although some school-based adolescent PA interventions have demonstrated effectiveness on a large scale,[44] more emphasis on implementation and scaling up from the initial design phase is often necessary. The importance of strong leadership, active participation of multiple actors in the intervention setting, and tailoring the intervention to the individual local context have been identified as important for scaling-up public health programs.[45] Scaling-up and sustaining whole-school interventions of any description is, of course, challenging, particularly given other competing school priorities and the resource and time constraints of leaders and staff.

Our results highlight several impasses where it is challenging to see a clear path for future intervention design. The components used here, including mentorship, flexibility, and choice, are commonly used in health-promotion interventions. Students indicated that the impact of the intervention could have been enhanced by earlier integration of the intervention into the school and direct incorporation into the timetable. This contradicts aims to develop autonomy in this age group and limits the flexibility often necessary across multiple school settings. Furthermore, although participants indicated a desire to try new activities,[10] students were reluctant to choose and participate in unfamiliar activities, countering their calls for novelty. The qualitative findings also highlight the diverse range of opinions and preferences of stakeholders and emphasise the challenges of designing and implementing widely acceptable programs. Although in theory, intervention components such as mentorship and leadership typically align with school philosophies, the articulation of and training for these roles may not align with school norms and, therefore, not function as planned. A deeper understanding of the school culture, perhaps through ethnography or by utilizing aspects of participant-led design, may provide further support and insight.

4.4. Strengths and limitations

The strengths of this study include its mixed methods design and the purposeful sampling to specifically include shy/inactive participants and participants with diversity in the intervention. Limitations include that all effect sizes were small for quantitative results, and when interpreted in the context of the 4- and 5-point scales used, are unlikely to represent substantial between-group differences. The study was not powered to assess quantitative differences in intervention effect by gender or shy/inactive subgroups, but interviewing shy/inactive students for the purpose of designing and evaluating interventions based on their opinions[8] is a novel contribution to the field. It is possible that the intervention was differentially experienced by other subgroups, including participants from low socioeconomic backgrounds, but focus groups were not set up to explore these differences. The critical process evaluation presented here provides transferable insights for future intervention design. Including participants from all intervention schools enabled exploration of the importance of variability in a school context. The researchers had some prior knowledge of participating schools as a result of earlier process-evaluation visits, which may have affected participants' responses. Given the study's qualitative component, the findings are not generalizable but, nonetheless, provide transferable insights for similar intervention studies. The large sample size for the quantitative data and the in-depth insights gained into students' perspectives provide a deeper understanding of the mechanisms of complex interventions in a complex environment.

5. Conclusion

This mixed methods process evaluation of the GoActive PA intervention showed that mentorship was liked in principle but implementation issues impacted satisfaction undesirably (e.g., competition was disliked by girls and shy/inactive students). Recommendations for future intervention design include an in-depth, school-led design and implementation process, consideration of gender differences, better implementation of activity choice provision and novelty, and improved mentorship training.

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Authors' Contributions

STJ completed qualitative coding, completed qualitative analysis, and drafted the initial manuscript; KC, the GoActive study's Primary Investigator, drafted the manuscript, completed quantitative analysis, and provided critical feedback on the mixed methods convergence matrix and all drafts of the manuscript; ERL completed qualitative coding and contributed to refining the manuscript; CF completed quantitative analysis and edited the manuscript; CHDC and CG read and provided critical feedback on the mixed methods convergence matrix and drafts of the manuscript; EMFvS obtained funding for the study and provided critical feedback; HEB, EKW, and

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PW contributed to refining the manuscript. All authors read and approved the final manuscript, and agreed with the order of presentation of the authors.

Declaration of Competing Interest

The authors declare that they have no competing interests.

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jshs.2019.06.007.

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