

Article

Recommendations for Recruiting and Retaining Adolescent Girls in Chronic Exercise (Training) Research Studies

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Abstract: Extensive challenges are often encountered when recruiting participants to chronic exercise (training) studies. High participant burden during chronic exercise training programmes can result in low uptake to and/or poor compliance with the study. The aim of this qualitative study was to identify factors affecting adolescent girls' recruitment and adherence to chronic exercise training research studies. Twenty-six adolescent girls (aged 12 to 15 years) participated in one of five focus groups discussing recruitment and retention to exercise physiology research involving a chronic exercise training programme. A thematic analysis was used to analyse the data and eight final themes were inductively identified. Seven evidence-based practical recommendations are suggested to improve the recruitment and retention of participants for prospective, chronic exercise training studies. Successful recruitment requires: (i) the defining of exercise-related terms; (ii) appropriate choice of recruitment material; and (iii) an understanding of participant motivations. Retention strategies include: (iv) regular monitoring of participant motives; and (v) small groups which foster peer and researcher support. Finally, (vi) friendship and ability groups were favoured in addition to (vii) a variety of activities to promote adherence to an exercise training programme.

Keywords: adolescent; exercise; focus groups; health promotion; research participation

1. Introduction

Cardiorespiratory fitness (CRF) levels are important for both adults and young people when completing everyday activities to athletic performance. However, there appears to be a decline in CRF during adolescence in girls [1]. Low CRF levels have been shown to be associated with adiposity and cardiovascular disease risk factors [2]. Exercise training could be used to prevent this reduction in CRF and could, consequently, promote improved mental health, quality of life and academic performance [2]. Yet, recruiting adolescents to exercise research studies can be very challenging [3,4]. Adolescent girls can be particularly difficult to recruit, due, in part, to gender-specific challenges (e.g., body image concerns, social comparison [5] and conflicting activities [6]).

Recruitment and retention of human participants in research studies is vital to obtain the highest quality of evidence possible with external validity [7–9]. Recruitment is the process encompassing the presentation of the study to the target population, obtaining consent, screening for eligibility and allocation of participants to the study [7]. Successful recruitment in research means minimising systematic and random error by recruiting a large enough sample “that adequately represents the target population” being studied and of sufficient power [10]. Retention of the participants can also be a challenge, for chronic exercise studies requiring a sustained commitment particularly and depends, in part, on a strong researcher–participant relationship, comprised with a sense of worthiness and achievement for the participant [8,11]. Poor participant retention can have a detrimental impact on research findings and their validity. For example, dropout or missing data points may bias the sample; which, in addition to a smaller sample size, can reduce the power of the study. Many interacting factors, both individual and social, affect and complicate the process of recruitment and retention [9].

Comprehensive accounts of retention problems and strategies to overcome these in longitudinal behavioural interventions have been detailed previously [12,13]. However, the majority of the participants in these studies were adults, in which responses to various barriers might differ to those of adolescents. Exploring the attitudes of the target group and the incorporation of their views and preferences when developing complex interventions is of great importance [12,14–16]. Correlates of adolescents’ physical activity have been studied previously and used to improve physical activity interventions [17,18]. These correlates do not though provide the specific details associated with recruitment and retention to a supervised chronic exercise training programme. Jago *et al.* [19] provided useful, practical ideas to enhance recruitment, such as highlighting the enjoyment factor and offering taster sessions to increase activity engagement with girls. Although these findings can be applied to physical activity interventions, they are specific to a dance intervention and may be limited in terms of their application to chronic exercise training programmes with a physiological research purpose because of the associated challenges to accurately measure outcome variables embedded within the study (e.g., cardiorespiratory fitness, body composition and blood pressure).

Exercise physiology research is often constrained by the strict standard controls that must be adhered to. As a result, chronic exercise training programmes often place great demands on the participants, which can lead to low uptake to and/or poor compliance with the study [3]. This means the success of the research might be hindered from the outset. Therefore, it is important to attempt to minimise participant burden [9]. One way to achieve this might be to adapt the way in which exercise training programmes are planned. While ensuring compliance with the research protocols, patient and

public involvement (PPI) with the research design could benefit the external validity of the research through improved participant recruitment and retention to the study. Affording participants greater autonomy and ownership during the planning process might enhance recruitment and adherence to a study compared with the researcher-led training programmes employed traditionally [3,14]. With recent technological advancements in the measurement of behaviours such as free-living energy expenditure, it should be possible to still measure outcome variables with more novel and inventive exercise programmes. Direct discussion with intended participants might enhance the relevance of the training programme to the target group and help alleviate difficulties recruiting and retaining participants.

The aim of this qualitative study was to identify factors affecting adolescent girls' recruitment and adherence to a chronic exercise training programme. This aim is vital to inform the recruitment and retention process to prospective exercise training studies and provide practical solutions to problems researchers face regularly when undertaking chronic studies with a substantial exercise component.

2. Methods

2.1. Context

The present study is part of a series of studies designed to support the recruitment, retention and data collection of adolescent girls' participation in a chronic exercise training programme with physiological outcome variables (e.g., body composition, cardiorespiratory fitness and resting metabolic rate). The outcomes of this study were used to devise the supervised exercise training component.

2.2. Participants

A purposive sampling strategy was used to identify adolescent girls who wanted to be more physically active and enhance their cardiorespiratory fitness. All girls in years 8 to 10 from a local secondary school attended a presentation detailing the study and were invited to participate in the focus groups. All girls had the opportunity to take an information pack home including the project details, consent forms and an interview guide. Twenty-six girls aged 12 to 15 years volunteered to participate in the study. Six participants were involved with regular sport and exercise currently, 14 participants took part in some physical activity (1 or 2 times per week), while the remaining six participants self-selected themselves as inactive. After providing written assent and parental consent the participants attended one focus group. The University Ethical Advisory Committee approved the study prior to data collection.

2.3. Data Collection

Focus groups were utilised to collect data. This method was considered appropriate for young people because of the interactional component of focus groups and that this group of people could engage in a discussion in a relaxed atmosphere with peers, rather than talking simply to an adult in a one-to-one interview [20]. Each focus group consisted of four to six girls and was homogenous in group composition for school year group and self-reported physical activity. This ensured all participants had the opportunity to share their opinion and could feel comfortable doing so as recommended by Heary and Hennessey [21]. A moderator facilitated the sessions, while a second

researcher took field notes. The focus groups were digitally recorded using two Olympus dictaphone voice recorders and lasted, on average, one hour. Data saturation was achieved after conducting five focus groups.

At the beginning of each focus group, participants were provided with a verbal and written explanation of the study. Additionally issues regarding confidentiality and respect for others were discussed. A semi-structured design based on the following four sections was employed to moderate the focus groups. Opening background questions regarding current physical activity levels and previous experience with research were used to promote participation. Next, thoughts about the factors which motivated and prohibited adolescent girls to exercise were sought, followed by general opinions about exercise and engaging girls with exercise-based research. Finally, participants were given ownership of an exercise training programme and asked to note down ideas and create a mind map of their ideal programme, including preferred activities, location, timing and any other specific and relevant details. A number of practical elicitation techniques, such as photographs of different people exercising and scenario tasks, were delivered throughout the focus group to supplement verbal questions, promote discussion and increase enjoyment [22]. To elicit richer data, probing questions were also used throughout each focus group interview.

2.4. Data Analysis

All focus group recordings were transcribed verbatim. Transcription occurred immediately after each focus group and prior to the next focus group. An inductive thematic analysis was used to identify the main patterns within the data. This approach enables the development of future exercise physiology interventions to be informed by the data collected. The six-phase procedure used is described in detail by Braun and Clarke [23]. After familiarisation with the data through data collection, transcription and re-reading, initial codes to describe the data were generated. These codes were then grouped into broader categories, before being refined to collate eight coherently meaningful themes. Once checked against the data set, themes were defined and named.

3. Results

The thematic analysis led to the development of eight main themes and twelve subthemes. The first three main themes relate to recruitment and were termed dynamics of communication, presentation of content and motives to participate. The final five themes explain participation and retention in an exercise training programme. These were termed barriers, exercise training programme, benefits of participation, peer relationships and instructor qualities.

3.1. Dynamics of Communication

The girls suggested the initial communication of the study is an important factor when recruiting adolescent girls to a chronic exercise training programme. Communication from both the research team and peers can impact on the girls' decision making process regarding their participation and is captured in the following two subthemes.

3.1.1. Presenter

Participants identified the presenters' characteristics and personality to be important when delivering a recruitment presentation. Participants reported that recruitment would benefit from the researcher communicating the study details in a positive, enthusiastic, honest, clear and realistic manner. For example one girl stated, "tell them exactly what happened there because if you like make stuff up and say over exaggerate things then, it, they might be a bit confused when they actually get there; so if you tell them exactly what you do and what to expect then they should be more persuaded".

3.1.2. Peers

Participants suggested successful recruitment is, in part, dependent on the response of their friends and peers. Issues relating to dominance, age and interest were raised. The impact of peer dominance was captured in the following comment, "if you had like a positive dominant person [within a friendship group] then that would be good but if they were quite negative it wouldn't really help encourage people to take part." It was also suggested that separate presentations for each year group might be more effective than one large presentation which combined year groups. Finally, one group proposed asking girls who had an initial interest in the study to attend an assembly to learn more. They perceived separating these girls from others who are not interested to be advantageous in recruitment by minimising disruption. The girls suggested an initial letter providing an overview of the study or a brief explanation by the teacher would help the girls decide whether they wished to attend the presentation.

3.2. Presentation of Content

How the study is communicated through the content of the presentation was identified as another important element of the recruitment process. Individual interpretation of the content was reiterated through all focus groups and its impact on recruitment is captured in the following two subthemes.

3.2.1. Images

The choice of images used in the presentation is crucial when recruiting adolescent girls to an exercise training programme. Participants suggested images displaying exercise in a positive manner, for example happy facial expressions, and not what they perceive to be negative, such as sweat, would aid recruitment as explained in the following two quotes. One girl stated; "I think it would be better if you had a photo of her cheering and celebrating because that makes her look upset and sad and it might just think oh, if that's what it's going to make me feel like do I really want to put myself through that and do it?"

Another girl commented; "That one [photo of a sweaty tennis player] would really put you off because she's sweaty, she looks tired and if you're not a fan of getting sweaty, or getting tired, or running or anything that would really put you off and not want you to join in".

The ability of the girls to relate to the images and visualise themselves participating in the activity was also an influential factor in recruitment to an exercise study. Preference of celebrities *versus* ordinary people pictured exercising to promote recruitment with adolescent girls returned a mixed response.

3.2.2. Choice of Words and Phrases

The choice and interpretation of words used to explain the programme was also suggested to influence the success of recruitment drives with adolescent girls. The meaning and relevance of the words to an individual were identified as key aspects of language impacting successful recruitment. For example, the words exercise and sport, often used interchangeably, were open to a wide variation of interpretations. The opinions of three different girls were as follows, “I prefer the word sport to exercise, because exercise seems like you are working really hard but sport seems like there is a lot of different sports and activities”; “Sport is like basically the same as exercise”; “They see the word sport and they say no and just think of horrible hours of running”.

Additionally, the phrasing of the exercise component of the study can affect decisions to participate. Both year groups suggested strong, persuasive phrases would aid recruitment. However, one participant highlighted the need for careful consideration of these phrases, stating, “Well it’s different for everyone isn’t it”. While both year groups agreed that conveying the potential for social interactions was important, other key differences were raised. Many year 9’s suggested phrases such as “you’ll look fit” and “you’ll lose weight” to be attractive. Whereas, a discussion between two year 8 participants suggested these words and phrases would put them off volunteering to participate in an exercise research study.

Participant (P) 1: If you said lots of stuff about losing weight, it would put me off because it’s like you are trying to change me;

Participant (P) 2: Yeh, if someone just came up to me and said, “hey join my thing for weight loss scheme”, I would be like I don’t really want to do that to lose weight. If you’d come up and said “hey do you want to join this club—it’s fun and it’s active”, I would do it because I don’t really care about weight loss I just care about having fun and doing something worthwhile;

Participant (P) 1: Yeh, if they phrased it a different way. “I’ve just had loads of fun with my friends doing my sport”. It phrases differently and attracts you.

3.3. *Motives to Participate*

The final recruitment theme captures the reasons why adolescent girls choose to participate. Fun and enjoyment were suggested as the main reasons why adolescent girls would engage in such an exercise programme. One girl stated, “If you enjoy it then you’re going to do it”. Nevertheless, it was clear that these thoughts were entwined with the enjoyment from the social element of group exercise as reported in the following three quotes, “because I enjoy sport when I’m doing it with someone I know”; “it’s like in PE like, it’s harder to do when you’re on your own. But if you’ve got friends it kind of makes you want to do it, and makes it more fun, and encourages you as well”; “I put fun, that’s probably because you meet new people”. While social and enjoyment factors dominated the year 8 discussions; body image and aesthetics were another key incentive for some girls, year 9’s predominantly. Improvements in self-confidence and health were identified as another motivational influence to recruit adolescent girls to exercise. The majority of girls indicated the opportunity for days off school to be in the laboratory, to meet athletes and their own autonomy within the exercise training programme were external drivers promoting recruitment.

3.4. Barriers

The participants identified a number of key barriers that increase the difficulty for girls to engage in a chronic exercise training programme. These are explained in the following two subthemes.

3.4.1. Logistical Barriers

Participants cited several difficulties associated with continued participation in an exercise training programme. Lack of time, arranging transport and activity cost were identified frequently as participation barriers. Numerous activities were identified which compete with young people's spare time. For example one girl said "with school work and home work and things like that you don't really have enough time to do it (exercise)". Another girl stated "they like want to do something else, like, I don't know, shopping or something". Time commitments of family members can also affect regular participation in a research exercise programme. For example, "If you've got single parents as well it's really hard, if you've got younger brothers and sisters who are like asleep and then you are going to have to wake them just for them to go and collect you." Some participants said that arranging transport to and from activities could be difficult as a result of their parents work commitments. One group suggested organised transport to the exercise training sessions could help overcome this challenge. Finally, cost was a well discussed topic with girls being deterred by expensive activities and additional expenses during the programme, such as buying specific sports clothing.

3.4.2. Comparative Barriers

The comparative barriers adolescent girls encounter include social comparisons and peer pressure. Peer pressure is discussed further under the theme 'participant characteristics and peer relationships'. For adolescent girls the process of social comparison can lead to barriers to participating in exercise. Concerns about feeling judged, embarrassed or self-conscious when exercising were suggested to result in lack of retention to the programme. Feelings of embarrassment were associated, in particular, with clothing and fitness levels. One girl commented, "It's embarrassing with some of the stuff you have to wear...like leggings that suck to you. And when you sweat, it makes you feel uncomfortable". When discussing reasons why adolescent girls might drop-out of an exercise programme one girl reported that they might be embarrassed or they might not be as fit as everyone else, "people are there and they are watching me and I don't like it. If you put them with more friends rather than feeling embarrassed with people they don't know. Especially in year groups where it's hard. Like we don't really want to go in front of them, but then year 9s (8th grade) are alright to come in front of us because they are obviously older and comparing us".

Participants suggested flexibility within the programme to overcome some of the logistical barriers and concurrent acknowledgment of the presence of comparative barriers could aid retention rates.

3.5. Exercise Training Programme

The exercise training programme was identified as a crucial factor when recruiting and retaining adolescent girls to an exercise-based research study. The following subthemes capture specific components of the exercise programme with the potential to affect retention.

3.5.1. Activity Characteristics

The variety of exercise activities were identified as a key component to promote participation in a chronic exercise training programme. Participants suggested that a range of different activities would afford girls greater autonomy and choice during the programme, maintain interest and prevent boredom. One girl reported that, “there should be a variety of sports, where, if they may not like this sport one day they might like the one the next day, so they can still carry on and enjoy it, but may not enjoy the others as much, because you can’t please everyone at every time”.

Novel activities, such as water sports and roller-skating, were reported favourably. Dance was also cited repeatedly, “things you can do as a group with music like Zumba and yoga and exercises”. Using gym equipment, including weights and a variety of machines were discussed by some year 9s; while expensive gym memberships were reported as the main deterrent for the remaining girls. Numerous team sports were also reported in the discussions of an ideal exercise programme (*i.e.*, netball, football, hockey and rounders). The girls added, however, that an appropriate intensity and skill level of all activities, reflecting individual differences, is vital to maintain engagement. The girls acknowledged that when performing team activities, individual differences can separate the group, for example, “some people wouldn’t say they were good at netball, so wouldn’t bother and would just stand on the side-lines.”

3.5.2. Group Composition

For many participants structuring the exercise training programme to promote a positive, flexible, fun and social atmosphere was important. The girls suggested group exercise sessions provide the enjoyment and social support necessary to improve girls’ participation retention. One year 9 girl said, “That (group exercise class) would be quite good because you could go with your friends and still help each other and have fun and stuff.” This view was supported by another girl who stated “if it was an individual activity—that would put me off more because I don’t want to work alone without anyone to like support me.”

The selection and composition of these groups were identified as crucial factors for achieving high participant retention rates. The first group composition discussed related to ability levels. With reference to a previous sports club experience, one girl stated, “They did groups ranging from like 10 year olds to like 14 year olds and you’re all different standards so they were just going by the top and we were really struggling”. A discussion between two year 9 students also supported the benefits of dividing exercise groups by ability.

P3: Some would be like trying to show off because they are so fast;

P4: Yeh, so only let the slow people come;

P3: Or have different ability groups.

Second, grouping according to age was reported positively by both year groups. One year 9 student stated, “I don’t like the idea of being in year 8’s clubs because I don’t like them. I just get really angry with the year 8’s if you decided to combine our groups”; whereas, as stated previously, year 8 students do not like exercising in front of year 9’s because they can perceive social comparison pressures.

3.5.3. Session Details

The session context was reported to influence both participation and retention in a chronic exercise training programme. Participants stated the location, facilities, length and timing of the training sessions were key features of the exercise programme. The University was suggested as an attractive location with appropriate facilities. Other reasons why the girls favoured exercise at the University included “we are at school too often” and “if they did it in a local area or school they might not take it seriously because they think they can overpower adults”.

The ideal number and duration of individual training sessions were variable; preferred session frequency ranged from 1 to 3 sessions a week, while preferred duration ranged between 30 min and 2 h. The girls indicated their preference was closely related to maintained enjoyment and interest. One girl suggested “Once or twice a week I would say because you don’t want it to be too often because then you might get fed up with it.” Likewise, another girl considering the duration of the programme stated, “About an hour...but if you made it too long, they might end up getting bored and then not wanting to come because it’s too long”. There was a mixed preference regarding indoor or outdoor activities; yet, all girls indicated that they would prefer indoor sports during bad weather conditions.

3.6. Benefits of Exercise Participation

3.6.1. Fun and Enjoyment

This subtheme, fun and enjoyment, was identified frequently as a fundamental reason for participant retention in a chronic exercise training programme. Participants suggested fun and enjoyment associated with the programme were essential when engaging with exercise. As one girl stated; “I wouldn’t do something if I didn’t enjoy it”. Opportunities to socialise and exercise with friends were reported to make exercise more attractive. One girl stated, “I enjoy sport when I’m doing it with someone I know”. The importance of enjoyment was highlighted, by some girls stating they would still join exercise programmes without their friends if they enjoyed the programme, recognising they could make new friends. Some practical methods to enhance enjoyment of the sessions were alluded to in the exercise programme theme particularly.

3.6.2. Body Image

Some girls expressed continued attendance to an exercise training programme would be associated with improvements in their physical appearance. Muscle toning, burning calories and weight loss were all perceived by some participants to be important benefits of engaging in an exercise programme. If these results were expected or seen during a programme the girls suggested they would feel happier with their looks and body image and thus maintain their engagement throughout the study.

3.6.3. Physical and Psychological Self

Participants identified physiological improvements as a reason to maintain participation in an exercise programme. The benefits associated with improving health, fitness levels and learning new skills were reported to aid participation and retention. When asked why they would enjoy exercise,

one girl stated, “knowing that you’re getting fit and doing something you enjoy and knowing that you are improving at it”. The perception of psychological benefits, including increased self-confidence, self-satisfaction and feeling better were also considered beneficial to retention. Finally, both the mental and physical challenges associated with participating in, and the achievements accompanying completion of an exercise programme were considered worthy incentives to participate in a long-term exercise-based research study.

3.7. Participant Characteristics and Peer Relationships

Positive, supportive and motivational peers within the exercise training programme were reported to improve retention by fostering enjoyment. When other girls are determined, committed and demonstrating buy-in to the research and exercise programme, this was reported to enhance participation and retention consequently. However, peer pressure was reported to deter some participants from continued participation. One girl reported, “I like rounders, just not when people shout at me,” while a second stated as a reason for disliking exercise, “if I’m playing a sport with other people I usually get yelled at”. Peer engagement was an important factor, in team games particularly, because this can impact on individuals’ experiences. When recruiting more active girls to exercise physiology research studies, a mixed group was reported favourably. Commenting on a discussion about girls and boys participating in team sports separately, one girl reported, “the boys I would say play more fairly because they, the boys, like most of the boys like the sport and want to get on with it, whereas the girls don’t so most girls that want to do the sport want to be with the boys because actually it’s more fair and they are playing by the rules and you’re getting stuff done”.

Similarly, another girl reported, “Some of the girls want to play but most of the girls don’t play so it ruins the game”. In contrast the less active girls appeared to prefer a gender split because they perceived the boys were too rough during games and limited the girls’ involvement. For example, “If it’s like football and it’s mixed, then they [the boys] won’t pass the ball to you. Basically they won’t involve the girls”.

3.8. Instructor Characteristics

This theme captures the qualities and personal characteristics of the instructor that the participants perceived to be important for maintaining participant retention. It was suggested that the positive attributes of the instructor, for example approachable, likeable, positive, encouraging and motivating, would enhance exercise retention, for example; “If you have a teacher that demonstrated it to you, then wasn’t shouting at you all the time and taking it in a calm voice, girls may approach it [PE] differently because they know it can actually be fun if you are not shouted at”.

Knowledge, expertise and qualifications in the activities and their delivery were reported by the participants as valuable qualities to help maintain engagement. Finally, the participants identified the ability to build relationships with each participant to be a key characteristic, “if you got to know the instructors because then it kind of becomes more personal...and they help you achieve, like, and they attend to your individual needs”.

4. Discussion

There is a need to address the challenges of recruiting and retaining adolescent girls to chronic exercise training programmes with physiological outcome variables. Qualitative work has great potential to enhance the development of such health related interventions [16]. This qualitative study contributes to the development of exercise physiology research and how such exercise training programmes might be enhanced by identifying important factors, specific to adolescent girls, which influence recruitment and retention to prospective studies. The key themes that emerged provide vital knowledge of the factors that require consideration in terms of recruitment and retention of participants to chronic exercise programmes. These are now discussed with reference to the practical recommendations that emerge from the qualitative results and are shown in Table 1.

Table 1. Chronic exercise training programme table synthesis.

| Process | Theme | Subtheme | Recommendations |
|---------------------------------|---|--|---|
| Recruitment | 1. Dynamics of Communication | 1.1 Presenter | 1. Define key terms |
| | | 1.2 Peers | |
| | 2. Presentation of Content | 2.1 Images | 1. Define key terms |
| 2.2 Choice of words and phrases | | 2. Representative images | |
| Retention | 3. Motives to Participate | - | 2. Images capture motives |
| | | 4.1 Logistical Barriers | 4. Understand and monitor the motivations |
| | 4. Barriers | 4.2 Comparative Barriers | 5. Address the barriers |
| 5. Exercise Training Programme | | 5.1 Activity Characteristics | 6. Participant grouping—size/composition |
| | 5.2 Group Composition | 6. Participant grouping—size/composition | |
| | 5.3 Session Details | 7. Activity variety | |
| Retention | 6. Benefits of Participation | 6.1 Fun and enjoyment | 3. Maximise enjoyment |
| | | 6.2 Body image | 4. Understand and monitor the motivations |
| | 6.3 Physical/psychological self | 7. Activity variety | |
| Retention | 7. Participant Characteristics and Peer Relationships | - | 3. Maximise enjoyment |
| | | - | 6. Participant grouping size/composition |
| Retention | 8. Instructor Characteristics | - | 3. Maximise enjoyment |

The first recommendation to improve the recruitment of participants in studies with a chronic exercise training component that emerges from this work is that key terms, such as physical activity, sport and exercise, need to be defined to ensure honest and clear communication of the study expectations. In previous research investigating engagement with intervention studies Jones and Broome [24] explain how adolescent girls wanted to know what would be expected of them during the intervention. The current study supports these findings, but further highlights the importance of defining key terms. While physiological research protocols and equipment are explained regularly, researchers often assume prior knowledge of terms such as physical activity, exercise and sport. Our results suggest exercise-related words in recruitment material are often interpreted differently to academic use. Therefore, this could lead to the misinterpretation of study expectations and potentially hinder recruitment. Communicating the nature of training studies accurately is also crucial for ethical reasons [25].

The second recommendation to emerge from the results is that the images used in recruitment material need to be representative of the exercise training programme but also capture the participants' motives for volunteering. Our results provide an understanding of how images in recruitment material (*i.e.*, posters, presentations, leaflets) can influence adolescent girls' decisions to participate. Consistent with previous research concerning reasons why girls do not like to exercise, for example Women's Sport and Fitness Foundation [26], the girls highlighted their dislike for images showing exercise to be sweaty and hard work. Omitting these photos, however, might portray the exercise programme in an unrealistic manner, contradicting the previous comments about honest communication and raising ethical issues of participant deception. A suitable alternative would be to use images that are representative of the exercise programme, but place a greater emphasis on the girls' motives for participating rather than the negative appearance girls' often associate with physical exertion [27]. For example, picturing girls having fun exercising in groups and engaging with novel activities, might capture the enjoyment and social opportunities associated with participation.

The third recommendation is to maximise enjoyment in every aspect of an exercise training programme for all volunteers. Enjoyment is a largely underplayed factor for initiating involvement and subsequent adherence in research, but its prevalence in all group discussions and the literature suggests this is a critical motive. For instance, Whitehead and Biddle [27] propose that clarity of the enjoyment concept is required to increase physical activity in adolescent girls. Furthermore, in work with older adults the various types of pleasure and enjoyment that can emerge from being active, such as when being with friends while walking, were seen as vital in maintaining a physically active lifestyle [28]. In the present study enjoyment appeared closely related with opportunities to socialise with friends, peers and research staff. This is consistent with the relatedness principle of self-determination theory (SDT), in which connecting with significant others can impact on motivations to participate and engage in research [29]. The efficacy of this recommendation can also be traced to the importance of participating with friends for support and opportunities to make new friends suggested by Jago *et al.* [19,30].

The fourth recommendation that this qualitative research offers to improve recruitment and retention of participants is to understand and monitor individual motivations for participation. Improving body image via exercise training participation was a motive cited commonly by year 9 (grade 8) girls. Physiology research with a chronic exercise training component needs to explicitly factor into the process the issue of body image and the desire to conform to the Western culture ideal of a slender body to be physically attractive when recruiting and seeking to retain participants [31]. Although a familiar motive for initiating participation, if the perceived benefits to body image are not met then a consequent lack of retention might result [27]. The positive and negative impact of body image on exercise participation can be traced to the broader literature in which it has been found that girls are highly concerned about their body image [27,31]. The authors suggest monitoring desired motivations and establishing realistic achievements during chronic exercise training research to sustain the motivation of participants and maintain adherence to the intervention. It is also of ethical importance that researchers are careful not to promote unrealistic body ideals when using exercise interventions.

Additionally, monitoring physiological and psychological improvements from participation can promote retention. Improvements in various physical components of fitness and skill to complete activities can satisfy the basic psychological need for competency. Psychological gains in

self-confidence and self-satisfaction are correlated with intrinsic motivation and thus continued participation [32]. Within exercise physiology research it is feasible to monitor both physiological and psychological measures and provide regular feedback to the participants throughout the study. The extrinsic incentives reported are also realistic to address and monitor. Good communication with schools and parents about the educational benefits of participating means days off school are feasible to factor into a study. The geographical location of this study, with high athlete profiles and sporting events, could have encouraged the desire to meet athletes, which might not be as accessible in other locations or not considered a key motivation to participate and should be employed with caution. Previous research has focussed on the ethical issue of providing monetary incentives to young people [33,34]. The findings from this study do not suggest monetary incentives are a necessary motive for recruitment of adolescent girls to chronic exercise training research. Highlighting intrinsic motivations and non-monetary extrinsic motivations to participants should be considered.

The fifth recommendation to improve the recruitment and retention of participants is to address the relevant logistical barriers when planning and developing chronic exercise training programmes and ensuring flexibility within scheduling. The logistical barriers reported by the girls, lack of time, transport and cost of the facilities and programme, are consistent with previous research [32,35]. Maximising the opportunities available for participants to attend study visits would ease scheduling around existing commitments. This recommendation identifies with offering tangible support and a flexible approach suggested by Coday *et al.* [12]. Allowing flexibility also lends itself to affording participants a degree of ownership. This can satisfy the autonomy principle of SDT, facilitating self-motivation and behaviour regulation [29], improving subsequent participation and retention in chronic exercise training research studies.

The sixth recommendation is that participant groups should be relatively small and selection should reflect age, ability and friendship groups. Small groups, of up to 10 participants, were positively suggested to meet the needs for individual attention from the researcher and the building of relationships within the group, satisfying the need for relatedness [29]. The retention of participants in chronic exercise training studies also needs to factor in the process of social comparison. To negate the undesirable impact of upward social comparisons to more able peers the use of homogenous ability groups are suggested. This recommendation extends the suggestion by Barnes and Spray [36], to encourage similar ability comparison in physical education classes, into a physiology research context. Body dissatisfaction concerns, in particular when exercising in front of boys, can be detrimental to adolescent girls participation in physical activity [27,35]. Nevertheless, a group exercise intervention remained preferable to an individual programme. Homogenous ability-based groups of the same gender might alleviate body dissatisfaction concerns. The efficacy of this recommendation can also be traced to the broader literature in which it has been found that less-active girls prefer “girls-only” exercise groups [24,37].

The final recommendation is to ensure chronic exercise interventions within physiology research contain a variety of activities consistent with the girls’ preferences. The number of activities reported highlights individual variability and the challenge to maximise engagement of all participants throughout the exercise intervention. These findings support Women’s Sport and Fitness Foundation [26] in suggesting a variety of activities can affect retention positively by increasing choice and enjoyment. It also provides a greater chance of promoting self-improvement and achievement of goals during the

programme, satisfying the need for competency and consequently promoting intrinsic motivation to retain participation [29].

One opportunity to emerge to enhance recruitment and retention is to incorporate dance into an exercise training programme. Dance was commonly cited as a preferred activity, complementing previous research focussing on the use of dance interventions to promote girls physical activity [19,38]. Burgess *et al.* argue, “aerobic dance can provide a more supportive environment (*i.e.*, non-competitive and non-threatening) and multiple opportunities for adolescent females with low body attitudes and physical self-perceptions to feel better about themselves.” [38] (p. 64). These advantages appear to match the suggested motives for volunteering and benefits associated with continued participation, supporting the use of dance within physiology research. Team-based activities were also reported frequently; yet they are associated with varying levels of engagement, intensity and enthusiasm. Exercise physiology research often requires all participants to exercise at a specified intensity, and as such, these activities would require modification to sustain involvement by all. Careful consideration and further research into how to incorporate team based activities into physiology research interventions would be advised.

Researchers need to be ethically aware of the possible dangers that can accompany exercising, for example eating disorders or injury and monitor such matters. Cognisant of the potential detrimental aspects that go with dance, such as creating an ideal body aesthetic and perfectionism [39], dance sessions need to ensure competence and self-satisfaction can be achieved by all participants. Integrating a mixture of activities, a degree of flexibility and autonomy suitable to a range of participants and motivations can be complicated and difficult to design, implement and evaluate [14]. In addition to other constraints such as research funding, facility accessibility and physiological measures, researchers must appreciate there are limits in what can be offered during exercise training programmes. It might be more feasible to introduce novel and greater variety of activities within future exercise physiology research with advancements of non-invasive free-living measures of energy expenditure and physical activity [40]. While replicating adolescent girls’ preferred activity more closely, this could consequently add ecological validity to the studies when translating research into practice.

With more physiology research targeting paediatric populations, successful recruitment and maximal adherence within our studies are crucial to improve the credibility of study findings. Implementing this qualitative work with subgroups of adolescent girls (*i.e.*, socio-economic status, family support structure, school type weight status and physical activity level) could be beneficial to extend the proposed recommendations. Children and adolescent’s involvement in research, often requires support and commitment from their parents (for example, providing lifts, arranging visits with the researcher and assisting with some measurements). Drews *et al.* [8] and Jago *et al.* [19] investigated parents’ views related to health promotion interventions. Extending the current research to explore parental views of the physiology research recruitment process and study retention is also warranted. This would provide a greater understanding of parents’ motives and needs for consenting to their child’s participation. Finally, whilst physical activity interventions and randomised controlled trials with an exercise arm may align with a number of these themes and recommendations, further research with a specific focus on recruitment to randomised controlled trials is warranted. This could provide important views related to the random allocation to study arms and possible issues of preference effects and resentful demoralisation that we are unable to infer from the present study.

5. Conclusions

In conclusion, based on this qualitative study, careful consideration of the phrases and images used in recruitment material which target enjoyment and personal motivations for participating during the recruitment process would be recommended. Allowing a degree of flexibility, appropriate grouping of participants and offering a variety of activities are suggested to improve retention rates in chronic exercise training studies with adolescent girls. It is hoped this article will prove useful in providing evidence-based recommendations to promote successful recruitment and maintained adherence to well-designed chronic exercise training programmes.

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Author Contributions

Rachel Massie and Keith Tolfrey conceived and designed the study; Rachel Massie performed the data collection; Rachel Massie and Brett Smith analysed the data; Rachel Massie wrote the original draft of the paper. All authors critically reviewed, contributed to and approved the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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