

## 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

## 71 1. Introduction

72 Cardiorespiratory fitness (CRF) levels are important for both adults and young people when  
73 completing everyday activities to athletic performance. However, there appears to be a decline in CRF  
74 during adolescence in girls [1]. Low CRF levels have been shown to be associated with adiposity and  
75 cardiovascular disease risk factors [2]. Exercise training could be used to prevent this reduction in CRF  
76 and could, consequently, promote improved mental health, quality of life and academic performance  
77 [2]. Yet, recruiting adolescents to exercise research studies can be very challenging [3,4]. Adolescent  
78 girls can be particularly difficult to recruit, due, in part, to gender-specific challenges (e.g., body image  
79 concerns, social comparison [5] and conflicting activities [6]).

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

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

106 Exercise physiology research is often constrained by the strict standard controls that must be  
107 adhered to. As a result, chronic exercise training programmes often place great demands on the  
108 participants, which can lead to low uptake to and/or poor compliance with the study [3]. This means  
109 the success of the research might be hindered from the outset. Therefore, it is important to attempt to  
110 minimise participant burden [9]. One way to achieve this might be to adapt the way in which exercise  
111 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 [14,3]. 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

152 recommended by Heary and Hennessey [21]. A moderator facilitated the sessions, while a second  
153 researcher took field notes. The focus groups were digitally recorded using two Olympus dictaphone  
154 voice recorders and lasted, on average, one hour. Data saturation was achieved after conducting five  
155 focus groups.

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

169

#### 170 2.4. Data Analysis

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

### 179 3. Results

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

185

#### 186 3.1. Dynamics of Communication

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

191

## 192 3.1.1. Presenter

193 Participants identified the presenters' characteristics and personality to be important when  
194 delivering a recruitment presentation. Participants reported that recruitment would benefit from the  
195 researcher communicating the study details in a positive, enthusiastic, honest, clear and realistic  
196 manner. For example one girl stated,

197 tell them exactly what happened there because if you like make stuff up and say over  
198 exaggerate things then, it, they might be a bit confused when they actually get there; so if you  
199 tell them exactly what you do and what to expect then they should be more persuaded.

200

## 201 3.1.2. Peers

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

213

214 3.2. *Presentation of Content*

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

218

## 219 3.2.1. Images

220 The choice of images used in the presentation is crucial when recruiting adolescent girls to an  
221 exercise training programme. Participants suggested images displaying exercise in a positive manner,  
222 for example happy facial expressions, and not what they perceive to be negative, such as sweat, would  
223 aid recruitment as explained in the following two quotes. One girl stated;

224 I think it would be better if you had a photo of her cheering and celebrating because that makes  
225 her look upset and sad and it might just think oh, if that's what it's going to make me feel like  
226 do I really want to put myself through that and do it?

227

228 Another girl commented;

229 That one [photo of a sweaty tennis player] would really put you off because she's sweaty, she  
230 looks tired and if you're not a fan of getting sweaty, or getting tired, or running or anything that  
231 would really put you off and not want you to join in.  
232

233 The ability of the girls to relate to the images and visualise themselves participating in the activity  
234 was also an influential factor in recruitment to an exercise study. Preference of celebrities versus  
235 ordinary people pictured exercising to promote recruitment with adolescent girls returned a mixed  
236 response.  
237

### 238 3.2.2. Choice of words and phrases

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

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

255 Participant (P) 1: If you said lots of stuff about losing weight ... it would put me off because  
256 it's like you are trying to change me.

257 P2: Yeh, if someone just came up to me and said, "hey join my thing for weight loss scheme", I  
258 would be like I don't really want to do that to lose weight. If you'd come up and said "hey do  
259 you want to join this club – it's fun and it's active", I would do it because I don't really care  
260 about weight loss I just care about having fun and doing something worthwhile.

261 P1: Yeh, if they phrased it a different way ... "I've just had loads of fun with my friends doing  
262 my sport". It phrases differently and attracts you.  
263

### 264 3.3. *Motives to Participate*

265 The final recruitment theme captures the reasons why adolescent girls choose to participate. Fun  
266 and enjoyment were suggested as the main reasons why adolescent girls would engage in such an  
267 exercise programme. One girl stated, "If you enjoy it then you're going to do it". Nevertheless, it was  
268 clear that these thoughts were entwined with the enjoyment from the social element of group exercise  
269 as reported in the following three quotes, "...because I enjoy sport when I'm doing it with someone I

270 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  
271 kind of makes you want to do it, and makes it more fun, and encourages you as well”; “I put fun, that’s  
272 probably because you meet new people”. While social and enjoyment factors dominated the year 8  
273 discussions; body image and aesthetics were another key incentive for some girls, year 9’s  
274 predominantly. Improvements in self-confidence and health were identified as another motivational  
275 influence to recruit adolescent girls to exercise. The majority of girls indicated the opportunity for days  
276 off school to be in the laboratory, to meet athletes and their own autonomy within the exercise training  
277 programme were external drivers promoting recruitment.

278

### 279 3.4. Barriers

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

282

#### 283 3.4.1. Logistical barriers

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

297

#### 298 3.4.2. Comparative barriers

299 The comparative barriers adolescent girls encounter include social comparisons and peer pressure.  
300 Peer pressure is discussed further under the theme ‘participant characteristics and peer relationships’.  
301 For adolescent girls the process of social comparison can lead to barriers to participating in exercise.  
302 Concerns about feeling judged, embarrassed or self-conscious when exercising were suggested to  
303 result in lack of retention to the programme. Feelings of embarrassment were associated, in particular,  
304 with clothing and fitness levels. One girl commented, “It’s embarrassing with some of the stuff you  
305 have to wear...like leggings that suck to you. And when you sweat, it makes you feel uncomfortable”.  
306 When discussing reasons why adolescent girls might drop-out of an exercise programme one girl  
307 reported that,

308 They might be embarrassed...they might not be as fit as everyone else...people are there and  
309 they are watching me and I don’t like it. If you put them with more friends rather than feeling  
310 embarrassed with people they don’t know. Especially in year groups where it’s hard. Like we

311 don't really want to go in front of them, but then year 9s (8<sup>th</sup> grade) are alright to come in front  
312 of us because they are obviously older and comparing us.

313  
314 Participants suggested flexibility within the programme to overcome some of the logistical barriers  
315 and concurrent acknowledgment of the presence of comparative barriers could aid retention rates.

### 316 317 *3.5. Exercise Training Programme*

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

#### 321 322 *3.5.1. Activity Characteristics*

323 The variety of exercise activities were identified as a key component to promote participation in a  
324 chronic exercise training programme. Participants suggested that a range of different activities would  
325 afford girls greater autonomy and choice during the programme, maintain interest and prevent  
326 boredom. One girl reported that,

327 There should be a variety of sports, where, if they may not like this sport one day they might  
328 like the one the next day, so they can still carry on and enjoy it, but may not enjoy the others as  
329 much, because you can't please everyone at every time.

330  
331 Novel activities, such as water sports and roller-skating, were reported favourably. Dance was also  
332 cited repeatedly, "...things you can do as a group with music like Zumba and yoga and exercises".  
333 Using gym equipment, including weights and a variety of machines were discussed by some year 9s;  
334 while expensive gym memberships were reported as the main deterrent for the remaining girls.  
335 Numerous team sports were also reported in the discussions of an ideal exercise programme (i.e.,  
336 netball, football, hockey and rounders). The girls added, however, that an appropriate intensity and  
337 skill level of all activities, reflecting individual differences, is vital to maintain engagement. The girls  
338 acknowledged that when performing team activities, individual differences can separate the group, for  
339 example, "some people wouldn't say they were good at netball, so wouldn't bother and would just  
340 stand on the side-lines."

#### 341 342 *3.5.2. Group Composition*

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

350 The selection and composition of these groups were identified as crucial factors for achieving high  
351 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 mins and 2 hours. 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

392 they could make new friends. Some practical methods to enhance enjoyment of the sessions were  
393 alluded to in the exercise programme theme particularly.

394

### 395 3.6.2. Body image

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

401

### 402 3.6.3. Physical and psychological self

403 Participants identified physiological improvements as a reason to maintain participation in an  
404 exercise programme. The benefits associated with improving health, fitness levels and learning new  
405 skills were reported to aid participation and retention. When asked why they would enjoy exercise, one  
406 girl stated, “knowing that you’re getting fit and doing something you enjoy and knowing that you are  
407 improving at it”. The perception of psychological benefits, including increased self-confidence, self-  
408 satisfaction and feeling better were also considered beneficial to retention. Finally, both the mental and  
409 physical challenges associated with participating in, and the achievements accompanying completion  
410 of an exercise programme were considered worthy incentives to participate in a long-term exercise-  
411 based research study.

412

### 413 3.7. Participant Characteristics and Peer Relationships

414 Positive, supportive and motivational peers within the exercise training programme were reported to  
415 improve retention by fostering enjoyment. When other girls are determined, committed and  
416 demonstrating buy-in to the research and exercise programme, this was reported to enhance  
417 participation and retention consequently. However, peer pressure was reported to deter some  
418 participants from continued participation. One girl reported, “I like rounders, just not when people  
419 shout at me,” while a second stated as a reason for disliking exercise, “if I’m playing a sport with other  
420 people I usually get yelled at”. Peer engagement was an important factor, in team games particularly,  
421 because this can impact on individuals’ experiences. When recruiting more active girls to exercise  
422 physiology research studies, a mixed group was reported favourably. Commenting on a discussion  
423 about girls and boys participating in team sports separately, one girl reported,

424 ...the boys I would say play more fairly because they, the boys, like most of the boys like the  
425 sport and want to get on with it, whereas the girls don’t so most girls that want to do the sport  
426 want to be with the boys because actually it’s more fair and they are playing by the rules and  
427 you’re getting stuff done.

428

429 Similarly, another girl reported, “Some of the girls want to play but most of the girls don’t play so it  
430 ruins the game”. In contrast the less active girls appeared to prefer a gender split because they  
431 perceived the boys were too rough during games and limited the girls’ involvement. For example, “If

432 it's like football and it's mixed, then they [the boys] won't pass the ball to you. Basically they won't  
433 involve the girls".

434

### 435 3.8. *Instructor Characteristics*

436 This theme captures the qualities and personal characteristics of the instructor that the participants  
437 perceived to be important for maintaining participant retention. It was suggested that the positive  
438 attributes of the instructor, for example approachable, likeable, positive, encouraging and motivating,  
439 would enhance exercise retention, for example;

440 If you have a teacher that demonstrated it to you, then wasn't shouting at you all the time and  
441 taking it in a calm voice, girls may approach it [PE] differently because they know it can  
442 actually be fun if you are not shouted at.

443

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

## 449 4. Discussion

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

459

460

461 **Table 1** Chronic exercise training programme table synthesis  
 462

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

463  
464

465 The first recommendation to improve the recruitment of participants in studies with a chronic  
 466 exercise training component that emerges from this work is that key terms, such as physical activity,  
 467 sport and exercise, need to be defined to ensure honest and clear communication of the study  
 468 expectations. In previous research investigating engagement with intervention studies Jones and  
 469 Broome [24] explain how adolescent girls wanted to know what would be expected of them during the  
 470 intervention. The current study supports these findings, but further highlights the importance of  
 471 defining key terms. While physiological research protocols and equipment are explained regularly,  
 472 researchers often assume prior knowledge of terms such as physical activity, exercise and sport. Our

473 results suggest exercise-related words in recruitment material are often interpreted differently to  
474 academic use. Therefore, this could lead to the misinterpretation of study expectations and potentially  
475 hinder recruitment. Communicating the nature of training studies accurately is also crucial for ethical  
476 reasons [25].

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

490 The third recommendation is to maximise enjoyment in every aspect of an exercise training  
491 programme for all volunteers. Enjoyment is a largely underplayed factor for initiating involvement and  
492 subsequent adherence in research, but its prevalence in all group discussions and the literature suggests  
493 this is a critical motive. For instance, Whitehead and Biddle [27] propose that clarity of the enjoyment  
494 concept is required to increase physical activity in adolescent girls. Furthermore, in work with older  
495 adults the various types of pleasure and enjoyment that can emerge from being active, such as when  
496 being with friends while walking, were seen as vital in maintaining a physically active lifestyle [28]. In  
497 the present study enjoyment appeared closely related with opportunities to socialise with friends, peers  
498 and research staff. This is consistent with the relatedness principle of self-determination theory (SDT),  
499 in which connecting with significant others can impact on motivations to participate and engage in  
500 research [29]. The efficacy of this recommendation can also be traced to the importance of  
501 participating with friends for support and opportunities to make new friends suggested by Jago *et al.*  
502 [19,30].

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

515 importance that researchers are careful not to promote unrealistic body ideals when using exercise  
516 interventions.

517 Additionally, monitoring physiological and psychological improvements from participation can  
518 promote retention. Improvements in various physical components of fitness and skill to complete  
519 activities can satisfy the basic psychological need for competency. Psychological gains in self-  
520 confidence and self-satisfaction are correlated with intrinsic motivation and thus continued  
521 participation [32]. Within exercise physiology research it is feasible to monitor both physiological and  
522 psychological measures and provide regular feedback to the participants throughout the study. The  
523 extrinsic incentives reported are also realistic to address and monitor. Good communication with  
524 schools and parents about the educational benefits of participating means days off school are feasible  
525 to factor into a study. The geographical location of this study, with high athlete profiles and sporting  
526 events, could have encouraged the desire to meet athletes, which might not be as accessible in other  
527 locations or not considered a key motivation to participate and should be employed with caution.  
528 Previous research has focussed on the ethical issue of providing monetary incentives to young people  
529 [33,34]. The findings from this study do not suggest monetary incentives are a necessary motive for  
530 recruitment of adolescent girls to chronic exercise training research. Highlighting intrinsic motivations  
531 and non-monetary extrinsic motivations to participants should be considered.

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

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

556 The final recommendation is to ensure chronic exercise interventions within physiology research  
557 contain a variety of activities consistent with the girls' preferences. The number of activities reported  
558 highlights individual variability and the challenge to maximise engagement of all participants  
559 throughout the exercise intervention. These findings support Women's Sport and Fitness Foundation  
560 [26] in suggesting a variety of activities can affect retention positively by increasing choice and  
561 enjoyment. It also provides a greater chance of promoting self-improvement and achievement of goals  
562 during the programme, satisfying the need for competency and consequently promoting intrinsic  
563 motivation to retain participation [29].

564 One opportunity to emerge to enhance recruitment and retention is to incorporate dance into an  
565 exercise training programme. Dance was commonly cited as a preferred activity, complementing  
566 previous research focussing on the use of dance interventions to promote girls physical activity  
567 [19,38]. Burgess *et al.* argue, 'aerobic dance can provide a more supportive environment (i.e. non-  
568 competitive and non-threatening) and multiple opportunities for adolescent females with low body  
569 attitudes and physical self-perceptions to feel better about themselves.' [38] (p. 64). These advantages  
570 appear to match the suggested motives for volunteering and benefits associated with continued  
571 participation, supporting the use of dance within physiology research. Team-based activities were also  
572 reported frequently; yet they are associated with varying levels of engagement, intensity and  
573 enthusiasm. Exercise physiology research often requires all participants to exercise at a specified  
574 intensity, and as such, these activities would require modification to sustain involvement by all.  
575 Careful consideration and further research into how to incorporate team based activities into  
576 physiology research interventions would be advised.

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

590 With more physiology research targeting paediatric populations, successful recruitment and  
591 maximal adherence within our studies are crucial to improve the credibility of study findings.  
592 Implementing this qualitative work with subgroups of adolescent girls (i.e., socio-economic status,  
593 family support structure, school type weight status and physical activity level) could be beneficial to  
594 extend the proposed recommendations. Children and adolescent's involvement in research, often  
595 requires support and commitment from their parents (for example, providing lifts, arranging visits with  
596 the researcher and assisting with some measurements). Drews *et al.* [8] and Jago *et al.* [19]  
597 investigated parents' views related to health promotion interventions. Extending the current research to

598 explore parental views of the physiology research recruitment process and study retention is also  
599 warranted. This would provide a greater understanding of parents' motives and needs for consenting to  
600 their child's participation. Finally, whilst physical activity interventions and randomised controlled  
601 trials with an exercise arm may align with a number of these themes and recommendations, further  
602 research with a specific focus on recruitment to randomised controlled trials is warranted. This could  
603 provide important views related to the random allocation to study arms and possible issues of  
604 preference effects and resentful demoralisation that we are unable to infer from the present study.

## 605 **5. Conclusions**

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

613

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## 621 **Author Contributions**

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

## 625 **Conflicts of Interest**

626 The authors declare no conflict of interest.

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