

Accepted Manuscript

Title: Physical activity engagement in early rheumatoid arthritis: A qualitative study to inform intervention development

Author: Janet Withall Anne M. Haase Nicola E. Walsh Anita Young Fiona Cramp



PII: S0031-9406(15)03806-7
DOI: <http://dx.doi.org/doi:10.1016/j.physio.2015.07.002>
Reference: PHYST 845

To appear in: *Physiotherapy*

Received date: 16-2-2015
Accepted date: 25-7-2015

Please cite this article as: Withall J, Haase AM, Walsh NE, Young A, Cramp F, Physical activity engagement in early rheumatoid arthritis: A qualitative study to inform intervention development, *Physiotherapy* (2015), <http://dx.doi.org/10.1016/j.physio.2015.07.002>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

16 FC: fiona.cramp@uwe.ac.uk Tel 0117 3288501

17

18 **Acknowledgements**

19 We would like to acknowledge Professor Sarah Hewlett of the University of the West of England for her contribution to the
20 initial design of this study and her role in the supporting its implementation.

21

22 Ethical approval for the study was provided by the NRES Committee South Central - Berkshire B committee, REF:
23 14/SC/0118. It was funded internally by the University of the West of England. The authors declare that they have no
24 competing interests.

25

26

27

41 Study participants (15 female, 4 male; 59.9 (standard deviation (SD) 10.3) years) had a mean time (SD) since diagnosis of 44
42 (34) months. Data analysis yielded 4 key themes relating to PA programmes 1) Why people join and why they drop out 2)
43 venue and timing 3) what people want to do and hear 4) who should deliver programmes and how.

44 Conclusion

45 Patients with RA are interested in PA programmes 6 to 12 months after diagnosis, which support safe exercise and provide
46 expert physiotherapist input. Recommendation by trusted health professionals and promotion of the benefits for 'people like
47 me' would positively impact recruitment and retention. Key elements of the programme include proficient, safety-oriented
48 exercise guidance, RA education, peer support, relaxation, coping strategies and self-set goals. Findings indicate that a group-
49 based programme with a social aspect would support adherence.

50

65 Even when pain free, people with RA often fear that PA will exacerbate their symptoms (12). Overall, these findings suggest
66 a need to identify programmes that support long term engagement with PA for recently diagnosed people with RA to
67 minimise inappropriate health beliefs and prevent unnecessary reductions in function. This assertion is supported by National
68 Institute for Health and Care Excellence (NICE) guidelines which indicate that people with RA should have access to
69 specialist physiotherapy to encourage regular physical exercise (13).

70 Basing PA interventions on appropriate health behaviour change models has been shown to increase the likelihood of success
71 and is recommended by NICE (14, 15). There is a dearth of evidence regarding health behaviour change models to promote
72 long term engagement with PA interventions in inflammatory arthritis, with the quality of the research poor and the findings
73 somewhat inconsistent (16, 17). However there have been successful theory-based interventions to increase PA in other long
74 term conditions; elements of which may be transferable to people with RA (18, 19).

75 The UK's Medical Research Council recommends a development-evaluation-implementation model for the development and
76 testing of complex interventions (15). The engagement of the intended patient group is central to ensuring that interventions
77 are as appealing and acceptable as possible. The ultimate aim of this study is to develop and test an intervention (Promoting
78 Engagement with Physical Activity – Rheumatoid Arthritis (PEPA-RA)) based on Self Determination Theory (SDT) (20), to
79 promote long term engagement with PA by people with RA. The intervention would target patients up to two years from
80 diagnosis in an attempt to prevent unnecessary physical de-conditioning due to inactivity and promote good PA habits (21).
81 This paper reports the results of the formative research conducted to inform the development and design of PEPA-RA.

82 Specifically, in this study, we sought to: 1) understand motivators and facilitators of engagement in PA post diagnosis of RA;
83 2) identify factors that might affect programme recruitment and retention; and 3) explore people with RA's perceptions of a
84 variety of PA programmes based upon existing evidence in other long-term conditions to identify key PA programme
85 elements.

86 **Methods**

87 Design

88 Data were collected via three focus groups conducted during July and August 2014. Group participants were recruited by
89 researchers from rheumatology clinics at University Hospitals Bristol NHS Foundation Trust (UHBristol) and the Royal
90 National Hospital for Rheumatic Diseases, Bath (RNHRD) rheumatology clinics. In addition a research nurse reviewed
91 patient notes at the RNHRD and contacted those who met the inclusion criteria by telephone.

92 Focus groups were used as the data collection device as they allow participants to refine and test their thoughts and responses
93 against those of others, and to explore and challenge their peers' opinions, so generating data of additional depth (22).

94 Qualitative approaches are highly appropriate for understanding complex personal and social issues such as engagement in
95 physical activity and the influence of chronic disease on PA and are useful when, as in this case, there is limited existing
96 knowledge.

97 Participants

98 Study inclusion criteria were 18 years plus and with a diagnosis of RA from a rheumatologist, according to ACR criteria (see
99 Appendix A) (23) within the last 5 years. This was considered to enable good recall of the early stages after diagnosis. Age
100 and diagnosis were procured from patient notes. Date of diagnosis was self-reported at recruitment.

101 Procedure

102 Patients who met the inclusion criteria were provided with participant information sheets and a reply slip. On receipt of a
103 completed reply slip the patient was allocated to a focus group. Participants' travel expenses were reimbursed.

104 Participants were purposefully sampled to reflect a range of age and gender. Due to the relative heterogeneity of the research
105 population in relation to the subject of enquiry, a sample size of approximately 20 was proposed to be sufficient to collect
106 data of an appropriate breadth and depth (22).

107 The focus group interview guide was semi-structured and designed to explore patients' views of their PA support needs
108 following a diagnosis of RA; their experiences relating to PA and motivators and facilitators of engagement in PA. Following
109 a discussion of these issues three different PA programmes were presented to the focus groups (see Appendix B). Two of
110 these were based upon successful interventions that the authors had experience of delivering, namely ESCAPE (Enabling
111 Self-Management and Coping with Arthritic Knee Pain Through Exercise) (19), a programme for patients with arthritic knee
112 pain based on Bandura's Social Cognitive Theory (24) and TREAD-UK (TRial for Exercise And Depression in the UK) (18)

113 for people with depression and based on Self Determination Theory (SDT) (20). The third intervention, PEPA-RA, also
114 based on SDT, was an intervention outline designed by the authors with input from additional members of the clinical team
115 and two patient research partners. All programmes proposed a combination of support for behaviour change, education and
116 PA (See Table 1). Participants were invited to comment on these interventions; explore their suitability for people with a
117 recent diagnosis of RA; identify limitations; suggest alternative content and delivery mechanisms; and critique support
118 materials. The interview guide was reviewed by the study Patient Research Partner, a person with RA and a patient at one of
119 the research centres. A pilot interview was conducted to refine the guide prior to commencing the focus groups and as a
120 result some of the interview guide language was revised to be more colloquial. It was subsequently deemed fit for use by the
121 research team.

122 JW conducted three focus groups, with FC acting as scribe; both are experienced qualitative researchers. JW has a non-
123 healthcare background and a research interest in physical activity while FC is an experienced researcher in the field of RA
124 and a qualified physiotherapist. This enabled the research team to respond effectively to issues raised in the fields of both
125 physical activity and RA. No relationship between the interviewer or scribe and the participants existed prior to the focus
126 groups and neither researcher was involved in the care of participants. Each group lasted approximately 80 minutes and was
127 recorded using a digital voice recorder, transcribed and coded to ensure anonymity and confidentiality. The final focus group
128 revealed no unique information so theoretical saturation was deemed to have been reached.

129 Ethics

130 Ethical approval for the study was provided by the NRES Committee South Central - Berkshire B committee, REF:
131 14/SC/0118. Written informed consent was obtained for all participants prior to focus groups commencing.

132 **Analysis**

133 Data analysis took an interpretivist view to allow for understanding individuals' opinions and views of PA within the context
134 of their RA diagnosis, as well as understanding the intersection of these views within a shared group environment (i.e.,
135 similar disease diagnosis). All transcribed text was entered into NVivo (Version 10, QSR, Southport, UK) for electronic
136 coding and data retrieval. Inductive thematic analysis was used to identify the main themes across the groups. Emerging
137 themes were verified through discussion and a coding framework based on these themes was developed (25). Transcripts
138 were coded by JW and reviewed by the study patient research partner. The coding was reviewed by the three other authors
139 and existing codes were refined and new codes were identified (see Table 4 for an example of the coding process from
140 quotes, codes, categorization and themes). The emergent themes and sub-themes were reviewed by AH, an experienced
141 qualitative researcher, and the interpretation and analysis were discussed and agreed by all four authors. Salient quotes that
142 captured the essence of the themes were extracted and summarised in tables using a framework approach (25).

143 **Results**

144 Twenty-seven people were recruited. Eight dropped out prior to the focus groups being held. The final sample comprised 19
145 participants (15 female, 4 male), with a mean age (SD) of 59.9 (10.3) years and patient reported mean time (SD) since

146 diagnosis to be 44 (34) months. RA diagnosis was ascertained from patients' clinical notes. A summary of participants'
147 demographic information is shown in Table 2.

148 The three programmes presented to patients (ESCAPE, TREAD and PEPA-RA) produced a variety of comment. To avoid
149 duplication the results are presented here as themes that were generated across all three programmes, rather than by each
150 individual programme.

151 The data analysis yielded 4 key themes: 1) Why people join and why they drop out 2) venue and timing 3) what people want
152 to do and hear 4) who should deliver programmes and how.

153 Pseudonyms have been used for the participants and the characteristics of each are detailed in Table 3

154 **Why people join and why they drop out**

155 Participants suggested that hearing about other patients' experiences and resulting health benefits would increase the
156 likelihood of their attending a PA programme.

157 *'It might be nice to know that somebody ...like you who seem to have quite an acute problem that this really made a*
158 *difference'. (Participant G).*

159 Fears that exercise could exacerbate disease and associated joint damage needed to be addressed. The presentation of PA as
160 for ‘people like me’ via images and case studies was proposed, with the social aspects of a group setting largely regarded as
161 positively influencing recruitment and adherence.

162 *‘I think you need to push the social side of it so it’s not like a structured exercise’. ((Participant I)*

163 Support from healthcare professionals to participate in PA, and their endorsement of the programme, were considered to be
164 influential.

165 Barriers to taking part included symptoms of RA such as pain and fatigue.

166 *‘You will find that a lot of people won’t turn up because they are not feeling very well’. (Participant R)*

167 Pragmatic measures suggested to support adherence included reminder phone calls or text messages.

168 **Programme venue and timing**

169 The second theme related to scheduling and included time from diagnosis, session frequency, duration and timing.

170 Between 6 and 12 months after diagnosis, when a stable drug regime had been established, was the preferred timing for a
171 PA programme.

172 *'If you are not settled on drugs and you are hurting and you are tired and you feel like death warmed up you are not*
173 *going to want to do anything apart from eat biscuits'. (Participant G)*

174 Views on frequency were disparate. ESCAPE's twice weekly sessions were seen as a large time investment by most but a
175 few acknowledged that such intensity may be required for impact.

176 *'Twice a week for six weeks that's a lotand you get away from your kids'. (Participant D)*

177 Some participants felt that PEPA-RA, a less intense programme over a longer period, offered greater flexibility,

178 *'When it's a longer one having not so many contact sessions is quite good because it still allows you some*
179 *flexibility'. (Participant G)*

180 whereas a lengthy programme such as TREAD could be a deterrent to engagement.

181 *'Six to eight months I think mmm that's really long for me to tie myself into something'. (Participant G)*

182 Preferred session timing depended on situational factors such as employment status and access to childcare while fatigue
183 later in the day was cited as a barrier to evening sessions.

184 **What people want to do and hear**

185 Education and RA related group discussions, supervised exercise sessions, home exercising, expert input and goal setting
186 emerged as the major sub-themes within programme content.

187 Relaxation and coping strategies, medication and its effects, RA flares, fatigue and pain were all regarded as important
188 education and discussion topics. An opportunity to meet and share thoughts with other people with RA was also positively
189 rated by most participants.

190 *'I don't really know anybody that has it and I think it would be nice to have that opportunity... just to talk about*
191 *those things that affect you.'* (Participant J)

192 Supervised exercise was considered positively, with sessions providing a safe and supportive environment. Training to
193 ensure safe and effective home exercising was also valued as a flexible option which could supplement group sessions and
194 continue post intervention.

195 *'If you are at home and you have been shown how to do it and you know you get results from doing it that would*
196 *motivate to do it as well'.* (Participant D)

197 However concerns about the motivation and self-discipline required for exercising alone were raised.

198 *'You would have to be quite self-disciplined wouldn't you to do it at home'.* (Participant K)

199 Support from peers and ‘experts’ was perceived to be an important element of a successful PA programme. Being advised by
200 a physiotherapist or someone perceived as an ‘expert’ would instil confidence and help to address concerns regarding injury
201 or potential joint damage.

202 *‘It’s really good ... being watched by the people who know how to use these machines properly because otherwise*
203 *you could end up doing more harm than good. I think I would feel much safer.’ (Participant K)*

204 Goal setting, as used in TREAD, ESCAPE and PEPA-RA, was regarded as motivational and ‘a bit of a push’ but should
205 clearly be patient developed as there were concerns about extrinsic pressures from peers and professionals.

206 *‘Everybody is at a different level and you have a group and you start discussing well you should be doing this ...I*
207 *would feel there was pressure on me to do something that I didn’t want to do.’ (Participant E)*

208 **Who should deliver programmes and how?**

209 The final theme was delivery including group sessions, telephone support and location.

210 TREAD, the PA programme including more telephone than in-person support, attracted polarised comments with the
211 benefit of flexibility juxtaposed against a lack of relatedness.

212 *You are almost on your own really with that aren’t you? (Participant E)*

213 A group setting was preferred by the majority but a small number of participants felt that the benefits were outweighed by the
214 increased commitment required, the lack of flexibility and a preference not to identify primarily as an RA patient.

215 *'I prefer the group because ... it's quite nice to have other people around you with the same problems, doing the*
216 *same thing'. (Participant K)*

217 *'Well I have been to one (group) ...all we did was sat around and talked about what was wrong with us'.*
218 *(Participant O)*

219 Peers were seen as sources of experiential and practical advice on issues such as managing flares; while peer support,
220 potentially via a buddying system, could be important in maintaining motivation and engagement.

221 *'It's quite nice to get to know other people...it's that sort of morale support that can be really, really useful'.*
222 *(Participant G)*

223 Incorporating TREAD style telephone support to maintain motivation and ongoing group programme engagement was
224 viewed positively.

225 *'It would be good to have telephone support because I know me I will just slide down the scale a bit until oh we have*
226 *got another group session coming'. (Participant A)*

227 An easily accessible location for sessions seemed important, with access to transport a common issue. There was also
228 support for holding sessions outside a hospital setting in a community/leisure centre which could help familiarise
229 participants with facilities that they might otherwise lack the confidence to access.

230 *'You are going (to the gym) with someone who understands what you can do and they could help you with a*
231 *programme ... you could ... feel a little bit more confident'. (Participant M)*

232 **Discussion**

233 This study explored the views of people with RA regarding the feasibility and acceptability of potential PA programmes.
234 The focus groups indicated that people with RA would be interested in a PA programme designed to improve physical
235 function. Common with other interventions, key issues were overcoming barriers to engagement, scheduling sessions at an
236 acceptable time, location and frequency, and delivering appealing and appropriate content (19). These findings are also
237 consistent with recruitment and retention issues in general health behaviour change interventions, where ill-health,
238 transportation issues, time conflicts and session timing and content impact engagement (26, 27). These findings clearly
239 illustrate the core challenges that need to be addressed in any PA intervention for patients with RA.

240 Recruitment is critical to the impact of any health-related programme. Referral by a health professional was regarded as a
241 preferred form of recruitment, and has been shown to be effective among chronically ill populations (19, 28). It also provides
242 reassurance regarding fears of disease exacerbation and increased joint damage (12). Also in common with previous

243 observations, belief in the benefits of PA in managing RA would be likely to affect motivation to participate (29) so should
244 be emphasised in recruitment materials. A preference for exercising amongst relative equals was also reported (30).
245 Therefore peer endorsement, case studies and the use of appropriate images that present the programme as being for ‘people
246 like me’ were considered important. However, as in other studies, some participants preferred not to be viewed primarily as
247 an individual with a disability, suggesting the inclusion of general health promotion content would be beneficial (31).

248 Consistent with the broader literature, potential health improvements were regarded as motivation to engage in physical
249 activity (32). However exercise adherence is more often associated with enjoyment and social interaction (33). Indeed many
250 participants considered the group-based elements of ESCAPE and PEPA-RA, which enabled the sharing of experiences and
251 socialising, as valuable to on-going programme engagement. However the nature of RA means that patients’ motivation to be
252 physically active is affected by fluctuating disease symptoms such as pain and fatigue. Consideration needs to be given to
253 methods of ensuring patient engagement despite a variable condition that challenges adherence. It may be that a programme
254 combining group sessions with telephone/text/email support could provide appealing levels of peer contact, support and
255 flexibility while maintaining sufficient contact levels to be effective. Further input from patients may be required to establish
256 the best way to address this.

257 Most patients considered that between 6 and 12 months after diagnosis, when a stable drug regime had been established, was
258 the ideal timing for a PA programme. Preferred session timing largely related to whether patients were in paid employment,

259 which made afternoon sessions (the generally favoured option) impractical. It may be that to recruit a working and non-
260 working cohort would require different timing options, and potentially different delivery methods.

261 Group participants presented disparate views on session frequency, highlighting the trade-off between flexibility and
262 effectiveness. The less frequent sessions of PEPA-RA were largely preferred to the twice weekly ESCAPE sessions.
263 However, a systematic review of reviews found that amongst the adult population in general greater PA intervention
264 effectiveness was causally linked with higher contact time or contact frequency (34).

265 Popular ESCAPE and PEPA-RA programme content included education and group discussions, relaxation and coping
266 strategies, supervised exercise sessions and guidance on home exercising. Expert input and peer support were highly valued
267 and have been widely shown to positively influence PA intervention effectiveness (34). Goal setting and monitoring, usually
268 effective in PA programmes (35, 36), were viewed by this population with some caution, eliciting fearful comments
269 regarding taxing goals being imposed by professionals and peer pressure. When introducing these concepts to those with RA,
270 it is clearly important to emphasise that these are patient-set goals, developed without extrinsic influence.

271 As with other groups where mobility may be compromised, an easily accessible location was advocated and a lack of
272 transport cited as a barrier to engagement (37). The largely telephone-based TREAD circumvented this barrier, but basing the
273 intervention in local community/leisure centres rather than a central clinical setting could also facilitate engagement. It could
274 also familiarise participants with amenities that they might otherwise lack the confidence to access, and which they could

275 continue to use long-term. However, to deliver programmes in this setting may require the training of appropriate healthcare
276 professionals as rheumatology services are traditionally provided through secondary care.

277 **Strengths and limitations**

278 This study provides information on the factors that would affect the recruitment and retention of people with RA into a PA
279 programme and input on programme design and content. We recruited across a broad section of patients through different
280 recruitment strategies with the aim of developing an understanding of a phenomena (PA in RA) rather than making
281 probabilistic generalizations to a population (38). A limitation of the study is that people who volunteer to participate in
282 studies may differ from those who do not, in potentially important variables such as socio-demographics, attitudes to PA and
283 the severity of RA. In addition some issues may not have been revealed as only three theory-driven programmes were
284 included for deliberation, although commencing with broad discussion prior to discussion of the programmes allowed general
285 themes to emerge.

286 Diagnosis of RA can occur after a long process of investigation and the exact date of diagnosis was not always clear from
287 patients' medical notes. As a result we asked patients to self-report timing of their RA diagnosis. At recruitment all
288 participants reported diagnosis in the last 5 years but at the focus groups four participants described earlier diagnoses. As
289 both sets of data were self-reported we do not know which is more accurate. For a small number (3 female, 1 male) of
290 participants a duration of more than 5 years since diagnosis may have affected the accuracy of their early RA recollections.

291 **Conclusion**

292 The data presented indicate that there is an interest in PA programmes for patients with RA, 6 to 12 months after diagnosis
293 which support and guide safe exercising and provide expert input. Recruitment is likely to be positively impacted by
294 recommendation or referral by trusted health professionals and a focus on the benefits for the target group and the
295 programme's relevance to 'people like me'. Key elements include proficient, safety-oriented exercise guidance, RA
296 education, peer support, relaxation, coping strategies and self-selected goals. Findings indicate that a group based programme
297 with a social aspect would support adherence. Incorporating telephone support to maximise contact and maintain engagement
298 when group participation is impacted by RA symptoms may be beneficial. Key issues that need to be addressed are
299 accessibility, setting (primary care/community), session timing and how to offer flexibility while maintaining effective levels
300 of contact. On-going patient engagement will be required in the further development and evaluation of this programme.

301

302 **Acknowledgements**

303 We would like to acknowledge Professor Sarah Hewlett of the University of the West of England for her contribution to the
304 initial design of this study and her role in the supporting its implementation.

305

306 Ethical approval for the study was provided by the NRES Committee South Central - Berkshire B committee, REF:
307 14/SC/0118. It was funded internally by the University of the West of England. The authors declare that they have no
308 competing interests.

309

310 **References**

- 311 1. Eurenus E, Stenström CH. Physical activity, physical fitness, and general health perception among individuals with
312 rheumatoid arthritis. *Arthritis Care & Research*. 2005;53(1):48-55.
- 313 2. Lacaille D, Sheps S, Spinelli JJ, Chalmers A, Esdaile JM. Identification of modifiable work-related factors that
314 influence the risk of work disability in rheumatoid arthritis. *Arthritis Care & Research*. 2004;51(5):843-52.
- 315 3. Lemmey AB, Williams SL, Marcora SM, Jones J, Maddison PJ. Are the benefits of a high-intensity progressive
316 resistance training program sustained in rheumatoid arthritis patients? A 3-year followup study. *Arthritis care & research*.
317 2012;64(1):71-5.
- 318 4. Neuberger GB, Aaronson LS, Gajewski B, Embretson SE, Cagle PE, Loudon JK, et al. Predictors of exercise and effects
319 of exercise on symptoms, function, aerobic fitness, and disease outcomes of rheumatoid arthritis. *Arthritis Care &*
320 *Research*. 2007;57(6):943-52.
- 321 5. Plasqui G. The role of physical activity in rheumatoid arthritis. *Physiology & Behavior*. 2008;94(2):270-5.
- 322 6. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and
323 distinctions for health-related research. *Public health reports*. 1985;100(2):126.
- 324 7. Pedersen BK, Saltin B. Evidence for prescribing exercise as therapy in chronic disease. *Scandinavian journal of*
325 *medicine & science in sports*. 2006;16(S1):3-63.
- 326 8. Sokka T, Häkkinen A, Kautiainen H, Maillefert JF, Toloza S, Calvo-Alen J, et al. Physical inactivity in patients with
327 rheumatoid arthritis: Data from twenty-one countries in a cross-sectional, international study. *Arthritis Care & Research*.
328 2008;59(1):42-50.

- 329 9. Wilcox S, Der Ananian C, Abbott J, Vrazel J, Ramsey C, Sharpe PA, et al. Perceived exercise barriers, enablers, and
330 benefits among exercising and nonexercising adults with arthritis: results from a qualitative study. *Arthritis Care &*
331 *Research*. 2006;55(4):616-27.
- 332 10. Jack K, McLean SM, Moffett JK, Gardiner E. Barriers to treatment adherence in physiotherapy outpatient clinics: a
333 systematic review. *Manual therapy*. 2010;15(3):220-8.
- 334 11. Crowley L, Kennedy N. Barriers to Exercise in Rheumatoid Arthritis—a Focus Group Study. *Physiotherapy Practice*
335 *and Research*. 2009;30(2):27-33.
- 336 12. Vervloesem N, Van Gils N, Ovaere L, Westhovens R, Van Assche D. Are Personal Characteristics Associated with
337 Exercise Participation in Patients with Rheumatoid Arthritis? A Cross-Sectional Explorative Survey. *Musculoskeletal care*.
338 2012;10(2):90-100.
- 339 13. NICE. Rheumatoid arthritis: The management of rheumatoid arthritis in adults. CG79. In: National Institute for
340 Health and Care Excellence, editor. London2009.
- 341 14. NICE. Behaviour Change. PH6 In: National Institute for Health and Care Excellence, editor. London2007.
- 342 15. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M. Developing and evaluating complex interventions:
343 the new Medical Research Council guidance. *Bmj*. 2008;337.
- 344 16. Cramp F, Berry J, Gardiner M, Smith F, Stephens D. Health Behaviour Change Interventions for the Promotion of
345 Physical Activity in Rheumatoid Arthritis: A Systematic Review *Musculoskelet Care*, . 2013;11:238–47.
- 346 17. Ezzat AM, MacPherson K, Leese J, Li LC. The Effects of Interventions to Increase Exercise Adherence in People with
347 Arthritis: A Systematic Review. *Musculoskeletal Care*. 2014.
- 348 18. Chalder M, Wiles NJ, Campbell J, Hollinghurst SP, Haase AM, Taylor AH, et al. Facilitated physical activity as a
349 treatment for depressed adults: randomised controlled trial. *BMJ*. 2012;344:e2758.
- 350 19. Hurley MV, Walsh NE, Mitchell H, Nicholas J, Patel A. Long-term outcomes and costs of an integrated rehabilitation
351 program for chronic knee pain: A pragmatic, cluster randomized, controlled trial. *Arthritis Care & Research*. 2012;64(2):238-
352 47.
- 353 20. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and
354 well-being. *American psychologist*. 2000;55(1):68.
- 355 21. Luqmani R, Hennell S, Estrach C, Birrell F, Bosworth A, Davenport G, et al. British Society for Rheumatology and
356 British Health Professionals in Rheumatology guideline for the management of rheumatoid arthritis (the first two years).
357 *Rheumatology*. 2006;45(9):1167-9.
- 358 22. Finch H, Lewis J, Turley C. Focus Groups. In: Ritchie J, Lewis J, McNaughton Nicholls C, Ormston R, editors.
359 *Qualitative Research Practice*. 2 ed. London Sage; 2014.
- 360 23. Arnett FC, Edworthy SM, Bloch DA, McShane DJ, Fries JF, Cooper NS, et al. The American Rheumatism Association
361 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis & Rheumatism*. 1988;31(3):315-24.

- 362 24. Bandura A. Health promotion from the perspective of social cognitive theory. *Psychology and health*.
363 1998;13(4):623-49.
- 364 25. Spencer L, Ritchie J, Lewis J, Dillon L. Quality in qualitative evaluation: a framework for assessing research evidence.
365 2003.
- 366 26. Coday M, Boutin-Foster C, Sher TG, Tennant J, Greaney ML, Saunders SD, et al. Strategies for retaining study
367 participants in behavioral intervention trials: retention experiences of the NIH Behavior Change Consortium. *Annals of*
368 *Behavioral Medicine*. 2005;29(2):55-65.
- 369 27. Withall J, Jago R, Fox KR. Why some do but most don't. Barriers and enablers to engaging low-income groups in
370 physical activity programmes: a mixed methods study. *BMC public health*. 2011;11(1):507.
- 371 28. Chalder M, Wiles N, Campbell J, Hollinghurst S, Searle A, Haase A, et al. A pragmatic randomised controlled trial to
372 evaluate the cost-effectiveness of a physical activity intervention as a treatment for depression: the treating depression
373 with physical activity (TREAD) trial. *Health Technology Assessment*. 2012;16(10).
- 374 29. Ehrlich-Jones L, Lee J, Semanik P, Cox C, Dunlop D, Chang RW. Relationship between beliefs, motivation, and
375 worries about physical activity and physical activity participation in persons with rheumatoid arthritis. *Arthritis care &*
376 *research*. 2011;63(12):1700-5.
- 377 30. Beauchamp MR, Carron AV, McCutcheon S, Harper O. Older adults' preferences for exercising alone versus in
378 groups: Considering contextual congruence. *Annals of Behavioral Medicine*. 2007;33(2):200-6.
- 379 31. Loeppenthin K, Esbensen B, Ostergaard M, Jennum P, Thomsen T, Midtgaard J. Physical activity maintenance in
380 patients with rheumatoid arthritis: a qualitative study. *Clinical rehabilitation*. 2014;28(3):289-99.
- 381 32. Allender S, Cowburn G, Foster C. Understanding participation in sport and physical activity among children and
382 adults: a review of qualitative studies. *Health education research*. 2006;21(6):826-35.
- 383 33. Burke SM, Carron AV, Eys MA, Ntoumanis N, Estabrooks PA. Group versus individual approach? A meta-analysis of
384 the effectiveness of interventions to promote physical activity. *Sport and Exercise Psychology Review*. 2006;2(1):19-35.
- 385 34. Greaves CJ, Sheppard KE, Abraham C, Hardeman W, Roden M, Evans PH, et al. Systematic review of reviews of
386 intervention components associated with increased effectiveness in dietary and physical activity interventions. *BMC public*
387 *health*. 2011;11(1):119.
- 388 35. Abraham C, Graham-Rowe E. Are worksite interventions effective in increasing physical activity? A systematic
389 review and meta-analysis. *Health Psychology Review*. 2009;3(1):108-44.
- 390 36. Michie S, Abraham C, Whittington C, McAteer J, Gupta S. Effective techniques in healthy eating and physical activity
391 interventions: a meta-regression. *Health Psychology*. 2009;28(6):690.
- 392 37. Crombie IK, Irvine L, Williams B, McGinnis AR, Slane PW, Alder EM, et al. Why older people do not participate in
393 leisure time physical activity: a survey of activity levels, beliefs and deterrents. *Age and Ageing*. 2004;33(3):287-92.

394 38. Popay J, Rogers A, Williams G. Rationale and standards for the systematic review of qualitative literature in health
395 services research. *Qualitative health research*. 1998;8(3):341-51.

396

397

397

398 **Table 1 Physical activity programmes presented to the groups for discussion**

Programme Name	Health Behaviour Theory	Programme duration	Patient Group	Frequency	Mode/Setting	Deliverer
ESCAPE	Social Cognitive Theory	6 weeks	Patients with arthritic knee pain	Twice a week (for one hour)	Group sessions in a secondary care setting Education/self-management discussion plus guided exercise	Physiotherapist
TREAD	Self-Determination Theory	6-8 months	Patients with depression	Up to 13 contacts over 6-8 months	3 face to face sessions in a community setting. Up to 10 telephone conversations	Trained physical activity facilitator
PEPA-RA (proposed intervention)	Self-Determination Theory	12 weeks	Patients with RA	5 sessions over 12 weeks	4 group sessions in a secondary care setting 1 individual session Education/discussion plus guided exercise	Physiotherapist

399

400

401

402

403

404 **Table 2 Characteristics of focus group participants (n=19)**

	Range	Mean	SD
Age (years)	31-73	59.9	10.3
Self report time since diagnosis (mths)	1-120	44.3	33.8
Gender		N	%
Male		4	21
Female		15	79
Current work status		N	%
Part time or full time paid work		8	42.1
Student		0	0
Homemaker		1	5.3
Unemployed		0	0
Retired		8	42.1
Retired and receiving incapacity benefits		2	10.5

405

406

407

408

409

410

411

412

413

414

415

416 **Table 4 Example of development from codes, categories to themes**

417

Meaning unit	Code	Sub-theme	Theme
---------------------	-------------	------------------	--------------

Participant A: ...and the motivation is there to push you to do it when you are doing it together.

Exercising
together

Social
support

Enablers of
exercise

Participant C: The other person isn't it?

Participant A: Exactly yeah you encourage one another

Participant E: Yeah I have been a couple of times without my sister and I have gone on less time instead of the 20 minutes I have only gone on ten minutes and come home like an hour before I should of.

Participant C: Yeah you push each other along.

418

419

420

421

422

423

Table 3 Focus group participant profiles

Participant	Gender	Age	Months since diagnosis	Work status	Engagement with physical activity
Participant A	F	61	1	Paid Work	w, g, e
Participant B	F	63	24	Paid Work	w, g
Participant C	F	66	36	Retired	w, s, g, c
Participant D	M	53	48	Paid Work	w, g
Participant E	F	42	120	Paid Work	w, g, gy
Participant F	F	71	36	Retired	h
Participant G	F	59	3	Retired	w, g, gy
Participant H	F	62	48	Paid Work	w, g, h
Participant I	F	52	48	Homemaker	w
Participant J	F	31	48	Paid Work	w, s
Participant K	F	63	24	Retired ¹	g
Participant L	F	73	24	Retired	g
Participant M	F	63	72	Retired	w, e
Participant N	M	60	84	Paid Work	w
Participant O	M	68	48	Retired	w
Participant P	M	69	Missing	Retired ¹	Missing
Participant Q	F	59	2	Paid Work	w, g, h
Participant R	F	Missing	108	Retired	w, g, c, h
Participant S	F	65	24	Retired	w, g, h

¹ Retired and receiving incapacity benefits

w = walking, s=swimming, g=gardening, e=exercise class, c=cycling, gy=gym, h=housework