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1 **Title: Exploring experiences, barriers and enablers to home and class based**
2 **exercise in rotator cuff tendinopathy: a qualitative study**

3

4 **Abstract:**

5 Study design: qualitative study

6 Introduction: Adherence is paramount to the successful outcome of exercise based treatment.

7 Purpose of study: The barriers and enablers to adherence to a home and class based exercise
8 programme were explored in this qualitative study.

9 Methods: Semi-structured interviews were carried out in order to establish common themes relating
10 to the participants experiences during a year-long randomised controlled trial.

11 Results: Twelve participants were interviewed. The main enablers to exercise were highlighted as
12 equipment, perceived benefit from the exercises, and longer and more intensive monitoring.

13 Barriers included lack of motivation, lack of equipment and pain.

14 Conclusions: Implications for practice are incorporating enablers and addressing barriers including
15 self-discharge from classes, the importance of longer term follow-up and the benefits of adopting
16 exercise into a well-established routine may provide potential benefits.

17 Level of evidence: N/A

18 Conflict of interest: None

19 Keywords: exercise, barriers, adherence, enablers, rotator cuff tendinopathy.

20

21 **1. Introduction:**

22 Exercise is the mainstay of rehabilitation treatment for rotator cuff (RC) tendinopathy (1, 2), often
23 delivered in class based settings with home exercise plans in support. Little is known about the
24 barriers, enablers and motivators in RC exercise based treatment. More is known regarding
25 adherence to exercise in general but not in this cohort of patients.

26 Adherence is defined as “the act or quality of sticking to something.”(3). It has been described as
27 the “most unpredictable, least controllable variable in a medical intervention” (4). By its very nature
28 clinical outcome is intrinsically linked to adherence (3-5). Non-adherence has been reported to
29 attribute to the ongoing disability with subsequent or associated reduction in the ability to work and
30 loss of wages (6). Although studies have highlighted the importance of adherence in securing a

31 successful outcome, in the clinical setting adherence is often erratic (7, 8). Adherence does not
32 appear to be an all or nothing issue; rather it appears to be one of gradation, with some patients
33 adhering to varying degrees and with different components of treatment (5, 9).

34 There are several quantitative studies on exercise in RC tendinopathy (10-14) but those
35 investigating qualitative aspects are lacking. Similarly, there is limited published information relating
36 to the experiences of individuals who have participated in an exercise class based programme as
37 well as carrying out concomitant home exercises. Littlewood et al (2014) explored patient
38 expectations and barriers which might influence self-managed exercise for patients in a group of six
39 patients in a private physiotherapy practice in northern England.

40 This qualitative study aimed to explore factors affecting adherence to a prescribed home and
41 class based exercise programme in the National health service setting in Central London for those
42 with rotator cuff tendinopathy and highlight enablers or suggestions for strategies to overcome any
43 barriers identified. It is envisaged that through the identification of barriers to treatment adherence,
44 clinicians may be able to develop and suggest methods to enhance adherence to exercise
45 prescription for people with RC tendinopathy.

46

47 2. Methods:

48

49 2.1 Study design:

50 A qualitative descriptive approach using semi-structured interviews was employed.

51

52 2.2 Positionality of researcher

53 The researcher was the chief investigator (CI) of a double-blind placebo controlled randomised
54 controlled trial (RCT) entitled: (The efficacy of long chain polyunsaturated fatty acids and exercise in
55 the treatment of RC tendinopathy. Trial registration: ISRCTN 17856844). This was a year-long trial
56 where patients with rotator cuff tendinopathy were randomised into one of two groups. Both
57 groups participated in an eight -week class based exercise programme with a complementary home
58 exercise programme to perform. One group of participants was provided with long chain
59 polyunsaturated fatty acid supplements and the other group with a placebo supplement. Levels of
60 adherence to exercise in the RCT was measured using a self-report diary and the attendance record
61 of the class. The mean reported level of adherence across both groups was 75% of classes or 6.2 out
62 of 8 classes attended (standard deviation 2.5) and 11.2 minutes (SD 8.5) out of a prescribed 20
63 minutes of the home exercise programme daily. One participant reported doing no home exercises

64 at all. Both the class based and home exercise programme were designed to increase shoulder
65 strength, mobility and proprioception. The CI, a physiotherapist, was responsible for recruiting,
66 consenting and interviewing all the participants who then took part in this qualitative study. She also
67 transcribed the interviews, coded the transcripts and led the development of the themes from the
68 data. Cross verification or researcher triangulation was achieved with another researcher
69 independently coding and analysing the transcripts and a consensus being reached as to the themes
70 and sub-themes.

71 **2.3 Ethical considerations**

72 Ethical approval was granted for this study from Bromley Research Ethics Committee, Bromley
73 Primary Care Trust, Bassetts House, Broadwater Gardens, Farnborough, Kent BR6 7UA (REC ref:
74 08/H0805/21). Written informed consent was obtained from each participant prior to interview.
75 Anonymity and confidentiality of participants was ensured in the process of data collection and
76 analysis through transcripts and recordings being identified by participant number only.

77 **2.4 Participants and recruitment**

78 A minimum of ten and a maximum of forty participants were sought to be interviewed,
79 dependent on resources available. Participants were purposively sampled from participants taking
80 part in the RCT, to ensure the views of people from different age groups, gender and social
81 backgrounds were captured. Participants who completed the main study between January 2012 and
82 April 2013 (n=45) were approached by email, post or telephone and invited to attend for an
83 interview. All participants were interviewed following their one year review at the end of the RCT.

84 **2.5 Interviews**

85 Interviews took between 12-35 minutes each and were face to face semi-structured interviews.
86 They were conducted by a physiotherapist researcher in a quiet assessment room in a clinical
87 research facility in a large central London National Health Service (NHS) Trust. Interviews were
88 conducted solely by the chief investigator (CI) with only the CI and participant present and were
89 audio recorded on two digital Dictaphones to ensure accuracy and preservation of the information.
90 No field notes were made. The interviews were transcribed verbatim by the CI and checked for
91 accuracy by one of the co -authors against the original recording. Participants were offered a copy of
92 the transcript of the interview. A naturalism mode of transcription was used where the transcript
93 matches as closely as possible the actual interview with every utterance recorded (15). No repeat
94 interviews were conducted.

95 An iterative research strategy was adopted, with open questions framed around the interview
96 schedule/ topic guide (Appendix), starting with general questions which were then honed to more
97 specific questions based on the responses of the participant but within the wider context of the
98 research aims.

99 In developing the interview guide a deductive approach was taken, using topics generated from
100 the CI's personal experience, reflection, as well as the literature. A list of topics to be explored was
101 generated, from which questions were developed.

102 At the start of each interview the participant was welcomed and thanked, followed by a synopsis
103 of the participant's involvement in the study (start date and intervention). The purpose of this was
104 to relax the participant and provide focus to the interview.

105 Each participant was then asked a series of questions (Appendix), however they were not
106 necessarily asked in the same order as detailed in the Table, as is common practice in semi-
107 structured interview methods (16). Further questions were asked if clarification was required or if
108 probing was necessary to gain more details.

109 **2.6 Data analysis**

110 A thematic style of analysis was used to explore across the data set to identify repeating patterns
111 of meaning. An inductive approach was taken where there were no pre-determined themes set to
112 explore and the analysis was data driven. The thematic analysis was undertaken by the CI using the
113 six point guide described by Braun (17). The six stages included; familiarisation with the data through
114 reading and re-reading; the generation of initial codes using Nvivo V10 software (QSR International
115 (UK) Ltd, London UK); then analysing and grouping the codes to generate themes, review, discussion
116 and consensus between the researchers regarding the themes, their name and definition. Extracts
117 from the interviews were chosen to illustrate effectively the themes and sub themes. The final stage
118 was writing of the discussion where relevant literature was reviewed and cross comparisons made
119 with the findings of this study to enable synthesis for the reader. Divergent views were reported
120 within the themes.

121 Triangulation was achieved through checking of the transcripts against the original recordings
122 and the discussions between the researchers regarding codes, themes and analysis. The participants
123 did not have an opportunity to provide feedback on the findings.

124

125 **3. Findings and results**

126

127 **3.1 Sample description**

128 Twelve participants responded to the request to take part in the study and were interviewed with
129 an equal number of males and females and an equal number allocated to the treatment and placebo
130 groups. The majority were aged between 50-69 years (50%) and employed (58%). The mean change
131 (improvement) in the Oxford Shoulder Score (OSS) over the twelve-month period was 14.17 (range
132 0-22), with 6 points change representing a clinically meaningful change (18). The OSS consists of
133 twelve questions, four pertaining to pain (33% of total score) and eight (67% of total score) to assess
134 activities involved in daily function (19, 20). The mean percentage change in pain (when performing
135 activities) intensity as measured by the numerical rating score (NRS) was an 81% decrease which
136 equates to a substantial improvement (21). The NRS is an 11-point scale anchored on the left with 0
137 representing no pain and 10 the worst pain imaginable. The characteristics were representative of
138 the wider participant group of the randomised controlled trial reflecting the purposeful sampling
139 method used. There was no significant difference in age, employment of mean change in OSS
140 between those who responded to the request to take part in the qualitative study and those who did
141 not.

142 **4. Thematic analysis and discussion**

143 This study provides an invaluable insight into the individual participant's experiences of carrying
144 out a class based and home exercise programme. It helps guide and shape future studies and current
145 practice. The context of RC tendinopathy must be considered when discussing participant's
146 experiences and their adherence to treatment in particular. The context of a condition is known to
147 be an important influence on how a patient absorbs information and decides to use that information
148 (22). Patients with chronic conditions have been found to be less adherent, although not statistically
149 significant, than those with acute post-operative conditions (9). It is well recognised that the
150 motivation to adhere with treatment can differ depending on the condition and population (23).

151 The barriers and enablers to exercise highlighted in this study indicate that there are few key
152 areas which could be enhanced to maximise patient's engagement with their treatment.

153 Three main themes were identified from the analysis of the transcripts:

- 154 1. Experiences relating to participation in a scientific study
- 155 2. Self-efficacy
- 156 3. Enablers/facilitators and barriers to exercise

157

158 **4.1 Experiences relating to participation in a scientific study**

159 Participants were motivated to take part in the study by both the trial processes (specialist
160 assessments and additional symptom monitoring and assistance as part of the trial follow up which
161 they were aware was over and above routine treatment) and by the interventions which were
162 perceived as a source of potential benefit.

163 *“I felt that the study would benefit myself plus other people.”* Participant 57.

164 Another aspect of the trial participation which participants commented on was the feeling of
165 obligation to the trial or the scientific process of the trial which increased their motivation or ability
166 to adhere with the prescribed treatment.

167 *“The study gave me the incentive to carry on doing the exercises and so I was quite pleased with that
168 and also to have a measure made of how well I was progressing.”* Participant 62.

169 *“I would have stopped doing it [the exercises] then [on discharge from the class at eight weeks] so
170 the further follow up was very useful to me.”* Participant 60.

171 These comments are illustrative of the value the participants placed on the follow up and more
172 intensive monitoring and feedback regarding their progress and condition which they received on
173 the trial. It is unrealistic to imagine that this level of supervision (year-long follow up) would be
174 possible in current clinical practice. However, it might be possible to schedule an additional review
175 appointment a few months after the time the patient is discharged. This might further encourage
176 and motivate the individual to continue with the exercise programme, allow progression of the
177 exercises ensuring they continue to be relevant to the patient and may (if future research
178 demonstrates) translate to improved outcomes. This additional review appointment could
179 potentially take the form of; face to face appointments, a telephone call, or email correspondence
180 depending on resource availability and patient preference.

181 However, one participant felt that they were recovering well on discharge from the class and
182 would have been happy to cease treatment at that point with no further desire to have been
183 followed up or monitored;

184 *“The assessments, I wouldn’t honestly say I found them helpful because the condition was clearing
185 up....I would have been happy to leave physio at 8 weeks.”* Participant 76.

186 The expressed preference of the majority of participants for the ongoing support is in concordance
187 with studies investigating barriers and enablers to adherence with a home exercise programme for
188 RC tendinopathy (9, 24, 25). The feedback and monitoring is essential in conveying the importance

189 and value of the rehabilitative process, progressing exercises where appropriate to gain maximal
190 outcome as well as recognising the patient's efforts, their progress and achievements. Patients may
191 be motivated by a desire to please or not let down healthcare professionals (25, 26).

192 **4.2 Self-efficacy**

193 The degree of an individual's self-efficacy is important in the rehabilitation process as it can
194 influence the engagement of the individual in the rehabilitation and the extent to which they will
195 preserve when faced with difficulties or distractions (27) and can determine how they incorporate a
196 treatment plan or exercise programme into their everyday lives (25).

197 The importance placed on being able to manage their own condition through improved
198 knowledge and a feeling of increased control was highlighted as a recurrent theme within the
199 participants' transcripts.

200 *"I was very down in the dumps because I was constantly in discomfort and no-one was listening and*
201 *once I'd started the exercises and whatever I was taking I found it was a lot easier because I felt it*
202 *was something I could manage myself and I could control what I was doing."* Participant 57.

203 *"I've been through a series of classes and I've seen the benefits. I've just come to the realisation that*
204 *it is something that I just have to manage and by doing the exercises I feel I can manage it...exercise*
205 *is key for me."* Participant 75.

206 Education regarding the condition, the treatment options available and the expected
207 recovery period have all been found to be key components to facilitate adherence to treatment (3).
208 This is especially the case with RC tendinopathy where a meaningful recovery often takes several
209 months (28). Indeed, one participant commented;

210 *"At first I expected to see an improvement within a few weeks but it was so small. They tried to*
211 *encourage me saying it was a long haul and by the end they said it would be six to nine months. I*
212 *think it might have helped to know the six to nine month time frame at the beginning."* Participant
213 62.

214 This illustrates and emphasises the need to find strategies to educate patients regarding expected
215 rehabilitation and recovery times to ensure their expectations are realistic.

216 **4.3 Enablers and barriers to exercise**

217 The exercise group was cited as being good fun and helpful by several participants;

218 *"The group aspect was good, it was really fun.....I enjoyed doing the exercises every Thursday*
219 *morning, it was one hours really fun and that really helped me a lot."* Participant 56.

220 Group exercise has been found to be beneficial in other physiotherapy studies where peer
221 support has been cited as a benefit of class based exercise over individual exercise (29, 30). The
222 enjoyment of the exercise class coupled with the supervision and assistance given to them within
223 the class proved to be an enabler to them exercising. However, one participant expressed they
224 found exercising in a class setting uncomfortable and so reported they did not attend regularly.

225 The individualisation of treatment in a class setting is a challenge and some class attendees run the
226 risk of feeling that they are being given a one size fits all approach as one participant voiced in the
227 interview;

228 *“There were several people in the group, everybody doing the same exercise and I did those*
229 *exercises. I had several sessions but it didn’t help at all.”* Participant 70.

230 Another participant felt,

231 *“Once I knew what to do I could pretty much do it at home”* Participant 66.

232 This range of comments supports the idea empowering patients to manage their own attendance
233 and discharge from a class based intervention in line with their personal requirements from the
234 service. This study highlighted that some participants felt they had attended enough or too many
235 classes and others would have preferred more. One suggestion might be that patients could elect
236 when to leave the class and continue with exercises at home. Thus, reducing non-attendance and
237 allowing those who need more classes to access these within reason.

238 Pain was found to have been a motivator, enabler and facilitator to exercise. In some,
239 exercise decreased their shoulder pain and therefore this increased their motivation and incentive to
240 continue with the exercises and get continued and or increased relief. Initially it is often the pain at
241 its peak which has led the person to seek treatment and thus it served as a prompt or reminder to
242 do the exercises.

243 *“As I was getting better, my motivation increased.”* Participant 60.

244 This concept also links into perceived benefit from the treatment where if the patient can see or
245 experience immediate benefits from the treatment the patient is believed to be more likely to
246 continue with it. This is interlinked with the relationship between the perceived balance between
247 the costs and benefits of rehabilitation (31). Littlewood et al (2014) found that quick and meaningful
248 relief in pain or response to therapy was a crucial feature of continued engagement with exercise
249 treatment for rotator cuff tendinopathy (25).

250 Pain was also used to assist in the self-management of the condition. Participants described
251 re-starting the exercises when they experienced pain again.

252 *"It's easier to do the exercises when you can feel a definite benefit. It's always hard to exercise to*
253 *prevent something from getting worse."* Participant 66.

254 This further emphasises the need for the right exercises or treatment plan for that individual at the
255 right time so that they can see that progress is being made. This could be a feature of a review
256 appointment, progressing exercises or reviewing exercises to make sure that those which are being
257 continued are appropriate and will result in reduced re-access to the healthcare system.

258 However, others found pain to be a barrier to exercise.

259 *"Those exercises were hurting me and I was not benefitting at all."* Participant 70.

260 *"There was one exercise that I was given earlier that I thought at the time might have made things*
261 *worse, so I stopped doing it"* participant 69.

262 This is in concordance with some of the literature where pain has similarly been found to be a
263 barrier to exercise, especially worsening pain with exercise (32, 33).

264 The relationship between the reduction in the impact that the condition is having on the
265 person's life and the reduction in the adherence is intrinsically interlinked. As the illness becomes
266 less important in the person's life and the perceived seriousness of it reduces. Sluijjs et al (1993) who
267 investigated physiotherapist's and patient's beliefs regarding adherence with exercises in the private
268 sector in the Netherlands found that the degree of disability provided the strongest link with the
269 level of adherence with an exercise programme. Those whose condition caused greater difficulties
270 with functioning demonstrated greater adherence to the home exercise programme than those who
271 had less hindrance from their condition;

272 *"I think the low level of my condition meant I was not highly motivated [to do the exercises]."*
273 Participant 76.

274 The participant's responses also suggest that the right equipment should be provided.
275 Several participants reported the Theraband™ (Performance Health, Akron, Ohio, USA) which was
276 provided to the participants to allow them to carry out the home exercise programme, as a key
277 enabler. They found the resistance exercises were effective and found it a reminder or visual prompt
278 to do them.

279 *"you can do it everywhere and anywhere."* Participant 64.

280 *“The elastic band, I think, is worth the money and I liked being able to go up the levels....I felt like I*
281 *was progressing.”* Participant 60.

282 Time and the need to fit in an extra thing during the day have been frequently cited in the literature
283 as barriers to exercise (9, 25). This was highlighted in some of the participant’s responses, *“never*
284 *find time.”* Participant 56.

285 The importance of linking in doing the exercises with an already established routine was
286 highlighted within the transcripts. Functional routines such as washing, dressing or meal times, were
287 all discussed as possible opportunities where exercise could be incorporated as part of that daily
288 routine. These strategies could be suggested and discussed with patients to collaboratively problem
289 solve to maximise adherence in a clinical setting. This is supported by the findings by Williams and
290 Adams (2000) who found that those who integrated their exercise programme into their lifestyle
291 managed a greater level of adherence with minimal behavioural change (34).

292 The participants cited forgetfulness as a barrier and suggestions were made regarding smart
293 phone reminders or daily emails from the research team to aid memory. M-health or mobile-health
294 is a term which is used to describe the support of health care and public health through the use of
295 mobile devices (35). A systematic review investigating the effect of m-health on chronic disease
296 concluded there was mixed evidence supporting its use (36). The potential for benefit is clear with
297 the widespread use of mobile and wireless devices throughout the world in all spheres of daily life
298 but currently evidence to support its influence on adherence to healthcare interventions is
299 inconclusive.

300 Some participants expressed it was their lack of motivation and self-discipline which was the
301 overwhelming barrier to exercise;

302 *“At home there was the problem with self-discipline, finding the time for it. But I have got loads of*
303 *time but still its self-discipline that’s always the problem.....the big problem was lack of motivation.”*
304 Participant 62.

305 It is unsurprising that this was expressed in the data within this study as low self-efficacy,
306 depression, anxiety, helplessness and poor self-discipline have all been found to be barriers to
307 treatment adherence (32).

308 **4.4 Limitations**

309 The sample size was small within this study and participants were selected pragmatically due to
310 the resources available. Having only the views of twelve participants carries with it a risk of bias that
311 that views raised were not representative of the larger sample. However, data saturation was

312 considered to be achieved as the data ceased to reveal new themes (37). The richness of the data
313 generated from the participants interviewed with overlapping themes also gives confirmability to
314 the conclusions drawn.

315 An iterative approach was used in this study to influence subsequent interviews after analysis of
316 preceding data. Whilst this allows rich and detailed data collection to occur over time and at many
317 different levels it also carries with it the risk of researcher bias with preconceived assumptions and
318 the potential narrowing of the topic field. In order to try to mitigate this the researcher's ideas and
319 thoughts during and before the process were documented. This heightened her awareness to her
320 preconceptions and how this might interact with the data. Each interview was conducted stating
321 with broad opening questions to allow the participant to steer the conversation and provide the
322 information they felt was relevant.

323 The interviewer was the physiotherapist whom had assessed the participants and co-designed
324 the study. This carries an inherent bias. Whilst the interviewees were put at ease and invited to
325 explore the negative as well as the positive aspects of the trial and the experiences some might have
326 been reluctant about being honest or held back with some of their responses. However the
327 positionality of the interviewer also brought some advantages, an in-depth understanding of the
328 intervention and a working therapist-patient relationship having met the participants on a minimum
329 of five occasions previously. It must also be acknowledged that although there was triangulation of
330 the data from a second researcher who is also a physiotherapist to agree themes the interpretation
331 of the data is largely the perspective of one physiotherapist. Another researcher examining the raw
332 data might well have elicited different themes.

333 The interviews were conducted ten months after the intervention had ceased as the participants
334 attended the exercise class only for the first two months of the year-long follow up. This
335 undoubtedly challenges the recall of the events, experiences and feelings at the time the participant
336 was involved in the RCT.

337 Additionally, the level of education attained by the participants was also not recorded in this
338 study. This has previously been shown to be significantly related to adherence (4, 9).

339

340 5 Conclusions:

341 This study explored the experiences of participants' taking part in a randomised controlled trial
342 and the enablers or barriers to adherence with the exercise based intervention.

343 Participants valued their experience within the study as largely being a positive one. The main
 344 enablers to exercise were highlighted as equipment, the perceived benefit from the actual exercises,
 345 incorporating exercise into an established routine, the longer follow up and more intensive
 346 monitoring and feedback received in the trial. Barriers included lack of motivation, lack of suitable
 347 equipment and pain whether it improving or worsening.

348 These findings can be used to inform study design for future studies and guide current clinical
 349 practice with self-discharge from classes and longer term monitoring being key clinical areas for
 350 further investigation.

351

352

353 **Appendix:**

354 Interview guide

Topic	Questions and prompts
Overview of experience.	Can you give me an overview of your experience of the study? Prompts: can you describe your experience, what was your lasting memory or overall impression of doing the exercises, your shoulder pain?
Aspects of exercise programme most/least enjoyed.	Were there any aspects of the exercise programme which most/ least enjoyed? What were they?
Aspects of the exercise programme easiest/hardest to implement.	Were there any aspects of the exercise programme which you found easiest/ hardest to implement? What were they?
Aspects the exercise programme, if any, continued beyond the study.	Were there any aspects the exercise programme, if any, continued beyond the study? If so which ones and to what extent? Any reasons why you continued? Any perceived benefits? Do you plan to continue long term?

Factors or strategies which participants found helped them to take the supplements (Enablers).

Did you have any or find any factors or strategies which you found helped you to take the supplements (enablers)? If so what and how did they help you?

Prompts: Support from family or friends, individual skills such as organising and planning, written advice, email/phone support? Provision of supplements and the way in which they were provided?

Factors or strategies which participants found helped them to complete the exercises (Enablers).

Did you have any or find any factors or strategies which you found helped you to complete the exercises (enablers)? If so what and how did they help you?

Prompts: Support from family or friends, individual skills such as organising and planning, motivation? Provision of exercise booklet, theraband, having attended the exercise class and email/phone support?

Factors or problems which participants encountered which prevented or limited their ability to carry out the exercise programme (barriers).

Were there any factors or problems which you encountered which prevented or limited your ability to carry out the exercise programme (barriers)? If so what, is there anything which could be done to alleviate them?

Physical experiences during the intervention (for example feelings of wellbeing).

Can you discuss any physical experiences during the intervention (for example feelings of wellbeing)? If yes how did these affect you? Any side effects?

Emotional experiences during the intervention (for example feelings of control/ lack of control).

Can you discuss any emotional experiences during the intervention (for example feelings of control/ lack of control)? Do you remember any feelings or emotions during the study? If yes what were they, when did they occur? Prompts: feeling more or less in control of their condition and its treatment- ask for reasons why. Feeling more of less certain of a positive outcome from treatment?

Social consequences of the
intervention and taking part in a
study.

Did you find any social consequences of taking part in
the study or doing the exercises? If yes how did you
manage these?

355

356

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358

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