



**Manchester
Metropolitan
University**

Mallows, A, Jackson, J, Littlewood, C ORCID logoORCID:
<https://orcid.org/0000-0002-7703-727X> and Debenham, J (2020) The
association of working alliance, outcome expectation, adherence and self-
efficacy with clinical outcomes for Achilles tendinopathy: A feasibility cohort
study (the MAP study). *Musculoskeletal Care*. ISSN 1478-2189

Downloaded from: <https://e-space.mmu.ac.uk/625474/>

Version: Accepted Version

Publisher: Wiley

DOI: <https://doi.org/10.1002/msc.1451>

Please cite the published version

<https://e-space.mmu.ac.uk>

1 Introduction

2 Achilles tendon-related pain and its associated functional limitations, termed
3 tendinopathy, can be traumatic or insidious in onset and short-lasting or persistent in
4 nature (Scott et al., 2013). Achilles tendinopathy (AT) can be characterised by a
5 reduced ability of the tendon to sustain tensile load (Cook & Purdam, 2009), resulting
6 in decreased activity participation, working ability and quality of life (Longo, Ronga, &
7 Maffulli, 2009). Factors influencing this impact are poorly understood; little is known
8 about mechanisms driving pain and the response (or lack of) to rehabilitation (Mallows,
9 Debenham, Malliaras, Stace, & Littlewood, 2017; O'Neill, Watson, & Barry, 2015; Rio
10 et al., 2015, 2014). Furthermore, despite structural changes being the focus of
11 tendinopathy models (Cook & Purdam, 2009; Cook, Rio, Purdam, & Docking, 2016)
12 current evidence suggests that structural changes on imaging of tendinopathic
13 tendons do not explain the response to exercise-led interventions (Drew, Smith,
14 Littlewood, & Sturrock, 2012; Färnqvist, Malliaras, & Pearson, 2019). Whilst
15 recognising that advancements in imaging techniques may yet contribute to improved
16 outcome by enhancing diagnosis (Khan et al., 2003), current evidence suggests that
17 clinical outcome for people with musculoskeletal conditions is influenced by similar
18 factors across different musculoskeletal presentations (Mallen, Peat, Thomas, Dunn,
19 & Croft, 2007). Factors such as pain intensity, association of psychological distress
20 and high functional disability, appear of key influence and the addition of a specific
21 structural diagnosis is not (Chester, Jerosch-Herold, Lewis, & Shepstone, 2016; de
22 Vos Andersen, Kent, Hjort, & Christiansen, 2017). As current strategies appear
23 incomplete, the need to investigate factors beyond the specific effects of exercise on
24 peripheral tissue appears to be one way of potentially optimising outcomes in AT. In
25 recent times, cognitive and contextual influences such as self-efficacy, working

26 alliance and expectations have been highlighted as potentially relevant factors that
27 would benefit from investigation in tendinopathy (Mallows, Debenham, Walker, &
28 Littlewood, 2017; Mallows et al., 2017). Working alliance, also known as ‘therapeutic
29 alliance’ or ‘patient-therapist relationship’, can be defined as “the working rapport or
30 positive social connection between the patient and the therapist” (Joyce, Ogrodniczuk,
31 Piper, & McCallum, 2003).

32

33 Based on this need, high-quality research in relation to factors associated with
34 outcome is warranted. However, to enhance the success of future large cohort studies,
35 several factors potentially affecting feasibility need to be investigated.

36

37 The primary aim of this study was to evaluate the feasibility of a large longitudinal
38 cohort study utilising an online platform to investigate the association and predictive
39 relationship of working alliance, outcome expectations, adherence and self-efficacy
40 with outcome in the management of AT. The objectives of this study were: 1) to
41 determine the recruitment & retention rate and 2) to carry out preliminary data analysis
42 of the selected variables and clinical outcomes.

43

44 **Ethical Approval**

45 Ethical approval was sought and granted on 14th September 2017 by London -
46 Camden & Kings Cross Research Ethics Committee; REC reference 17/LO/1583 and
47 by the Health Research Authority on 15th September 2017; IRAS project ID: 219457.

48

49 **Methods / Design**

50 **Study Design**

51 A multi-centred, longitudinal feasibility cohort study was conducted to meet the study's
52 aim and was reported according STROBE guidelines for reporting of observational
53 studies (von Elm et al., 2007).

54

55 **Study Setting**

56 Potential participants were recruited from physiotherapy services at a large NHS
57 Foundation Trust site, two NHS musculoskeletal provider services and three private
58 practices within East Anglia from October 2017 to September 2018.

59

60 **Recruitment Process**

61 Potential participants were identified at each site by their treating physiotherapist. To
62 minimise burden on the physiotherapist, the physiotherapist explained the purpose of
63 the study, the methods involved, and then provided a card detailing a website which
64 hosted further information. Training in the study processes was provided to the
65 physiotherapists in line with Good Clinical Practice (GCP) recommendations (NIHR
66 Clinical Research Network Coordinating Centre, 2016). Once identified and provided
67 with a card, potential participants were then able to consider whether they would like
68 to participate or not. If potential participants decided not to participate in the study
69 while still in the clinic there was the option to provide a reason as to why on the reverse
70 of the card and leave this anonymously in a marked box in the reception area.

71

72 On the card, the potential participant was directed to [a website \(www.managing-
73 achilles-pain.com\)](http://www.managing-achilles-pain.com), which was designed as a part of the bespoke online platform for
74 the purposes of this study. The website hosted a landing page and blog post
75 containing password protected information (the participant information sheet, consent
76 form) and the outcome measures in the form of an online questionnaire). The

77 participant could freely read the participant information sheet and consent details
78 without time constraint, and decide to participate or not. Participants were free to leave
79 the website without having completed the consent form. This information clearly stated
80 that involvement was voluntary, participants were free to withdraw at any time and
81 information would not be shared with their physiotherapist. It also included contact
82 details to provide the opportunity for questions. If the participant consented to take
83 part, they were then able to access the online questionnaire.

84

85 **Eligibility Criteria**

86 Participants were required to be a minimum of 18 years old, have access to the
87 internet, an available email address, proficient with written and spoken English, and
88 identified as having AT as determined by the attending physiotherapist according to
89 established criteria (Adrian Mallows, Debenham, Walker, & Littlewood, 2016; Martin
90 et al., 2018):

- 91 • Local Achilles tendon pain reproduced with load-based activity, for
92 example heel raising, for at least ten days duration
- 93 • Tenderness on palpation of the Achilles tendon
- 94 • Range of movement at the ankle within normal limits

95 To minimise confounding variables for recovery, participants presenting post-
96 operatively, or with lumbar spine related disorders which may refer directly to the
97 Achilles tendon region were excluded (Mallows et al., 2016; Martin et al., 2018). The
98 exclusion criteria were:

- 99 • Tendon rupture
- 100 • Receiving treatment for post-surgical recovery
- 101 • Reproduction of pain in the Achilles region on movements of the spine

102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126

Care Pathways and Physiotherapy

The care pathway for patients recruited into this cohort study did not change as a result of study participation; physiotherapy treatment, referral pathways and waiting times were unaffected.

Variables

Factors beyond the specific effects of exercise on peripheral tissue were the focus of this study. As cognitive and contextual factors may be associated with clinical outcome in AT (Mallows et al., 2017), factors investigated by this study were reflective of these.

- Working Alliance measured by the Working Alliance Inventory Short-Form (WAI-SF) (Hall, Ferreira, Maher, Latimer, & Ferreira, 2010; Hanson, Curry, & Bandalos, 2002; Hatcher & Gillaspay, 2006; Tracey & Kokotovic, 1989). The WAI-SF requires the participant to rate their agreement with their therapist on a numerical rating scale from 1-7 in twelve domains. The total score ranges from 12-84, where a higher score represents a stronger therapeutic alliance.
- Outcome expectation measured by the Global Rating of Change (GRC) for Outcome Expectation (Costa et al., 2008). A numerical rating scale from -5 (very much worse) to +5 (very much better) is considered optimal with a change of two or more points considered meaningful (Kamper, 2009). As the literature does not support a standardised measure of expectation, a single question with clear instructions was provided in order to differentiate predicted expectations (what the patient thinks will happen, including negative expectations) from ideal expectations (what the patient wants to happen) (Bialosky, Bishop, & Cleland, 2010). Consequently, participants were asked to ‘please indicate what you think

127 will occur, NOT what you want to occur; at the end of your treatment, what do
128 you expect the pain associated with your Achilles tendon to be?' (Bialosky et
129 al., 2010).

130 • Adherence measured by a retrospective patient self-report scale (Bassett,
131 2003). While limited, such scales are convenient and simple to use. In response
132 to the question, 'if you have been requested by your physiotherapist to do
133 exercises at home, please select the word that overall best indicates the extent
134 you have followed the instruction', participants responded using a 5-item
135 numerical scale from 0 (not at all) to 5 (as advised) (Brewer et al., 2000; Taylor
136 & May, 1996).

137 • Self-efficacy measured by the Pain Self-Efficacy Questionnaire (PSEQ)
138 (Asghari & Nicholas, 2001; Miles, Pincus, Carnes, Taylor, & Underwood, 2011;
139 Nicholas, 2007). The PSEQ requires the participant to state their confidence,
140 despite pain, on a numerical rating scale of 0-6 in ten domains; the total score
141 ranges from 0-60, where a higher score represents stronger self-efficacy beliefs
142 (Asghari & Nicholas, 2001).

143

144 **Clinical Outcome Measures**

145 Due to concerns surrounding the usefulness of the VISA-A to accurately inform a
146 change in a patient's clinical status (Mallows, Littlewood, & Malliaras, 2017), the
147 primary clinical outcome measure chosen was the Lower Extremity Functional Score
148 (LEFS) (Binkley, Stratford, Lott, & Riddle, 1999). The LEFS is a twenty item
149 questionnaire with excellent test-retest reliability and construct validity (Ashby,
150 Grocott, & Haddad, 2008; Binkley et al., 1999), and is recommended in current clinical
151 guidelines to assess activity participation (Martin et al., 2018). The twenty items cover

152 a range of lower extremity functional activities and are scored on a numerical rating
153 scale from zero (extreme difficulty or unable to perform activity) to four (no difficulty).
154 This provides maximum scale points of eighty, with zero representing maximum
155 dysfunction. A secondary clinical outcome measure was the Numerical Pain Rating
156 Scale (NPRS) (Farrar, Young, LaMoreaux, Werth, & Poole, 2001).

157

158 **Collection of Clinical Outcome Measures and Variables**

159 Clinical outcome measures (LEFS and NPRS) were collected together with the other
160 outcome variables (GRC, PSEQ, WAI-SF and patient self-report scale) via the online
161 platform ([www. managing-achilles-pain.com](http://www.managing-achilles-pain.com)). Responses from electronic versions of
162 the measures in the form of a questionnaire were collected on three occasions; at
163 baseline, at six and finally at twelve weeks following completion of the first
164 questionnaire. Twelve weeks represents a clinically meaningful timepoint; response to
165 exercise may plateau after this (Murphy et al., 2018), leading to the consideration of a
166 change in treatment for non-responders. Consequently, determining predictive factors
167 early in the rehabilitation (such as baseline and six weeks) would seem important. The
168 participant did not have access to the responses they provided previously. To
169 maximise response rates, non-responders to follow up were sent two email reminders
170 to encourage them to re-visit the website and complete the questionnaire

171

172 **Sample Size**

173 Feasibility studies typically do not evaluate the clinical outcome of interest because
174 they do not undertake hypothesis testing and typically are not of a sufficient size to
175 support such statistical testing; the sample size is estimated to enable evaluation of
176 the key feasibility criteria (UK National Institution for Health Research (NIHR), 2017).

177 To meet the study's objective of evaluating the recruitment rate and retention, a 'recruit
178 to time' approach was used over a period of eleven months to fit within the wider scope
179 of the research programme.

180

181 **Statistical Analysis**

182 Feasibility outcomes (recruitment and retention rates) were described using
183 descriptive statistics. Primary hypothesis testing is not recommended for this size and
184 type of study (Lancaster, Dodd, & Williamson, 2004; UK National Institution for Health
185 Research (NIHR), 2017), however a preliminary correlational analysis was conducted
186 to assess 1) the overall relationship between the variables of working alliance,
187 outcome expectation, adherence and self-efficacy and the clinical outcome measures
188 of pain and function and 2) between baseline and the twelve week follow-up time point.
189 The value of the correlation coefficient was interpreted as small (.10 to .29); medium
190 (.30 to .49); and large (.50 to 1.0) (Cohen, 1988). Statistical analysis was undertaken
191 using SPSS (version 25.0, Armonk, NY: IBM Corp).

192

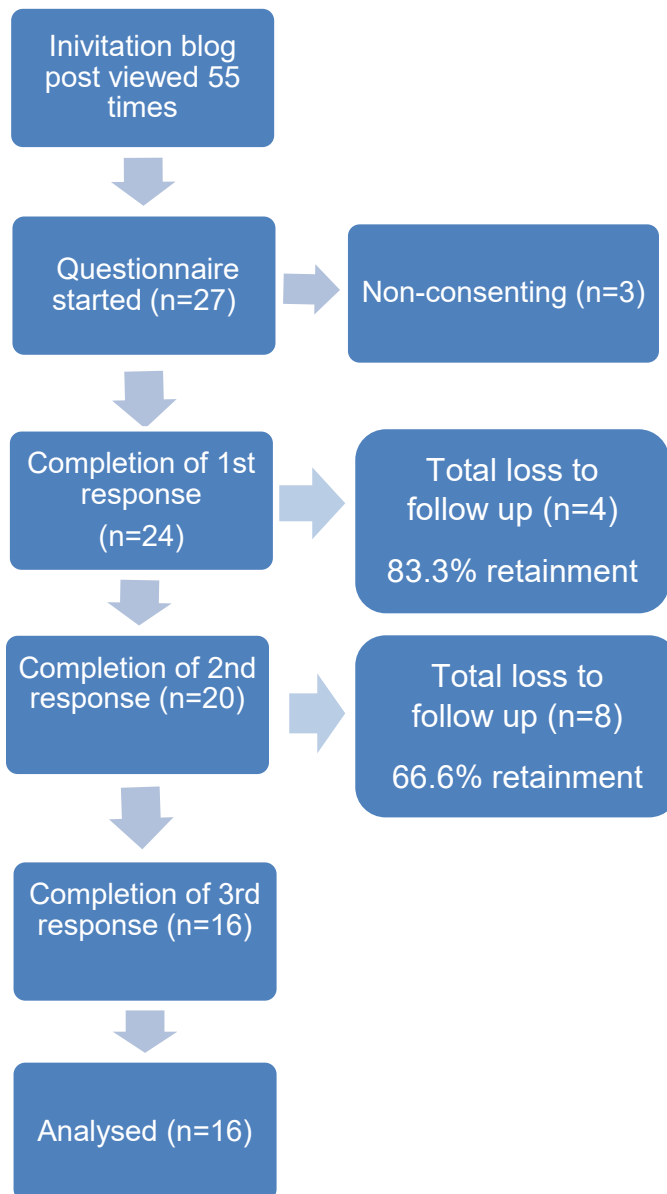
193 **Results**

194 **Feasibility Analysis - Recruitment and Retention**

195 The physiotherapists were issued 1100 cards to provide to potential patient
196 participants. Of these, 795 were returned on the completion of the study and hence it
197 is assumed that 305 were provided to potential patient participants. The traffic through
198 the website recorded a total 55 views of the blog post containing the information about
199 the study. These 55 views resulted in 24 participants (11 males) consenting to join the
200 study. Table 3 describes the participants' details. No adverse events were reported by
201 any participants. The study asked participants to complete the same questionnaire on
202 three separate occasions. The questionnaire at baseline was started 63 times and

203 completed on 60 separate occasions resulting in a 95% conversion rate from those
204 participants who provided initial consent. Full details are listed in figure 1. All three
205 participants who did not complete the questionnaire at baseline aborted when asked
206 for their email address and as such did not consent to join the study. Retainment for
207 completion of the questionnaire for a second time was 83.3% and for the third time
208 was 66.6%. All questionnaires were completed fully without any missing data yielding
209 a missing data indicator of 0%.

210



211

212 Figure 1 Participants flow through the MAP study

213

214 **Correlation Analysis**

215 Initially the data were tested for normality. The results are presented in table 2 and

216 indicate that the data from the WAI-SF ($p=0.026$), GRC ($p=0.003$), NPRS ($p=0.043$)

217 and Patient Self-Report Scales of Their Home-Based Rehabilitation Adherence

218 ($p < 0.001$) were not normally distributed as the value of significance is $p < 0.05$ (Pallant,
 219 2016). Accordingly, baseline characteristics for all participants shown in table 3 are
 220 median and range values. As data were not normally distributed a non-parametric test
 221 (Mann-Whitney Test) was used to assess for differences between the responders and
 222 non-responders (Pallant, 2016). Statistically significant differences were found
 223 between the median values of the WAI-SF (responders 78.5, non-responders 60;
 224 $p = 0.003$), the PSEQ (responders 50.05, non-responders 35; $p = 0.004$) and the LEFS
 225 (responders 57, non-responders 43; $p = 0.011$).

226

	Shapiro-Wilk		
	(n)	Statistic	Level of significance
WAI-SF	24	.904	.026*
GRC	24	.856	.003*
PSEQ	24	.947	.238
NPRS	24	.914	.043*
LEFS	24	.959	.428
Patient Self-Report Scales of Their Home-Based Rehabilitation Adherence	24	.693	<.001*

227 Table 2 Shapiro-Wilk test for normality of baseline data

228 * Indicates non-normal distribution of data ($p < 0.05$)

229

230

231

232

233

234

235

236

237

238

239

240

241

Baseline	Participants included in analysis: responders	Participants lost to follow up: non-responders	Overall
	(Median) Range	(Median) Range	(Median) Range
Age range+ (years)	19% 30-39 25% 40-49 31% 50-59 19% 60-69 06% 70-79	38% 30-39 25% 40-49 25% 50-59 12% 60-69 00% 70-79	25% 30-39 25% 40-49 29% 50-59 17% 60-69 04% 70-79
Sex (% female)	56%	50%	54%
WAI-SF	(78.5) 47-84	(60)* 40-70	(73) 40-84
PSEQ	(50.5) 24.8-60.0	(35)* 19-45.8	(45.8) 19-60
GRC	(3) 0-5	(3.5) -3-4	(3) -3-5
LEFS	(57) 21-75	(43)* 38-60	(53.5) 21-60
NPRS	(45) 5-71	(57.5) 38-81	(50) 5-81
Patient Self-Report Scales of Their Home-Based Rehabilitation Adherence	(5) 1-5	(5) 3-5	(5) 1-5

242 Table 3 Baseline characteristics

243 WAI_SF- Working Alliance Inventory – Short Form (score ranges from 12-84, where a higher score represents a
244 stronger therapeutic alliance).
245 PSEQ - Pain Self-Efficacy Questionnaire (score ranges from 0-60, where a higher score represents stronger self-
246 efficacy beliefs).
247 GRC - Global rating of change for outcome expectation (scale from -5 (very much worse) to +5 (very much better)).
248 LEFS - Lower Extremity Functional Score (score ranges from 0-80, with 0 representing maximum dysfunction).
249 NPRS - Numerical Pain Rating Scale (scale ranging between 0 (no pain at all) and 10 (the worst pain ever
250 possible)).
251 Patient Self-Report Scales of Their Home-Based Rehabilitation Adherence (5-item numerical scale from 0 (not at
252 all) to 5 (as advised))
253 * Statistically significant difference ($p < 0.05$) between responders and non-responders using Mann-Whitney Test
254 + Age range was captured only

255

256 Table 4 details the results of the overall correlation between variables and clinical
257 outcomes across all time points. The relationship was investigated using Spearman's
258 rho correlation coefficient as preliminary analyses (table 2) indicated there was a
259 violation of normality in distribution of data. Overall, the measures of working alliance

260 (WAI-SF) ($\rho=-.527, p<0.001$), and pain self-efficacy (PSEQ) ($\rho=-.580, p<0.001$)
 261 have a large negative correlation with pain measured by the NPRS. Overall, outcome
 262 expectation measured by the GRC ($\rho=-.417, p=0.003$) has a medium negative
 263 correlation with NPRS measurement of pain. In addition, the WAI-SF ($\rho=.551,$
 264 $p=<0.001$), PSEQ ($\rho=.800, p=<0.001$) and GRC ($\rho=.507, p=0.001$) overall all have
 265 a large positive correlation with disability measured by the LEFS.

266
 267

	PSEQ	GRC	Patient Self-Report Scales of Their Home-Based Rehabilitation Adherence	LEFS	NPRS
WAI-SF	.669	.634	0.051	.551**	-.527**
PSEQ	-	.492	0.092	.800**	-.580**
GRC	-	-	0.005	.507**	-.417**
Patient Self-Report Scales of Their Home-Based Rehabilitation Adherence	-	-	-	0.121	-0.051
LEFS	-	-	-	-	-.677

268 Table 4 Spearman's rho correlations between measures of the variables and clinical
 269 outcome measures across all time points

270 ** Correlation is statistically significant ($p<0.01$)

271
 272
 273

	Baseline Pain self-efficacy	Baseline GRC	Baseline Patient Self-Report Scales of Their Home-Based Rehabilitation Adherence	LEFS at 12 weeks	NPRS at 12 weeks
Baseline WAI-SF	.686	.795	.143	.325	-.157
Baseline PSEQ	-	.521	.220	.650*	-.401
Baseline GRC	-	-	.160	.146	.078
Baseline Patient Self-Report Scales of Their Home-Based Rehabilitation Adherence	-	-	-	.428	.005

274 Table 5 Spearman's rho correlations between measures of the baseline variables
275 and clinical outcome measures at 12 weeks
276 * Correlation is statistically significant ($p < 0.05$)

277

278

279 Table 5 details the results of the correlation between baseline variables and clinical
280 outcomes at 12 weeks. The relationship was investigated using Spearman's rho
281 correlation coefficient as preliminary analyses performed (table 2) indicated there was
282 a violation of normality in distribution of data. There was a large, positive correlation
283 between baseline pain self-efficacy as measured by the PSEQ and disability
284 measured by the LEFS at 12 weeks ($\rho = .650, p < 0.06$). There was a medium, positive
285 correlation between baseline working alliance measured by the WAI-SF ($\rho = .325,$
286 $p < 0.219$) and adherence measured by the Patient Self-Report Scales of Their Home-
287 Based Rehabilitation Adherence ($\rho = .428, p < 0.98$) and the LEFS at 12 weeks. There

288 was a medium, negative correlation between baseline PSEQ and NPRS at 12 weeks
289 ($\rho = -.401, p < 0.124$).

290

291 **Discussion**

292 High-quality research in relation to factors associated with outcome in AT is warranted.
293 However, to enhance the success of future large cohort studies, factors potentially
294 affecting feasibility are required to be investigated. To the author's knowledge, this is
295 the first study to utilise a protocol incorporating an online platform as a data collection
296 method for a longitudinal study involving a population with AT. Accordingly, the
297 objectives of this study were: 1) to determine the recruitment & retention rate and 2)
298 to carry out preliminary data analysis of the selected variables and clinical outcomes.

299

300 **Feasibility Outcomes - Recruitment and Retention**

301 Internet-based questionnaires provide an attractive alternative to postal and telephone
302 questionnaires, but they raise important technical and methodological issues. The
303 major obstacle here is external validity; specifically related to how a representative
304 sample and adequate response rate is achieved (Braithwaite, Emery, de Lusignan, &
305 Sutton, 2003). Such obstacles were seen in this study. Although 305 cards were not
306 returned, it is not possible to determine how many of these cards were provided to
307 patients. Recruitment difficulties detailed in an accompanying process evaluation
308 suggests many of these non-returned cards may have been lost or simply not returned
309 (Mallows, Littlewood, Jackson, & Debenham, 2019). Over an eleven-month duration,
310 the traffic through the website recorded a total 55 views of the blog post containing the
311 information about the study. It is not possible to determine how many of the 31 people
312 who viewed the blog post but did not take the survey had been directed to the website

313 by an invitation card and how many were simply 'traffic'. On average of 2.2 participants
314 were recruited per month. Of these participants 66% were retained and completed all
315 three questionnaires. Whilst the difference in the attrition rates between feasibility
316 studies and their associated full trial demonstrates high variability (Cooper, Whitehead,
317 Pottrill, Julious, & Walters, 2018), strategies to maximise retention were reported in
318 the accompanying process evaluation (Mallows et al., 2019). Only three people started
319 but did not complete the initial questionnaire resulting in a 95% conversion rate.
320 Internet-based questionnaires allow the option of utilising a 'forced response' to a
321 question; the participant is not allowed to submit the questionnaire without completing
322 all the required details. This option may have been a contributing factor to the missing
323 data indicator of 0%.

324

325 **Correlation Outcomes**

326 The small sample size limits inferences from this preliminary analysis. Small sample
327 sizes increase data variability, lowering the probability of replication and as such,
328 correlation data may be unusual simply by chance. As the significance of the rho is
329 strongly influenced by the sample size (Pallant, 2016), these preliminary outcomes
330 should be interpreted cautiously. As such, future studies require a much larger sample
331 size to allow correlation inferences to be made and ascertain dependence through
332 regression analysis. Tabachnick and Fidell (Tabachnick & Fidell, 2007) provide a
333 formula for calculating sample size requirements by taking into account the number of
334 independent variables that will be used: $N > 50 + 8m$ (m = number of independent
335 variables). Utilising the number of independent variables investigated in this feasibility
336 study ($n=4$; working alliance, outcome expectation, adherence, self-efficacy), the
337 sample size required for a future study which would allow for determining prediction in

338 addition to correlation would be $50+(8 \times 4) = n > 82$. Strategies to maximise recruitment
339 were also a focus of the previously reported process evaluation (Mallows et al., 2019).
340 Suggested additional strategies included the use of posters to raise awareness with
341 patients and reminders for staff, the potential need for dedicated clinical time for
342 recruitment purposes and the need for additional communication strategies between
343 the researcher and clinicians – such as the use of a newsletter with recruitment hints
344 and tips.

345

346 **Limitations**

347 This feasibility study has some limitations. Firstly, the design of the study did not allow
348 for all feasibility data to provide complete answers; it remains uncertain how many
349 patients were given cards and how many landed on the blog page and then decided
350 not to participate. Secondly, all recruitment sites were within the UK. The online
351 platform allows for future studies to include international collaboration to improve
352 generalisability.

353

354 **Conclusion**

355 Feasibility studies ask the question ‘can this be done’? Based on the data from
356 recruitment and rates and exploratory correlation analysis a future study can be done;
357 this previously untested online platform appears feasible, but changes could be useful
358 before proceeding to a much larger study that conceivably could be rolled out across
359 English speaking countries. Changes to consider include; how the study could be
360 better publicised, such as the use of posters in clinical and staffing areas; how verbal
361 recruitment strategies could be optimised, including the potential need for dedicated
362 clinical time for recruitment; and how communication between clinicians and

363 researchers could be enhanced, such as the use of developing a newsletter as a
364 progress report.

365

366 Reference List

- 367 Asghari, A., & Nicholas, M. K. (2001). Pain self-efficacy beliefs and pain behaviour. A
368 prospective study. *Pain*, 94(1), 85–100. Retrieved from
369 <http://www.ncbi.nlm.nih.gov/pubmed/11576748>
- 370 Ashby, E., Grocott, M. P. W., & Haddad, F. S. (2008). Outcome measures for
371 orthopaedic interventions on the hip. *The Journal of Bone and Joint Surgery.*
372 *British Volume*, 90-B(5), 545–549. [https://doi.org/10.1302/0301-](https://doi.org/10.1302/0301-620X.90B5.19746)
373 [620X.90B5.19746](https://doi.org/10.1302/0301-620X.90B5.19746)
- 374 Bassett, S. F. (2003). the assessment of patient adherence to physiotherapy
375 rehabilitation. *New Zealand Journal of Physiotherapy*, 31(July). Retrieved from
376 [http://findarticles.com/p/articles/mi_6848/is_2_31/ai_n28172934/%5Cnpapers2:/](http://findarticles.com/p/articles/mi_6848/is_2_31/ai_n28172934/%5Cnpapers2:/publication/uuid/60AECD5C-3F52-4490-A977-6F4E8C46882E)
377 [/publication/uuid/60AECD5C-3F52-4490-A977-6F4E8C46882E](http://findarticles.com/p/articles/mi_6848/is_2_31/ai_n28172934/%5Cnpapers2:/publication/uuid/60AECD5C-3F52-4490-A977-6F4E8C46882E)
- 378 Bialosky, J. E., Bishop, M. D., & Cleland, J. A. (2010). Individual expectation: an
379 overlooked, but pertinent, factor in the treatment of individuals experiencing
380 musculoskeletal pain. *Physical Therapy*, 90(9), 1345–1355.
381 <https://doi.org/10.2522/ptj.20090306>
- 382 Binkley, J. M., Stratford, P. W., Lott, S. A., & Riddle, D. L. (1999). The Lower Extremity
383 Functional Scale (LEFS): Scale Development, Measurement Properties, and
384 Clinical Application. *Physical Therapy*, 79(4), 371–383.
385 <https://doi.org/10.1093/ptj/79.4.371>
- 386 Braithwaite, D., Emery, J., de Lusignan, S., & Sutton, S. (2003, October 1). Using the
387 internet to conduct surveys of health professionals: A valid alternative? *Family*
388 *Practice*. Oxford University Press. <https://doi.org/10.1093/fampra/cm9509>
- 389 Brewer, B. W., Van Raalte, J. L., Cornelius, A. E., Petitpas, A. J., Sklar, J. H., Pohlman,
390 M. H., ... Ditmar, T. D. (2000). Psychological factors, rehabilitation adherence,
391 and rehabilitation outcome after anterior cruciate ligament reconstruction.
392 *Rehabilitation Psychology*, 45(1), 20–37. [https://doi.org/10.1037/0090-](https://doi.org/10.1037/0090-5550.45.1.20)
393 [5550.45.1.20](https://doi.org/10.1037/0090-5550.45.1.20)
- 394 Chester, R., Jerosch-Herold, C., Lewis, J., & Shepstone, L. (2016). Psychological
395 factors are associated with the outcome of physiotherapy for people with shoulder
396 pain: a multicentre longitudinal cohort study. *British Journal of Sports Medicine*,
397 52(4), 269–275. <https://doi.org/10.1136/bjsports-2016-096084>
- 398 Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd editio).
399 UK: Routledge.
- 400 Cook, J. L., & Purdam, C. R. (2009). Is tendon pathology a continuum? A pathology
401 model to explain the clinical presentation of load-induced tendinopathy. *British*
402 *Journal of Sports Medicine*, 43(6), 409–416.
403 <https://doi.org/10.1136/bjism.2008.051193>
- 404 Cook, J. L., Rio, E., Purdam, C. R., & Docking, S. I. (2016). Revisiting the continuum
405 model of tendon pathology : what is its merit in clinical practice and research ? *Br*
406 *J Sports Med*, 1–7. <https://doi.org/10.1136/bjsports-2015-095422>
- 407 Cooper, C. L., Whitehead, A., Pottrill, E., Julious, S. A., & Walters, S. J. (2018). Are
408 pilot trials useful for predicting randomisation and attrition rates in definitive

- 409 studies: A review of publicly funded trials. *Clinical Trials*, 15(2), 189–196.
410 <https://doi.org/10.1177/1740774517752113>
- 411 Costa, L. O. P., Latimer, J., Ferreira, P. H., Maher, C. G., Pozzi, G. C., Freitas, L. M.
412 A., & Ferreira, M. L. (2008). Clinimetric Testing of Three Self-report Outcome
413 Measures for Low Back Pain Patients in Brazil. *Spine*, 33(22), 2459–2463.
414 <https://doi.org/10.1097/brs.0b013e3181849d8e>
- 415 de Vos Andersen, N.-B., Kent, P., Hjort, J., & Christiansen, D. H. (2017). Clinical
416 course and prognosis of musculoskeletal pain in patients referred for
417 physiotherapy: does pain site matter? *BMC Musculoskeletal Disorders*, 18(1),
418 130. <https://doi.org/10.1186/s12891-017-1487-3>
- 419 Drew, B. T., Smith, T. O., Littlewood, C., & Sturrock, B. (2012). Do structural changes
420 (eg, collagen/matrix) explain the response to therapeutic exercises in
421 tendinopathy: a systematic review. *British Journal of Sports Medicine*, 48(12),
422 966–972. <https://doi.org/10.1136/bjsports-2012-091285>
- 423 Färnqvist, K., Malliaras, P., & Pearson, S. (2019). Eccentric Exercise, Tendon
424 Thickness, Pain and Function in Achilles Tendinopathy: A Systematic Review.
425 *Journal of Sport Rehabilitation*, 1–30. <https://doi.org/10.1123/jsr.2018-0353>
- 426 Farrar, J. T., Young, J. P., LaMoreaux, L., Werth, J. L., & Poole, R. M. (2001). Clinical
427 importance of changes in chronic pain intensity measured on an 11-point
428 numerical pain rating scale. *Pain*, 94(2), 149–158. Retrieved from
429 <http://www.ncbi.nlm.nih.gov/pubmed/11690728>
- 430 Hall, A. M., Ferreira, P. H., Maher, C. G., Latimer, J., & Ferreira, M. L. (2010). The
431 influence of the therapist-patient relationship on treatment outcome in physical
432 rehabilitation: a systematic review. *Physical Therapy*, 90(8), 1099–1110.
433 <https://doi.org/10.2522/ptj.20090245>
- 434 Hanson, W. E., Curry, K. T., & Bandalos, D. L. (2002). Reliability generalization of
435 working alliance inventory scale scores. *Educational and Psychological*
436 *Measurement*, 62(4), 659–673. <https://doi.org/10.1177/0013164402062004008>
- 437 Hatcher, R. L., & Gillaspay, J. A. (2006). Development and validation of a revised short
438 version of the working alliance inventory. *Psychotherapy Research*, 16(1), 12–25.
439 <https://doi.org/10.1080/10503300500352500>
- 440 Joyce, A. S., Ogrodniczuk, J. S., Piper, W. E., & McCallum, M. (2003). The alliance as
441 mediator of expectancy effects in short-term individual therapy. *Journal of*
442 *Consulting and Clinical Psychology*, 71(4), 672–679. Retrieved from
443 <http://www.ncbi.nlm.nih.gov/pubmed/12924672>
- 444 Kamper, S. (2009). Global Rating of Change scales. *The Australian Journal of*
445 *Physiotherapy*, 55(4), 289. [https://doi.org/10.1016/S0004-9514\(09\)70015-7](https://doi.org/10.1016/S0004-9514(09)70015-7)
- 446 Khan, K. M., Forster, B. B., Robinson, J., Cheong, Y., Louis, L., Maclean, L., &
447 Taunton, J. E. (2003). Are ultrasound and magnetic resonance imaging of value
448 in assessment of Achilles tendon disorders? A two year prospective study. *British*
449 *Journal of Sports Medicine*, 37(2), 149–153.
450 <https://doi.org/10.1136/bjsm.37.2.149>
- 451 Lancaster, G. A., Dodd, S., & Williamson, P. R. (2004). Design and analysis of pilot
452 studies: recommendations for good practice. *Journal of Evaluation in Clinical*
453 *Practice*, 10(2), 307–312. <https://doi.org/10.1111/j.2002.384.doc.x>
- 454 Longo, U. G., Ronga, M., & Maffulli, N. (2009). Achilles Tendinopathy. *Sports Medicine*
455 *and Arthroscopy Review*, 17(2), 112–126.
456 <https://doi.org/10.1097/JSA.0b013e3181a3d625>
- 457 Mallen, C. D., Peat, G., Thomas, E., Dunn, K. M., & Croft, P. R. (2007). Prognostic
458 factors for musculoskeletal pain in primary care: a systematic review. *The British*

- 459 *Journal of General Practice: The Journal of the Royal College of General*
 460 *Practitioners*, 57(541), 655–661. Retrieved from
 461 <http://www.ncbi.nlm.nih.gov/pubmed/17688762>
- 462 Mallows, A., Debenham, J., Walker, T., & Littlewood, C. (2017). Association of
 463 psychological variables and outcome in tendinopathy: A systematic review. *British*
 464 *Journal of Sports Medicine*, 51(9). <https://doi.org/10.1136/bjsports-2016-096154>
- 465 Mallows, A. J., Debenham, J. R., Malliaras, P., Stace, R., & Littlewood, C. (2017).
 466 Cognitive and contextual factors to optimise clinical outcomes in tendinopathy.
 467 *British Journal of Sports Medicine*, bjsports-2017-098064.
 468 <https://doi.org/10.1136/bjsports-2017-098064>
- 469 Mallows, A., Littlewood, C., & Malliaras, P. (2017). Measuring patient-reported
 470 outcomes (PROs/PROMs) in people with Achilles tendinopathy: How useful is the
 471 VISA-A? *British Journal of Sports Medicine*. [https://doi.org/10.1136/bjsports-](https://doi.org/10.1136/bjsports-2017-097531)
 472 [2017-097531](https://doi.org/10.1136/bjsports-2017-097531)
- 473 Mallows, Adrian, Debenham, J., Walker, T., & Littlewood, C. (2016). Association of
 474 psychological variables and outcome in tendinopathy: a systematic review. *British*
 475 *Journal of Sports Medicine*, bjsports-2016-096154.
 476 <https://doi.org/10.1136/bjsports-2016-096154>
- 477 Mallows, Adrian, Littlewood, C., Jackson, J., & Debenham, J. (2019). Managing
 478 Achilles Pain (the MAP study)– A process evaluation of data collection methods.
 479 *Musculoskeletal Science and Practice*, 42, 60–66.
 480 <https://doi.org/10.1016/j.msksp.2019.04.008>
- 481 Martin, R. L., Chimenti, R., Cuddeford, • Tyler, Houck, J., Matheson, J. W.,
 482 Mcdonough, C. M., ... Torburn, L. (2018). Clinical Practice Guidelines Achilles
 483 Pain, Stiffness, and Muscle Power Deficits: Midportion Achilles Tendinopathy
 484 Revision 2018 SUMMARY OF RECOMMENDATIONS. *J Orthop Sports Phys*
 485 *Ther*, 48(5), 1–38. <https://doi.org/10.2519/jospt.2018.0302>
- 486 Miles, C. L., Pincus, T., Carnes, D., Taylor, S. J. C., & Underwood, M. (2011).
 487 Measuring Pain Self-efficacy. *The Clinical Journal of Pain*, 27(5), 461–470.
 488 <https://doi.org/10.1097/AJP.0b013e318208c8a2>
- 489 Murphy, M., Rio, E., Chivers, P., Debenham, J., Travers, M., & Gibson, W. (2018). The
 490 rate of improvement of pain and function in mid-portion Achilles tendinopathy with
 491 loading protocols: A Systematic Review and Meta-Analysis Identification of
 492 Required Studies. *The International Journal of Sports Physical Therapy*, 13(2),
 493 283–292. <https://doi.org/10.1007/s40279-018-0932-2>
- 494 Nicholas, M. K. (2007). The pain self-efficacy questionnaire: Taking pain into account.
 495 *European Journal of Pain*, 11(2), 153–163.
 496 <https://doi.org/10.1016/j.ejpain.2005.12.008>
- 497 NIHR Clinical Research Network Coordinating Centre. (2016). *Good Clinical Practice*
 498 *(GCP) Reference Guide 2016*. Retrieved from [http://www.crn.nihr.ac.uk/learning-](http://www.crn.nihr.ac.uk/learning-development/)
 499 [development/](http://www.crn.nihr.ac.uk/learning-development/)
- 500 O'Neill, S., Watson, P. J., & Barry, S. (2015). Why Are Eccentric Exercises Effective
 501 for Achilles Tendinopathy? *International Journal of Sports Physical Therapy*,
 502 10(4), 552–562. Retrieved from
 503 [http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4527202&tool=pmcen-](http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4527202&tool=pmcentrez&rendertype=abstract)
 504 [trez&rendertype=abstract](http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4527202&tool=pmcentrez&rendertype=abstract)
- 505 Pallant, J. (2016). *SPSS survival manual: a step by step guide to data analysis using*
 506 *IBM SPSS* (6th editio). UK: Open University Press.
- 507 Rio, E., Kidgell, D., Moseley, G. L., Gaida, J., Docking, S., Purdam, C., & Cook, J.
 508 (2015). Tendon neuroplastic training: changing the way we think about tendon

509 rehabilitation: a narrative review. *British Journal of Sports Medicine*, bjsports-
510 2015-095215-. <https://doi.org/10.1136/bjsports-2015-095215>

511 Rio, E., Moseley, L., Purdam, C., Samiric, T., Kidgell, D., Pearce, A. J., ... Cook, J.
512 (2014). The pain of tendinopathy: Physiological or pathophysiological? *Sports*
513 *Medicine*, 44(1), 9–23. <https://doi.org/10.1007/s40279-013-0096-z>

514 Scott, A., Docking, S., Vicenzino, B., Alfredson, H., Zwerver, J., Lundgreen, K., ...
515 Danielson, P. (2013). Sports and exercise-related tendinopathies: a review of
516 selected topical issues by participants of the second International Scientific
517 Tendinopathy Symposium (ISTS) Vancouver 2012. *British Journal of Sports*
518 *Medicine*, 47(9), 536–544. <https://doi.org/10.1136/bjsports-2013-092329>

519 Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics, 5th ed. Using*
520 *multivariate statistics, 5th ed.* Boston, MA: Allyn & Bacon/Pearson Education.

521 Taylor, A. H., & May, S. (1996). Threat and coping appraisal as determinants of
522 compliance with sports injury rehabilitation: An application of protection motivation
523 theory. *Journal of Sports Sciences*, 14(6), 471–482.
524 <https://doi.org/10.1080/02640419608727734>

525 Tracey, T. J., & Kokotovic, A. M. (1989). Factor structure of the Working Alliance
526 Inventory. *Psychological Assessment: A Journal of Consulting and Clinical*
527 *Psychology*, 1(3), 207–210. <https://doi.org/10.1037/1040-3590.1.3.207>

528 UK National Institution for Health Research (NIHR). (2017). NIHR Research for Patient
529 Benefit (RfPB) Programme Guidance on Applying for Feasibility Studies.
530 *National Institute for Health Research*, (July), 1–6. Retrieved from
531 [https://www.nihr.ac.uk/funding-and-support/documents/funding-for-research-](https://www.nihr.ac.uk/funding-and-support/documents/funding-for-research-studies/research-programmes/RfPB/Guidance)
532 [studies/research-programmes/RfPB/Guidance](https://www.nihr.ac.uk/funding-and-support/documents/funding-for-research-studies/research-programmes/RfPB/Guidance)
533 [Documents/Guidance_on_feasibility_studies.pdf](https://www.nihr.ac.uk/funding-and-support/documents/funding-for-research-studies/research-programmes/RfPB/Guidance)

534 von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., Vandenbroucke,
535 J. P., & STROBE Initiative. (2007). Strengthening the Reporting of Observational
536 Studies in Epidemiology (STROBE) statement: guidelines for reporting
537 observational studies. *BMJ (Clinical Research Ed.)*, 335(7624), 806–808.
538 <https://doi.org/10.1136/bmj.39335.541782.AD>

539