

1 **Adherence to limiting weight-bearing activity in patients**
2 **with diabetic foot ulcers: A qualitative study**

3

4 Jennie E. Hancox^{a,b*}, Charlotte Hilton^a, Katie Gray^c, Fran Game^d, Kavita Vedhara^a

5 ^aSchool of Medicine, University of Nottingham, UK.

6 ^bLoughborough University, Loughborough, UK.

7 ^cDerbyshire Community Health Services NHS, UK.

8 ^dUniversity Hospitals of Derby and Burton NHS Foundation Trust, UK.

9

10 *Corresponding author

11 Email: j.hancox@lboro.ac.uk

12 Present address: Loughborough University, School of Sport, Exercise and Health
13 Sciences, Epinal Way, Loughborough, Leicestershire, LE11 3TU, United Kingdom.

14

15 **Conflict of interest**

16 The authors have no conflict of interest to disclose in relation to this submission.

17

18 **Funding**

19 This study/project was funded by the National Institute for Health Research (NIHR)

20 School for Primary Care Research (project reference 399). The views expressed are

21 those of the author(s) and not necessarily those of the NIHR or the Department of

22 Health and Social Care.

23

24

25

26 **ABSTRACT**

27

28 **Aims:** Patients with diabetic foot ulcers are advised to limit weight-bearing activity for
29 ulcers to heal. Patients often disregard this advice although the reasons are not yet fully
30 understood. This study explored 1) patients' experiences of receiving the advice and 2)
31 factors influencing adherence to the advice.

32 **Methods:** Semi-structured interviews were conducted with 14 patients with diabetic foot
33 ulcers. Interviews were transcribed and analysed using inductive thematic analysis.

34 **Results:** Advice regarding limiting weight-bearing activity was described by patients as
35 directive, generic and conflicting with other priorities. Rapport, empathy and rationale
36 supported receptivity to the advice. Barriers and facilitators to limiting weight-bearing
37 activity included: demands of daily living, enjoyment of exercise, sick/disabled identity
38 and burden, depression, neuropathy/pain, health benefits, fear of negative
39 consequences, positive feedback, practical support, weather, and active/passive role in
40 recovery.

41 **Conclusions:** It is important that healthcare professionals pay attention to *how* limiting
42 weight-bearing activity advice is communicated. We propose a more person-centred
43 approach in which advice is tailored to individuals' specific needs with discussion around
44 patient priorities and constraints.

45

46 **Keywords:** patient adherence, motivation, diabetic foot ulcer, communication,
47 physician-patient relations

48 **Key Messages**

- 49 • Patients with diabetic foot ulcers find adhering to advice to limit weight-bearing
50 activity challenging
- 51 • This study explored patients' experiences of being advised to limit weight-bearing
52 activity and factors influencing adherence to this advice.
- 53 • Semi-structured interviews were conducted with 14 patients with diabetic foot
54 ulcers
- 55 • Footrest was generally viewed as impractical due to the constraints of everyday
56 life and conflicting health priorities.
- 57 • Patients require tailored support to manage physical activity and ulceration and
58 are more receptive to advice when delivered with rapport, empathy and the
59 rationale behind recommendations explained.

60 **1. INTRODUCTION**

61 Individuals with diabetes are at increased risk of developing lower limb complications
62 such as foot ulcers. Diabetic foot ulcers (DFUs) are estimated to affect up to 25% of
63 patients with the disease, with a high rate of recurrence (40% within 1 year).(1,2) Some
64 ulcers never heal and can lead to severe complications including infection, amputation,
65 hospitalisation, and premature mortality.(3) Both ulcers and amputations are associated
66 with reduced quality of life with nearly half of patients with DFUs experiencing symptoms
67 of depression.(4,5) Moreover, the financial burden of DFUs is significant, costing the NHS
68 an estimated £837-£962 million a year.(6) The likelihood of developing a DFU, and the
69 subsequent healing process, is affected by patients' self-management strategies and
70 adherence to clinical advice. Thus, research exploring factors influencing DFU patient
71 adherence to treatment recommendations is needed.

72 The International Working Group of the Diabetic Foot recommend patients with pre-
73 ulcerative signs or active ulceration limit weight-bearing activity (WBA) to aid
74 healing.(7,8) DFUs are caused by a combination of factors, the most common pathway
75 being excessive mechanical stress on insensate neuropathic plantar tissue.(2,9) Weight-
76 bearing is thought to increase the cumulative plantar tissue stress, which in turn, can
77 increase the risk for foot ulceration.(9) Consequently, current practice is for healthcare
78 professionals to recommend patients reduce WBA for an ulcer to heal.(7)

79 Adherence to treatment advice for patients living with DFUs has been consistently
80 low.(10-12) Qualitative research exploring the experiences of patients living with DFUs
81 has reported patients' lack of engagement with advice to limit WBA on the ulcerated
82 foot.(13-18) However, the reasons for patients' non-adherence to limiting WBA advice
83 are not yet fully understood.

84 Previous research on adherence to treatment for patients living with DFUs have focused
85 on barriers and facilitators to footcare advice in general (e.g., inspection of feet,
86 appropriate footwear, attendance at foot screening appointments), rather than WBA

87 specifically. A qualitative meta-synthesis reported factors that influence adherence to
88 foot care behaviours include knowledge of appropriate foot care, perceived importance,
89 practical support from family and friends, prior experience of consequences (e.g.,
90 amputation), and communication style of healthcare providers.(19) Some of these
91 factors may play a role in patients' adherence to limiting WBA but there may also be
92 other factors specific to this behaviour that have not yet been explored.

93 The recommendation to limit WBA directly opposes the general advice consistently given
94 for patients with diabetes to be physically active.(20) Engaging in regular activity is
95 associated with many benefits for patients with diabetes including, but not limited to,
96 weight control, reduction in blood pressure, improved glucose control, reduced risk of
97 cardiovascular disease, and improvements in mental health and health-related quality of
98 life.(21) Thus, long-term adherence to limiting WBA may be particularly problematic for
99 those who experience high recurrence of ulceration. To our knowledge, no research has
100 explored DFU patients' experience of receiving advice to limit WBA and perceptions of
101 managing seemingly conflicting advice. Exploring patients' views and experiences may
102 inform our understanding of the factors that influence adherence. Findings could be used
103 to assist healthcare professionals in supporting patients to limit WBA.

104 Therefore, the aim of the study was to 1) explore patients' experiences of receiving
105 advice to limit WBA and 2) factors that may influence adherence to this advice.

106

107 **2. METHODS**

108 **2.1. Study Design**

109 In depth qualitative semi-structured interviews were conducted with patients with DFUs.
110 The study was approved by the East Midlands – Derby Research Ethics Committee (REC
111 Number 18/EM/0162) and written informed consent gained from all participants.

112 **2.2. Recruitment**

113 Participants were an opportunistic sample recruited from a specialist Diabetes Foot Clinic
114 in the East Midlands, UK. To be eligible individuals needed to be a patient at the diabetes
115 clinic, aged 18 years and over, and be able to communicate in English. Potential
116 participants were initially approached by a member of the patient's usual care team who
117 provided patients with detailed written information pertaining to participation in the study.
118 It was explained that participation was entirely voluntary and that their treatment and
119 care would not be affected by their decision. On consenting to take part the patients'
120 contact details were shared with the researchers to organise the interview.

121 **2.3. Data collection**

122 Interviews were conducted by two authors (JEH and CEH) both trained and skilled in
123 qualitative interviewing. Most interviews took place face-to-face in a private room within
124 the Diabetes Foot Clinic. One interview was conducted via phone as the patient was
125 unable to attend in-person. All interviews were audio-recorded and lasted no more than
126 1-hour.

127 Interviewers utilised a semi-structured guide which was formulated from best practice
128 guidance.(22) The guide included questions covering patients' views on and experience
129 of being advised to limit WBA (e.g., how the advice was communicated, how relevant
130 they felt the advice was for them, anything that was said or done that made them more
131 or less likely to limit their activity, how confident they feel in limiting their WBA, the
132 things that help them to reduce their WBA, and things that make it difficult for them to
133 limit their WBA).

134 **2.4. Data analysis**

135 Interviews were transcribed verbatim and anonymised. Data were analysed in NVivo
136 (version 12) using inductive thematic analysis following the recommendations of Braun
137 and Clarke.(23) Analysis was iterative, occurring concurrently with interviews so that
138 sampling continued until saturation was reached with no new information emerging.(24)
139 Authors familiarised themselves with the data through 'active reading' of the transcripts

140 and noted initial analytic observations. Due to the explorative nature of the study, initial
141 codes were developed using an inductive approach. Coded data was reviewed and
142 collated into potential themes. Themes discussed between authors and refined until
143 consensus was reached. Detailed field notes and a clear audit trail of analytic decisions
144 were kept to maximise transparency and ensure credibility and quality.

145

146 **3. RESULTS**

147 Fourteen participants with DFUs (13 male, 1 female) were interviewed in 2019. The
148 gender split broadly reflects the clinical population, with DFUs affecting men more than
149 women.(25) All participants were White British with ages ranging from 28-81 (mean
150 age=60.36, s.d.=15.07). Two participants were diagnosed with type 1 diabetes and 12
151 with type 2 diabetes mellitus. Mean BMI was 32.42 (range 22.53-48.70). Marital status
152 varied: 3 reported as single, 2 partnered, 6 married, 1 divorced, and 2 widowed.
153 Patients had been receiving treatment at the specialist Diabetes Foot Clinic for an
154 average of 25 months (range 3-72 months). Interviews lasted on average 37 minutes
155 (range 23-59).

156 **3.1. Patients' experiences of receiving advice to limit weight-bearing activity**

157 Two themes and five sub-themes were identified. See Table 1 for a summary.

158

159 [TABLE 1]

160

161 **3.1.1. Advice**

162

163 *3.1.1.1. Directive*

164 Patients described repeatedly being advised to rest and limit their WBA. Such advice was
165 often viewed as 'nagging', particularly when delivered in a directive/paternalistic
166 manner.

167

168 “The podiatrists, the doctors, everyone that’s involved with my care, they all say
169 the same to me. You must, must limit your activity...So from the word go all the
170 advice I received at each consultation, it’s always the same: are you limiting your
171 activity? Yeah, yeah doctor, as much as I can, blah-blah-blah.”

172

173 When advice was delivered in a controlling way (e.g., using phrases such as “You
174 must...”) patients reported feeling like they were being told off which made them less
175 likely to want to adhere.

176

177 “Not putting my feet up. Always get told off...If people tell me to do something, I
178 just do the opposite...the more they tell me to do something I’m less likely to do
179 it.”

180

181 Patients preferred it when healthcare professionals explained the reasoning behind their
182 recommendations.

183

184 “They’re not telling you; they’re explaining it to you, which is a subtle difference,
185 but it is something you do feel comfortable with.”

186

187 Provision of information as to why WBA is problematic appeared to aid patient
188 understanding and made them more willing to accept advice.

189

190 “The more information they give me about causes and effects and stuff like that
191 the more you can actually try and adapt what you do to take it into account.”

192

193 Patients expressed valuing it when healthcare professionals check if they want to be given
194 information and provide it in a way which is understandable.

195

196 “Yes, she described it as little things are trying to mesh and knit together, and
197 every time you put your foot down it’s like smashing them apart again. But we try
198 to not smash them too much because they’re trying to knit together...But also, she
199 asks the question, shall I go on telling you these things?”

200

201 3.1.1.2. *Generic*

202 Treatment advice was described by many as generic and ‘one-size-fits-all’ with a lack of
203 discussion around individual needs and lifestyles.

204

205 “The advice at the clinic is general knowledge really. Keep off your foot...they
206 haven’t got time to think about what’s going on in my life...They seem to tar
207 everybody with the same brush.”

208

209 Patients felt they would benefit from advice being tailored to their specific needs via a
210 process of collaborative problem-solving.

211

212 “I think certainly the more individual you can tailor the advice, the more it works
213 for individual people...It’s a case of me sort of saying well hang on, what about this?
214 What you’re looking for is a suggestive process rather than an instructive process.
215 What works for me almost certainly doesn’t work for someone else.”

216

217 3.1.1.3. *Conflicting advice*

218 Patients reported receiving conflicting advice, with doctors recommending they exercise
219 to manage their diabetes or other health conditions (e.g., osteoarthritis, depression) and
220 podiatrists encouraging them to limit their WBA. Many described feeling confused about
221 which advice they should follow.

222

223 "Because I've got osteoarthritis my doctor tells me to keep active because
224 it stops me from ceasing up. But then the hospital are telling me to
225 offload."

226

227 Some patients expressed being active was more important to them than the ulcer
228 healing.

229

230 "The dilemma is that the podiatry want me to rest, my doctor wants me to
231 exercise, what do I do? It seems to me that that's because they'll be some
232 weight loss with that [exercise] as well as lots of peripheral gains. If the
233 other side of the coin is that it's not helping my feet, well I'll probably
234 have to live with it."

235

236

237 **3.1.2. Relationships with health care providers**

238

239 *3.1.2.1. Rapport*

240 Participants explained that when healthcare professionals showed interest in them
241 and their life it made them feel supported and understood.

242 "We've been coming here for such a long time now, she [the podiatrist] shows a
243 regular interest...they're the little things which make us smile, make us feel
244 wanted and cared for. Understanding you as a person rather than just caring
245 about what is going on with your foot."

246

247 Participants reported being more willing to open-up about their challenges with
248 limiting WBA when there was a sense of connection with healthcare professionals.

249 "I think just knowing that someone's there as well and you can talk to them. They're
250 easily approachable."

251

252 *3.1.2.2. Empathy*

253 Some patients reported a lack of empathy in discussions regarding limiting WBA. They
254 explained the challenges of putting the advice into practice in their everyday life was not
255 always acknowledged.

256

257 "Obviously they know I live alone, and I've got to work but sometimes I think they
258 don't live in the real world...Just go home and put your foot up, doesn't fit with my
259 lifestyle."

260

261 However, others felt that practitioners did take time to recognise the difficulties patients
262 face in adhering to treatment recommendations.

263 "There's empathy there, and they do understand what I'm going through. They
264 don't go over the top, it is what it is, but they do understand that there is a lifestyle
265 change in the fact that you've got something like this."

266

267 **3.2. Factors influencing adherence to advice to limit weight-bearing activity**

268 Themes were organised into barriers and facilitators to limiting WBA (see Table 2).

269

270 [TABLE 2]

271

272 **3.2.1. Barriers to limiting weight-bearing activity**

273 *3.2.1.1. Demands of daily living*

274 Many patients understood that limiting WBA would likely aid healing but expressed that
275 it was just not practical. Participants described needing to engage in various activities of

Running title: limiting weight-bearing activity

276 daily living which involve WBA (e.g., work, shopping, driving, cleaning, gardening,
277 attending hospital appointments and caring for family members and pets).

278 "I know I've got to keep off it...I try and keep off it as much as I can, but I've got
279 stuff to do: cook, clean the home, you know."

280 Financial hardship was an insurmountable barrier for some. Participants working in jobs
281 that require WBA (e.g., manual labour, shop assistant) described not being able to afford
282 to change job or reduce hours worked.

283 "I mean they're [healthcare professionals] always telling me to stop, to not go to
284 work, but obviously I need the money. I've got to earn... I'm in a job that doesn't
285 pay fantastically. I don't get paid if I'm off sick, apart from statutory sick pay.
286 And the last time I was off, I had a shock, I nearly lost my house because I
287 couldn't pay the mortgage."

288

289 *3.2.1.2. Enjoyment of exercise*

290 For those who being active was part of their identity and considered essential for health
291 and well-being, being told to rest, and limit WBA conflicted with their core values.

292

293 "You've got to be active haven't you; otherwise rigor mortis sets in."

294

295 A few patients acknowledged that non-WBA could provide a means for remaining
296 active but these types of activities (e.g., chair-based exercise) did not appeal. The
297 preference was for physical activity which is enjoyable and/or purposeful.

298

299 "I suppose there are exercises you can do lying down. But we tend to do
300 activities like taking the dog out, so that means quite a bit of walking. So
301 that's contrary to what I should be doing."

302

303 *3.2.1.3. Sick/disabled identity and burden*

304 Being viewed as someone who was chronically ill and limited in their ability to get around
305 was not an identity that patients wanted to associate with. Resting was often attempted
306 in the short-term but not viewed as a viable long-term option.

307 "Well, they just tell me to sit down and rest it. You know, sit at home and
308 watch whatever's on TV if you like. Which I did for a couple of weeks, but
309 that's not me."

310 Family relationships and caring responsibilities changed because of patients developing
311 foot ulcers. Patients reported loss of independence and concern regarding overburdening
312 others.

313 "It's just not that easy dragging folk in, people do help us, don't get me
314 wrong. But other people have got busy lifestyles as well haven't they,
315 can't just down tools and help us all the time."

316

317 *3.2.1.4. Depression*

318 One patient, when asked about the importance of limiting WBA, explained that it
319 depended on how they were feeling emotionally, with their depression sometimes
320 leading them to want to weight-bear to make the ulcer worse.

321 "That's down to my moods and the way that I feel in myself and not
322 wanting to feel well really...The depression is manifesting itself in ways
323 that I want to punish myself I suppose."

324 Another patient, diagnosed with clinical depression, described a conflict between
325 knowing that they need to rest for their ulcer to heal and remaining active for
326 their physical and psychological well-being.

327 “From the first moment I saw a podiatrist I’ve been told to rest and put
328 my feet up and from day one I’ve ignored it. I heard it and it makes sense
329 but looking at my big picture it makes less sense...I’m suffering from a
330 clinical depression, being so weak and feeble doesn’t do much for my
331 spirit.”

332

333 *3.2.1.5. Neuropathy*

334 Some patients explained that because they do not feel pain from the ulcer it does
335 not seem as high a priority to limit WBA.

336 “If it hurt more, I would think it was more important, but it doesn’t. And
337 that is probably the biggest problem. If it hurt, your motivation on
338 accelerating the healing process would go up.”

339

340 *3.2.1.6. Passivity*

341 Many patients described adopting a passive role in management of their
342 condition, relying on healthcare professionals to fix their ulcer. This seemed to be
343 the case particularly for those who had had ulcers for a long-time and given up
344 hope.

345 “I just come, get treated, go home. I’ve been doing it for so long that I don’t
346 think I attend to it. I don’t think I’m that bothered...so from that point of
347 view I keep walking.”

348

349 **3.2.2. Facilitators to limiting weight-bearing activity**

350 *3.2.2.1. Health benefits*

Running title: limiting weight-bearing activity

351 Belief that limiting WBA will lead to ulcer healing appeared to be related to
352 patients' willingness to adhere.

353 "Knowing that I'll get fixed if I do as I'm told... Because less weight bearing on my
354 foot, quicker healing recovery. That's it really."

355

356 *3.2.2.2. Fear and/or experience of negative consequences*

357 Seeing the negative implications from not limiting WBA made some re-assess
358 their activity.

359 "Just because I feel it's getting worse. So, like I say you just look at it, reality
360 check, and you think well, it's going to get even worse if you're going to keep doing
361 it. So, you think right OK enough is enough, you need to stay off your feet."

362 Fear of consequences (e.g., amputation) appeared to be a strong motivating
363 factor.

364 "There's the thought in the back of my mind, well if I don't get this right then, you
365 know, in my worst-case scenario I might have to have my toe amputated. And I
366 don't particularly want that, so."

367 Patients also talked about the long-term implications of not limiting WBA to include not
368 being around to care for loved ones.

369 "My partner says well I want you here for at least another 20, so I need to see if I
370 can achieve that. And for my grandson's sake as well!"

371

372 *3.2.2.3. Lifestyle adjustments*

373 Participants described a process of adjustment using trial and error. Awareness of
374 which activities aggravate the ulcer was described as key.

Running title: limiting weight-bearing activity

375 “The biggest thing is awareness. If you know what you’re doing is wrong, then
376 you can limit and adjust. Give you an example, one of the things I used to do is
377 merchandising, which involves hoarding cages of stock...So you look at it and
378 think well, probably best if I don’t do that...It’s a constant balance.”

379 This participant went on to describe how living with an ulcer involves planning ahead,
380 taking time to consider activities and the impact they may have.

381 “It’s all about risk assessment...It’s just a case of taking what I’m offered and
382 analysing it far more than I ever used to. Now it’s more a case of when somebody
383 says to me, well we want you to do this, you ask them what’s involved and then
384 make a balanced decision. Rather than just turn up and do it, no big deal.”

385 Identifying ways of adapting their activities to minimise the time spent on their feet was
386 described as requiring conscious effort and problem-solving.

387 “So not just go for a walk for the sake of it. So yeah, I try to be mindful. If I go to
388 a shop, rather than using the steps, use the elevator or the escalator. So just trying
389 to think ahead how to minimise what I will need to do.”

390 The process of adjusting behaviours to reduce activity was described as time consuming
391 and requiring patience.

392 “Yeah, it can be difficult, you have to think about a lot of different things. Can you
393 do this, can you do that? So, putting it into practice, it is harder said than done.
394 It can be done, but it just takes a lot of time and patience. And I think that’s the
395 key thing, patience.”

396 Some participants found identifying activities they could do while resting, that
397 they find enjoyable and purposeful, helped with adapting their lifestyle.

398 “What I’ve done is I’ve filled up my life with learning and education whilst I’m
399 waiting for my foot to heal”

400

401 *3.2.2.4. Positive feedback*

402 Confirmation from healthcare professionals that what patients are doing to limit pressure
403 on their ulcer is working was described as a key facilitator.

404 "When they do the camera, take the photograph, and give you feedback, it is useful
405 because if it is positive, even if it's telling you like half a mil that it's reduced, that
406 does give you a bit of a, like hey great, that's good then. I need that confirmation
407 that I'm getting better."

408

409 *3.2.2.5. Practical support and reminders*

410 Practical support (e.g., cooking, shopping, driving) from family and friends was
411 described as vital.

412 "Well, my sister lives locally, and I've got friends and family that can help.

413 But it's a case of mainly deliveries, or I can get people to drive me places."

414

415 A key component of the support from family involved provision of verbal
416 reminders and recognition of the importance of patients limiting their WBA.

417 "I'd say family and friends, they know how important it is for me to stay off my
418 feet. They realise if I don't stay off my feet, I could end up losing my feet. They
419 just say how much walking have you done today? They ask me little questions like
420 that so that I think well, yeah, I have been on my feet quite a bit today, for the
421 rest of the afternoon I need to stay off my feet."

422

423 *3.2.2.6. Cold weather*

424 The weather was described to influence WBA. Participants explained they are more likely
425 to stay indoors and rest in winter months when it is cold and dark outside.

Running title: limiting weight-bearing activity

426 “Recently, we've had some days of solid rain. Well, those two days I couldn't go
427 outside, I did more sitting down. But you've got to organise the weather to get me
428 to do that.”

429 In the summer months individuals expressed a desire to go out and about more.

430 “I think I've been more motivated this month just because it's cold weather and
431 you want to try and stay as warm as possible. This summer just gone; I think I
432 was less motivated than ever before, just because it's warm weather. You just want
433 to go out and do your day-to-day stuff.”

434

435 3.2.2.7. *Pain*

436 A participant without neuropathy described how pain from his ulcer acted as a
437 reminder not to put pressure on it.

438 “If I get a bit of pain, I will stop. Yeah, well I just put my foot up for half
439 an hour, not very long. As soon as the pain's gone I start walking about.”

440

441 3.2.2.8. *Depression*

442 Depression acted as a facilitator for one individual who explained they are more likely to
443 rest and limit WBA when they feel low.

444 “Although because I've been depressed, I do go to bed an awful lot, lie in bed
445 watching the telly or go to sleep, I don't have to think about what's going on.”

446

447 3.2.2.9. *Active role in recovery*

448 Participants who expressed feelings of empowerment and self-determination in their
449 motivation were more willing to limit their WBA.

450 "At the end of the day all I want to do is get my foot fixed, but there's only me
451 that can do it. It's me that's got to make the change."

452

453 **4. DISCUSSION**

454 This study aimed to explore 1) DFU patients' experiences of receiving advice to limit
455 WBA and 2) factors influencing adherence to this treatment advice. Interviews with
456 patients revealed advice to limit WBA to be perceived to be delivered in a directive
457 manner via the use of controlling language (such as, 'you must', 'you need to'). Use of
458 controlling language by significant others is understood to be an antecedent of poor-
459 quality (or non-self-determined) motivation driven by internal or external contingencies
460 such as pressure or guilt.(26) Thus, the language used to convey the treatment
461 recommendation may influence patients' experiences of receiving the advice and, in
462 turn, their motivation for adhering. The directive approach also included regular
463 repetition of the recommendation. Previous research exploring podiatrists' views on
464 patient adherence to footcare behaviours, revealed podiatrists to believe that regular
465 reiteration of advice increased the likelihood of patient adherence.(17) The present
466 findings suggest that may not be the case, with regular repetition of generic advice
467 viewed as 'nagging' and not considered conducive to engagement.

468 Findings revealed patients viewed advice to limit WBA as generic and 'one-size fits all'
469 rather than that which is specifically tailored to their individual circumstances. This is
470 aligned with findings by Searle who reported advice given by podiatrists to be generic
471 rather than tailored specifically to patients' needs.(17) The quality of the relationship
472 with healthcare professionals was also found to be important factor within patient
473 experiences of being advised to limit WBA. Patients appeared to view advice to limit WBA
474 more favourably when a rapport was already established with healthcare professionals.
475 Similar experiences were described by Coffey et al. in their qualitative meta-analysis,
476 which reported development of rapport and empathy as important factors in DFU patient

Running title: limiting weight-bearing activity

477 engagement and willingness to follow treatment advice.(19) Therefore, the findings from
478 previous research and the current study suggests healthcare professionals may need
479 support to develop skills in person-centred care.

480 The main barrier identified in relation to limiting WBA was the practicalities of daily life.
481 Patients reported various activities of daily living (e.g., work, shopping, caring
482 responsibilities) that affected their ability to limit WBA. Searle also reported patients to
483 view footrest as impractical due to the constraints of everyday life.(17) Patients were
484 often left to work out for themselves how to implement the recommendation into their
485 everyday life. Patients described making lifestyle adjustments as a process of trial and
486 error and requiring forward planning. This is a strong indicator that support from
487 healthcare professionals in the form of collaborative problem-solving may be beneficial
488 to aid the behaviour change process.

489 Findings from the current study support previous research detailing barriers and
490 motivators to foot self-care behaviours.(19,27) For example, the present study also
491 found patient understanding of the importance, prior experience of consequences (e.g.,
492 amputation), practical support from family and friends and a sense of personal
493 responsibility/empowerment to be key influencing factors. This provides further support
494 for targeting these aspects within routine clinical care.

495 This study advances our understanding of DFU patient adherence by identifying aspects
496 which are unique to the behaviour of limiting WBA. For instance, patients reported
497 enjoyment and/or importance of exercise as a barrier to limiting WBA. Regular physical
498 activity is essential for the management of diabetes and other health conditions(21) and
499 patients described the advice to limit WBA as conflicting with other health priorities.

500 Although the advice given to patients is to limit WBA, this does not necessarily mean
501 stopping exercise altogether.(7) There is scope therefore for further research to identify
502 how to most effectively support patients' engagement in non-weightbearing alternatives
503 as part of the management and treatment plan.

504 Findings revealed depression to have a potentially complex relationship with adherence
505 to limiting WBA. A recent meta-analysis showed nearly half of DFU patients report
506 symptoms of depression.(5) Individuals with depression have been found to be less
507 physically active and engage in higher levels of sedentary behaviour compared to aged-
508 matched controls.(28) Our findings partially concur with this, with some patients
509 reporting feelings of depression to make it more likely for them to rest and limit WBA.
510 However, other patients described their depression manifesting in a way which led to
511 them engaging in WBA to either to improve their psychological well-being or purposefully
512 cause themselves injury. Emotional support for such patients is essential to reduce the
513 risk of further self-harm.

514

515 **4.1. Practical implications**

516 The findings of the present study highlight the need for improved patient support with
517 managing physical activity and ulceration. Patients have reported dissatisfaction with the
518 way in which treatment advice to limit WBA is communicated. Future research is needed
519 to identify how to most effectively support health professionals to communicate in a way
520 which empowers patients' to actively engage with treatment advice and adhere to
521 recommendations to limit WBA. This may involve taking time to develop a rapport and
522 connection with patients and delivery of advice using non-controlling language and
523 rationales. Such communication strategies have been found to promote autonomous
524 motivation for health behaviours.(29,30)

525 Patients expressed a preference for advice which is person-centred and tailored to
526 individuals' specific needs. For many patients being told to rest and limit WBA conflicted
527 with either their lifestyle or identity which created a sense of resistance and lack of
528 adherence. Rather than the generic message being to 'rest and limit WBA' it may be that
529 a shift to a more personalised approach involving discussion around 'safe physical
530 activity levels' for individual patients would be beneficial.(31) Such an approach could be

Running title: limiting weight-bearing activity

531 consistently communicated by all healthcare professionals, reducing patient confusion
532 resulting from conflicting advice.

533

534 **5. Conclusion**

535 To our knowledge, this is the first study to explore DFU patients' experience of receiving
536 advice to limit WBA and perceptions of managing such conflicting advice. Various
537 barriers and facilitators to limiting WBA have been identified and can be used to inform
538 practice. An understanding of patient priorities and constraints may aid healthcare
539 professionals in developing person-centred treatment plans.

540 **REFERENCES**

- 541 1. Singh N, Armstrong DG, Lipsky BA. Preventing foot ulcers in patients with diabetes.
542 *JAMA*. 2005;293(2):217–228.
- 543 2. Armstrong DG, Boulton AJM, Bus SA. Diabetic foot ulcers and their recurrence. *N Engl*
544 *J Med*. 2017;376(24):2367-2375.
- 545 3. Jupiter DC, Thorud JC, Buckley CJ, Shibuya N. The impact of foot ulceration and
546 amputation on mortality in diabetic patients. I: From ulceration to death, a
547 systematic review. *International Wound Journal*. 2016;13(5):892-903.
- 548 4. Khunkaew S, Fernandez R, Sim J. Health-related quality of life among adults living
549 with diabetic foot ulcers: a meta-analysis. *Qual Life Res*. 2019;28(6):1413-1427.
- 550 5. Jiang FH, Liu XM, Yu HR, Qian Y, Chen, HL. The incidence of depression in patients
551 with diabetic foot ulcers: a systematic review and meta-analysis. *Int J Low*
552 *Extrem Wounds*. 2022;21(2):161-173.
- 553 6. Kerr M, Barron E, Chadwick P, Evans T, Kong WM, Rayman G, Sutton-Smith M, Todd
554 G, Young B, Jeffcoate WJ. The cost of diabetic foot ulcers and amputations to the
555 National Health Service in England. *Diabetic Med*. 2019;36(8):995-1002.
- 556 7. International Working Group of the Diabetic Foot. The 2019 IWGDF Guidance
557 documents on the prevention and management of diabetic foot disease. Accessed
558 20th April 2022. <https://iwgdfguidelines.org/guidelines/guidelines/>; 2019.
- 559 8. Crews RT, Schneider KL, Yalla SV, Reeves ND, Vileikyte L. Physiological and
560 psychological challenges of increasing physical activity and exercise in patients at risk
561 of diabetic foot ulcers: a critical review. *Diabetes Metab Res Rev*. 2016;32(8):791-
562 804.
- 563 9. Lazzarini PA, Crews RT, van Netten JJ, Bus SA, Fernando ME, Chadwick PJ, Najafi B.
564 Measuring plantar tissue stress in people with diabetic peripheral neuropathy: a
565 critical concept in diabetic foot management. *J Diabetes Sci Technol*.
566 2019;13(5):869-80.
- 567 10. Bus SA. Priorities in offloading the diabetic foot. *Diabetes Metab Res Rev*.
568 2012;28(1):54–59.

- 569 11. Bus SA., Van Netten JJ. A shift in priority in diabetic foot care and research: 75% of
570 foot ulcers are preventable. *Diabetes Metab Res Rev.* 2016;32,195-200.
- 571 12. Tanharo D, Ghods R, Pourrahimi M, Abdi M, Aghaei S, Vali N. Adherence to treatment
572 in diabetic patients and its affecting factors. *Pajouhan Scientific Journal.*
573 2018;17(1):37-44.
- 574 13. Brod M. Quality of life issues in patients with diabetes and lower extremity ulcers:
575 patients and care givers. *Qual Life Res.* 1998;7(4):365-372.
- 576 14. Kinmond K, McGee P, Gough S, et al. 'Loss of self': a psychosocial study of the
577 quality of life of adults with diabetic ulceration. *J Tissue Viability.* 2003;13(1):6-16.
- 578 15. McPherson MV, Binning J. Chronic foot ulcers associated with diabetes: patients'
579 views. *The Diabetic Foot.* 2002;5(4):198-204.
- 580 16. Ribu L, Wahl A. Living with diabetic foot ulcers: a life of fear, restrictions, and pain.
581 *Ostomy Wound Manage.* 2004;50(2):57-67.
- 582 17. Searle AJ, Campbell R, Tallon D, et al. A qualitative approach to understanding the
583 experience of ulceration and healing in the diabetic foot: patient and podiatrist
584 perspectives. *Wounds.* 2005;17(1):16-26.
- 585 18. Searle A, Gale L, Campbell R, et al. Reducing the burden of chronic wounds:
586 prevention and management of the diabetic foot in the context of clinical guidelines.
587 *J Health Serv Res Policy.* 2008;13(3):82-91.
- 588 19. Coffey L, Mahon C, Gallagher P. Perceptions and experiences of diabetic foot
589 ulceration and foot care in people with diabetes: A qualitative meta-synthesis. *Int*
590 *Wound J.* 2019;16(1),183-210.
- 591 20. Department of Health and Social Care. UK Chief Medical Officers' Physical Activity
592 Guidelines. Accessed 18 August 2022.
593 [https://www.gov.uk/government/publications/physical-activity-guidelines-uk-chief-](https://www.gov.uk/government/publications/physical-activity-guidelines-uk-chief-medical-officers-report)
594 [medical-officers-report](https://www.gov.uk/government/publications/physical-activity-guidelines-uk-chief-medical-officers-report); 2019.
- 595 21. Colberg SR, Sigal RJ, Yardley JE, et al. Physical activity/exercise and diabetes: a
596 position statement of the American Diabetes Association. *Diabetes Care.*
597 2016;39(11):2065-2079.

- 598 22. Morris A. Developing the interview guide. In: Morris A, ed. *A practical introduction to*
599 *in-depth interviewing*. London: SAGE Publications Ltd; 2015:39-52.
- 600 23. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psych*.
601 2006;3(2),77-101.
- 602 24. Braun V. To saturate or not to saturate? Questioning data saturation as a useful
603 concept for thematic analysis and sample-size rationales. *Qual Res Sport Exerc*
604 *Health*. 2021;13(2):201-216.
- 605 25. Zhang P, Lu J, Jing Y, Tang S, Zhu D, Bi Y. Global epidemiology of diabetic foot
606 ulceration: a systematic review and meta-analysis. *Ann Med*. 2017;49(2):106-116.
- 607 26. Bartholomew KJ, Ntoumanis N, Mouratidis A, Katartzi E, Thøgersen-Ntoumani C,
608 Vlachopoulos S. Beware of your teaching style: A school-year long investigation of
609 controlling teaching and student motivational experiences. *Learn Instr*. 2018;53:50-
610 63.
- 611 27. Kim EJ, Han K. Factors related to self-care behaviors among patients with diabetic
612 foot ulcers. *J Clin Nurs*. 2020;29(9-100):1712-1722.
- 613 28. Schuch F, Vancampfort D, Firth J, Rosenbaum S, Ward P, Reichert T, Bagatini NC,
614 Bgeginski R, Stubbs B. Physical activity and sedentary behavior in people with major
615 depressive disorder: A systematic review and meta-analysis. *J Affect Disord*.
616 2018;210:139-150.
- 617 29. Ntoumanis N, Ng JY, Prestwich A, Quested E, Hancox JE, Thøgersen-Ntoumani C,
618 Deci EL, Ryan RM, Lonsdale C, Williams GC. A meta-analysis of self-determination
619 theory-informed intervention studies in the health domain: Effects on motivation,
620 health behavior, physical, and psychological health. *Health Psych Rev*.
621 2021;15(2):214-244.
- 622 30. Gillison FB, Rouse P, Standage M, Sebire SJ, Ryan RM. A meta-analysis of techniques
623 to promote motivation for health behaviour change from a self-determination theory
624 perspective. *Health Psychol Rev*. 2019;13(1):110-130.

- 625 31. Van Netten JJ, Woodburn J, Bus SA. The future for diabetic foot ulcer prevention: a
626 paradigm shift from stratified healthcare towards personalized medicine. *Diabetes*
627 *Metab Res Rev.* 2020;36:e3234.

Running title: limiting weight-bearing activity

Table 1. Themes and subthemes

Theme	Subtheme
3.1.1. Advice	3.1.1.1. Directive
	3.1.1.2. Generic
	3.1.1.3. Conflicting
3.1.2. Relationship	3.1.2.1. Rapport
	3.1.2.2. Empathy

Table 2. Themes relating to barriers and facilitators to limiting WBA

Barriers	Facilitators
5.1.1.1. Demands of daily living	3.2.2.1. Health benefits
5.1.1.2. Enjoyment of exercise	3.2.2.2. Fear and/or experience of
5.1.1.3. Sick/disabled identity and burden	consequences 3.2.2.3. Lifestyle adjustments
5.1.1.4. Depression	3.2.2.4. Positive feedback
5.1.1.5. Neuropathy	3.2.2.5. Practical support and reminders
5.1.1.6. Passivity	3.2.2.6. Cold weather 3.2.2.7. Pain 3.2.2.8. Depression 3.2.2.9. Active role in recovery
