

1 Yoga provision for individuals living with Multiple Sclerosis: Is the future online?

3 Short title: Online yoga provision for individuals living with Multiple Sclerosis

5 Gemma Wilson-Menzfeld^{1*}, Jenni Naisby², Katherine Baker², Rosie Morris², Jonathan Robinson³ and
6 Gill Barry².

7 ¹ Department of Nursing, Midwifery and Health, Northumbria University, Newcastle upon Tyne, United Kingdom

8 ²Department of Sport, Exercise & Rehabilitation, Northumbria University, Newcastle upon Tyne, United
9 Kingdom

10 ³School of Health and Life Sciences, Teesside University, Middlesbrough, United Kingdom

12 *Corresponding author:

13 Email: gemma.wilson-menzfeld@northumbria.ac.uk (GWM)

15 Abstract

16 **Background:** Yoga has multiple benefits for individuals living with Multiple Sclerosis (MS), including
17 reduced pain, depression, fatigue, strength, and improved quality of life. During the COVID-19
18 pandemic, home-based delivery of yoga increased. However, no studies to date have explored online
19 home-based yoga for individuals living with MS, more specifically the motivations, experiences, or
20 the sustainability of home-based yoga practice for individuals living with MS.

21 **Aim:** This study aimed to explore the facilitators and barriers of online yoga provision for individuals
22 living with MS.

23 **Methods:** One focus group and three semi-structured interviews were carried out online via Zoom
24 with one yoga instructor and seven yoga participants living with MS. Thematic Analysis was used to
25 analyse this data.

26 **Findings:** Two themes were generated from the interviews, the environment and future provision,
27 each with their own sub-themes. The themes reflect various facilitators and barriers of home-based
28 yoga provision which differed depending upon the individuals home environment, social
29 connections, physical ability, and confidence practising yoga. Furthermore, preferences of home
30 provision fluctuated over time depending upon symptoms of MS.

31 **Conclusions:** Home-based yoga practice is a viable and enjoyable option for individuals living with
32 MS. It is recommended that yoga studios offering home-based yoga provision consider individual
33 differences in preference, as well as fluctuations in symptoms that may create inequitable access to
34 services and may prevent participation for some.

35

36 **Keywords**

37 Multiple Sclerosis; yoga; home-based exercise; digital health; digital exclusion; COVID-19

38

39 **Introduction**

40 Multiple Sclerosis (MS) is an incurable neurodegenerative and chronic inflammatory disease that
41 affects the central nervous system. In Europe and North America, MS is the most common cause of
42 neurological disability in young adults, with diagnosis normally between 20-40 years, and more
43 prevalent in females (1). Symptoms of MS vary, but can include depression, fatigue, chronic pain,

44 muscle weakness, spasticity, decreased strength, balance and gait problems; all of which led to
45 reduced physical activity and increased risk of falls (2).

46 Exercise (including balance, strength, aerobic and stretching) is commonly used to improve MS
47 symptoms (3). Despite evidence for exercise improving MS symptoms (4-6), uptake remains limited.
48 Yoga is a form of exercise that incorporates meditation, breathing exercises, strength and balance,
49 to benefit physical and mental wellbeing simultaneously (7). Evidence suggests that PwMS find yoga
50 particularly beneficial for reducing pain, depression, fatigue and improving general quality of life and
51 strength (8-10). A systematic review and meta-analysis of MS and yoga indicated a positive short-
52 term effect on fatigue and mood (11).

53 Through the COVID-19 pandemic there has been a shift towards home-based consultation and also
54 home-based exercise, especially for more vulnerable groups who were “shielding”, including PwMS.
55 Home-based management practices, such as telemedicine, are now being used by People living with
56 MS (PwMS) to manage symptoms, often alongside traditional models of care (12). Home-based
57 telemedicine allows individuals to partake in remote consultation, assessment, and social
58 networking (12-14), however, there does remain some drawbacks to remote telemedicine practices
59 including low engagement over time (14). Home-based exercise was also encouraged during
60 lockdown to reducing sedentary behaviour habits (15). A recent systematic review regarding the
61 effect of home-based exercise for MS found that exercise that is performed between 2-7 times per
62 week can improve health-related outcomes and reduction in fatigue (16). Furthermore, a
63 Randomised-Controlled trial study looking specifically at home-based yoga for PwMS can have
64 positive outcomes for strength and balance (17). Home-based exercise combats the barriers of
65 attending face-to-face sessions through accessibility, lack of time, and transportation issues (16, 18).
66 One disadvantage to home-based exercise is reduced social connections and increased social
67 isolation (18), however, outdoor activities and live home-based exercise programmes, as opposed to
68 pre-recorded classes, went some way to reducing experiences of social isolation (18).

69 Whilst this research is promising and demonstrates the physical and psychological benefits of home-
70 based practice and the physical benefits of home-based yoga (16, 17), it does not consider
71 individuals' motivations or experiences of home-based yoga practice. Whilst COVID-19 based
72 lockdowns are seemingly coming to an end worldwide, the likelihood of home-based class provision
73 continues. Yet, there is no evidence exploring the motivations, experiences, or the sustainability of
74 home-based yoga practice for PwMS. Therefore, this study aimed to explore the facilitators and
75 barriers of online yoga provision for PwMS.

76

77 **Materials and Methods**

78 **Design**

79 This study employed a descriptive Phenomenological methodology (19) and a qualitative design. This
80 study was approved by Northumbria University's ethical approval system (Ref: 29257).

81

82 **Participants**

83 One instructor (female) and seven class participants took part in this study (5 female; 2 male). All
84 participants were over 18 years old. All class participants self-diagnosed as living with MS and were
85 members of a yoga studio based in London which provided yoga classes targeted at PwMS.

86

87 **Data collection**

88 An instructor at the yoga studio acted as a gatekeeper for this study. The instructor sent potential
89 participants an information sheet and consent form via email, explaining the purpose of the study.
90 Participation was entirely voluntary, and potential participants were asked to contact a member of

91 the research team (GB) if they had any questions or wished to participate. The instructor also
92 volunteered to participate in this study. Participants were offered the opportunity to ask questions
93 before providing written consent.

94 Two members of the research team (GWM; GB), who were independent of the yoga studio, carried
95 out online one-to-one interviews (n=3) and a focus group (n=1; 5 participants) using an online video
96 calling platform (Zoom Video Communications, Inc.). The focus group included class participants
97 only. The instructor participated separately in a one-to-one interview. These sessions were set up at
98 the most convenient time for participant, however, due to availability, two other class participants
99 took part in one-to-one interviews rather than the focus group.

100 The focus group/interview schedule explored motivations to begin yoga, the impact of yoga on MS
101 symptoms, online yoga provision, in-person yoga provision, social connections, and future delivery
102 (Fig 1).

103

104 Fig 1. **Focus Group / semi-structured interview schedule.** Focus Group / semi-structured interview
105 schedule

106

107 The focus group/interviews lasted between 27 – 53 minutes. All sessions were recorded using Zoom’s
108 recording facility and were downloaded immediately following the session. These recordings were
109 transcribed verbatim.

110

111 Data analysis

112 Transcripts were uploaded into NVivo 12 (QSR International) for analysis. Braun and Clarke’s
113 reflexive, inductive Thematic Analysis was chosen as the data analysis strategy due to its theoretical

114 freedom (20-22). GWM analysed all transcripts. Initially, the analyst immersed themselves within the
115 transcripts before generating initial codes and subsequent themes (20). Meetings were conducted
116 with the team to discuss codes and themes before defining and naming themes. Participant quotes
117 were used to demonstrate points of interpretation and generated themes/sub-themes.

118

119 Results

120 Two themes were generated from the interview data: the environment and future provision. Each
121 theme is made up of multiple sub-themes (Fig 2).

122

123 **Fig 2. Themes and sub-themes.** Themes and sub-themes.

124

125 Theme 1: The environment

126 The environment played an integral role in online yoga provision. This programme was the first of its
127 kind in the studio, and there were several factors considered for home practice. The participants
128 compared the home environment to the studio environment throughout, and barriers to online
129 provision from home were still present.

130

131 Setting up for practice at home

132 The shift from in-person to online yoga provision occurred rapidly due to the onset of the COVID-19
133 pandemic. This change had not been planned or foreseen and therefore measures were quickly put
134 in place to continue practice despite the implemented restrictions. The yoga instructor visited each
135 participant's home to ensure their space was safe and effective for home practice.

136 *"I gave them half an hour and we looked in their house [...] I helped them"*

137 *(P001; instructor)*

138 Some participants owned technology which facilitated their practice, specifically to ensure they were
139 able to be seen by the instructor in all positions. This was one concern for health and safety, as the
140 instructor needed to see individuals in all positions.

141 *"The main problem is just sort of moving the computer around during the*

142 *class in order to be seen. So the inversion that I do using my sofa [the*

143 *instructor] knows I just disappear" (P006)*

144 Other participants had to invest in technology to sustain their engagement with yoga online. Despite
145 this additional investment, there were no participants who were unable to participate in home
146 practice due to digital exclusion through lack of access or digital skills.

147 Yoga equipment was another area for investment. Some participants already owned supportive yoga
148 equipment whereas others did not.

149 *"I had the equipment, but I would stop short like, people are talking about*

150 *getting ropes and things like that, I'm not, like I'm not, I don't need to get*

151 *everything" (P002)*

152 Not everyone's environment was ideal for practising yoga, but the instructor consciously tried to
153 provide alternatives to suit their home environment.

154 *"So and so goes on the sofa, so and so does it like this [...] There are always*

155 *alternatives [...] It doesn't matter so much how they do it, whether it is a*

156 *pillow or a bolster or this or that, as long as the shape is there, and they get*

157 *something from it" (P001)*

158

159 Differentiating practice (home vs studio)

160 It was not just the space that was different from studio to home. The principal difference between
161 the home environment and the studio environment was the absence of physical support, if needed.
162 Support was provided by individuals during in-person classes at the studio. They helped with
163 positioning and with equipment needed during class.

164 *“When they are in real life class, we have these helpers that, do you need a*
165 *brick? And they would go and get it. Now they have to get it themselves [...]*
166 *and it works perfectly. So actually, we will learn for when we go back” (P001)*

167 These changes were not always negative, and learning was taken from home practice to promote
168 independent practice, even when back in the studio environment. However, there were some
169 downsides in that lack of home support made the instructor, and the participants, wary of more
170 difficult moves, or wary if they felt particularly tired at that time.

171 *“I will be more cautious and this is generally with all the Zoom teaching, if*
172 *they say, oh I’d rather not do it today. I may try one more time [...] but if*
173 *they are then doubtful, I can’t do it. Whereas in class I will be next to them*
174 *saying, do it” (P001)*

175 This resulted in differing practice from the studio to home. Participants value the physical support
176 provided during in-person classes.

177 *“My balance is really poor and so I have to adapt what is going on to do the*
178 *poses etc., how I can do it safely, I think that would probably be easier within*
179 *the studio around the teachers” (P005)*

180 Participants were sometimes more reluctant to do certain poses without the support from
181 instructors. The lack of physical support reduced their confidence of practising some poses, and some
182 described feeling scared when doing more demanding movements.

183 *“I actually need help to lift the left leg to hold it up, because I can’t do it by*
184 *myself and I’m a bit scared. I won’t [go upside down] [...] So more*
185 *confidence, I would say in the studio than by myself here” (P003)*

186 For others, they did not feel as though they pushed themselves as much when at home, as they did
187 not have instructors observing them.

188 *“When I’m at home, I’ll start doing something like a back bend thing and I’ll*
189 *think, oh, I don’t know. Whereas, in class where I’m being observed by three*
190 *teachers, then you put more effort into it” (P002)*

191 Although the instructor did encourage this verbally, when appropriate, online.

192 *“I do have to push them sometimes, but sometimes if they are really too*
193 *tired [...] obviously I am not going to push” (P001)*

194 All of the participants interviewed in this study had attended the classes for some time and mostly
195 understood their own physical boundaries. The instructor knew them and the physical difficulties
196 they experienced as a result of MS. However, the thought of online provision was proposed as being
197 difficult for new attendees, particularly those living with MS.

198 *“[The instructor] spends a bit of extra time with [new attendees].*
199 *Really focusing on understanding their condition, what they can do*
200 *[...] I think that would be so difficult to do in the Zoom environment”*
201 *(P005)*

202

203 Social interaction

204 Social interaction is one of the benefits of going to class, especially social interaction with peers who
205 understand each other's condition.

206 *"Socially because it feels like [...] the whole group we're like... I accept them*
207 *as part of my family [...] You feel these people, because you see them every*
208 *day" (P003)*

209 This social interaction was still valued when online, but it was not seen as being the same as face-to-
210 face interaction.

211 *"I prefer if we were there to see each other face-to-face. Because you know,*
212 *you can communicate and chat a little bit or something, but even online it*
213 *felt, how to say, mentally that you are actually you are not alone, you are*
214 *doing it with the people you know" (P003)*

215 The instructor made an effort to incorporate time for social interaction into the online session at
216 the beginning of class, as well as organising additional social sessions, but also recognised that this
217 interaction was dissimilar to in-person classes.

218 *"Before Christmas we had a little session [...] we all introduced ourselves and*
219 *talked a little bit about who we are and what we are doing and that went*
220 *through and it was really lovely, but then I felt many people just wanted...*
221 *they were tired, it is also the time of class, they want to eat something"*
222 *(P001; instructor)*

223 It was important to consider the social interaction provided by the instructor during the class itself.
224 The "hands-on" support of Iyengar yoga was key for both the instructor and the participants, as well

225 as verbal and visual cues for support. The physical support was not possible, but it was also difficult
226 to communicate between instructor and participants when doing practice online. All participants
227 were encouraged to go on mute so that there was no noise disruption, and the participants could
228 hear instructions, however, this meant that it was not easy to ask questions or advice during class.

229 *“Because you can't go in and mute yourself that is the other problem with*
230 *Zoom is that [...] it is a big effort to move to the other side of the room to*
231 *then unmute yourself to say something and then mute yourself again”*
232 *(P002)*

233

234 Theme 2: Future provision

235 Participants considered a number of approaches to moving forward, looking at the differences
236 between live and recorded delivery, as well as the potential of offering yoga practice as a ‘hybrid’
237 approach of both live online and in-person events.

238

239 Live vs recorded online provision

240 Participants discussed the merits of live online provision, which they considered as being very
241 different to pre-recorded sessions or doing self-led yoga provision. Participants valued the live
242 classes with an instructor and other participants, as opposed to doing yoga by themselves in their
243 own time.

244 *“This business of having a live person, and [the instructor] is really good at*
245 *saying, come on stick with it, do it, I can see what you are doing, come on,*
246 *lift that leg [...] For the whole session and [the instructor] keeps you going*
247 *for the whole lot. And also you can't just get up and clear off” (P007)*

248 The instructor was also central to online yoga practice for MS due to her understanding of individual
249 barriers. This allowed the instructor to personalise sessions, and poses, for individuals within the
250 class.

251 *“It is about the amazing opportunity to do these special classes, which with*
252 *the teacher who understands the conditions that we are dealing with. I*
253 *wondered how that would work digitally [...] I don't know whether it is her*
254 *magic” (P006)*

255 Personalisation is not possible during pre-recorded sessions and is a benefit of attending live
256 sessions. Another complication of living with MS can be memory impairment which often made it
257 difficult for participants to do self-led sessions or sessions that are not live.

258 *“If you are by yourself you just go, eurgh, you just do the first two poses and*
259 *you can't remember the third one. You are going to have to get up, go to*
260 *your notes, and look” (P007)*

261 Despite in-person social interaction being favoured, the social element was important with live
262 classes, and these were therefore preferred to pre-recorded sessions. This online (and in-person)
263 social interaction meant that the participant was sharing the experience with others, and even more
264 meaningfully, with peers living with MS.

265 *“It is amazing to actually be in a physical space with other people who*
266 *completely understand the condition [...] regardless of whether it's online or*
267 *in the physical space, to be around people that sort of understand what*
268 *you're struggling with” (P006)*

269

270 A hybrid approach

271 Participants explored the barriers for taking part in both in-person and online provision and there
272 were differing views across participants. There were advantages and disadvantages to both class
273 types. Travel as a major barrier to in-person provision and a benefit to practising from home. Travel
274 could be especially problematic for those living with MS.

275 *“I will fall over on my way to the tube station. I can’t carry my electric scooter*
276 *up the stairs to the tube station. I will catch cold when I am there and it will*
277 *take me 10 weeks to get over it” (P007)*

278 Participant 3 must get a taxi to each class due to restrictions using public transport. Cost is a
279 restriction for this participant, but despite this, they still prefer in-person classes.

280 *“The travel, this is another thing that is not really convenient for me because*
281 *I live like 25-minutes by car, half an hour from the institute and it costs me*
282 *money because I cannot travel by normal transport [...] I will do my best to*
283 *have it face to face. I will make it a priority” (P003)*

284 Participants suggested the potential of running both online and in-person classes at the same time.
285 There were advantages and disadvantages considered for both modes of delivery.

286 *“If it is a big class, it wouldn’t work so well” (P001; instructor)*

287 *“You don't get the physical manipulation, but you do get to your class quite*
288 *easily” (P004)*

289 *“It increases the access, but the downsides are you don't have that instant,*
290 *you know, somebody there able to manipulate you or help you or say, we*
291 *will do something different for you” (P005)*

292 Whilst challenges to this approach were recognised, the potential to allow for flexibility was also
293 considered.

294 *"I mean [...] obviously for all of us, you know, the more options we have the*
295 *better" (P006)*

296 Flexibility of classes was important for PwMS, particularly due to fatigue.

297 *"You make the effort and try and turn up and there has only been one*
298 *occasion where I felt literally that I could not do the class... and I was really*
299 *sad about it, you know. So of course, I personally would make as much effort*
300 *as possible, but it is great if you've got more options, that just goes without*
301 *saying" (P002)*

302 Another motivation for a hybrid approach is to have the option of more classes. The instructor also
303 felt that specific classes were more suited to online delivery and would continue to deliver them
304 online.

305 *"I will continue some kind of class [online]. I do sort of prema yoga and*
306 *recuperative class and it is beautifully done on Zoom because you don't hear*
307 *the person next to you snore, you don't smell, you know, you are on your*
308 *own, you're really on your own. The teacher shows you what to do then they*
309 *close their eyes and then you just talk through them" (P001; instructor)*

310

311 Discussion

312 This study aimed to explore the facilitators and barriers of online yoga provision for PwMS.
313 Interviews with participants and the instructor led to the development of two crucial factors: the
314 environment of yoga practice, and future provision of yoga. Various facilitators and barriers were

315 experienced for individuals. Facilitators and barriers varied depending on the individual, but included
316 the home environment, the importance of the instructor, social connections, physical ability, and
317 confidence practising yoga. Furthermore, motivation to practice and ease of practicing yoga at home
318 fluctuated over time through physical and psychological symptoms of MS.

319 The transition from studio environment to home environment was not always straightforward to
320 begin practising yoga at home. For safety, it was important that the participants could be seen by
321 the instructor. Some participants had to buy both digital and yoga-specific equipment which, once
322 acquired, facilitated home-based practice. It is important that provision is equitable for all, and that
323 individuals who cannot afford extra equipment are not at risk of exclusion from these services and
324 heightened health inequalities. However, a financial benefit related to home-based practice was that
325 for most participants, the cost of home equipment was offset by travel. There were other drawbacks
326 to travel that further increased the preference of online delivery, including accessibility of public
327 transport, particularly when MS symptoms were at their worst. This supports other research
328 examining experiences of homebased exercise for PwMS which documented accessibility, lack of
329 time, and transportation issues as being barriers to exercise classes outside of the home (16, 18).

330 The yoga instructor was important within online provision, both in terms of setting up the home
331 environment so that it was safe and suitable, and also in their experience and expertise of yoga
332 practice and MS, in understanding participants' strengths and limitations in practice. This allowed
333 the live online yoga sessions to be personalised and suitable to individual class participants.

334 It was clear that practice changed for some at home, without physical support, and verbal
335 interaction, from instructors or class assistants. This depended upon their confidence, ability to do
336 poses without support, as well as fluctuations of symptoms. Lack of physical support from
337 trustworthy professionals can be a barrier in physical activity engagement for PwMS (23). A
338 supportive class structure in yoga and sense of belonging have been demonstrated to be key in
339 overcoming barriers to participation for people living with disabilities (24). The yoga class within this

340 study has been found to provide an online community and the feeling of support around the
341 individual during a live class, however, for some, this was not comparable to face-to-face sessions.

342 Whilst there was a sense of community with the online classes, loss of social interaction was an issue
343 with moving from in-person to online yoga classes (18). Social interaction of live online classes was
344 still valued, and time was set aside to socialise, however it was not always perceived as being good
345 quality social interaction. Community building through meeting up face-to-face and attending social
346 events has been found to enhance adherence to yoga for people living with disabilities (24) and
347 warrants consideration for future models of yoga practice for PwMS.

348 One consideration for online provision moving forward is digital exclusion. There are many
349 individuals who cannot, or choose not to, use digital technologies, either through lack of access, lack
350 of digital skills, or not recognising the tangible outcomes related to digital technology use (25). Digital
351 exclusion is associated with inequalities and disadvantages through the life course, and there are
352 multiple factors that increase the likelihood of digital exclusion: educational attainment (26-29),
353 increased age (28-35), health (27, 35-37), disability (30), and gender, with women often being more
354 digitally excluded than men (35-37). All participants in this study already had broadband access at
355 home and owned at least one digital device which they were able to use to connect to classes online.
356 However, some participants did describe having to invest in technology or yoga equipment to sustain
357 their engagement with online yoga provision. However, for others, the cost of broadband, digital
358 technologies, and yoga equipment, as well as having sufficient space to practise in the home, could
359 lead to exclusion from this future model of provision.

360 Rather than digitally excluded individuals needing to become digitally connected, services have the
361 responsibility to make services equitable for all, and not to exclude those who do not have the access
362 to digital devices or broadband, or do not have the skills or confidence to utilise digital technology.
363 A 'hybrid' model of yoga practice was suggested in this study, in which both online and face-to-face
364 classes could be ran simultaneously. This has the potential to support participants in both ways,

365 depending on their access needs and preferences. Further research would benefit from evaluating
366 this type of yoga provision for PwMS. Participants valued the flexibility of classes and providing more
367 classes, either in person, online, or both, was valued.

368 This study has illustrated the benefits and drawbacks of online yoga provision for PwMS. Online yoga
369 provision is a viable alternative to in-person practice, however, the barriers to participation in online
370 yoga must be considered by yoga studios providing these services, to ensure equitability for all class
371 participants, sustainability of practice, and safety. Therefore, it is critical to consider individual
372 preferences and fluctuations in preferences depending upon MS symptoms, as well as the home
373 environment, potential loss of social connection, and exclusion based on lack of digital access or
374 access to equipment.

375 There are limitations to this study. First, this study used convenience sampling and therefore the
376 sample may not be representative of all PwMS e.g. use of digital technology. Second, this data is
377 collected from one yoga studio, and it is important to consider the perspectives and experiences of
378 PwMS who practise yoga across the UK and internationally. Finally, all of the participants in this
379 study were existing members of the yoga studio and this may have biased the results favourably for
380 at-home practice. Further research must therefore consider the experiences of those who are new
381 to yoga generally, including at-home yoga.

382

383 Conclusions

384 Our study is the first known study to explore the facilitators and barriers of online yoga provision for
385 PwMS. Data highlighted that home-based yoga practice is a viable and enjoyed option for PwMS.
386 There were various facilitators and barriers of home-based yoga provision, which were dependent
387 on the individual. Furthermore, preferences for home-based yoga practice were unstable for
388 individuals depending upon physical and psychological symptoms of MS.

389 For yoga studios offering home-based yoga provision or a hybrid approach of simultaneous in-person
390 and online classes, it is critical to consider these fluctuations, as well as the home environment,
391 potential loss of social connection, and exclusion based on lack of digital access or access to
392 equipment.

393

394 References

- 395 1. Browne P, Chandraratna D, Angood C, Tremlett H, Baker C, Taylor BV, et al. Atlas of multiple
396 sclerosis 2013: a growing global problem with widespread inequity. *Neurology*. 2014;83(11):1022-4.
- 397 2. Hasanpour-Dehkordi A, Jivad N, Solati K. Effects of yoga on physiological indices, anxiety and
398 social functioning in multiple sclerosis patients: A randomized trial. *Journal of clinical and diagnostic
399 research: JCDR*. 2016;10(6):VC01.
- 400 3. Hale L, Schou E, Piggot J, Littmann A, Tumilty S. The effect of a combined exercise programme
401 for people with Multiple Sclerosis: a case series. *New Zealand Journal of Physiotherapy*.
402 2003;31(3):130-9.
- 403 4. Ensari I, Motl RW, Pilutti LA. Exercise training improves depressive symptoms in people with
404 multiple sclerosis: results of a meta-analysis. *Journal of psychosomatic research*. 2014;76(6):465-71.
- 405 5. Halabchi F, Alizadeh Z, Sahraian MA, Abolhasani M. Exercise prescription for patients with
406 multiple sclerosis; potential benefits and practical recommendations. *BMC neurology*. 2017;17(1):1-
407 11.
- 408 6. Tollár J, Nagy F, Tóth BE, Török K, Szita K, Csutorás B, et al. Exercise effects on multiple
409 sclerosis quality of life and clinical-motor symptoms. *Med Sci Sports Exerc*. 2020;52(5):1007-14.
- 410 7. Feuerstein G. *The Yoga tradition: its history, literature, philosophy and practice*. Prescott, AZ.
411 Hohm Press. 1998;100:103.
- 412 8. Frank R, Larimore J. Yoga as a method of symptom management in multiple sclerosis.
413 *Frontiers in neuroscience*. 2015;9:133.
- 414 9. Rogers KA, MacDonald M. Therapeutic yoga: symptom management for multiple sclerosis.
415 *The Journal of Alternative and Complementary Medicine*. 2015;21(11):655-9.
- 416 10. Senders A, Wahbeh H, Spain R, Shinto L. Mind-body medicine for multiple sclerosis: a
417 systematic review. *Autoimmune diseases*. 2012;2012.
- 418 11. Cramer H, Lauche R, Azizi H, Dobos G, Langhorst J. Yoga for multiple sclerosis: a systematic
419 review and meta-analysis. *PLoS One*. 2014;9(11):e112414.
- 420 12. Abbadessa G, Brigo F, Clerico M, De Mercanti S, Trojsi F, Tedeschi G, et al. Digital therapeutics
421 in neurology. *Journal of Neurology*. 2022;269(3):1209-24.
- 422 13. Lavorgna L, Russo A, De Stefano M, Lanzillo R, Esposito S, Moshtari F, et al. Health-Related
423 Coping and Social Interaction in People with Multiple Sclerosis Supported by a Social Network: Pilot
424 Study With a New Methodological Approach. *Interact J Med Res*. 2017;6(2):e10.
- 425 14. Yeroushalmi S, Maloni H, Costello K, Wallin MT. Telemedicine and multiple sclerosis: A
426 comprehensive literature review. *Journal of Telemedicine and Telecare*. 2019;26(7-8):400-13.
- 427 15. Ghram A, Briki W, Mansoor H, Al-Mohannadi AS, Lavie CJ, Chamari K. Home-based exercise
428 can be beneficial for counteracting sedentary behavior and physical inactivity during the COVID-19
429 pandemic in older adults. *Postgrad Med*. 2021;133(5):469-80.

- 430 16. Ghahfarrokhi MM, Banitalebi E, Negaresh R, Motl RW. Home-based exercise training in
431 multiple sclerosis: A systematic review with implications for future research. *Multiple Sclerosis and*
432 *Related Disorders*. 2021;55:103177.
- 433 17. Hosseini SS, Rajabi H, Sahraian MA, Moradi M, Mehri K, Abolhasani M. Effects of 8-week
434 home-based yoga and resistance training on muscle strength, functional capacity and balance in
435 patients with multiple sclerosis: A randomized controlled study. *Asian J Sports Med*.
436 2018;9(3):e68807.
- 437 18. Koopmans A, Pelletier C. Physical Activity Experiences of People with Multiple Sclerosis
438 during the COVID-19 Pandemic. *Disabilities*. 2022;2(1):41-55.
- 439 19. Husserl E. *The essential Husserl: Basic writings in transcendental phenomenology*: Indiana
440 University Press; 1999.
- 441 20. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative research in psychology*.
442 2006;3(2):77-101.
- 443 21. Braun V, Clarke V. *Successful qualitative research: A practical guide for beginners*: sage;
444 2013.
- 445 22. Braun V, Clarke V. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport,*
446 *Exercise and Health*. 2019;11(4):589-97.
- 447 23. Momsen A-MH, Ørtenblad L, Maribo T. Effective rehabilitation interventions and
448 participation among people with multiple sclerosis: an overview of reviews. *Annals of physical and*
449 *rehabilitation medicine*. 2022;65(1):101529.
- 450 24. Regan EW, Wende M, Blake C, Fritz S. Yoga for everyone: a qualitative study of a community
451 yoga class for people with disability. *Physiotherapy Theory and Practice*. 2020:1-11.
- 452 25. Van Deursen AJ, Helsper EJ. *The third-level digital divide: Who benefits most from being*
453 *online? Communication and information technologies annual*: Emerald Group Publishing Limited;
454 2015.
- 455 26. Neves BB, Amaro F, Fonseca JR. Coming of (old) age in the digital age: ICT usage and non-
456 usage among older adults. *Sociological Research Online*. 2013;18(2):1-14.
- 457 27. Cresci MK, Jarosz PA. Bridging the Digital Divide for Urban Seniors: Community Partnership.
458 *Geriatric Nursing*. 2010;31(6):455-63.
- 459 28. Hargittai E, Dobransky K. Old dogs, new clicks: Digital inequality in skills and uses among
460 older adults. *Canadian Journal of Communication*. 2017;42(2):195-212.
- 461 29. Bergström A. Digital equality and the uptake of digital applications among seniors of different
462 age. *Nordicom Review*. 2017;38(Special Issue 1):79-91.
- 463 30. Choi NG, Dinitto DM. The Digital Divide Among Low-Income Homebound Older Adults:
464 Internet Use Patterns, eHealth Literacy, and Attitudes Toward Computer/Internet Use. *Journal of*
465 *Medical Internet Research*. 2013;15(5):e93-e.
- 466 31. Yoon H, Jang Y, Vaughan PW, Garcia M. Older Adults' Internet Use for Health Information:
467 Digital Divide by Race/Ethnicity and Socioeconomic Status. *Journal of Applied Gerontology*. 2018.
- 468 32. Gilleard C, Higgs P. Internet use and the digital divide in the English longitudinal study of
469 ageing. *European journal of ageing*. 2008;5(3):233.
- 470 33. Friemel TN. The digital divide has grown old: Determinants of a digital divide among seniors.
471 *New Media and Society*. 2016;18(2):313-31.
- 472 34. Gordon NP, Hornbrook MC. Older adults' readiness to engage with eHealth patient
473 education and self-care resources: a cross-sectional survey. *BMC Health Services Research*.
474 2018;18:220-.
- 475 35. Matthews K, Nazroo J, Marshall A. Digital inclusion in later life: cohort changes in internet
476 use over a ten-year period in England. *Ageing & Society*. 2019;39(9):1914-32.
- 477 36. Age UK. *Digital inclusion evidence review*. London: Age UK; 2018.
- 478 37. Age UK. *Later life in a digital world*. London: Age UK; 2015.

479