

**Flexible, Accessible, Effective: Patient Perceptions of the
Pulmonary Hypertension and Home-Based (PHAHB)
Physical Activity Intervention**

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Citation:

MCCORMACK, Ciara, HARDCASTLE, Sarah, MOYNA, Niall M., MORAHAN, Emer, CULLIVAN, Sarah, GAINE, Sean, MCCULLAGH, Brian and KEHOE, Brona (2026). Flexible, Accessible, Effective: Patient Perceptions of the Pulmonary Hypertension and Home-Based (PHAHB) Physical Activity Intervention. *Pulmonary Circulation*, 16 (2): e70309. [Article]

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PH patients perceptions of a home-based intervention

1 Flexible, Accessible, Effective: Patient perceptions of the Pulmonary Hypertension
2 and Home-Based (PHAHB) Physical Activity Intervention

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21 **Work number:** +353 1 474 7380

22 **Type:** *Original article*

23 **Word Count:** 4206

24 **Pages:** #26

25 **Tables:** #1

26 **Figures:** #1

27 **Short Title:** *PH patients perceptions of a home-based intervention*

28

29 **Keywords:** *home-based* ,exercise, patient experience, acceptability

30

31 **Conflict of interest:** Prof Gaine has received honoraria from a number of companies involved
32 in PH including Johnson&Johnson and MSD.

33

34 **Funding:** This study was supported by Janssen Ireland Science UC grant NOPRODPAH4014.

35 Note: this research was not completed nor endorsed by the HSE.

36

37 **Ethical approval:** Ethical approval was obtained from the Mater Misericordiae institutional
38 review board (ref. 1/378/2032) and Dublin City University research ethics
39 (DCUREC/2018/246).

40

41 **Acknowledgments:** We would like to acknowledge the pulmonary hypertension (PH) nurse
42 specialists and secretary in the PH Unit in the Mater Hospital (Dublin, Ireland) for their

43 support with this trial. We would like to thank all PH patients involved in this study for their
44 engagement and support.

45

46 ***Consent to participate:*** All participants signed consent forms to participant in this research.

47

48 ***Authors' contribution:*** CMCC conceived original idea. BK,NM,SH,SG were involved in
49 supporting the study design and study implementation. EM was involved with the data
50 collection. Qualitative data were analysed by CMCC, SH, BK and were involved with
51 drafting the manuscript. CMCC drafted original manuscript. SC,SG,BMCC revised the
52 manuscript critically. All authors read and approved this final manuscript.

53

54 ***Guarantor:*** Ciara McCormack

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64 **ABSTRACT**

65

66 Pulmonary hypertension (PH) is a progressive condition associated with reduced physical
67 activity and impaired quality of life. While exercise training is now recognised as a safe and
68 beneficial adjunct to PH management, opportunities for supervised programmes remain
69 limited. There is a growing need for person-centred, acceptable interventions that enable
70 patients to engage safely and meaningfully in physical activity within their own environment.
71 The aim of this study was to explore the lived experiences of individuals with PH who
72 participated in a 10-week, home-based exercise programme, and to evaluate its, acceptability,
73 utility and perceived impact. Semi-structured interviews were conducted with participants
74 (N=13) diagnosed with precapillary PH, specifically pulmonary arterial hypertension (PAH)
75 and chronic thromboembolic pulmonary hypertension (CTEPH) who completed the
76 intervention. Data were analysed thematically to identify core themes reflecting patient
77 experiences and perceived changes. Thematic analysis revealed four key themes: convenience
78 and accessibility, development of exercise self-regulation skills, support and accountability,
79 and perceived improvements in physical fitness and well-being.

80 Person-centred, behaviourally informed home-based exercise interventions can help
81 individuals with PH exercise safely, overcome fear, enhance self-efficacy, and re-engage with
82 physical activity. These findings provide patient-driven insights to guide the design and
83 implementation of scalable exercise models for the PH population.

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88

89 **Introduction**

90 Pulmonary hypertension (PH) is a chronic, progressive disease characterised by elevated
91 pulmonary artery pressure and vascular resistance, leading to right heart failure. Hallmark
92 symptoms include exertional dyspnoea and severe fatigue, resulting in marked reductions in
93 exercise capacity and overall quality of life (QoL).[1] Despite advancements in
94 pharmaceutical treatments, many patients with PH continue to experience these debilitating
95 symptoms. Such ongoing limitations, combined with fears of overexertion and potential
96 harm, often discourage engagement in physical activity (PA) [2], further contributing to
97 declines in physical function and QoL.

98 Research has shown, compared to age and sex matched controls, that patients with PH are
99 more sedentary and have a reduced health related quality of life (HRQoL).[3–5] Structured
100 exercise training can provide a supportive environment for PA engagement. Despite previous
101 concerns, research has shown that exercise is both safe and well tolerated in stable patients
102 with PH [6–9] and has demonstrated significant benefits in enhancing physical function and
103 QoL in individuals with PH.[10–12] Exercise training is now recognised as an important
104 adjunctive therapy and is endorsed by international guidelines, including those from the
105 European Society of Cardiology (ESC)/European Respiratory Society (ERS) and the
106 American Thoracic Society (ATS).[13,14]

107 Traditional exercise rehabilitation in PH is typically offered in controlled specialized
108 centres, which can be burdensome for many patients. In recent years, home-based exercise
109 programmes have been proposed as a pragmatic alternative to improve access. Primary
110 findings from home-based studies with either supervised or clinic visits included [15–18] or

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111 fully remote [19] have demonstrated positive outcomes in increasing PA, physical function
112 and QoL among PH patients.

113 Despite growing recognition of the benefits of exercise for people with PH, there remains
114 a critical gap in understanding how home-based interventions are experienced in real-world
115 contexts. Chia et al., [20] recently explore PH patients experience of participating in
116 structured outpatients exercise interventions and concluded that these programmes can
117 increase knowledge, confidence and have a positive impact on PA perceptions.[20] However,
118 to date, no qualitative study has explored the experiences of engagement with a remote home-
119 based exercise intervention amongst those with PH, limiting our understanding of how and
120 why interventions might succeed or fail in practice. While assessing clinical outcomes is
121 essential, exploring the patient experience offers unique insights into behavioural, emotional,
122 and contextual factors that shape engagement. These include motivations, perceived barriers,
123 intervention usability, and real-world feasibility elements often overlooked in quantitative
124 analyses.[21] Such understanding is vital for informing intervention refinement, future trial
125 design, and scalable models of care.

126 Accordingly, this study used semi-structured interviews to explore the experiences of
127 individuals with PH completion of the 10-week home-based Pulmonary Hypertension and
128 Home-Based (PHAHB) exercise intervention. Participants included individuals with
129 precapillary PH, specifically pulmonary arterial hypertension (PAH) and chronic
130 thromboembolic pulmonary hypertension (CTEPH). The aim was to assess the utility and
131 acceptability of the pilot intervention from the patients' perspective. This study addresses a
132 pressing need for practical, real-world insight to inform the development of interventions that
133 are not only clinically effective, but also meaningful, acceptable and sustainable for
134 individuals living with PH.

135

136 **METHODS**

137

138 **Study Design**

139 This qualitative study is part of the mixed methods evaluation of the 10-week home-
140 based exercise intervention. Quantitative results have been previously reported in detail.[22]
141 The current study reports qualitative results from semi-structured interviews with participants
142 within 2 weeks following the end of the intervention. It conformed to the suggested
143 recommendations of the standard for Reporting Qualitative research (SRQR) checklist. [23]
144 Ethical approval was obtained from the (omitted for blind review) Institutional Review
145 Board REF(omitted for blind review) and (omitted for blind review) Research Ethics (omitted
146 for blind review).

147

148 **Participants**

149 Twenty participants were recruited to the PHAHB intervention, and all completed it,
150 except for one participant who was hospitalised for unrelated reasons. Of the nineteen
151 participants, 89% agreed to take part. Inclusion criteria were a confirmed diagnosis of
152 precapillary PH, including PAH and CTEPH and completion of at least 80% of prescribed
153 intervention sessions as previously outlined.[19]

154

155 **Intervention**

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156 The PHAHB intervention was a 10-week, fully remote, patient-centred PA intervention
157 for individuals living with PH. It was underpinned by Social Cognitive Theory (SCT) and
158 incorporated established behaviour change techniques (BCTs) (i.e., goal setting, action
159 planning, self-monitoring) known to support PA uptake.

160 The intervention was based on formative research with PA patients that explored PA,
161 exercise preferences, exercise barriers and support needs [2,24] and also previous distance-
162 based, smart wearable PA intervention in chronic disease. [25,26] The intervention has been
163 described previously.[22] In brief, the 10- week intervention consists of the following
164 components: Three 60–90 minute induction educational sessions, five 30-minute health
165 coaching sessions, and an exercise programme combining aerobic, resistance and respiratory
166 training sessions. Participants also received a stationary bicycle, customised exercise videos,
167 PA manual and logbook, and a Fitbit Charge 3 and devices for home monitoring, including a
168 blood pressure monitor, pulse oximeter, and a real-time heart/respiratory monitor (Frontier
169 X). The intervention was delivered by a clinical exercise physiologist.

170

171 **Data Collection**

172 To ensure participant convenience, interviews were conducted virtually or via phone. A
173 semi-structured interview guide was developed to explore acceptability and utility of the
174 intervention, while remaining open to capturing other experiences of the participant. [27,28]
175 All nineteen participants were invited to participate in an interview after they completed the
176 10-week follow-up assessments, with all interviews conducted within 2-weeks of participant
177 completion. The interviews were conducted by a researcher trained in qualitative data
178 collection who was not involved in the intervention's development or delivery in order to

179 foster openness regarding experiences of PHAHB. All interviews were audio recorded and
180 transcribed verbatim.

181

182 **Data Analysis**

183 Interview data were analysed using reflexive thematic [29] analysis following Braun and
184 Clarke's six-step framework.[30] This approach recognises the active role of the researcher in
185 interpreting meaning within qualitative data and supports the development of themes through
186 an iterative and reflexive engagement with the dataset. Transcripts were read repeatedly to
187 ensure familiarity, and initial codes were generated inductively through line-by-line coding.
188 Related codes were then organised into candidate themes, which were reviewed, refined, and
189 structured into a thematic map to capture shared and divergent experiences.

190 To enhance rigour, a second qualitative researcher independently reviewed the transcripts
191 and contributed to coding, theme development, and interpretation. In line with reflexive
192 thematic analysis, themes were developed through ongoing engagement with the data and
193 researcher interpretation rather than through deductive coding frameworks. It is
194 acknowledged that interpretations are constructed by the researcher and context dependent
195 and therefore different interpretations are possible. Nevertheless, we aimed to achieve
196 credibility and trustworthiness in the analysis produced through regular discussions between
197 members of the research team supported reflexive consideration of coding decisions and
198 theme development, allowing interpretations to be refined through collaborative dialogue and
199 critical reflection. [31] Credibility was further supported through transparent reporting of
200 analytic procedures and the inclusion of illustrative participant quotations to provide depth
201 and contextual grounding for the themes presented.[32]

202 **Participant Demographics**

203 Thirteen participants (76%) were interviewed, the majority were women (n = 11), aged
204 between 29–70 years. Eleven participants had PAH (85%) and two had CTEPH (15%). The
205 remaining 13% were unable to complete the interview within the 2 week time frame.
206 Participant demographics are outlined in Table 1. Interview duration was between 30-50
207 minutes.

208

209 **Results**

210 Thematic analysis revealed four key themes: (i) convenience and accessibility of the
211 home-based program, (ii) development of exercise self-regulation skills, (iii) support and
212 accountability, and (iv) perceived improvements in physical fitness and well-being (Figure 1).
213 These themes collectively highlight the acceptability of the intervention, the barriers it
214 addressed, and the meaningful impact on participants' lives.

215 Figure 1: Visual summary of themes with illustrative quotation.

216

217 ***Convenience and Accessibility***

218 Participants consistently emphasised the value of the home-based nature of the PHAHB
219 intervention, describing it as convenient, flexible, and accessible. The ability to exercise in a
220 familiar setting contributed to a sense of ease and independence; *“To be able to do it in your
221 own environment, in your own house, it was great altogether”* (PH-12). This familiarity also
222 alleviated potential discomfort associated with gym-based exercise; *“I would be very
223 embarrassed in a gym”* (PH-06).

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224 A key advantage highlighted was the flexibility to complete exercise at a time that suited
225 personal schedules. Participants appreciated the autonomy to structure their sessions
226 according to daily routines: *“I certainly would be in favour of the home approach wherever
227 possible... Once you get it at home, it really offers great independence. I mean you’re the
228 master of everything you can control, when you do it, you know, for how long”* (PH-03). This
229 flexibility also allowed for exercise to be split into multiple sessions: *“I’ll do the bike twice a
230 day on the days I’m not able to get out for a walk.”* (PH-12).

231 Several participants reported that the home-based setting fostered a greater sense of
232 personal responsibility and long-term sustainability: *“I think when you’re at home, there’s a
233 certain level of personal responsibility. You’re in your normal environment, your equipment is
234 here, and it just feels more sustainable in the long term”* (PH-15).

235 The provision of home exercise equipment further enhanced accessibility. Participants
236 highlighted the practicality of having equipment readily available, making exercise more
237 feasible: *“It has set up an exercise regime in my own home that I found easy to follow and
238 carry out... I think it has made it very accessible”* (PH-21); *“You can do it in your pyjamas,
239 for goodness’ sake. It’s not effortful to get to do the exercises. Doing it at home kind of
240 imprinted in me in these 10 weeks that it’s possible to do all this exercise at home”* (PH-02).

241 While outdoor walking was preferred over stationary cycling by some, the exercise bike
242 served as a crucial alternative, particularly in poor weather: *“There would have been days I
243 wouldn’t have been able to do my exercise without the bike. If the weather was too bad to
244 walk, the bike was essential”* (PH-17).

245 This was especially important for individuals during the winter months when conditions
246 associated with PH are normally more aggravated: *“I have scleroderma and Reynaud’s, so*

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247 *going out for walks in winter wasn't really an option. Having the bike indoors was really*
248 *beneficial"* (PH-13).

249 Participants also found the pre-recorded exercise videos helpful, as they provided visual
250 modelling and demonstration of correct technique. This simulated an in-person experience
251 and supported participants in performing exercises more confidently and accurately: *"I found*
252 *the videos very helpful because I used to put my phone up on the mantelpiece and follow her*
253 *as if I was at a class"* (PH-13).

254 Another significant advantage reported was the elimination of travel-related burdens.
255 Participants emphasized how this reduced fatigue associated with travel and removed a key
256 barrier to participation: *"I didn't have to travel, which made a huge difference. If I had, I*
257 *wouldn't have been fit for anything"* (PH-06).

258 This was particularly relevant for individuals in full-time employment: *"One of the barriers*
259 *for me was time. The home program was so convenient. If I had to leave the house, drive to a*
260 *gym, and exercise there, I probably wouldn't have done it"* (PH-15).

261

262 ***Development of Exercise Self-Regulation Skills***

263 A dominant theme emerging from participants' experiences was the development of
264 exercise self-regulation skills, specifically the ability to monitor symptoms, adjust intensity,
265 and pace activity appropriately. These skills were fostered progressively through guided
266 exposure to structured exercise and tailored support. Participants described learning to
267 interpret their body's responses, apply pacing or recovery strategies, and manage
268 breathlessness safely: *"The program showed me ways to do exercise with PH that I was*
269 *scared of doing... So it showed me I can do this and I don't need to be scared"* (PH-18).

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270 Developing breathlessness management strategies was described as a key outcome of the
271 programme. Many participants reported gaining confidence in regulating their breathing and
272 applying practical tools to manage discomfort: *“I have learnt to pace myself, breathe better. I
273 learnt I was going to get out of breath, but I was going to get through it... I knew I wasn’t in
274 danger”* (PH-06); *“I learned how to manage breathlessness, breathe correctly, and pace
275 myself. It was a good guide”* (PH-11).

276 Participants also described using structured monitoring tools such as the RPE scale, heart
277 rate, and Fitbits to guide their activity. These tools enhanced self-awareness and confidence
278 in adjusting exercise intensity safely: *“I used my Fitbit during my walk to see my heart rate...
279 I aimed to stay within a Borg scale of three to four, moderately hard”* (PH-21); *“Putting
280 myself under a little bit of stress... was incredibly helpful because I now understand that
281 some breathlessness is good, and I feel confident knowing what intensity I can handle”* (PH-
282 02).

283 For many, gaining clarity on safe intensity, pace, and duration increased motivation and
284 readiness to continue exercising independently: *“I’d had the bike sitting there, but I never had
285 the confidence. Now I know the intensity, pace, and duration I can manage”* (PH-01).

286 Self-monitoring and goal-setting through the Fitbit and exercise logbook further
287 supported motivation and accountability:

288 *“I set different goals, and the Fitbit was a convenient way to check distances walked/cycled,
289 steps taken, and minutes of cardio”* (PH-21); *“There were weeks I thought I wasn’t doing
290 much, but when I saw it written down (in log book), I realized I had actually done a lot. It
291 lifted me up and motivated me to do more”* (PH-06).

292 Many reported that they planned to continue using the logbook as a self-monitoring and
293 planning tool after the programme had ended: *“I might keep up a log for myself, aiming for*
294 *two walks, one bike session, and some strength exercises each week” (PH-09).*

295 Ultimately, the structured and supportive nature of the programme appeared to shift
296 participants’ attitudes and confidence toward exercise, even among those initially
297 hesitant: *“Before this, I wasn’t walking much... but I actually became more motivated to walk.*
298 *Eventually, I didn’t have to be pushed out the door—I wanted to go” (PH-06).*

299

300 ***Support and Accountability***

301 Participants consistently emphasised the central role of support and accountability in
302 sustaining their motivation and engagement throughout the intervention. A key component
303 was the ongoing relationship with the CEP, whose expertise, encouragement, and non-
304 judgemental approach helped build trust and confidence: *“You could ask XXX anything. She*
305 *was very kind, very approachable, so that support was always there” (PH-13); “She really*
306 *knew how to connect” (PH-21).*

307 Although the programme was delivered remotely, the structured guidance and human
308 connection provided a sense of accountability and belonging. Several participants described
309 how this support helped combat feelings of isolation: *“Knowing someone was keeping an eye*
310 *on my progress made a big difference. It gave me a reason to keep going, even on the days I*
311 *didn’t feel like it” (PH-04).“It’s easy to feel alone when you have a condition like this. But*
312 *knowing there was someone checking in, encouraging me, and helping me adjust things if*
313 *needed—that made me feel supported” (PH-11).*

314 The clarity and structure of the intervention also provided reassurance and reduced
315 uncertainty around safe exercise: *“I always worried I’d push myself too hard or do something*
316 *wrong. But this gave me confidence because I knew the exercises were designed for someone*
317 *like me”* (PH-02 ; *“It’s easy to put things off when you’re doing it on your own. But this gave*
318 *me a reason to show up for myself”* (PH-01).

319

320 ***Perceived Improvements in Physical Fitness and Well-Being***

321 All participants reported perceived improvements in their physical fitness, functional
322 ability, and overall well-being. Many described noticeable gains in cardiovascular fitness,
323 reporting reduced breathlessness during daily tasks and exercise sessions. Improvements in
324 the ability to perform activities of daily living such as stair climbing and walking were
325 particularly valued: *“I found that like now I can come up the stairs and I’m not as*
326 *breathless... So that’s a big improvement”* (PH-01). *“Before this I could only manage 10*
327 *minutes of a walk... that was 10 minutes of stopping and starting... but now I did a 37-minute*
328 *walk there ... It was brilliant. I couldn't have done that before”* (PH-06).

329 Participants also reported increased strength, flexibility, and physical resilience, often
330 noticing improvements through tangible outcomes such as weight loss or reduced
331 fatigue: *“My thigh muscles feel a lot stronger”* (PH-13); *“I’ve definitely lost an inch or two*
332 *and feel more flexible”* (PH-15).

333 These physical gains were accompanied by improvements in energy levels, sleep quality,
334 and emotional well-being. Several participants noted that feeling physically tired after
335 structured activity improved sleep, while others highlighted the programme’s impact on mood
336 and motivation during difficult times: *“I was sleeping better... I had tired myself out enough*
337 *to sleep rather than just sitting in front of the telly all day”* (PH-06); *“Having a structured*

338 *program helped me this winter... I didn't feel symptoms of depression, and I had more energy*
339 *to do things” (PH-13).*

340 Several participants described a renewed sense of autonomy and personal achievement,
341 with physical gains translating into improved confidence and independence in daily life:

342 *“I realised how inactive I had become... I'm stronger now and feel like I can get back to 90%*
343 *of a normal life” (PH-21); “I used to drive to the village, but now I walk the two kilometres*
344 *there and back... It gives me a real sense of achievement” (PH-21).*

345 Importantly, the experience of improvement reframed many participants' beliefs about
346 what they were capable of, offering a renewed sense of hope and control over their
347 health: *“This programme gave me back a sense of control. I feel like I'm actually doing*
348 *something to help myself, rather than just waiting for my condition to get worse” (PH-09); “I*
349 *had kind of given up on the idea that I could exercise. Now, I know I can, and that changes*
350 *everything” (PH-07).*

351 These reflections highlight how perceived physical gains often acted as a catalyst for
352 broader psychosocial improvements, helping participants reimagine what was possible for
353 their lives with PH.

354

355 **Discussion**

356 The qualitative findings from this study highlight the acceptability, utility and perceived
357 impact of the PHAHB pilot intervention. Participants described the programme as
358 empowering, enjoyable, and confidence-building, reflecting enhanced self-efficacy,
359 motivation, and autonomy in managing PA. To our knowledge, no prior research has
360 explored the acceptability or impact of a fully remote PA intervention in PH patients. These

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361 qualitative insights complement and extend previously published quantitative data
362 demonstrating significant improvements in self-efficacy domains, physical function, PA
363 engagement and QoL following the PHAHB intervention.[19] Participants reported
364 meaningful improvements in physical function and psychological well-being, including
365 increased walking capacity, strength, and confidence in daily activities. These findings mirror
366 those observed in supervised exercise training studies in PH populations and reinforce the
367 growing evidence supporting exercise training as a safe and effective strategy to reduce
368 disease-related limitations and enhance functional independence and QoL in PH
369 populations.[12,33,34]

370 This study provides new insights into the lived experience of PH patients participating in
371 exercise interventions. While recent work by Chia et al., [20] showed that structured
372 outpatient programmes can enhance confidence and perceptions of exercise among people
373 with PH, our findings extend this by demonstrating comparable experiences through a fully
374 remote model. This model addressed accessibility challenges commonly associated with
375 traditional centre-based rehabilitation [35] and is particularly relevant in PH, where
376 specialised centres are often located in major urban areas, limiting access for patients
377 nationwide. Participants valued the flexibility, and autonomy of exercising at home and
378 within the constraints of their daily lives. These findings align with growing evidence
379 supporting remote and home-based models for chronic disease management, particularly for
380 populations with limited access to specialist rehabilitation services.[36,37] However, it
381 remains important to consider individual preferences and disease severity when offering
382 exercise programmes. Consistent with previously reported exercise preferences
383 [20,24,38,39], PH-specialised centres should adopt flexible delivery models, offering
384 supervised, hybrid, or fully remote options to enhance accessibility and patient choice.

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385 The PHAHB intervention was purposefully developed to address known patient barriers such
386 as fear of exertion, uncertainty about safety, limited PH-specific physical activity knowledge,
387 and restricted access to supervised care.[2,24,39] By embedding safety education and
388 evidence-based BCTs within a personalised, home-based format, the intervention fostered
389 participants' trust, confidence, and motivation enabling self-regulation, sustained
390 engagement, and a shift toward autonomous motivation.[40–44] This approach highlights the
391 potential of PHAHB to empower individuals with PH to take ownership of their PA in a safe,
392 supportive, and flexible environment, suggesting a promising person-centred model that may
393 inform the development of clinical trials to explore such scalable approaches to PH
394 rehabilitation.

395 The integration of wearable technology emerged as a valuable component of the PHAHB
396 intervention. Participants frequently cited the wrist-worn device as a source of real-time
397 feedback, motivation, and accountability, which enhanced their engagement with the
398 intervention consistent with previous research findings in cancer survivors.[45] Furthermore
399 wearable devices have also demonstrated cost-effectiveness in supporting PA adherence in
400 chronic respiratory populations.[46] In the context of PH, where fear of overexertion and
401 uncertainty about safe intensity levels are common barriers [24], wearable technology offers a
402 practical solution to enhance self-efficacy and safety.

403 A unique and defining feature of the PHAHB intervention was the individualized shared-
404 decision making approach to exercise prescription and progression, delivered through
405 structured health coaching sessions with a CEP, which has not been previously described in
406 PH rehabilitation. Participants valued collaborating with the CEP to set goals and adapt
407 training to their needs, fostering autonomy, which is known to enhance motivation, and long-
408 term adherence to PA.[47] The CEP's expertise in PH pathophysiology and behaviour change
409 built trust and alleviated fears of symptom exacerbation, an enabler previously highlighted in

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410 the literature.[19,39] Participants described the CEP as a trusted source of knowledge and
411 motivation, underscoring the value of therapeutic alliance.

412 The CEP also supported broader lifestyle modification, promoting sustainable health
413 behaviours. This holistic, person-centred approach reflects best practices in chronic disease
414 rehabilitation and highlighting the potential for CEPs to serve as integral members of
415 multidisciplinary teams supporting PH care. The remote model supported by consistent
416 contact with the CEP enabled flexible engagement without compromising individualisation or
417 human contact. Research on patients perceptions of digital health interventions indicates a
418 desire to remain human contact experienced during more traditional consultations.[48] These
419 findings reinforce the idea that digital readiness and relational care can coexist, creating a
420 feasible and equitable model for PH rehabilitation delivery.

421 **Clinical Implications**

422 While this exploratory study provides valuable provide patient-informed insight into the
423 acceptability and perceived utility of the PHAHB intervention, the central role of the CEP
424 warrants consideration when evaluating wider implementation. The expertise, guidance, and
425 therapeutic rapport provided by the CEP appeared to play a critical role in supporting
426 participant engagement, confidence, and adherence to the programme. However, reliance on
427 specialist supervision may present challenges for scalability and resource allocation within
428 routine PH services. Wider implementation would likely require investment in workforce
429 training, service redesign, and clearly defined referral pathways to ensure equitable access to
430 exercise support. Furthermore, the close CEP–patient relationship, while beneficial for
431 engagement, may risk fostering overreliance, potentially undermining long-term self-
432 management and independent exercise participation, if structured tapering or transition
433 strategies are not in place. Future research should therefore explore the optimal intensity and

434 duration of professional support required to initiate and sustain behaviour change, as well as
435 the long-term maintenance of PA following programme completion. Overall, these findings
436 provide preliminary evidence to support the acceptability and utility of remotely delivered PA
437 interventions in PH. Further work is necessary to establish the effectiveness, scalability and
438 cost-effectiveness of such interventions prior to implementation within routine care.

439 **Strengths and Limitations**

440 A key strength of this study lies in its mixed-methods approach, providing rich insights into
441 both functional outcomes and the lived experience of participants, which offers a nuanced
442 understanding of how and why the intervention was deemed useful. However, several
443 limitations should be acknowledged. The sample size was modest and would not fully capture
444 the diversity of the broader population living with PH. Interviews were required to be
445 completed within a two-week timeframe following programme completion, which may have
446 limited participation for some individuals. Participants were self-selected and may therefore
447 have been more motivated, health-literate, or positively disposed toward exercise
448 interventions than the wider PH population. Furthermore, the qualitative findings reflect the
449 experiences of individuals who successfully completed the exercise programme. All
450 participants who completed the intervention (n = 19) achieved the predefined adherence
451 threshold (>80%) and were invited to participate in the qualitative interviews, of whom 13
452 took part. As such, the findings may over-represent more positive perspectives regarding the
453 feasibility and acceptability of the programme. The views of individuals who declined
454 participation were not captured. The findings should be interpreted as exploratory and
455 hypothesis-generating and future research would benefit from purposive sampling strategies
456 designed to capture a wider range of experiences, including those of individuals who decline

457 initial participation, encounter greater barriers to engagement, or demonstrate lower
458 adherence to exercise interventions.

459 **Conclusion**

460 This exploratory study demonstrates that a personalised, home-based exercise intervention
461 may be both acceptable and useful for individuals with PH, while also providing HRQoL
462 benefits. Participants described how supportive and flexible programme delivery helped
463 foster autonomy, trust, and self-efficacy, enabling them to reframe their relationship with PA
464 from one of fear and limitation to one of possibility and empowerment. As the field of PH
465 continues to move toward more holistic and patient-centred models of care, these findings
466 provide preliminary patient-informed insight into the potential role of remotely delivered
467 home-based exercise interventions. As a pilot study, this work offers practical insights to
468 inform the development and evaluation of larger-scale trials examining the effectiveness,
469 scalability, and long-term sustainability of home-based exercise interventions within PH care.

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- 636 Table 1 Participants characteristics

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Clinical Characteristics

Gender (Male:Female)	3:10
Age (yrs)	51 ± 13.40
Distance from NPHU (km)	116.81 ± 119.02
PH specific diagnosis	
PAH	11(85)
CTEPH	2(15)
Duration of diagnosis (yrs)	7 ± 4.51
QoL -Emphasis – 10 (total score)	
Pre-intervention	23.84 ± 9.12
Post-intervention	20.28 ± 8.02
6MWD (m)	
Pre-intervention	381.84 ± 62.54
Post-intervention	451.92 ± 67.64

637 Continuous variables are presented as mean ± standard deviation. Categorical variables are n
638 (%). BMI: NPHU: National Pulmonary Hypertension Unit; PH: Pulmonary Hypertension;
639 PAH: Pulmonary Arterial Hypertension; CTEPH: Chronic Thromboembolic Pulmonary
640 Hypertension; QoL; Quality of life;6MWD: 6 minute walk distance

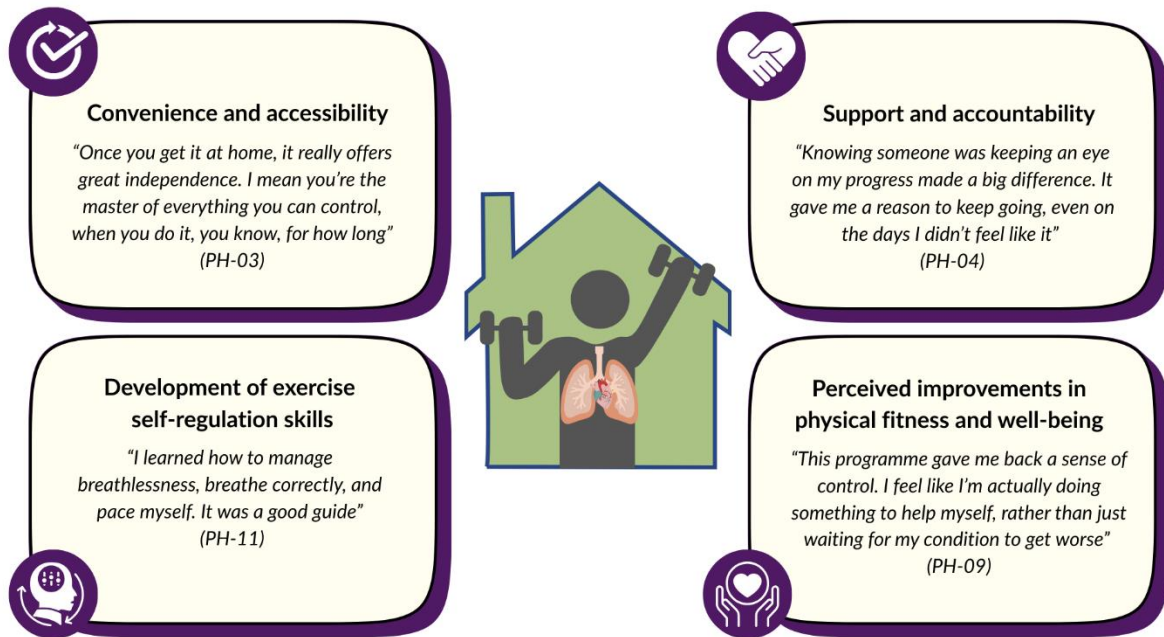
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646 Figure 1: Visual summary of themes with illustrative quotation.

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