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An interdisciplinary approach to improving the quality of life in Postural Orthostatic Tachycardia Syndrome: A case study

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4 **An interdisciplinary approach to improving the quality of life in**

5 **Postural Orthostatic Tachycardia Syndrome: A case study**

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33 **Overview of POTS**

34 Postural Orthostatic Tachycardia Syndrome (POTS) is a condition that affects
35 0.2% of the population, resulting from disturbances in the autonomic nervous system,
36 presenting as a heterogeneous group of disorders with similar characteristics. The
37 constellation of symptoms that arise as a result of this condition include blurred
38 vision, brain fog, chest pain, headaches, severe fatigue and a rapid heart rate (HR)
39 (Anderson, Lambert, Sari, Dawood, Esler et al., 2014; Raj, 2013). These symptoms
40 make everyday living extremely challenging for POTS patients, with quality of life
41 (QOL) severely impacted (Flack & Fulton, 2018; Moon, Kim, Byun, Sunwoo, Lim et
42 al., 2016). Symptoms often occur when patients stand upright, resulting in inadequate
43 vasoconstriction of blood vessels (particularly in the legs and core), due to muscle
44 deconditioning and/or peripheral denervation. At present all medicines used to treat
45 POTS have concerning side effects, some of which may exacerbate symptoms (Raj,
46 2013). Research indicates that short-term exercise (Galbreath, Shibata, VanGundy,
47 Okazaki, Fu et al., 2011) could alleviate symptoms, and cognitive behavioural
48 therapies including goal setting (Kizilbash, Ahrens, Bruce, Chelimsky, Driscoll et al.,
49 2014) would be specifically beneficial for managing POTS and improving QOL.

50 **Context and Research Team**

51 As part of a larger scale trial examining the benefits of exercise and Functional
52 Imagery Training (FIT); an approach that aims to enhance self-efficacy and intrinsic
53 motivation by exploring tangible goals, a potential participant was identified as
54 having POTS. Due to the multitude of health-related complications including cardiac
55 disorders and the research teams' prior lack of POTS knowledge, this participant
56 (R.L.) did not meet the entry criteria because of her current health condition. The
57 second author suggested the possibility of an adapted study, specific to R.L.'s needs if

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58 an interdisciplinary team could be formed and ethical clearance granted. The study
59 aimed to investigate if FIT plus exercise improves the QOL in a patient diagnosed
60 with POTS.

61 The project was promptly approved by the institutional ethics committee on
62 the proviso that a first-aider be present during each exercise session. A case study
63 project was then offered as an alternative to provide individual support necessary for
64 POTS. Prior to the initial meeting a detailed information sheet and consent form
65 explaining the protocols of the study was emailed to the subject. This also included a
66 clear statement explaining FIT sessions would be audio recorded.

67 In the weeks pending ethical clearance, an interdisciplinary team of nine
68 formed to devise and execute the treatment intervention. The team was brought
69 together and managed by the second author, a chartered psychologist (British
70 Psychological Society; Division of Academics, Teachers and Researchers) who
71 directs a degree in sports rehabilitation and supervises final year projects. The second
72 author will be referred to as 'the psychologist'. The psychologist has completed >500
73 clinical hours of Motivational Interviewing (MI) training including fidelity checks
74 and is a FIT practitioner. A trainee psychologist studying for a Ph.D in psychology
75 and FIT practitioner was responsible for data collection and fidelity checks to add
76 objectivity to the approach.

77 Two certified sports therapists (Sports Therapy Organisation) with a combined
78 experience of 32 years, who own private practices, and are trained in special
79 populations (e.g., cardiovascular disease) agreed to assist. The first author, one of the
80 sports therapists, took responsibility for project logistics, such as timetables and
81 general communication between all parties. Three conditioning coaches were
82 undergraduate students supervised by a National Strength and Conditioning

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83 Association (NSCA) Coach, who is also lecturer in the subject. The medical doctor
84 (National Health Service), a Consultant in Acute and General Medicine, acted as a
85 sounding board and is a leading specialist in POTS.

86 The collaborative team realised the potential for adopting an interdisciplinary
87 approach and weekly meetings evolved to share information and practice, although
88 not all members could always attend. Collectively, the team developed an evidenced-
89 based intervention to improve health and psychological factors. General exercise has
90 shown to benefit numerous health conditions such as: type 2 diabetes, depression,
91 some cancers and heart disease (Agarwal, 2012; Pal, Radavelli-Bagatini, & Ho,
92 2013), and specific studies (Fu, VanGundy, Shibata, Auchus, Williams et al., 2011;
93 Shibata, Fu, Bivens, Hastings, Wang et al., 2012) provide guidance for working with
94 POTS patients. For psychological support, goal-centred motivational imagery is
95 beneficial for behavioural change and motivation to goal adherence (Andrade, Khalil,
96 Dickson, May, & Kavanagh, 2016). As the psychology practitioners were trained in
97 FIT, it was a natural starting point to explore motivation before focusing on tangible
98 goals. It was therefore the aim to merge physiological and psychological interventions
99 to create an interdisciplinary approach.

100 **Philosophical Application**

101 The interdisciplinary nature of this study involving an amalgamation of both
102 psychological and physiological practices meant that we required a joint philosophical
103 approach. Therefore, recognising there could be conflicting approaches, during the
104 first team meeting the psychologist outlined the holistic stance; to assess the
105 individual not the POTS diagnosis, which was accepted by all practitioners.
106 Collectively, we accepted that there may be similarities between all POTS patients,
107 however, we attempted to treat R.L. as a unique individual by assessing and treating

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108 based on findings alone, rather than making assumptions. Each finding drove our next
109 step, and we conducted a weekly progress meeting to check practice and share
110 information, which R.L. was invited to attend and provide input. Therefore, aligned
111 with Rorty's (1991) philosophical suggestions, our findings developed with our
112 contextual learning and treatment.

113 Individually, the psychologist adopted a humanistic cognitive approach, which
114 gave R.L. the opportunity to learn imagery through cognitive methods after an initial
115 interview. This approach could be seen as a paradoxical philosophy, but using person-
116 centred FIT (Rhodes, May, Andrade, & Kavanagh, 2018; Solbrig, Whalley,
117 Kavanagh, May, Parkin et al., 2019) gives the participant the autonomy to learn
118 imagery to foster intrinsic motivation. The sports therapists, conditioning coaches and
119 medical consultant were ultimately reductionist in their treatment due to the biological
120 nature of their methods. Where possible R.L. was given the autonomy to make
121 choices, therefore, we aimed to engage her in discussions about, for example, exercise
122 selection. Collectively we were pragmatic (cf. Bhaskar, 2013) in nature,
123 acknowledging that we are operating in different contexts.

124 **Case Overview**

125 R.L. is a 39-year-old, Caucasian female who works as a secondary school
126 teacher and is a single mother of three teenage boys. During a routine exercise session
127 at her gym in February 2018 she collapsed and was later diagnosed with POTS in
128 March 2019. Prior to this event R.L had recently undergone surgery for carpal tunnel
129 syndrome, however this condition was later found to be Hypermobile Ehlers-Danlos
130 syndrome (HEDS) - synonymous with POTS. Before the condition developed, R.L.
131 had previously led a very active lifestyle, attending exercise sessions four to five
132 times per week, including high intensity group exercise and personal training

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158 **Measure**

159 Upon meeting R.L. the study design was recapped, and any questions
160 answered. The WHOQOL-BREF (see Gholami, Jahromi, Zarei, & Dehghan, 2013)
161 was then administered at baseline with score available in Table 2. The World Health
162 Organisation (Whoqol Group, 1995, p. 1403), defines QOL as:

163 An individual's perception of their position in life in the context of the culture
164 and value systems in which they live and in relation to their goals, expectations,
165 standards and concerns.

166 The WHOQOL-BREF questionnaire consisting of 26 self-report items was used to
167 assess domain specific and two overall QOL items. Individual items are scored 1-5
168 and each domain presents a range of 0-100; the raw scores have been transformed
169 according to manual guidelines (World Health Organisation, 1997). The four
170 domains: physical health, psychological health, social relationships and environment
171 (World Health Organisation, 1997) factorially vary. Physical health questions seek to
172 evaluate an individual's ability to perform daily tasks, energy levels and fatigue,
173 mobility, pain and discomfort, sleep and rest, dependence on medicine and work
174 capacity. Psychological health questions assess the level of positive feelings, negative
175 feelings, self-esteem, ability to think and concentrate, personal beliefs, body image
176 and appearance. Social relationship questions are in relation to personal relationships,
177 social support and sexual activity. Finally, environment questions consider aspects
178 such as: home environment, financial resources, access to health and social care and
179 opportunities for recreation.

180 **FIT**

181 FIT is a person-centred methodology that utilises the skills from MI,
182 integrating imagery to enhance self-efficacy and foster intrinsic motivation. MI is a

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183 client-centred counselling technique that aims to reduce resistance and resolve
184 ambivalence towards change using specific systematic processes (cf. Miller &
185 Rollnick, 2012). When compared to a control group, MI has been found to be
186 significantly better for weight loss (Smith, Heckemeyer, Kratt, & Mason, 1997), but
187 not as effective when compared to an imagery (FIT) group (Solbrig et al., 2019). Due
188 to the complex motivational needs of POTS patients, FIT can be adapted to support
189 change based on individual cases.

190 The fundamentals of FIT operate within the spirit of MI and the four processes
191 of the interview must be adhered to; engage in conversation, focus on goals, evoke
192 change, and plan for progress. Individuals are supported using skills such as
193 affirmations when they discuss possible solutions to obstacles, further developing
194 self-efficacy. Using Paivio's (1985) motivational and cognitive imagery approach,
195 FIT explores goals by discussing intrinsic values and goals, potential obstacles,
196 personal strengths and overcoming struggles, and future success. At each stage of
197 discussion, the individual is taught how to use multisensory imagery by periodically
198 layering each sense (see Williams, Cooley, & Cumming, 2013) to enhance the
199 experiences and create feedback from discussion (Lang, 1979). Specifically, imagery
200 focuses on the multisensory experience of goal achievement to foster self-efficacy,
201 and immediate action-based implementations (Duckworth, Kirby, Gollwitzer, &
202 Oettingen, 2013) which could be beneficial for managing POTS and adhering to
203 exercise. Progressive interview questions like; "what would it be like in six months if
204 you did not change your exercise routine", are later compared to; "imagine a future
205 version of you in six months who did stick to the exercise program. What does that
206 look like? How does it feel? What can you do right now to support a future you?".

207 **FIT Interview**

208 The initial FIT interview is both an assessment and intervention as it involves
209 motivational imagery training. The meeting was audio recorded (and later fully
210 transcribed) for potential client quotes. The audio was shown to other FIT
211 practitioners for training purposes and to check fidelity, which was later reported as
212 ‘high’. The transcription was highlighted to show the best fit from the answers given.
213 All quotes were checked with R.L. to ensure meaning was accurate during later
214 interpretation and brief quotes approved by R.L. for publication.

215 The psychologist began by asking open-ended questions about lifestyle to
216 engage in conversation, progressing to focusing on goals, and then the difference
217 between R.L.’s life now and what she expected it would be like at this point. As the
218 interview continued, imagery was used to contrast between current self and future
219 achievements. To train multisensory imagery, especially motivation specific
220 achievement goals (Paivio, 1985), layered stimulus response training (LSRT;
221 Williams, Cooley, & Cumming, 2013) was used to enhance vividness and
222 controllability. Through the FIT process R.L. revealed how the opportunity to enrol
223 on to a study which included exercise, physical therapy and psychological support
224 was the “final roll of the dice”, and this was the “most important step in regaining her
225 identity”.

226 R.L. described a desire and need to change, giving reasons such as: “I have to
227 try. I feel guilty of not being able to go out with my children”, and a need to be fit and
228 healthy to keep her job and provide for her family. The interview also revealed a loss
229 of confidence in her physical appearance, lack of self-esteem, and an admission that
230 “with POTS life would never be the same again” and was “pretty crap at present”. In
231 spite of this, there was an underlying tone of defiance towards her condition, wanting

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232 to gain “some form of control” to improve her QOL. Towards the end of the session,
233 R.L. set a goal: “I would like to jog continually for five minutes and maybe a long-
234 term goal is to run for 5K” and suggested some lifestyle modifications such as
235 “walking 10,000 steps” daily. Jogging was the primary goal, which was imagined
236 through a set of controllable scenarios, and multisensory LSRT delivered to again
237 enhance vividness and controllability. Using a scale from 0 (no image) to 5 (as vivid
238 as having achieved the goal), R.L. was asked to rate her imagery at strategic points,
239 scoring >3 at each. A cue was linked to a daily activity, in this case before taking the
240 first sip of coffee, whereby imagery is activated throughout the day to imagine the
241 feeling of success from jogging for five minutes followed by a small implementation
242 strategy. Immediately after this session the physical assessment occurred.

243 **Physical Assessment**

244 The physical assessment determined areas which required improvement
245 through corrective exercise and physical therapy. Assessments included: range of
246 motion (RoM), flexibility, functional movement, muscle activation and special tests.
247 The findings of the physical tests revealed: posterior pelvic tilt, weak: gastrocnemius,
248 gluteus maximus, hamstrings, quadriceps and lower back, limited external rotation at
249 the acetabular femoral joint, painful/stiff lumbar region and sacroiliac joint with
250 hypermobility in the glenohumeral joint. The assessment lasted for 33 minutes, with
251 no exercise occurring at baseline. The results from the assessment went on to develop
252 the physiological intervention delivery. A retest of these assessments did not formally
253 occur, but observations were made based on posture, balance and movement quality
254 which then informed the exercise program.

255 **Developing and Delivering the Interventions**

256 It was not until after completion of the WHOQOL-BREF, FIT interview, and
257 physical assessments at baseline that the interdisciplinary team had enough
258 information to develop a plan for R.L.'s needs. We decided to run combined
259 conditioning and physical therapy, and supportive imagery sessions for eight-weeks
260 following similar exercise protocols (Richardson, Nordon-Craft, & Carrothers, 2017)
261 and FIT delivery (Rhodes et al., 2018) timelines. At week eight the WHOQOL-BREF
262 would be conducted a second time. At that point, the intervention stopped, and no
263 support provided. Four-weeks later (12-weeks from the first exercise session) we
264 asked the participant to complete the WHOQOL-BREF a final time.

265 The general plan was to deliver FIT booster sessions for the first 15-minutes,
266 followed by aerobic conditioning for up to 30-minutes and corrective exercises lasting
267 approximately 15-20 minutes. Although this time was set aside for delivery, we were
268 pragmatic in our approach as there are many obstacles at play.

269 **Psychological Intervention**

270 From a psychological perspective exercise alone has been shown to decrease
271 depression and anxiety, while enhancing body image and confidence (De Moor,
272 Beem, Stubbe, Boomsma, & De Geus, 2006; Campbell & Hausenblas, 2009).
273 Furthermore, exercise is beneficial in negating social withdrawal and low self-esteem
274 whilst presenting opportunities for enhanced self-efficacy and social interactions
275 (Sharma, Madaan, & Petty, 2006). Although there are many benefits associated with
276 general exercise, individuals with POTS often lack motivation to start, with the
277 primary concern of becoming unconscious during training (Kizilbash et al., 2014).
278 Research (Tito & Hess, 2017) delivering exercise and assessing QOL has reported a
279 decrease in both physical and psychological domains, but an increase in overall QOL.

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280 To complement the physical exercise and mobility support intervention, a FIT booster
281 session was delivered weekly which aimed to support motivation to exercise
282 throughout the 8-weeks.

283 ***FIT Booster.*** The FIT booster sessions were conversational, focusing on
284 vividness and controllability of images and were used to monitor goals, reporting
285 findings back to the research group. In weeks 1 and 2, R.L. reported using imagery
286 infrequently as her thoughts were on occasion negative, such as fainting during
287 exercise. A thought parking strategy was implemented whereby R.L. recognises a
288 negative thought and then changes the focus to feelings of accomplishment when she
289 achieves her initial running goal. All imagery regardless of positive or negative
290 outcomes were praised for use, supporting self-efficacy by following the imagery
291 process. During week 3 imagery use was reported as more frequent and controllable,
292 aligned with cue use, and the goal changed to a 10-minute run. By week 4 R.L. was
293 using imagery multiple times daily with the original cue and adaptations such as “when
294 walking the dog, I image running 5K with my son, and how that accomplishment
295 would feel, and what he would say”. This goal and cue adaptation occurred for the
296 remainder of the intervention, with the psychologist inputting very little towards the
297 end, merely adding prompts to add a sensory layer where necessary.

298 **Physiological Intervention**

299 Exercise can be particularly beneficial as it has been shown to address many
300 of the common issues that make POTS so debilitating. It is cost effective, simple to
301 implement and has minimal side-effects (Fu & Levine, 2018). Exercise improves the
302 body’s skeletal pump through strengthening the extremities and core, thus improving
303 venous return. It has been found effective in increasing blood volume, ventricle size
304 and baroreflex sensitivity. This can improve stroke volume, vasoconstriction and

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305 pulmonary circulation which are all critical to negating the symptoms of POTS
306 (Conner, Sheikh, & Grubb, 2012; Galbreath et al., 2011; Fu & Levine, 2018). Winker,
307 Barth, Bidmon, Ponocny, Weber et al. (2005) found that following a three-month
308 running program involving Austrian soldiers, 10 out of 16 who had previously
309 experienced dizziness with tachycardia upon standing had a complete recovery from
310 orthostatic intolerance. The control group, who did not jog, reported a resolution of
311 symptoms in just 1 out of 11 soldiers. Considering case studies, there have been
312 projects (e.g., Richardson et al., 2017) which implement specific exercise protocols to
313 treat POTS by monitoring HR and setting tangible targets that motivate exercise
314 adherence, enabling participants to return to full work duties.

315 For replication purposes exercises were selected by R.L and the conditioning
316 coach in unison from a battery of suggestions in Richardson et al. (2017) on the day
317 of training. Table 1 outlines all completed exercises which include actual rate of
318 perceived exertion (RPE; Borg, 1982), exercise selection, duration, rest and
319 observational notes. Principles of training, in particular frequency and intensity were
320 adopted from Fu et al. (2011), however in contrast we did not incorporate a semi-
321 recumbent only approach at the start.

322 Table 1. Exercise Training Program including RPE and Observations

Week 1	Duration (sets/reps/time)	Rest Interval	RPE	Observations
Jog	3-mins		15	Speed 6.5 KMPH; comfortable.
Lower Trunk Rotation	2 x 12 reps	30s	10	
Bridge	2 x 15s	30s	14	Limited glute activation. Hamstrings dominant.
Abdominal Curl	2 x 8 reps	30s	15	
Week 2				
Jog	5-mins		15	Speed 6.5 KMPH. Felt faint; 15-mins recovery.

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Lower Trunk Rotation	3 x 12 reps	30s	10	
Bridge	3 x 15s	30s	14-15	Improved glute firing.
Abdominal Curl	3 x 8 reps	30s	15	
Weeks 3-4				
Jog	10-mins		15-16	Speed 6.5 KMPH. Felt steady was able to talk throughout.
Bridge	3 x 12 reps	30s	14	
Side Plank	3 x 15s	30s	15	
Hip Abduction	3 x 8 reps	30s	13-14	Pain in left hip; stretched in adduction to resolve.
Plank on Elbows	2 x 20s	30s	15-16	
Abdominal Curl	3 x 10 reps	30s	15	Fatigued in last set.
Weeks 5-6				
Jog (week 5)	15-mins		15	Speed 6.5 KMPH continuous.
Jog (week 6)	20-mins		15-16	5-mins at 7.8 KMPH, followed by 15-mins at 6.5 KMPH.
Stationary Bike	5-mins		16-17	Interval; 10s at 100+ RPM followed by 20s at 60 RPM; repeat until time elapsed.
Sit to Stand	3 x 12 reps	30s	14-15	
Seated Shoulder Press	3 x 12 reps	30s	14-15	Using 3KG dumbbells.
Dumbbell Bench Press	3 x 12 reps	30s	13-14	Using 4KG dumbbells.
Bridge	3 x 12 reps	30s	14-15	
Side Plank	3 x 20 secs	30s	14	
Abdominal Curl	3 x 12 reps	30s	15	
Weeks 7-8				
Jog	20-mins		15-16	5-mins at 7.8 KMPH, followed by 15-mins at 6.5 KMPH.
Stationary Bike	5-mins		16-17	Interval - 10s at 100+ RPM followed by 20s at 60 RPM. Repeat until time elapsed.
Sit to Stand	3 x 8 reps	30s	15-16	Holding 5KG kettlebell in both hands.
Hip Abduction	3 x 8 reps	30s	14-15	With resistance band.
Seated Shoulder Press	3 x 8 reps	30s	15-16	Using 5KG dumbbells.
Arm Curls	3 x 8 reps	30s	15-16	Using 4KG dumbbells.
Dumbbell Bench Press	3 x 8 reps	30s	15	Using 6KG dumbbells.
Reverse Dip	3 x 30s	30s	15-16	

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Bridge	3 x 12 reps	30s	15
Abdominal Curl	3 x 12 reps	30s	15

323 *Note.* reps = repetitions; s = seconds; mins = minutes; KMPH = kilometres per hour;
324 RPM = revolutions per minute; KG = kilograms.

325 In conjunction with supervised exercise sessions, a home-based program
326 consisting of two sessions per week, with at least 48 hours rest between sessions. The
327 aim of these exercises was to develop core, shoulder and lower extremity strength,
328 thus enhancing the body's skeletal pump efficiency. The home exercises were
329 reviewed each week to monitor adherence and to discuss progressions and
330 adaptations. We were pragmatic, and if this amount was not achievable, we decreased
331 the progressions or home exercise frequency.

332 As sessions progressed, goals were modified to: increase strength (in
333 particular legs and core), develop cardiovascular fitness, improve RoM in the hips,
334 resolve lower back pain, and enhance stability in the shoulder girdle. There were also
335 challenges that needed to be overcome related to time management, fatigue, and
336 monitoring POTS symptoms before, during and after exercise. To help during
337 exercise, the medical consultant prescribed vasoconstriction medication which was
338 taken before exercise.

339 **Evaluating the Intervention**

340 The WHOQOL-BREF was administered at baseline (week 0), week 8 at the
341 end of the combined intervention, and week 12. We also documented exercise
342 adherence. Table 2 shows the domain scores for the WHOQOL-BREF, plus the two
343 general life and health satisfaction questions similar to the format reported by Tito
344 and Hess (2017). Furthermore, we have included change as percentage from baseline
345 to week 12.

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346 Table 2. WHOQOL-BREF scores by domain and time point.

Domain	Baseline (week 0)	Week 8	Week 12	Change %
1. Physical health*	19	44	44	57.14
2. Psychological*	44	56	56	18.18
3. Social relationships*	25	44	44	37.50
4. Environment*	44	69	56	18.18
Q1. How satisfied are you with your life?***	2	4	4	100.00
Q2. How satisfied are you with your health?***	2	2	2	0.00

347 *range of scores for each domain is 0-100

348 ***range for each individual question is 1-5

349 The physical and environmental domains had the highest improvement from
 350 baseline to week 8 with increases at 53.8% and 31.8% respectively. Exercise
 351 adherence at week 8 was reported as a mean average of 83% based on three sessions
 352 per week for eight-weeks which saw 20 out of 24 sessions completed.

353 Before exercise was completed at week 8, the psychologist interviewed R.L.
 354 She discussed how the program had made her feel “less isolated...physically and
 355 mentally healthier and stronger”. She went on to say: “before the intervention when I
 356 passed out it would leave me feeling unwell for a week or more, but now I feel more
 357 in control. If it does happen, I just dust myself off and get on with it”. When asked to
 358 give feedback for future developments of the POTS program, R.L. said that the social
 359 interaction and having a team that cared about her “specific needs” was motivating
 360 alone. Beyond the intervention R.L. planned to continue exercising with a personal
 361 trainer, with the new aim to independently run.

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362 Comparing week 8 to week 12, there was a 4.9% drop in total QOL with the
363 environmental domain performing the worst at -13.8%, and the psychological domain
364 the best with an increase of 5%. Overall, comparing total QOL baseline scores to
365 week 12, there was a 27.9% increase. All domain scores: physical (46.2%),
366 psychological (25%), social relationships (33.3%), and environmental (13.6),
367 increased with specific questions showing no change for health (Q2), but a 100%
368 increase for life satisfaction (Q1). The smaller variation between in the scores can
369 also be associated by the test-retest reliability (von Steinbüchel, Lischetzke, Gurny, &
370 Eid, 2006). At week 12, an exit interview was conducted, and R.L. stated that the
371 intervention: “gave me the confidence to exercise”, but from week 10 there was a
372 “decrease in using imagery because I felt back to my normal self”. Therefore, bi-
373 weekly booster sessions could be of benefit.

374 Approximately 16-weeks after the study finished (28-weeks from week 1), we
375 contacted R.L. and were informed that she is continuing to exercise, although less
376 regularly than when under supervision, and hopes to get back in the gym post
377 COVID-19. She informed us that she has decreased the use of medications including
378 antidepressants but continues to have good and bad days, stating: “the bad days are
379 now very few, and a great deal more manageable”. The current exercises conducted at
380 home were from the study (or small adaptations), and small self-administered lifestyle
381 modifications such as walking at least 10,000 steps daily were being completed 20-
382 weeks post intervention.

383 **Reflections and Recommendations**

384 We tried to approach challenges with reactive solutions driven partly by R.L.
385 We knew that the exercise program would have to be specific to the assessments, and
386 the progression of the sessions could be generally planned but were required to be

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387 flexible due to the nature of POTS. The home exercise program was encouraged but
388 again adapted to suit the reality of home training, including exercises that limited the
389 potential for tachycardia and risk of falls. Additional challenges such as fatigue levels,
390 loss of motivation, and time constraints, were overcome with positive dialogue,
391 reinforcement of goals and a program that required just one weekly attendance for
392 supervised sessions.

393 An initial issue occurred in week one. R.L wore a HR monitor during the
394 session constantly checking her HR, which exacerbated exercise anxiety elevating her
395 HR. Therefore, the psychologist and R.L. immediately left the laboratory and FIT was
396 delivered through a brisk walk around the institution grounds. This became the initial
397 method of delivery as it enabled the psychologist to review goals, help with imagery
398 specific practice, and answer questions, whilst exercising and decreasing anxiety.
399 However, this meant that no booster sessions were recorded in their entirety. A HR
400 monitor was not worn again during exercise sessions, and although HR was often
401 checked when using static equipment, most feedback was subjective through RPE.

402 The main challenge with the FIT intervention was initially reminding R.L. to
403 use the cue as her activating process that commences imagery. Imagery use, precisely
404 motivation general mastery (see Paivio, 1985) was slow to start. R.L. could imagine
405 achieving her exercise goal, but verbally reported limited positive self-imagery. The
406 booster sessions were mutually beneficial at disseminating imagery application and
407 three topics arose during conversations; examine goals and cues, explore
408 opportunities to solve problems and overcome negative thoughts, and feedback on
409 how to optimise vividness and controllability. We suggest that FIT imagery booster
410 sessions use these three topics as the minimum requirement as it promotes learning
411 and motivational goals.

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412 Adjusting medication, work commitments and dietary patterns to fit into the
413 intervention was challenging for R.L. The medical consultant prescribed the best
414 medication to his knowledge to help with the incremental exercise program, and work
415 was compassionate allowing flexible working hours. Eating habits were self-adapted
416 to offset the increased energy expenditure resulting from exercise.

417 As an interdisciplinary team our main challenge was in meeting together,
418 reviewing notes and developing a combined plan after week two. All nine members of
419 the interdisciplinary team involved in the project met after the initial interview and
420 assessments, then failed to meet together again. To maintain continuity weekly notes
421 were circulated and generally all parties responded inputting into the following weeks
422 program.

423 The aim of this study was to enhance the QOL through psychological and
424 physiological interventions. To do this we collaboratively set out specific goals,
425 which were modified based on achievement by R.L. and the research team. The initial
426 goal of jogging five-minutes was completed in week three after a series of small
427 setbacks and achievements, then goals evolved quickly which saw an observable
428 change in R.L. She was more talkative, upbeat and seemed confident, setting more
429 challenging goals such as jogging for 20-minutes. The overall increase in QOL due to
430 the intervention at week eight, we feel, was due to the combination of psychological
431 and physiological support, which assisted with the increase in confidence to exercise.
432 Whilst it would be beneficial to complete larger studies comparing the combined or
433 independent use of psychological and physiological interventions, there are clear
434 benefits to using a holistic individualised approach. A key benefit is the consistency
435 in scores from week 8 to 12 which demonstrate maintained QOL when support is

436 removed. We recommend that future researchers include periodic FIT booster support
437 sessions after the intervention to support motivation through imagery use.

438 **Conclusion**

439 Within our specific professions we are experienced in collaborative structures
440 and because of our person-centred approach, we assumed little about R.L.'s condition
441 before completing assessments. POTS is complex and the training program included
442 is only a rough guide for practitioners. Generic exercise suggestions for POTS (Fu et
443 al., 2011; Richardson et al., 2017) such as interval training would not have worked for
444 R.L. in the first few weeks, so we suggest a collaborative approach that engages the
445 specialists and client in mutual conversations that are focused on tangible goals.

446 We were very fortunate to have the expertise available and acted promptly to
447 get the project underway. Applying neutrality, an essential skill for FIT, to this project
448 was perhaps the most challenging part. We tried not to show emotion from R.L.'s
449 highs and lows during setbacks and achievements, but we developed a connection as
450 we learned from her. Motivational interventions such as MI and FIT focus on
451 unambiguous goals, which as practitioners we fully engage in. These goals are client-
452 centred, and team driven through mutual processes, resulting in behaviour change
453 from us all. We recommend that practitioners who work with individuals that have
454 low self-efficacy become trained in motivational goal setting. This creates a learning
455 environment that cultivates empathy and autonomy, key factors for improving QOL.
456 Overall, we supported R.L. by rekindling the enjoyment she once had whilst
457 participating in health and exercise activities and were able to collaboratively support
458 behavioural change by increasing intrinsic motivation.

459

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