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

Abstract

Postural Orthostatic Tachycardia Syndrome (POTS) is a debilitating condition affecting the autonomic nervous system that causes a series of symptoms such as blurred vision, brain fog, chest pain, headaches, shortness of breath, fatigue, syncope and rapid heart rate. These symptoms can lead to diminished daily activity, daytime fatigue, poor sleep quality, and increased suicidal tendencies. Among the physical symptoms, POTS patients present decreased quality of life (QOL), increased prevalence of depression and elevated anxiety (Anderson, et al, 2014). This case study documents an interdisciplinary approach to treating a 39-year-old female POTS patient with an eight-week intervention program and a further four-week follow-up. The intervention investigated the combined effects of Functional Imagery Training (FIT) and physical exercise on the patient's QOL. Following completion of the program, the subject improved in all four QOL components and this change was maintained over time when compared to baseline measures. The program demonstrated that high levels of exercise adherence beyond the intervention can be achieved when combining FIT and exercise, regardless of the exercise intolerant characteristics presented by a POTS patient.

Keywords: postural orthostatic tachycardia syndrome, quality of life, exercise, functional imagery training

Overview of POTS

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

Context and Research Team

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

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

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

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

Case Overview

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

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133 sessions. There were even plans put in place to undergo training to become a studio
134 instructor and teach aerobic exercise classes. After collapsing her life quality
135 deteriorated substantially. She continued to feel unwell for prolonged periods of time,
136 stating that her ability to lead a “normal life is unattainable”.

137 Receiving the correct diagnosis took many “frustrating months” due to
138 ongoing misdiagnosis from her general practitioner (GP). Her initial GP
139 underestimated the severity of her symptoms, firstly diagnosing fainting with low
140 blood sugar levels suggesting she should “eat some cake” to improve symptoms. Lack
141 of POTS specific understanding is common amongst medical professionals (Kavi,
142 Gammage, Grubb, & Karabin, 2012). Eventually, at her own financial expense and 13
143 months of “uncertainty” a diagnosis of POTS was confirmed by a specialist
144 consultant. The consultant proposed the condition had manifested due to recent
145 surgery, leaving her vulnerable to autonomic dysfunction. Medications (Midodrine
146 and Fluoxetine), salt, B2, B12 and probiotics were prescribed leading to slight
147 improvements of her condition, albeit with her still feeling fatigued and lacking
148 motivation towards performing physical activity. She demonstrated an understanding
149 that exercise is beneficial for POTS, however conceding “whilst working full-time,
150 work is all I can manage”. She expressed fears about losing her job due to long-term
151 absence, losing consciousness, and an inability to perform routine tasks as a
152 consequence of suffering from extreme fatigue.

Case Formation

153 To treat the person not the condition, R.L. was assessed at week 0, now
154 referred to as baseline, before a treatment plan was collectively put into action. The
155 assessments are reported in order of occurrence, summing in overall case formation
156 which was then developed into a personalised intervention.

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

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

The fundamentals of FIT operate within the spirit of MI and the four processes of the interview must be adhered to; engage in conversation, focus on goals, evoke change, and plan for progress. Individuals are supported using skills such as affirmations when they discuss possible solutions to obstacles, further developing self-efficacy. Using Paivio's (1985) motivational and cognitive imagery approach, FIT explores goals by discussing intrinsic values and goals, potential obstacles, personal strengths and overcoming struggles, and future success. At each stage of discussion, the individual is taught how to use multisensory imagery by periodically layering each sense (see Williams, Cooley, & Cumming, 2013) to enhance the experiences and create feedback from discussion (Lang, 1979). Specifically, imagery focuses on the multisensory experience of goal achievement to foster self-efficacy, and immediate action-based implementations (Duckworth, Kirby, Gollwitzer, & Oettingen, 2013) which could be beneficial for managing POTS and adhering to exercise. Progressive interview questions like; "what would it be like in six months if you did not change your exercise routine", are later compared to; "imagine a future version of you in six months who did stick to the exercise program. What does that 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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to gain “some form of control” to improve her QOL. Towards the end of the session, R.L. set a goal: “I would like to jog continually for five minutes and maybe a long-term goal is to run for 5K” and suggested some lifestyle modifications such as “walking 10,000 steps” daily. Jogging was the primary goal, which was imagined through a set of controllable scenarios, and multisensory LSRT delivered to again enhance vividness and controllability. Using a scale from 0 (no image) to 5 (as vivid as having achieved the goal), R.L. was asked to rate her imagery at strategic points, scoring >3 at each. A cue was linked to a daily activity, in this case before taking the first sip of coffee, whereby imagery is activated throughout the day to imagine the feeling of success from jogging for five minutes followed by a small implementation strategy. Immediately after this session the physical assessment occurred.

Physical Assessment

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

Developing and Delivering the Interventions

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

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

Psychological Intervention

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

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

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

Physiological Intervention

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

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

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

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.

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

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

Reflections and Recommendations

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

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

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

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

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

Conclusion

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

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

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