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**Consumer experience of a Flexible Exercise Participation Program (FEPP) for individuals with multiple sclerosis: a mixed-methods study.**

Journal:	<i>Physiotherapy Research International</i>
Manuscript ID	PRI-Jan-2021-RA-0019.R1
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Keywords:	Behavioural change techniques, COVID-19, Exercise, Multiple sclerosis
Abstract:	<p><b>Background and Purpose</b>                      The flexible exercise participation program (FEPP) is a novel intervention developed to enable individuals with multiple sclerosis (MS) participate and progress in an exercise or sport of their choice. The FEPP is underpinned by guidelines on aerobic exercise for individuals with MS and is supported by a physiotherapist using behaviour change techniques. As part of a FEPP feasibility trial, the aim of this nested study was to explore the experience of participation in the FEPP from the perspective of individuals with MS. The objectives were to i) determine the acceptability of the FEPP and ii) identify recommendations for improvement.</p> <p><b>Methods</b>                      A mixed methods study using a sequential explanatory design was conducted. Part I consisted of a quantitative participant survey. Survey data were analysed descriptively using SPSS and informed the protocol for part II - qualitative interviews. Interview data were analysed thematically using NVivo. Part III consisted of integration of quantitative and qualitative data to allow greater explanation of survey responses. Individuals with MS who had participated in the FEPP feasibility trial were invited to take part in the study.</p> <p><b>Results</b>                      The FEPP was highly acceptability to the 10 participants. Five themes emerged to describe the experience of participating in the FEPP: i) exploring exercise boundaries, ii) measuring energy, iii) acknowledging accountability, iv) adjusting to exercising in a pandemic and v) sustaining participation. Recommendations for improving the FEPP included changes to energy level monitoring and incorporation of peer support mechanisms.</p> <p><b>Discussion</b>                      Participants found the FEPP highly acceptable and valued the flexibility to choose their own activity and the health professional support. Based on participant recommendations, future versions of the FEPP will include daily rather than weekly monitoring of exercise and peer support to further enable individuals with MS to find the right balance with exercise and sport.</p>

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Exercise for individuals with MS

## Consumer experience of a Flexible Exercise Participation

### Program (FEPP) for individuals with multiple sclerosis: a mixed-methods study.

#### Abstract

##### Background and Purpose

The flexible exercise participation program (FEPP) is a novel intervention developed to enable individuals with multiple sclerosis (MS) participate and progress in an exercise or sport of their choice. The FEPP is underpinned by guidelines on aerobic exercise for individuals with MS and is supported by a physiotherapist using behaviour change techniques. As part of a FEPP feasibility trial, the aim of this nested study was to explore the experience of participation in the FEPP from the perspective of individuals with MS. The objectives were to i) determine the acceptability of the FEPP and ii) identify recommendations for improvement.

##### Methods

A mixed methods study using a sequential explanatory design was conducted. Part I consisted of a quantitative participant survey. Survey data were analysed descriptively using SPSS and informed the protocol for part II - qualitative interviews. Interview data were analysed thematically using NVivo. Part III consisted of integration of quantitative and qualitative data to allow greater explanation of survey responses. Individuals with MS who had participated in the FEPP feasibility trial were invited to take part in the study.

##### Results

The FEPP was highly acceptability to the 10 participants. Five themes emerged to describe the experience of participating in the FEPP: i) exploring exercise boundaries, ii) measuring energy, iii) acknowledging accountability, iv) adjusting to exercising in a pandemic and v) sustaining participation. Recommendations for improving the FEPP included changes to energy level monitoring and incorporation of peer support mechanisms.

##### Discussion

Participants found the FEPP highly acceptable and valued the flexibility to choose their own activity and the health professional support. Based on participant recommendations, future versions of the FEPP will include daily rather than weekly monitoring of exercise and peer support to further enable individuals with MS to find the right balance with exercise and sport.

##### Key words

Behavioural change techniques, COVID-19, exercise, multiple sclerosis.

## Exercise for individuals with MS

## Introduction

Individuals with multiple sclerosis (MS) participate in less exercise and physical activity than individuals without the disease (Marck, Learmonth, Chen, & van der Mei, 2020). This disparity exists despite knowledge that exercise is beneficial for improving aerobic fitness, strength, balance and fatigue in persons with MS (Cruickshank, Reyes, & Ziman, 2015; Gunn, Markevics, Haas, Marsden, & Freeman, 2015; Langeskov-Christensen, Heine, Kwakkel, & Dalgas, 2015; Razazian et al., 2020). Exercise is also likely to have neuro-protective or neuro-regenerative effects on the inflammatory disease process (Dalgas, Langeskov-Christensen, Stenager, Riemenschneider, & Hvid, 2019; Kjolhede et al., 2018). Lack of support from health professionals has been identified as one of the barriers to participating in exercise for individuals with MS (Hale, Smith, Mulligan, & Treharne, 2012; Smith, Neibling, Williams, Birks, & Barker, 2019). In particular, support from health professionals is reportedly required to participate in and find the right balance with exercise (i.e. when to progress, regress or maintain activity) (Smith et al., 2019). Individuals with minimal disability from MS have requested health professional support to participate in an exercise of their choice (Smith et al., 2019). That choice may include exercise that demands a high-level of mobility such as running, trail walking or squash (Smith et al., 2019). To date, clinical trials have not commonly targeted interventions which support individuals with MS to engage in exercise that demands a high-level of mobility (Smith, Barker, Williams, Carr, & Gunnarsson, 2020).

A flexible exercise participation program (FEPP) was developed for individuals with minimal disability from MS in response to consumer requests for support (Smith et al., 2019). The aim of the FEPP was to allow participants to choose their preferred exercise or sport and progress towards personal exercise goals over a 12-week period. Recently updated guidelines on aerobic exercise for individuals with MS formed the evidence base for the FEPP (Kim et al., 2019) ([appendix 1](#)).

Consumer consultation and feedback was an essential part of shaping the FEPP design and its future development. Consumer requests for health professional support were incorporated into the FEPP, via a weekly telephone coaching session. Behaviour change techniques were included in the coaching session as the basis of that support ([appendix 2](#)) (Michie et al., 2011). Social cognitive theory underpinned the approach to behavioural change through the promotion of self-management habits for exercise participation (Bandura, 2004; Motl, Pekmezi, & Wingo, 2018),

1 Exercise for individuals with MS

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3 techniques were selected due to established use with individuals with MS (Casey, Coote, Hayes, &  
4 Gallagher, 2018; Sangelaji et al., 2016).

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7 A trial was conducted to explore the feasibility and impact of the FEPP. This current mixed-method  
8 study was nested within the FEPP feasibility trial. The aim of this study was to explore the experience  
9 of participation in the FEPP from the perspective of individuals with MS. The objectives were to i)  
10 determine the acceptability of the FEPP and ii) identify recommendations for improvement of the  
11 FEPP for a larger trial.  
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## 16 Method

### 17 FEPP Protocol

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19 The FEPP rationale and protocol have been published previously (Smith, Williams, & Barker, 2020).  
20 The 12-week FEPP allowed participants choose their preferred exercise or sport, set goals for  
21 exercise participation and complete the exercise at a time and place suitable to them. Progression  
22 towards their goals was guided by use of a FEPP flowchart, their perceived energy levels each week  
23 and the MS aerobic exercise guidelines (Kim et al., 2019). Participants were supported remotely via a  
24 weekly telephone coaching call from an experienced physiotherapist (>20 years) with training in  
25 behaviour change techniques.  
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34 One minor protocol deviation occurred allowing email contact if a participant could not be reached  
35 via telephone for the weekly coaching call.  
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### 38 Study design

39 This study adopted a sequential explanatory mixed-methods design (Creswell & Plano Clark, 2018).  
40 Part I involved collection of quantitative data via an electronic survey. Part II consisted of a series of  
41 focus groups or individual interviews with questions informed by part I results. A qualitative  
42 descriptive approach was taken (Stanley, 2015). Part III involved the integration of the quantitative  
43 and qualitative data with qualitative emphasis (Ivankova, Creswell, & Stick, 2006). The rationale for  
44 this mixed-methods approach was that qualitative data gathered in part II would allow refinement  
45 and greater explanation of the findings from part I (Fetters, Curry, & Creswell, 2013; Ivankova et al.,  
46 2006). A diagrammatic representation of the study design is shown in [figure 1](#).  
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57 **Insert\_Figure1**  
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Exercise for individuals with MS

## Study setting

The FEPP feasibility trial commenced in regional Northern Queensland, Australia in January 2020 with completion by November 2020. During this time, the COVID-19 pandemic began and the FEPP was completed by all participants during the pandemic.

## Participants

All participants who completed the FEPP feasibility trial (Smith, Williams, et al., 2020) were invited to participate. Inclusion criteria were: (i) diagnosis of relapsing remitting MS as defined by the 2017 McDonald criteria (Thompson et al., 2018); (ii) independent mobility as defined by Expanded Disability Status Scale (EDSS) level 0-3.5 (Kurtzke, 1983); (iii) stable i.e. not worsening in past three months (Lublin, 2014); (iv) aged 18 years or over; (v) able to provide informed consent. Potential participants were excluded if they had: (i) any concomitant neurological condition or (ii) an additional health condition that prohibited their participation in aerobic exercise or sport.

## Data collection

### *Participant survey*

A participant survey was developed, piloted and administered to provide an initial assessment of the acceptability of the FEPP to the participants of the trial, which targeted three key areas: satisfaction, usability and suitability using a five-point Likert scale (appendix 3). Survey questions were developed based on similar surveys used with individuals with MS (Aminian, Motl, Rowley, & Manns, 2019; Learmonth, Adamson, Kinnett-Hopkins, Bohri, & Motl, 2017) and was informed by the needs of individuals with MS (Smith et al., 2019). The survey was provided electronically to each participant on completion of the FEPP feasibility trial, via the survey platform Qualtrics (QualtricsXM, 2019). Survey responses were anonymous.

### *Focus group or individual interviews*

Focus group or individual interviews (depending on participant availability) took place during the six-week post-intervention period for all participants. Interviews were conducted via Zoom (Zoom., 2017) video conferencing technology, due to government social distancing guidance in response to the COVID-19 pandemic. Interview questions were designed to explore the participants' experience of the FEPP and their recommendations for improvement.

Interview questions were initially developed from previous studies investigating participation in exercise for individuals with MS (Smith, Barker, et al., 2020; Smith et al., 2019). Questions were

## Exercise for individuals with MS

developed further following analysis of the participant survey results regarding acceptability. These additional questions targeted areas of lower acceptability of the FEPP to the participants (appendix 4). Interview questions were piloted prior to interviewing all ten participants. Interviews were conducted by one researcher (MS), with an additional researcher present during focus group interviews for note taking and fidelity checking (BN). A summary report was compiled after each interview by the researchers (MS, BN). Both researchers had three years' experience in qualitative research.

## Data analysis

### *Part I: Participant survey*

Participant survey responses were exported from the Qualtrics (QualtricsXM, 2019) platform and analysed descriptively using measures of central tendency and dispersion, with IBM Statistics SPSS (Version 25).

### *Part II: Interviews*

Interview data were exported to NVivo qualitative analysis software (QSR International Pty Ltd. Version 12) and analysed in accordance with the qualitative descriptive methodology. Following reading and re-reading of the dataset each line of data was coded, using a short title or word enabling clear identification of topics within the data (Saldana, 2013). Inductive thematic analysis was used to identify patterns in the data, with similar codes brought together to identify emergent themes and sub-themes from the bottom up (Braun & Clarke, 2006; Stanley, 2015). Themes were reviewed to check that they aligned with the coded extracts by checking and rechecking the data. Analysis continued until themes were refined and a thematic map created (Braun & Clarke, 2006). Codes and patterns from one focus group data set were reviewed by a second researcher (BN) to check and verify, or identify error, as part of a validity check (Braun & Clarke, 2013). Comparison of codes and sub-themes with survey responses enabled triangulation of the data (Turner, Cardinal, & Burton, 2015).

### *Part III: Integration of quantitative and qualitative data*

Survey data provided information on the level of acceptability of the FEPP in the domains of suitability, utility and satisfaction. To fully explore the reasons underpinning the level of acceptability of the FEPP, data from the survey and interviews were integrated as per the mixed-methods sequential explanatory design (Creswell & Plano Clark, 2018; Ivankova et al., 2006). All sub-themes from the interviews were re-examined to search for data that further explained the findings from



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each domain of the survey. Relevant sub-themes were identified and the thematic map was used by the researchers as a discussion tool to cross-check findings.

Recommendations for improvement of the FEPP were directly extracted from the interview data. In addition, member checking with one participant from each focus group took place to ensure appropriate representation of participant views.

## Ethics

Ethical approval was obtained for this study from the XXXX Human Research Ethics Committee on 06/12/19 (H7956). Informed written consent was obtained from all participants.

## Results

### Participants

Eleven participants enrolled in the FEPP feasibility trial and ten completed it. One participant withdrew from the trial at week four due to the personal impact of the government restrictions imposed in response to the COVID-19 pandemic. Only those participants who completed the FEPP feasibility trial agreed to participate in the current study.

The ten participants were predominantly female (n=8) with a mean age of 47 years (SD: 10.4; range 30-65). Participants had been diagnosed with MS, on average, for 11 years (SD: 7.6; range 0.3-24) and had a mean EDSS level of 1.9 (SD: 0.5; range 1.5-3). Most participants were in full-time paid work with three participants not in paid work. Participants chose a variety of exercise modes such as, touch football, squash, aerobic gym sessions and walking.

### Part I: Participant survey

All ten participants reported they completed the survey following the FEPP, however only nine electronic surveys were received. Due to the anonymity of the survey it was not possible to track which participant was unsuccessful at submitting their survey. Overall, participants were satisfied with the FEPP, its utility and its suitability. The median score in each area was five out of five (where one indicated low satisfaction/agreement and five indicated high satisfaction/agreement, table 1).

**Insert\_Table1.**

Exercise for individuals with MS

## Part II: Interviews – individual and focus groups

All ten participants took part in the interviews. Three focus groups and two individual interviews were conducted. Five key themes emerged to describe the experience of participating in the FEPP: i) exploring exercise boundaries, ii) measuring energy, iii) acknowledging accountability, iv) adjusting to exercising in a pandemic and v) sustaining participation. Key themes and subthemes are shown in figure 2.

### Insert\_Figure2

#### *Exploring exercise boundaries*

Participants responded positively to exploring their exercise boundaries with the FEPP, reporting that the individualised nature of the program, with the weekly coaching sessions, supported this process.

*“What I did learn out of it was where my limits were, because I tend to push myself quite a bit. So I learnt – I think I learnt – at the end of it how much I can juggle within my busy week and where I have to learn to take a rest or to pull back.”*

*FG1 female participant*

*“My expectation was always low... like it's the fear of what if I do too much, then I'm going to get a flare up, or whatever. But I've actually realised the complete opposite – that the more I push myself the better I actually get. And then I realise: wow, I can actually do this. So it's really motivating.”*

*FG1 female participant*

Personalised goals provided a focus for most, with others identifying that despite not reaching goals, their increase in exercise participation was a strong achievement in itself. Whilst some participants really challenged their exercise limits, others were keen to identify that the maintenance of exercise participation was just as important for them.

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*“Like doing something structured every day, every week, is as much a win as anything else....we’re doing something good by doing something.”*

*FG1 male participant*

For those who really pushed exercise limits, recording and reviewing energy levels, exercise intensity and frequency allowed them to scale exercise participation accordingly. Several participants regularly exercised beyond the advanced aerobic guidelines for individuals with MS (Kim et al., 2019). Having the coaching support via remote delivery reportedly encouraged participation but enabled self-efficacy.

*“It’s self-paced. It’s what we can do. So you’re not the one that’s trying to move our legs or push us through the push ups or the workout, we’re the ones that are doing it for ourselves.”*

*FG3 male participant*

Flexibility of the program was important for most, as it enabled participants to structure their exercise schedule depending on how they were feeling. Others preferred a rigid routine around exercising days, but varied the intensity or duration of the exercise instead.

*“With MS, every day is a new adventure, and so you can't necessarily guarantee that yesterday when you went running is going to be as fantastic as tomorrow when you go running. But because of the flexibility that the program allows, you can actually adjust.”*

*FG1 female participant*

### *Measuring energy*

The concept of energy was relevant for all participants, yet qualifying and quantifying energy was difficult. Energy was perceived as physical, mental or a combination of both and some participants questioned whether these should, or could, be separated. While energy levels were to be measured

## Exercise for individuals with MS

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3 weekly, according to the FEPP protocol, using an energy monitoring tool (a 5-point energy Likert  
4 scale ranging from no energy to maximum energy), participants found this difficult due to the high  
5 variability of energy levels from day-to-day.  
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11 *“I couldn't measure my energy on a weekly basis. I started putting it down on a daily basis and*  
12 *sometimes it's even within a day that you feel sort of different.”*  
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15 *FG1 male participant*  
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20 Participants proposed it might be more useful to record the energy score pre- and post-exercise  
21 sessions and calculate an average energy score for the week. Participants who chose to do this  
22 during the trial, also found it helpful to see the change in energy from pre- to post-exercise.  
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28 *“See, it was good for me because I started off with a three, “I'm OK”. And that was the feeling that I*  
29 *went in with was that “I'm OK”. And in the end I was a five, yeah, I'm feeling great.”*  
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32 *FG3 female participant*  
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37 Participants debated the expectation of improved vitality (the experience of being full of energy)  
38 over the 12-week duration of the FEPP, with some reporting overall vitality did not actually change  
39 that much and others indicating vitality was too variable to accurately determine. Some questioned  
40 whether it was possible to reach full vitality.  
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#### *Acknowledging accountability*

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46 Participants acknowledged the importance of accountability in their exercise participation success.  
47 Accountability was experienced in different ways. For many, knowing that there was a weekly  
48 coaching session to discuss exercise, facilitated their participation in exercise. Others found the  
49 exercise diary did the same and was a useful means of recording and demonstrating exercise  
50 completion.  
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58 *“So, I think the fact that you had to write it down, made sure you did more exercise.”*  
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## Exercise for individuals with MS

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*FG2 female participant*

Self-accountability was a driving factor for some – taking on responsibility for the choices made concerning exercise participation and making a self-commitment to complete the FEPP. For others accountability to different support networks such as family or friends was acknowledged as a facilitator of exercise participation.

*Adjusting to exercising in a pandemic*

The onset of the COVID-19 pandemic during the trial and the government imposed restrictions affected participants in several ways in relation to exercise participation. Disruption to exercise routine occurred, for example with respect to location, access to equipment and participation in team sports. Feelings of uncertainty, fear and changing moods surrounded a struggle in adjusting to living with the pandemic and the restrictions.

*“And it was really good up until the coronavirus and then the wheels just fell off.... It just seemed like everything came to a halt.”*

*IV 1 female participant*

Most participants highlighted a need to regain control. Creating new routines and strategies to engage in exercise assisted in regaining control.

*“You know, having that structure each day was really important when there was no structure outside that, because we have no clue what was happening in the world. And so I think exercise was really important for me because it bookended that part of my day that was like: work is over now, now we do exercise”*

*FG1 female participant*

Participating in the FEPP provided support to find solutions to problems exercising during the pandemic. Finding new ways to exercise enabled perseverance.

1 Exercise for individuals with MS

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3 *Sustaining participation*

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5 Different factors influenced sustaining participation in exercise during the trial and beyond.  
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7 Enjoyment in the social aspect of exercise was a motivator for some, more so than the exercise  
8 participation itself. For most, the flexibility to choose an exercise of interest aided motivation to  
9 continue.  
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12 Some participants varied their exercise modes within a week and this variety helped to maintain  
13 interest and sustain participation. Different environmental options also added variety and interest.  
14 These included walking (treadmill, outdoor flat or outdoor hill), swimming (pool or sea) and gym  
15 sessions (indoor or outdoor).  
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19 Participants frequently discussed their mindset around exercise. Positive self-belief was identified as  
20 important for sustaining exercise. Personal strategies were reported as a means for sustaining  
21 exercise participation. Incorporating exercise as part of an active lifestyle was one strategy.  
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28 *“Definitely this concept of deliberately asking a friend, “Well, let’s go for a walk”, rather than, “Let’s*  
29 *meet for lunch”. It’s definitely changed my mindset.”*  
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32 *FG2 female participant*

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37 Creating an exercise routine and recording exercise were commonly used strategies to sustain  
38 participation. Some used their calendars to continue recording exercise participation once the trial  
39 ceased. Others used fitness tracking technology such as a Fitbit or Apple watch to record data. Few  
40 continued with explicit goal setting. Ongoing accountability to friends and family was beneficial in  
41 sustaining participation in exercise. All participants reported that they continued with exercise  
42 following the trial – some as frequently as before, others less so.  
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48 **Part III: Integration of qualitative and quantitative data**

49 *Acceptability*

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51 Key subthemes from the interviews that supported or explained the level of acceptability reported in  
52 the survey for each domain are displayed in [table 2](#).  
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58 **Insert\_Table2.**

## Exercise for individuals with MS

Satisfaction with the FEPP was high. The individualised nature of the program was important in determining this satisfaction. Participants' freedom to engage in their choice of sport at a time and place that was suitable to them underpinned their satisfaction. Remotely delivered coaching support was highly valued, enabling self-efficacy and satisfactory completion of the FEPP.

Utility of the FEPP scored lower than the other two domains in the survey, with data reflecting that this was largely due to participant difficulty with weekly energy level measurement. Participants reported energy levels varied considerably on a daily basis therefore a weekly energy level was hard to quantify. Interpretation of the utility of the diary and the FEPP flowchart also related to the understanding and application of the energy level measurement.

Suitability of the FEPP was reported as high. The flexibility of the FEPP enabled commencement at an appropriate level of fitness that could be tailored in frequency, intensity and duration. The ability to vary exercise mode and location made for a flexible program that could be implemented during the challenges of the COVID-19 pandemic.

### *Recommendations*

Recommendations made by study participants for future versions of the FEPP, focused on monitoring of energy levels, specifically what this encompasses and how it should be recorded. It was proposed by participants that energy levels are measured pre- and post-exercise and an average value calculated for the week, to guide exercise progression.

Support from a health professional was a key component of the FEPP and participants recommended the addition of peer support from other members of the trial. The use of technology to record exercise was reported as a means of sustaining participation with many participants making use of fitness trackers, which may be useful to consider for future trials.

### **Discussion**

The aim of this study was to explore the experience of participation in the FEPP from the perspective of individuals with MS. Participants found the FEPP a highly acceptable program that enabled them to explore exercise boundaries while engaging in exercise where and when it suited them. By providing coaching via remote delivery using behaviour change techniques, participants were able to demonstrate self-efficacy in their approach to exercise participation. Coaching sessions also enabled participants to progress exercise at a rate that was acceptable to themselves and encouraged working to meet or exceed MS aerobic exercise guidelines (Kim et al., 2019), depending on personal

## Exercise for individuals with MS

goals. Given that individuals with MS engage in less physical activity than the general population (Marck et al., 2020), strategies that can facilitate engagement and sustain exercise participation are important for management of this chronic disease.

The experience for individuals participating in the FEPP was novel. It enabled participants to explore and push the boundaries of their own exercise participation. To the authors' knowledge, this is the first study to explore the experience of individuals with mild to moderate MS working towards and beyond the updated aerobic exercise guidelines for individuals with MS (Kim et al., 2019). Given that exercise may potentially have a disease modifying effect on MS, exploring the boundaries of intensity, duration and frequency is required to determine the optimum benefit for individuals with MS (Kjohede et al., 2018; Motl & Pilutti, 2016). Programs such as the FEPP may provide a means to do so.

Health professional support to explore exercise boundaries was deemed essential by participants and was enabled using behaviour change techniques. Participants identified that the coaching call created accountability and helped to push them forward. Coaching also enabled self-efficacy in completing the program and sustaining exercise participation. Behaviour change techniques for increasing physical activity have been shown to be efficacious for individuals with MS (Kim, Mehta, Lai, & Motl, 2020). Further consideration is required as to when and how to implement these techniques, so that exercise can be used as a preventative as well as a restorative measure (Dalgas et al., 2019; Riemenschneider, Hvid, Stenager, & Dalgas, 2018). In addition, the sustainability of long term behaviour change in exercise participation requires further investigation (Kim et al., 2020).

Barriers to changing exercise behaviour are evident for individuals with MS (Riemann-Lorenz et al., 2019). The need to change exercise behaviour during the onset of the COVID-19 pandemic further increased the challenge to participants. The strength of the FEPP and trial design was the flexibility which enabled participants to self-select the type and dose of exercise undertaken and as a result, enable them to adjust the exercise across the 12 weeks. As indoor gyms closed and team sports ceased during the pandemic, participants problem solved during the coaching session to find new ways to exercise. Options included online exercise videos and classes, running and outdoor gyms (restrictions permitting). This individualised approach, supported by the coaching sessions, enabled resilience and perseverance with exercise during a significantly challenging time. Worldwide, physical activity and exercise participation in the general population reduced in the wake of the COVID-19 pandemic in 2020 (Tison et al., 2020). The implications of reduced physical activity and exercise for those with MS include worsening of gait impairments due to physical deconditioning (Motl et al., 2017; Sandroff, Klaren, & Motl, 2015). Mechanisms to support exercise participation are



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3 therefore essential and need to be flexible in terms of exercise choice and delivery. The remote  
4 delivery and individualised nature of the FEPP provides such an opportunity for a flexible  
5 intervention, which is also important given the heterogenic pathology and symptomatology of  
6 multiple sclerosis (Baird & Motl, 2019).  
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10 Overall the FEPP was perceived as highly acceptable by the participants. Much of this acceptability  
11 was associated with the flexibility and individualised nature of the FEPP, which was viewed as an  
12 enabler and is a novel component of this study. Satisfaction with the FEPP and the process for  
13 delivery of the FEPP in the trial was also high. In particular, the support provided through coaching  
14 sessions aided progress, self-efficacy and satisfaction. These essential features of flexibility,  
15 individuality and support, identified by participants, are necessary components for the next phase of  
16 this study which will be a larger trial to evaluate the effectiveness of the FEPP.  
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23 Consumer opinions are an important contribution to the development of the study design in  
24 preparation for a larger trial (Learmonth, Kinnett-Hopkins, & Motl, 2018) and participant  
25 recommendations will be incorporated into future versions of the FEPP. These recommendations  
26 include greater specificity around monitoring energy levels, to include measurement pre- and post-  
27 exercise with an average value calculated for the week. Provision of peer support is an important  
28 avenue for investigation and there is currently limited research in this area (Ploughman, 2017).  
29 Different media forms for peer communication for example, telephone, video or social media  
30 provide several options for exploration. Peer support could also be provided through connecting  
31 technology such as commercially available fitness trackers to allow text message support,  
32 comparison of progress and possibly introduce an element of competition for motivation.  
33 Commercial fitness trackers have been utilized to increase physical activity in individuals with MS  
34 (Manns, Mehrabani, Norton, Aminian, & Motl, 2020) however, connecting the users as a means of  
35 support is yet to be explored.  
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## Limitations

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48 The FEPP trial was conducted in northern Queensland, Australia which may influence the  
49 generalisability of the findings. In particular, COVID-19 restrictions were in place for a shorter period  
50 of time in northern Queensland than other parts of Australia and the world. A hard lockdown was in  
51 place for two months with gradual easing of restrictions across the remainder of the year, enabling a  
52 graded return to indoor gyms, walking trails and sport. In addition, recruitment may have attracted  
53 individuals who were motivated to exercise, which could influence findings (Barreto, Ferrandez, &  
54 Saliba-Serre, 2013). Interviews were conducted by researchers who were directly involved in the  
55 intervention which may have influenced the participants' reporting of the experience (Raheim et al.,  
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## Exercise for individuals with MS

2016). In order to minimise this effect, participants were specifically guided to provide honest answers, positive or negative, prior to completing the survey and interview, to enable an accurate reflection of the FEPP. In addition, survey responses were anonymous. The participant who withdrew from the FEPP feasibility trial was unable to be interviewed, their perspective may have provided additional insights to this study.

### Implications for physiotherapy practice

The findings from this study demonstrate that the FEPP was highly acceptable from the perspective of individuals with MS. Participants valued the flexibility to implement the FEPP with an activity of their choosing, supported by health professional coaching based on behaviour change techniques. Future versions of the FEPP will involve refinement of energy level monitoring and incorporation of peer support mechanisms to further enable finding the right balance with exercise and sport for individuals with MS.

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## Exercise for individuals with MS

Table 1. Acceptability of the FEPP, survey results

Topic Area	Question Content	Survey score (1-5)	
		Median (IRQ)	Range
Satisfaction	FEPP overall	5 (5-5)	4-5
	Telephone contact - amount	5 (5-5)	5-5
	Telephone contact - advice	5 (5-5)	5-5
Utility	FEPP flowchart	5 (5-5)	4-5
	Energy monitoring tool	5 (4.5-5)	3-5
	Exercise diary	5 (5-5)	4-5
Suitability	Fitness level	5 (5-5)	5-5
	Time requirement	5 (5-5)	5-5
	Exercise progression	5 (5-5)	5-5

Table 2. Exploring the acceptability of the FEPP

Survey acceptability domain	Interview subtheme(s)
Satisfaction	Individualised Coaching Self-efficacy
Utility	Variability (measuring energy)
Suitability	Flexibility Variability Exercise mode

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## Appendix 1. Aerobic exercise guidelines for adults with mild to moderate MS (Kim et al., 2019)

	General Aerobic Exercise	Advanced Aerobic Exercise
<b>Frequency</b>	2-3 days per week	5 days per week
<b>Duration</b>	10-30 minutes	Can approach 40 minutes
<b>Intensity</b>	Moderate intensity. 11-13 on the 20-point Rating of Perceived Exertion (RPE) scale	Intensity can approach 15 on the 20-point RPE scale

## Appendix 2: Behaviour change techniques and application framework

Technique	Application Framework
Goal setting	Exercise and sport participation goals will be set by the participant following consultation with the physiotherapist. Session: Initial interview.
Action planning	Guidance on application of the FEPP to ensure appropriate and correct usage. Session: Initial interview and weekly coaching.
Barrier identification/problem solving	Discussion of barriers to participating in sport and exercise and potential ways of overcoming them. Session: Weekly coaching.
Prompt review of outcome goals	Discussion of progress towards participation goals. Session: Weekly coaching.
Prompt self-monitoring of behaviour	Completion and submission of exercise diary each week. Session: Weekly coaching.
Provide feedback on performance	Discussion and feedback on activity recorded in exercise diary. Session: Weekly coaching.

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Appendix 3: Participant survey

Satisfaction				
<b>1. How satisfied were you with the FEPP overall?</b>				
very satisfied	moderately satisfied	neither satisfied or dissatisfied	moderately dissatisfied	very dissatisfied
<b>2. How satisfied were you with the amount of contact by telephone from the physiotherapist?</b>				
very satisfied	moderately satisfied	neither satisfied or dissatisfied	moderately dissatisfied	very dissatisfied
<b>3. How satisfied were you with the advice received during the telephone contact with the physiotherapist?</b>				
very satisfied	moderately satisfied	neither satisfied or dissatisfied	moderately dissatisfied	very dissatisfied
Ease of use				
<b>4. How easy did you find it to use the FEPP flowchart?</b>				
very easy	moderately easy	neither easy or difficult	moderately difficult	very difficult
<b>5. How easy did you find it to use the Energy Monitoring Tool (smiley faces chart) to guide your activity?</b>				
very easy	moderately easy	neither easy or difficult	moderately difficult	very difficult
<b>6. How easy did you find it to use the exercise diary?</b>				
very easy	moderately easy	neither easy or difficult	moderately difficult	very difficult
Suitability				
<b>State the extent to which you agree with the following statements:</b>				
<b>7. The FEPP was suitable for use with my fitness level.</b>				
strongly agree	moderately agree	neither agree or disagree	moderately disagree	strongly disagree
<b>8. The time requirement of the FEPP was suitable for me.</b>				
strongly agree	moderately agree	neither agree or disagree	moderately disagree	strongly disagree
<b>9. The FEPP assisted suitable progression of my exercise.</b>				
strongly agree	moderately agree	neither agree or disagree	moderately disagree	strongly disagree



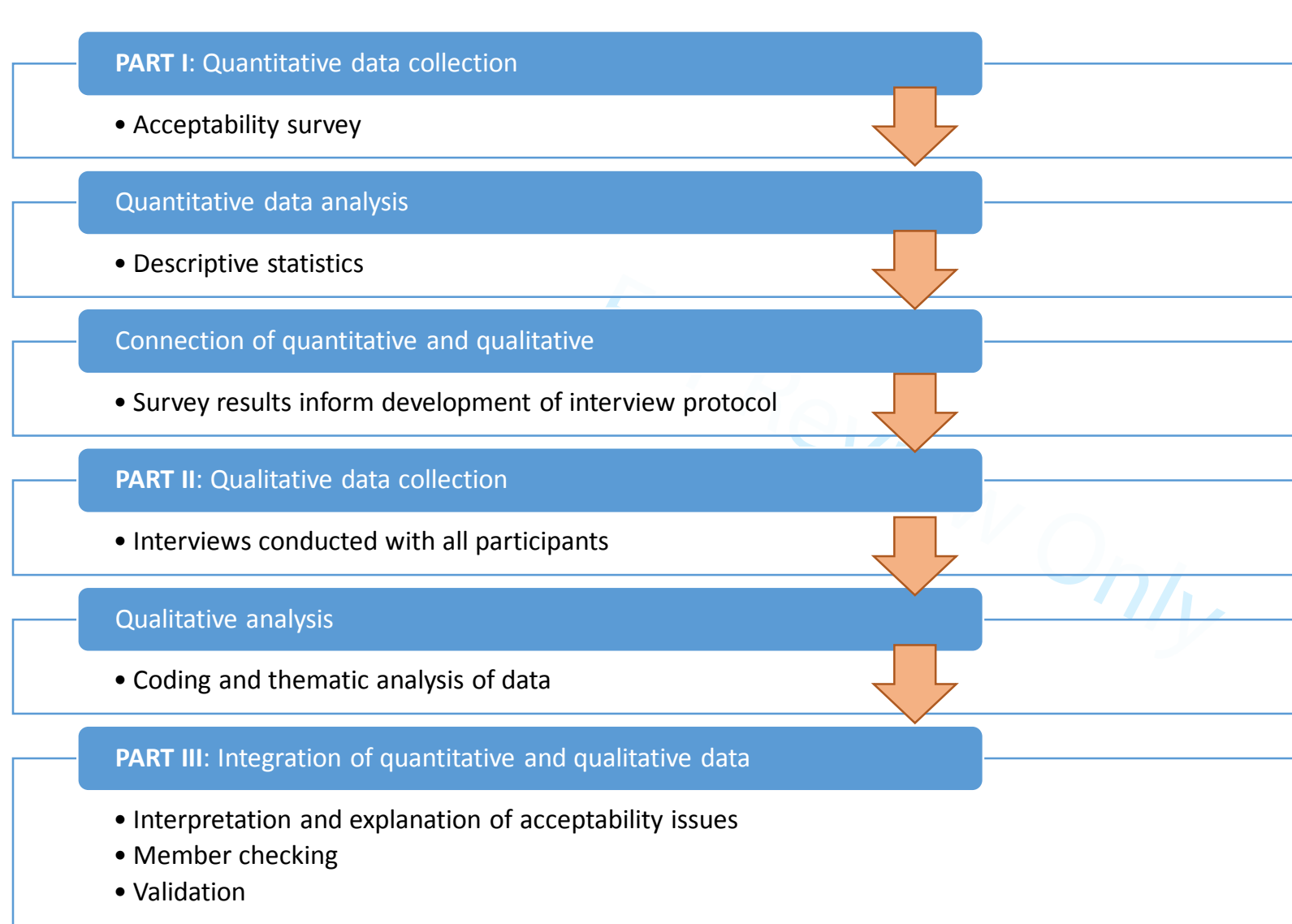


Figure 1. The mixed-methods sequential explanatory design

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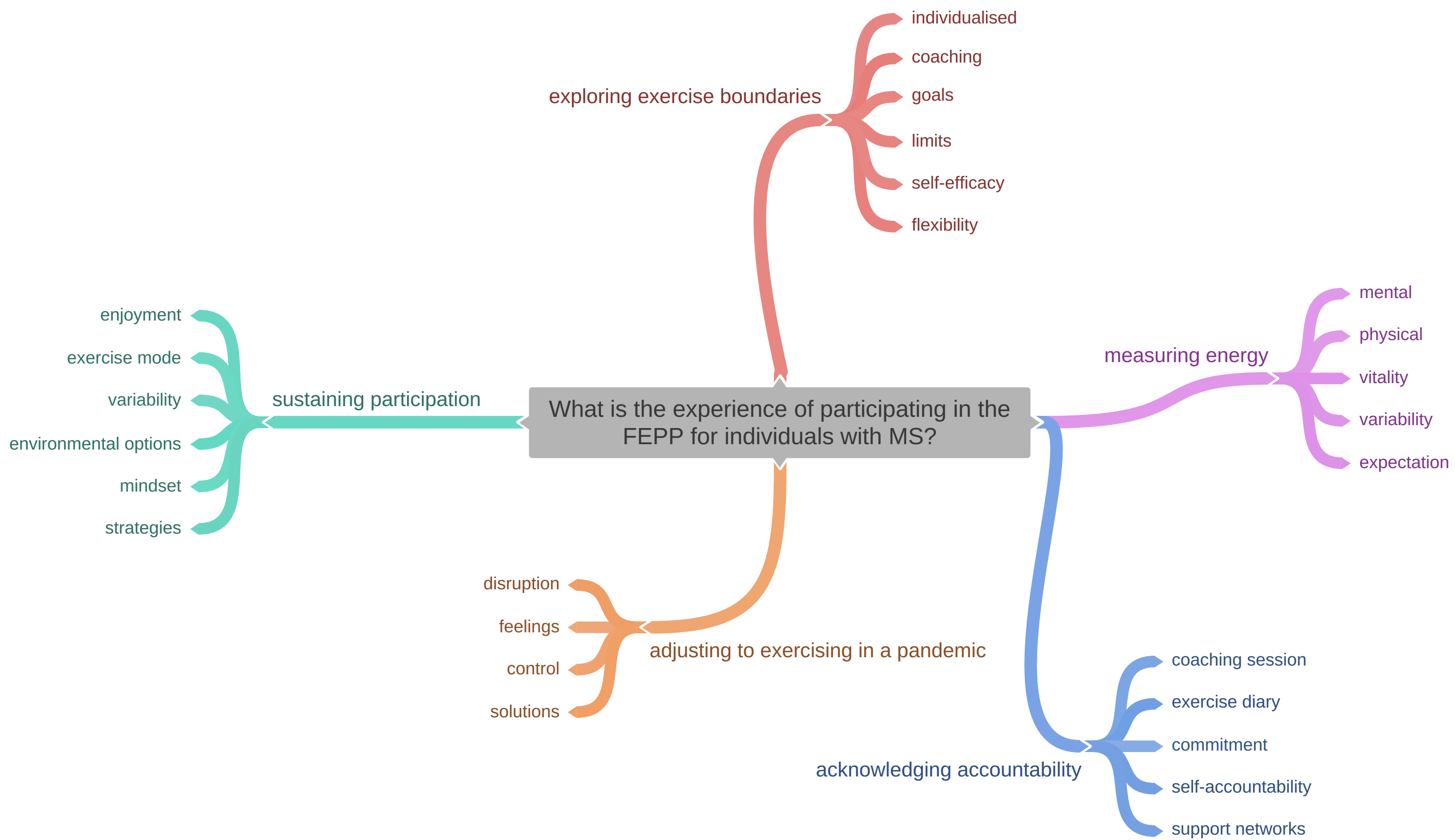


Figure 2. Thematic map