Can behaviour change interventions improve self-efficacy and exercise adherence among people with Parkinson's? A systematic review.

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Introduction

People with Parkinson's (PwP) are more likely to assume a ***sedentary lifestyle*** compared to their healthy peers. Literature has shown that personal influences including ***low self-efficacy*** and ***poor outcome expectation*** are ***greater predictors of exercise adherence than disease severity***.

Exercise has been showed to improve strength, physical functioning, balance, walking, exercise tolerance, motor control as well as non-motor features including general and health-related quality of life (QoL), self-efficacy and depression.

Despite exercise's strong benefits, only 30% meet the required activity levels, with some individuals being inactive for 70% of the day.

Behavioural change interventions are intricate with many cooperating elements. To motivate PwP to remain active outside a clinical setting, it is important ***to identify self-management strategies*** to ***overcome barriers to exercise***, to ***improve exercise self-efficacy*** and ***promote physical activity***.

To the best of our knowledge, ***no previous review has explored the effectiveness of behaviour change interventions on self-efficacy and long-term exercise adherence among PwP***.

Aim

To synthesise the available evidence on behavioural change interventions that comprise of self-management strategies to overcome challenges to exercise and promote self-efficacy and exercise adherence among PwP.

Methods

The review protocol is published[1] and registered with PROSPERO (ID: CRD42021293057) and reported using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines.

Inclusion Criteria
Population: Community dwelling independently mobile people with Parkinson's (Hoehn and Yahr stage 1-4
Intervention: Any form of behavioural change intervention (used in conjunction with exercise)
Comparator: Must include people with a Parkinson's diagnosis. Comparator groups including but not limited to exercise alone, usual care or waiting list will be included.
Outcomes of interest: Self-efficacy measures Quality of life measures Physical function Exercise adherence
Study design: Interventional studies: Randomized control trials, quasi-experimental trials, pilot interventional studies, pre- and post-interventional studies, and feasibility studies.

Search Term categories

1. ["behavioural change intervention*" OR "behavioral change intervention*" OR "behaviour change technique*" OR "behavior change technique*" OR "cognitive behavioural therapy" OR "cognitive behavioral therapy" OR psychology OR "psychological therapy" OR "health behaviour*" OR "health behavior*"]
2. [self-efficacy OR "self efficacy" OR "physical activity self-efficacy" OR "physical activity self efficacy" OR "exercise self-efficacy" OR "exercise self efficacy" OR self-management].
3. 1 AND 2
4. ["physical activit*" OR recreation OR sport OR exercise OR training OR fitness OR "physical therap*" OR rehabilitation]
5. 3 AND 4
6. ["Parkinson's Disease" OR "Parkinsons Disease" OR "Parkinson Disease" OR Parkinson's OR Parkinson]
7. 5 AND 6

Electronic Database Search

EBSCO (Academic search complete and Psychinfo), Medline, Cinahl, Web of Science, PubMed, Embase, Scopus, Google Scholar, and Cochrane Library

Hand Search

Risk of Bias Assessment

Cochrane Risk of Bias Tool 2 – for RCTs (n = 4)

Robins – I tools for non-randomized studies (n = 7)

Data Extraction and mapping to the Theoretical Domains Framework (TDF – see diagram)

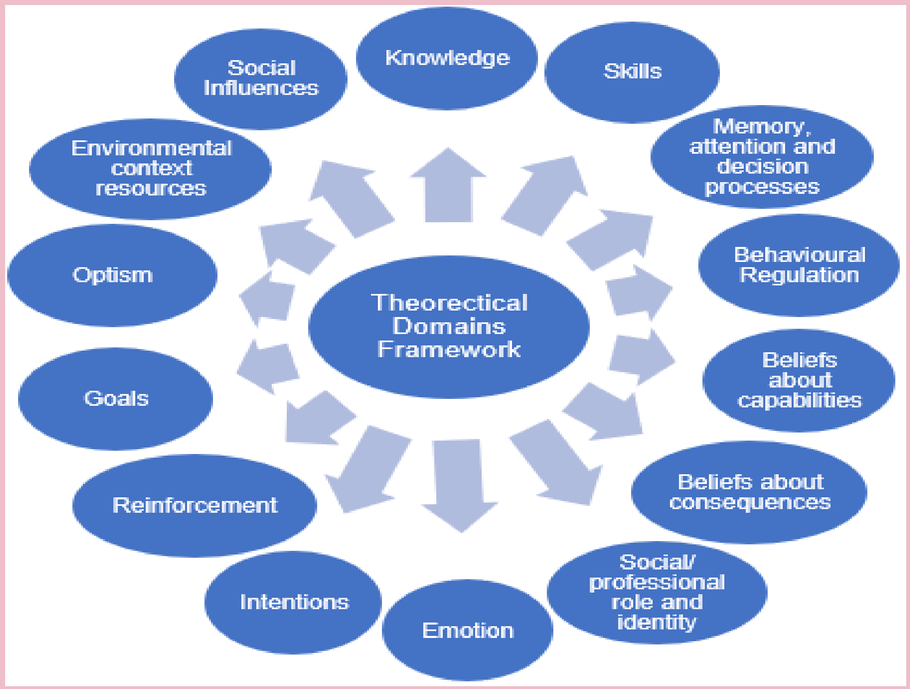
a) Study identification
b) Study aim
c) Participant characteristics
d) Behaviour change intervention
e) Exercise component
f) Control intervention
g) Outcome measures

Vote Counting

Meta – Analysis (for outcomes of QoL and physical function)
Assessment of Heterogeneity
Subgroup analysis
Sensitivity analysis

Effect Sizes

GRADE Assessment



Results

The systematic search identified 11 eligible studies, 4 RCTs (1 Low RoB, 2 Moderate RoB and 1 High RoB) and 7 non-randomized trials (2 Low RoB, 4 Moderate RoB and 1 High RoB)

Participant Characteristics

- A total of 901 participants, consisting of 570 males and 331 females
- Mean weighted age of 65.17 years.
- 55 participants were in the early stages (Stage 1, n = 35, Stage 1.5, n= 20),
- 623 participants in Stage 2 (Stage 2, n = 529, Stage 2.5, n = 94).
- 44 participants in Stage 3 (Stage 3, n = 44).
- Three studies did not provide the individual participant data for H&Y scale (n= 179 participants).

Intervention Characteristics

Behavioural change interventions consisted of **education** (n = 3; 1 education only, 2 hybrid interventions), **behavioural strategies** (n = 5, all hybrid), **technology** (n = 8; 3 technology only, 5 hybrid) and **support groups** (n = 5; 1 support only, 4 hybrid). Majority of studies included a hybrid behavioural change intervention (6/11), with only 5 studies implementing a sole intervention type.

Mapping to the TDF

Education

TDF domain: Knowledge
- Educational workbooks, Brochures,
- Groups sessions and lectures providing knowledge about the condition

TDF domain: Belief about capabilities
- Benefits of exercise

TDF domain: Belief about consequences
- Risks of sedentary behaviours

TDF domain: Skills
- Self-management

Behavioural Strategies

TDF domain: Goals
- Goal setting

TDF domain: Environmental context resources
- Barrier identification

TDF domain: Intentions
- Cognitive restructuring

TDF domain: Memory, attention and decision processes
- Decision making
- Problem solving

TDF domain: Behaviour regulation
- Action planning

TDF domain: Emotion
- Relaxation

Technology

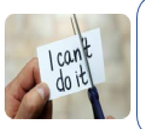
TDF domain: Behaviour regulation
- Activity trackers,
- Pedometers,
- Virtual coaches

TDF domain: Reinforcement
- Online exercise apps

Support Groups

TDF domain: Social Influences
- Peer coaching
- Weekly phone calls
- Private online sessions
- Motivational telephone counselling and
- Therapist support

Outcomes



Self-Efficacy

- Four studies examined self-efficacy outcomes, 1 RCT (High RoB) and 3 non-randomized (1 Low RoB and 2 Moderate RoB) = **No significantly positive findings**
- Interventions included: Remote peer-mentored walking program using mobile technology, online support, activity tracker, behavioural strategies (goal setting and action planning), education
- Of these studies the largest sample size was 19 participants while the lowest was 5 participants, increasing the risk of a Type 2 error occurring.

Exercise Adherence

- Nine studies examined exercise adherence outcomes, 3 RCTs (1 Low RoB, 1 Moderate RoB and 1 High RoB) and 6 non-randomized (2 Low RoB, 3 Moderate RoB and 1 High RoB) = **One study (moderate RoB RCT, n = 586 participants) produced significantly positive findings.**
- A multi component behavioural change intervention **(including all four intervention types)** compared to conventional physiotherapy
- Both the activity diary (95% CI 17% to 45%; **p <0.001**) and the activity monitor data (95% CI 7% to 16%; **p <0.001**) **suggested increased levels of physical activity in ParkFit patients**.
- According to the diary, ParkFit patients spent almost 1.5 hours a week extra on physical activity, compared with baseline. This differed significantly from controls, who increased their level of physical activity by 30 minutes compared with baseline.
- Other interventions included: telephone counselling, online exercise app, telecoach, remote peer-mentored walking program using mobile technology, online support, activity tracker, behavioural strategies (goal setting and action planning) and education
- Of the remaining eight studies the maximum sample size was 51 participants, Due to a relatively small sample size in these studies, failure to detect a statistically significant result may have occurred due to a lack of statistical power rather than the lack of real differences

Quality of Life

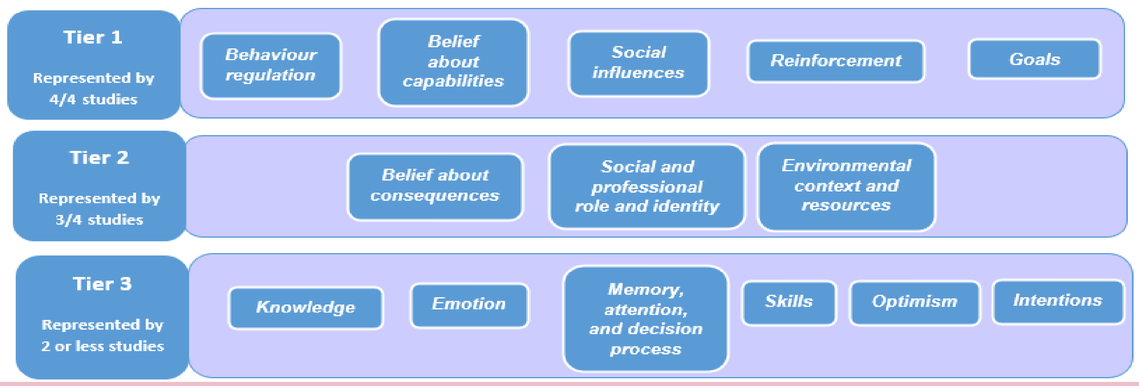
- Six studies examined quality of life outcomes, 3 RCTs (1 Low RoB, 2 Moderate RoB) and 3 non-randomized (1 Low RoB and 1 Moderate RoB and 1 High RoB) = **Three studies produced significantly positive findings**
- A Low RoB RCT (n = 51) comparing mobile technology to self-regulated exercise found that **participants with lower activity at baseline reported better mobility-related quality of life in the mHealth condition compared with the active control condition, with a statistically significant and clinically meaningful difference in the change in PDQ-39 mobility** over 12 months between groups (95% CI = −15.4 to −0.9; **p = 0.03**).
- A Moderate RoB RCT (n = 107) comparing clinic delivered rehabilitation classes to no intervention found that at **immediately post-test**, 54% of participants in rehabilitation were improved versus 18% receiving no rehabilitation (95% CI 5 20– 53%; **p < 0.0001**). Improvements weakened but remained significant at 6 months (38% improvement in QoL versus only 10% in the control group (**p < 0.001**).
- One High RoB non-randomized study (n = 20) comparing telephone counselling to usual care (pharmacological treatment) reported a **significant difference found between the groups for overall health related QoL (p = 0.012)**
- Primary Meta – analysis (n = 4): 4.42 (REM, 95% CI 1.37, 7.48; **I² = 98%; p = 0.005**)
- Sensitivity analysis for high RoB studies and control group (n = 2): 1.90 (REM, 95% CI 0.90, 1.27; **I² = 0%; p < 0.00001**).
- However, a mean difference of -1.90 points **did not exceed the minimal clinically important difference of** -4.72 points

Physical Function

- Seven studies examined physical function outcomes, 3 RCTs (1 Low RoB, 2 Moderate RoB) and 4 non-randomized (1 Low RoB and 2 Moderate RoB and 1 High RoB) = **One study (moderate RoB RCT, n = 586 participants) produced significantly positive findings.**
- **ParkFit Study:** A multi component behavioural change intervention **(including all four intervention types)** compared to conventional physiotherapy
- ParkFit patients increased their **physical fitness** compared with controls (**6MWT** adjusted group difference 4.8 m, 95% CI 0.1 to 9.6; **p = 0.05**).
- Of the remaining six studies the maximum sample size was 51 participants, The ParkFit study was a large-scale study (n = 586) and was the only study to include all four intervention types.
- Primary Meta – analysis (n = 4): 7.92 (REM, 95% CI -10.23, 26.07; **I² = 87%; p = 0.39**)
- Sensitivity analysis for high RoB studies and control group (n = 3): 15.25 (REM, 95% CI 5.31, 25.19; **I² = 44%; p = 0.003**)
- However, a mean difference of 15.25m **did not exceed the minimal clinically important difference** of 50m

Theoretical Domains Framework

From the vote counting – 4 studies produced a significantly positive finding. From this, the TDF domains were categorized into three tiers based on the domains represented by these studies.



Discussion and Implications

At present, the implementation of ***behavioural change interventions is somewhat lacking***.

Of the four intervention types (education, behavioural strategies, technology, and support groups), ***behavioural strategies encompassed majority of the TDF domains*** with the other intervention types lacking in important domains (knowledge, skills, goals, and environmental context resources). However, to ensure that a ***behavioural change intervention*** represents all the components of the TDF including ***personal, social, and environmental factors*** a ***multicomponent intervention*** is required.

It was determined that the five most effective TDF domains were: ***Behavioural regulation***, ***Belief about Capabilities***, ***Social influences***, ***Reinforcement*** and ***Goals***

Following a meta-analysis, ***behavioural change interventions combined with exercise*** showed a ***significant improvement in quality of life and physical function*** compared to exercise alone. However, neither of these exceeded the minimal clinically important differences.

Potential ***beneficial long-term strategies*** include ***goal setting, social support, feedback (via technology or person) and monitoring, identification of barriers and action planning***.

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