

## **Psychological interventions for people with Parkinson’s disease in the early 2020s: Where do we stand?**

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## **Abstract**

**Purpose:** To explore the heterogeneity of the literature on psychological interventions for psychological difficulties in people with Parkinson's disease (PD).

**Methods:** A scoping review was performed across five major databases (MEDLINE Complete, PsycINFO, CINAHL, Academic Search Ultimate, and Cochrane Library) up to June 2020.

**Results:** From an initial return of 4911 citations, 56 studies were included, of which 21 were RCTs. A relatively wide range of therapeutic models have been adopted with people with PD, from common therapies such as cognitive behavioural therapy (CBT) and mindfulness, to less frequent approaches, e.g., acceptance and commitment therapy (ACT) and psychodrama. The clinical implications of the findings are discussed, and suggestions are provided for future research on intervention studies and key psychological outcomes.

**Conclusions:** CBT appears to be effective in treating depression and sleep disorders in people with PD, while psychoeducation programmes alone should be avoided. The use of CBT to improve anxiety, quality of life, and impulse control, as well mindfulness-based interventions, should be undertaken with some caution because of insufficient research and inconsistent results. As we enter the new decade, more high-quality evidence is required for psychological interventions in people with PD in general, and to corroborate preliminary positive findings on the adoption of less frequent approaches such as ACT.

**Keywords:** Parkinson's disease; psychotherapy; clinical psychology; psychological interventions; psychological therapy; CBT; mindfulness, ACT.

## **Introduction**

Parkinson's disease (PD) is a progressive neurodegenerative condition caused by the death of dopaminergic neurons in the substantia nigra pars compacta of the basal ganglia. This leads to disorders of movement which include bradykinesia, muscular rigidity, rest tremor, and postural and gait impairment (Kalia & Lang, 2015). Other difficulties involve affect, sleep, pain, gastrointestinal and autonomic symptoms (Chaudhuri & Schapira, 2006; Weintraub & Burn, 2011), as well as cognitive deterioration which may ultimately lead to dementia (Emre, 2007; McKeith & Burn, 2000). Motor symptoms usually appear after the age of 50, although younger onset is also possible (Willis, Schootman, Kung, & Racette, 2013). PD is the second most common neurodegenerative disease in older people (after Alzheimer's disease), affecting around 1 in 500 individuals in the UK (Mark, 2006). Its worldwide prevalence ranges from 1 to 418 per 100,000 (Zhang & Roman, 1993) and, due to the ageing population, is expected to increase by 50% by 2030 (Dorsey et al., 2007). There is no definitive diagnostic test for PD and diagnosis is usually made following the emergence of motor symptoms (Gelb, Oliver, & Gilman, 1999).

### ***Psychological difficulties in people with PD***

PD is most commonly conceived as a motor disorder and psychological problems are often under-recognised by healthcare professionals (Barbosa, 2013). In fact, people with PD can experience a wide range of psychological difficulties, including anxiety, depression, apathy, impulse control disorders, and more rarely psychosis (ffytche et al., 2017; Simpson, McMillan, & Reeve, 2013).

Anxiety is especially common in PD, affecting up to 55% of people with the condition (Yamanishi et al., 2013). It is often diagnosed as generalised anxiety disorder (GAD), followed closely by social phobia and non-specific clinically relevant anxiety.

Diagnoses of panic disorder, obsessive compulsive disorder (OCD), and agoraphobia tend to be more rare (Broen, Narayen, Kuijf, Dissanayaka, & Leentjens, 2016). Similarly, the prevalence of depression in people with PD is estimated to be as high as 56% (Yamanishi et al., 2013), with a diagnosis of minor depression being the most frequent, followed by major depressive disorder and dysthymia (Reijnders, Ehrt, Weber, Aarsland, & Leentjens, 2008). In addition, around 40% of individuals might hold concurrently diagnoses of anxiety and depression (Yamanishi et al., 2013).

All psychological difficulties in PD may occur at any time throughout the course of the disease – sometimes preceding formal diagnosis by many years (Goldman & Postuma, 2014) – and can be as disabling as motor symptoms (Goldman & Holden, 2014), with their severity representing a key predictor of health-related quality of life in affected individuals (Leroi et al., 2011). However, our understanding of the psychological impact of PD has been historically dominated by neurobiological conceptualisations (Brown & Jahanshahi, 1995). These assume that psychological difficulties largely occur as a result of pathophysiological processes, such as changes in dopaminergic systems (Chaudhuri & Schapira, 2009). Only more recently has it been recognised that psychological issues in PD are likely caused by a mixture of neurobiological, psychological, and indeed social factors, depending on the individual's specific presentation (Simpson, Lekwuwa, & Crawford, 2013). As a result, more psychologically-informed interventions for people with PD have recently been developed and implemented, with a number of reviews reporting mixed results for cognitive behavioural therapy (CBT) and approaches focused on mindfulness, in particular for anxiety and depression (Armento et al., 2012; Berardelli et al., 2015; Ghielen et al., 2019; Xie et al., 2015; Zečević, 2020).

However, the vast majority of reviews and meta-analyses on this topic selectively focus on specific therapies with the aim of examining their effectiveness, with most failing to encompass the heterogeneity of models and approaches. In fact, only one recent umbrella review has endeavoured to shed light on the variety of psychological interventions for PD (Kampling, Brendel, & Mittag, 2019). The results confirmed the heterogenous evidence for CBT's effectiveness and reported novel insight into less investigated approaches (e.g., psychodrama), but failed to identify any of the existing studies which explored mindfulness-based therapies. Moreover, the search strategy showed a strong focus on cognitive interventions and was significantly limited in scope over time, only including publications between 2000 and 2018.

As we have recently passed the second centenary of PD's first description (Parkinson, 1817) and have now entered the 2020s, our current understanding of the applications of various psychological interventions in this population appears very limited. Consequently, the overarching aim of the present review was to provide a comprehensive account of the heterogeneity and effectiveness of approaches to psychological interventions adopted to date with individuals affected by Parkinson's.

## **Methods**

### ***Identifying the research question***

The present addressed the following research question: which psychological interventions have been explored so far with PD, and what is their effectiveness? To answer this, a scoping review was performed, in accordance with the latest guidelines from The Joanna Briggs Institute (Peters et al., 2020). This approach was adopted in order to explore methodologically heterogenous topics (i.e., both quantitative and qualitative) with a systematic and replicable search strategy without the need for narrow

research questions, as in traditional systematic reviews (Arksey & O'Malley, 2005).

### ***Identifying relevant studies***

To be included in the present review, studies had to: a) be related to people with PD; b) involve individuals aged 18 or above; and c) describe the delivery of any psychological intervention targeting psychological outcomes in PD. Qualitative studies were included if consisting of evaluations of psychological interventions.

Studies not related to the concept under investigation, not published in full in the English language, enrolling individuals aged 17 or under, not providing sufficient details on the adopted intervention (e.g., methodological approach), or involving mainly animal models were excluded. Systematic reviews, reviews, commentaries, editorials, conference proceedings, and letters were also excluded. As the overarching aim of this study was to investigate psychological interventions for psychological difficulties in people with PD specifically, interventions targeting physical symptoms or aimed only at family members and/or carers, as well as studies focusing only on cognition and/or neuroimaging were not included.

### ***Study selection***

A comprehensive search was carried out across five major databases (Academic Search Ultimate, CINAHL, Cochrane Library, PsycINFO, PubMed) up until June 1<sup>st</sup> 2020, using a combination of free text terms. Reference lists of included citations and key reviews were also hand-searched to identify any further relevant studies. The logic grid for the search strategy is illustrated in Table 1, while Table 2 provides details on the terms adopted in the searches.

As current guidelines on scoping reviews do not consider a formal quality assessment appropriate for this methodology (Peters et al., 2020), this was not carried

out for the present review. Nevertheless, efforts were made when possible to highlight any methodological and clinical limitations in the included citations, as well as which studies adopted more robust methodologies such as randomised control trials (RCTs).

### ***Charting the data***

First, the raw results from the searches were filtered for duplicate citations and studies not fully in English. Following this, all titles and abstracts were screened by one reviewer (NZ) against the abovementioned inclusion criteria. In a second phase, all remaining full-text articles were screened for eligibility by three reviewers (NZ, FE, JF) and confirmed by two more (IL, JS). Although rare, any disagreements between reviewers around the inclusion of studies were solved with collective discussions involving all the authors. The PRISMA flow diagram for the study selection is illustrated in Figure 1.

### ***Collating, summarising, and reporting the results***

Data were extracted independently by three reviewers (NZ, IL, AP) and double-checked for accuracy by a further two (FE, JS).

### ***Consultation***

Since the present study was part of a larger project aimed at drawing the first UK national guidance on psychological approaches to people with neurodegenerative diseases ([name]), a number of stakeholders including key academics and third sector organisations were consulted to review the research question and methodology.

## **Results**

The database searches identified a total of 4911 citations, reduced to 2094 following the initial filtering for duplicates and language. From these, the screening of titles and

abstracts led to the exclusion of 2006 studies, leaving 88 full-text articles to consider. A total of 56 studies were eventually included, whose key characteristics and results are showed in Table 3. The findings of the included studies are reported below, categorised by therapeutic approach.

### ***Cognitive Behavioural Therapy (CBT)***

CBT holds that emotional distress and behavioural difficulties arise from “maladaptive” or unhelpful cognitions, which comprise general beliefs about the world, the self, and the future (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). The therapy is predicated on the assumption that changing these cognitions through therapeutic interventions will reduce distress and problematic behaviours. A total of 36 studies have been carried out to evaluate interventions based on CBT for psychological difficulties in PD, of which only around a third (i.e., 11) were RCTs. The main psychological outcomes addressed were anxiety, depression, quality of life, sleep disorders, and impulse control disorders. While some studies addressed multiple outcomes with their intervention, for the sake of clarity the results are presented separately for each outcome.

#### *Anxiety*

The results from experimental studies targeting anxiety appear to be mixed. Two RCTs with small sample sizes (Calleo et al., 2015; Wuthrich & Rapee, 2019) both administered CBT individually either in person or via telephone, and found no significant improvements in anxiety when compared to waitlist controls or enhanced care. Another similarly sized RCT (Troeng, Egan, & Gasson, 2014) compared group CBT to waitlist controls, and found significant and large improvement effects for anxiety at post-intervention, as well as at 1-month and 6-month follow-ups. A slightly larger RCT adopting telephone-based CBT tailored for depression also reported significant



improvements in anxiety (Dobkin et al., 2020). Similar findings were obtained by two quasi-experiments, which found a significant positive effect for the CBT group post-intervention when compared to psychoeducation (Berardelli et al., 2018) or no treatment (Dreisig, Beckmann, Wermuth, Skovlund, & Bech, 1999). However, mixed results were observed in an RCT comparing a CBT-based self-help guided reading resource to provision of simple information about worry (Lawson, Millar, Brown, & Burn, 2013), finding initial significant reductions for the primary outcome of worry for the intervention group, but no differences in final outcomes at the end of the three months of treatment. In addition, another RCT comparing internet-based CBT with treatment as usual (TAU) reported significant differences for anxiety between the intervention group and controls, but also observed how this was not accompanied by significant improvements in the intervention within-group analysis, suggesting that the effect could be at least partly explained by deterioration in the control group.

On the other hand, the observational studies adopting CBT as the primary intervention for anxiety have reported mostly positive findings. Group CBT for 12 weeks was found to lead to significant improvements in anxiety post-intervention in an uncontrolled pretest-posttest design (Berardelli et al., 2015), and a similar study also found that improvements were maintained at three and six months (Dissanayaka et al., 2017). This was consistent with the findings from a number of case studies (Macht, Pasqualini, & Taba, 2007; Mohlman et al., 2010; Richardson & Marshall, 2012; Veazey, Cook, Stanley, Lai, & Kunik, 2009) except for one (Feeney, Egan, & Gasson, 2005), which did not observe any significant improvements for anxiety. Similar positive findings were also reported by two studies adopting a multiple baseline single-subject experimental design (SSED; Lebrun, Gély-Nargeot, Rossignol, Geny, & Bayard, 2019; Reynolds, Saint-Hilaire, Thomas, Barlow, & Cronin-Golomb, 2019), which found

significant reductions in anxiety at post-treatment maintained at 6-week and 3-month follow-up.

### *Depression*

The current evidence from experimental studies suggests that CBT is superior to TAU for improving low mood in PD, either when delivered individually (Dobkin, Menza, Allen, Gara, et al., 2011; Wuthrich & Rapee, 2019) or in a group (Troeng et al., 2014), as well as over the phone (Dobkin et al., 2020) and the internet (Kraepelien et al., 2020). Most of these studies enrolled participants who met clinical criteria for depression at baseline using validated scales, and those which reported effect sizes described at least medium-sized effects (Dobkin, Menza, Allen, Gara, et al., 2011; Wuthrich & Rapee, 2019). Two other small RCTs found CBT to be superior to psychoeducation and/or monitoring, either at post-treatment (Veazey et al., 2009), or at 1-month follow-up (Calleo et al., 2015). However, these were both limited by small participant numbers and relatively high attrition rates. Positive results for depression were also observed by two quasi-experiments comparing CBT against psychoeducation (Berardelli et al., 2018) and no treatment (Tiihonen, Lankinen, & Viemerö, 2012), as well as two multiple baseline SSEDs adopting CBT for insomnia (Lebrun et al., 2019; Reynolds et al., 2019). One of the quasi-experiments also reported significant improvements in apathy (Berardelli et al., 2018).

A number of observational studies have reported CBT to be useful for improving low mood in PD. These included uncontrolled pretest-posttest designs (Berardelli et al., 2015; Dobkin, 2014; Dobkin, Allen, & Menza, 2007; Dobkin, Interian, Durland, Gara, & Menza, 2018; Dobkin, Menza, Allen, Tiu, et al., 2011; Shinmei et al., 2016), case series (Cole & Vaughan, 2005; Dobkin, Allen, & Menza, 2006; Feeney et al., 2005), and a single case study (Richardson & Marshall, 2012). Some of the improvements in mood were also

maintained at 1-month (Dobkin et al., 2006; Feeney et al., 2005) and 3-month (Shinmei et al., 2016) follow-ups.

### *Quality of life*

The current evidence on the effectiveness of CBT to improve quality of life in PD is characterised by contrasting results, for both experimental and observational studies. Positive findings were reported by experimental designs which compared CBT to a health enhancement programme (Hadinia et al., 2016) and no treatment (Tiihonen et al., 2012). Similar positive effects were reported when adopting internet-based CBT (Kraepelien et al., 2020), while the use of telephone-based CBT yielded positive results in one RCT (Dobkin et al., 2020), but not in another (Wuthrich & Rapee, 2019).

Findings from observational studies showed significant improvements in quality of life post-intervention after group CBT (Berardelli et al., 2015) or brief CBT (Osawa, Kamei, Nozaki, Furusawa, & Murata, 2020), but no notable differences at all time points after mixed in-person and telephone-delivered individual CBT in another (Veazey et al., 2009).

### *Sleep disorders*

To date, CBT has shown very promising results for treating sleep disorders in PD. In particular, four RCTs showed significant improvements in participants' levels of insomnia and sleep quality when comparing face-to-face or computerised CBT with education on basic sleep hygiene (Leroi, Baker, Kehoe, Daniel, & Byrne, 2010; Patel et al., 2017), sham light therapy (Rios Romenets et al., 2013), or TAU (Kraepelien et al., 2020). Similarly, positive findings were observed in a multiple baseline SSED (Reynolds et al., 2019), an uncontrolled pretest-posttest design (Yang & Petrini, 2012), and two case series (Humbert, Findley, Hernandez-Con, & Chahine, 2017; Osawa et al., 2020), with

benefits being maintained at 3-month follow-up in some cases (Reynolds et al., 2019; Yang & Petrini, 2012).

### *Impulse control disorders (ICDs)*

The extant evidence on the efficacy of CBT for impulse control disorders (ICDs) in PD is characterised by just two studies, showing mixed results. The larger investigation consists of an RCT which randomised 45 people with PD with ICDs to either an intervention involving 12 sessions of face-to-face CBT or a waitlist (Okai et al., 2013). At the 6-month outcome point, 44% of participants in the CBT group no longer met clinical criteria for an ICD, compared to 29% of waitlist controls.

A second study (Jiménez-Murcia et al., 2012) adopted a quasi-experimental design to compare people with PD experiencing pathological gambling to controls with pathological gambling alone on 16 weekly sessions of CBT. The results revealed no difference between groups following the intervention. However, higher dropout and relapse rates were observed among the PD participants compared to those without PD.

### *Mindfulness*

Mindfulness-based approaches focus on bringing the attention to the present moment and accepting feelings, sensations, and emotions non-judgementally, including the experience of illness (Kabat-Zinn, 2006). When adapted for neurological conditions, such approaches may emphasise acceptance of discomfort and physical changes, focusing on appreciation of the abilities and resources which remain, and may include elements of cognitive therapy (mindfulness-based cognitive therapy; MBCT) or focus on stress reduction (mindfulness-based stress reduction; MBSR).

A total of 10 intervention studies have adopted approaches based on mindfulness to target psychological difficulties in PD. Of these, five were RCTs (Advocat et al., 2016;

Kwok et al., 2019; Pickut et al., 2015; Rodgers et al., 2019; Son & Choi, 2018). The most commonly addressed psychological outcomes were anxiety, depression, and quality of life. As with CBT, while some interventions addressed more than one outcome, the results are presented separately for clarity.

### *Anxiety*

The use of mindfulness-based interventions to address anxiety in PD has been evaluated by three RCTs (Kwok et al., 2019; Rodgers et al., 2019; Son & Choi, 2018) and two uncontrolled pretest-posttest studies (Birtwell et al., 2017; Dissanayaka et al., 2016). Most reported an improvement in anxiety post-intervention, with some effects maintained at 2-month (Birtwell et al., 2017) and 6-month follow-ups (Dissanayaka et al., 2016). However, one of the RCTs (Rodgers et al., 2019) did not find any significant improvements compared to waitlist controls. Moreover, there was some variation in terms of intervention delivery and content, with two studies using the same protocol based on six two-hour sessions of MBCT (Dissanayaka et al., 2016; Rodgers et al., 2019), two adopting an MBSR course (Birtwell et al., 2017; Son & Choi, 2018), and one an adapted yoga intervention that included components of mindfulness across eight 90-minute sessions (Kwok et al., 2019). A number of adaptations were made to account for the PD population, including omitting certain exercises involving motor or sensory components, shortening sessions and meditation practices, simplifying language, and using more relevant metaphors.

### *Depression*

The current evidence on using mindfulness techniques to improve depression in PD consists of four RCTs (Kwok et al., 2019; Pickut et al., 2015; Rodgers et al., 2019; Son & Choi, 2018) and three uncontrolled pretest-posttest studies (Birtwell et al., 2017; Cash

et al., 2015; Dissanayaka et al., 2016), and shows mixed results. In particular, studies using MBCT or MBSR have reported significant improvements in depression (Cash et al., 2015; Rodgers et al., 2019), with large effect sizes. These findings are consistent with those from a qualitative investigation, which reported that people with PD who participated in a 8-week MCBT course found MCBT to be an acceptable and helpful form of group intervention (Fitzpatrick, Simpson, & Smith, 2010). Significant improvements were also observed following the adoption of mindfulness-based yoga, which were maintained at 3-month follow-up (Kwok et al., 2019). However, it should be noted that, unlike the CBT interventions, two of these studies excluded people with PD with major depression (Cash et al., 2015; Kwok et al., 2019), while one (Rodgers et al., 2019) used no depression inclusion criteria and found that the group average depression score was in the normal range. In addition, three other studies which adopted a form of MBSR found contrasting results, with one reporting significant improvements both post-intervention and at follow-up (Birtwell et al., 2017), one only reporting improvements at post-intervention (Dissanayaka et al., 2016), and one reporting no effect on depression at all (Pickut et al., 2015).

### *Quality of life*

Similarly to depression, the current findings on the impact of mindfulness-based interventions on quality of life in PD appear to be mixed. Among the RCTs, only one (Son & Choi, 2018) showed significant improvements in quality of life compared to waitlist when adopting an MBSR exercise programme, while the other two found no positive effect for an 8-week mindfulness-based intervention (Pickut et al., 2015) or a group mindfulness-based lifestyle programme (Advocat et al., 2016). However, a qualitative evaluation of the latter found that, following the intervention, many participants felt increased levels of perceived control and acceptance of disease

progression, as well as improved social relationships and self-confidence (Vandenberg et al., 2018).

Considering the observational evidence, one uncontrolled pretest-posttest design found no significant effect on quality of life for an 8-week group MBSR course (Birtwell et al., 2017), while another reported significant improvements for a manualised group mindfulness intervention tailored for PD at post-intervention, but not at 6-month follow-up (Dissanayaka et al., 2016).

### ***Psychoeducation***

Psychoeducation focuses on developing individuals' understanding about illness and themselves in relation to their condition by providing of information and using exercises (Walsh, 2010). The aim is to empower the individual to manage their condition and their own reactions to it more successfully, and consequently improve their well-being. A total of four studies have so far examined the use of PD-specific psychoeducation programmes to manage daily aspects of the disease (e.g., diet and movement) and improve low mood, two of which were RCTs (Flores Alves Dos Santos et al., 2017; Guo et al., 2009).

One RCT (Flores Alves Dos Santos et al., 2017) compared a group psychoeducation programme designed for people with PD undergoing subthalamic nucleus deep brain stimulation (STN-DBS) against standard STN-DBS aftercare. The results showed no significant difference in social adjustment between the two groups at 1-year follow-up, although the finding became significant at 2-year. Another RCT (Guo et al., 2009) found that three 1-hour psychoeducation lectures and 24 subsequent 30-minute individual sessions did not lead to an objective improvement in low mood when compared to waitlist controls. However, the study did not recruit people with PD who had clinically significant levels of depression, and the intervention group's average depression score was in the normal range, making reductions harder to evidence.

An uncontrolled pretest-posttest design (Macht et al., 2007) evaluated a patient education programme based on information and self-monitoring sessions across seven European countries (Spain, Finland, Italy, The Netherlands, United Kingdom, Estonia, Germany). The results showed no significant improvements in self-rated depression or quality of life at post-intervention. A recent qualitative study (Soundy et al., 2019) explored the experiences of people with PD who underwent First Steps, a 2-day peer-led psychoeducational intervention for people with a new diagnosis of PD. The results showed that the participants engaged well with the programme, showing improved exercise behaviour and coping mechanisms at post-intervention. Proposed mechanisms of change included improved perceived control, hope and action, changes in personal mind-set, as well as opportunities within the groups for social comparison, social control, and peer-sharing. However, no quantitative evaluation of the efficacy of the programme appears to be currently available.

### ***Behavioural Relaxation Training (BRT)***

BRT focuses on progressive muscle relaxation techniques aimed at relieving muscular tension, on the hypothesis that it represents a physiological response to anxiety, and that therefore relaxing muscles will reduce anxious symptoms (McCallie, Blum, & Hood, 2006). Techniques may involve progressive attention to muscle groups along with the act of tensing and releasing in turn while focusing on the sensation of release following tension, and this may be supported by relaxing music or guided narratives. Two single case studies reported reductions in both therapist-rated and patient-rated measures for social anxiety (Lundervold, Pahwa, & Lyons, 2013) and generalised anxiety (Lundervold, Pahwa, & Lyons, 2008) post-treatment. While both studies employed BRT techniques that taught 10 overt relaxed behaviours, the latter also combined imagery and coping techniques. Sessions were short, lasting around 15 to 20 minutes and required daily



practice, and both studies reported the intervention as acceptable to participants.

### *Other approaches*

Along with the most commonly adopted therapeutic models, a number of single studies exploring other less frequent approaches were identified by the present review. These are briefly outlined below, in descending order of study methodological complexity.

#### *Acceptance and Commitment Therapy (ACT)*

ACT aims to improve individuals' acceptance of distressing thoughts, beliefs, sensations and emotions, contending that this will generate behavioural change and consequently improved quality of life (Hayes, 2004). Emphasis is usually put on moving towards key goals and acting upon values which are most important to the person, designing behavioural changes which direct one towards living these values. One RCT explored the adoption of ACT to target self-efficacy and anxiety in people with PD (Ghielen et al., 2017). The intervention consisted of a group body awareness training (BEWARE) based on psycho-education, training in ACT, imaginary exposure using FEEL (Feeling Experiences Enriches Living) exercises, diminishing avoidance behaviour, physical exercises, and homework assignments. The results showed a significant improvement in emotional well-being but no changes in self-efficacy.

#### *Psychodrama*

Psychodrama is a therapeutic technique based on discussions of interactions and the dramatisation and role-playing of situations of daily life from an individual's past (Moreno, 1946). One RCT evaluated a psychodrama intervention for people with PD consisting of two 90-minute group sessions every fortnight (Sproesser, Viana, Quagliato, & de Souza, 2010). The intervention was compared to a waitlist control group, and the

results showed significant improvements in anxiety, depression, and quality of life at post-intervention.

#### *Behavioural Activation (BA)*

BA focuses on treating mood difficulties by trying to increase participants' active involvement in therapy and life (Jacobson, Martell, & Dimidjian, 2001). Common techniques include scheduling activities and self-monitoring. An uncontrolled pretest-posttest design (Butterfield et al., 2017) found that six weeks of activity scheduling and monitoring significantly reduced apathy and depression in 27 participants with PD, and these gains were maintained at 1-month follow-up. The targets for the activity scheduling were first agreed at a 2-hour in-person planning session, and then supported by automated reminders and short weekly telephone calls.

#### *Eye Movement Desensitization and Reprocessing (EMDR)*

EMDR focuses on reprocessing of traumatic memories, including images, emotional and physical responses, and changes in self-representation (Shapiro, 2017). The aim is to support the brain to process trauma, helping individuals develop more positive self-representations, improve well-being, and move forwards with their lives. A single case study adopted EMDR to address trauma in a woman with Parkinson's disease dementia (PDD; Ahmed, Mosquera, & Ross, 2018). While some improvement on subjective reporting of trauma symptoms and resilience were observed at post-intervention and 9-month follow-up, no changes were found in anxiety and depression. Moreover, some difficulties in administering EMDR were reported, as eye movements were slowed as a consequence of PD. However, this study is notable for being the only one that included a person with PDD. While most interventions to address mood difficulties have excluded people with PD with any signs of cognitive impairment, this study provided preliminary

evidence which suggests that psychological therapies may be both required and received well by people with PDD.

## **Discussion**

### *Summary of main findings*

The present review aimed at providing a comprehensive account of the breadth and effectiveness of psychological interventions in use for a broadly-defined set of psychological difficulties with people with PD. From an initial return of 4911 citations, 56 studies were eventually considered eligible for inclusion. While these covered some of the most common therapeutic models alongside a few less frequent approaches, only 21 were RCTs. Moreover, only six of these (Advocat et al., 2016; Dobkin et al., 2011; Dobkin et al., 2020; Kraepelien et al., 2020; Kwok et al., 2019; Son & Choi, 2018) enrolled samples of 30 or more participants.

CBT was by far the most common approach, with 36 papers adopting it in some form. The evidence suggests that CBT can be effective to address depression and sleep disorders in people with PD, not only when compared to TAU, but also against other psychotherapy approaches (e.g., psychoeducation; Berardelli et al., 2018). However, the same cannot be stated for anxiety, quality of life, and impulse control disorders (ICDs), for which the literature presents mixed results and, in the case of ICDs, is also still sparse. These findings appear to be fairly consistent with what has been reported from previous targeted systematic reviews (Armento et al., 2012; Berardelli et al., 2015; Dobkin et al., 2008; Xie et al., 2015; Zečević, 2020). As only 11 out of 36 studies adopting CBT were RCTs (Calleo et al., 2015; Dobkin, Menza, Allen, Gara, et al., 2011; Dobkin et al., 2020; Hadinia et al., 2016; Kraepelien et al., 2020; Lawson et al., 2013; Leroi et al., 2010; Okai et al., 2013; Patel et al., 2017; Troeung et al., 2014;

Wuthrich & Rapee, 2019), further high-quality research is required to shed light on the impact of this approach on all these psychological outcomes.

The second most common psychotherapeutic model was mindfulness, with 10 studies adopting one of its many variations (e.g., MBCT, MBSR, mindfulness yoga), five of which were RCTs (Advocat et al., 2016; Kwok et al., 2019; Pickut et al., 2015; Rodgers et al., 2019; Son & Choi, 2018). However, the current evidence on mindfulness-based approaches for people with PD was also characterised by contrasting results, with no clear indication of their efficacy for anxiety, depression, or quality of life. Where positive results were found, a number of potential mechanisms of change were highlighted, including perceived control and self-confidence (e.g., Vandenberg et al., 2018). Therefore, further more comprehensive studies, possibly involving larger sample sizes, are urgently needed.

Psychoeducation programmes were adopted by four studies, of which two were RCTs (Flores Alves Dos Santos et al., 2017; Guo et al., 2009). The results are mostly negative, with all the quantitative studies finding no significant impact on depression (Guo et al., 2009; Macht et al., 2007), social adjustment (Flores Alves Dos Santos et al., 2017), and quality of life (Macht et al., 2007), and only one qualitative evaluation (Soundy et al., 2019) showing promising results for a peer-led psychoeducational intervention for newly diagnosed people with PD ('First Steps'). However, similarly to mindfulness, the latter highlighted a number of potential mechanisms causing positive change which included perceived control and individual mindset (Soundy et al., 2019), thus reinforcing the case for further exploration of the concept of perceived control within this population.

The current preliminary evidence on the use of BRT – based on two single case studies (Lundervold et al., 2008, 2013) – appears to be positive, with both investigations

reporting reductions in therapist- and patient-rated measures of anxiety at post-intervention. However, this needs to be confirmed by further higher quality experimental investigations.

Finally, tentative results are available from single studies exploring some forms of therapy which are less commonly adopted with people with PD. In particular, promising findings were reported for the use of ACT (Ghielen et al., 2017), psychodrama (Sproesser et al., 2010), and BA (Butterfield et al., 2017), while somewhat mixed results were observed for EMDR (Ahmed et al., 2018). For all of these, further explorations of their feasibility, effectiveness, and acceptability are currently needed.

### *Clinical implications and future directions*

Even though the importance of psychological approaches in people with PD has received more recognition compared to other neurodegenerative conditions, such as Huntington's disease and motor neuron disease (Anestis, Eccles, Fletcher, French, & Simpson, 2020; Simpson et al., 2019; Zarotti, Dale, Eccles, & Simpson, 2020; Zarotti, Mayberry, Ovaska-stafford, Eccles, & Simpson, 2020), the current literature around psychological interventions for PD is mainly characterised by low-level and/or underpowered studies, and more comprehensive high-powered RCTs are urgently needed. In addition, since only five studies out of 56 involved samples with a mean age lower than 60, all of which showed promising results (Berardelli et al., 2015; Dreisig et al., 1999; Lundervold et al., 2013; Okai et al., 2013; Sproesser et al., 2010), further investigations are required to explore the impact of psychological interventions in younger patients, in particular due to the potentially lower severity of cognitive and motor difficulties.

Based on the current evidence from this review, CBT may be recommended as an effective treatment for depression and sleep disorders in PD, especially with an

intervention duration ranging between eight and 12 weeks. However, it is currently more equivocal if it is effective for anxiety, quality of life, and ICDs, as well as with briefer forms of CBT in general (e.g., six weeks or less). A similar note of caution is suggested when considering mindfulness-based interventions, due to the lack of clear results on the effectiveness of either MBCT or MBSR. The adoption of psychoeducation programmes alone, on the other hand, cannot be recommended due to predominantly negative findings with this population. In addition, data from single studies appear to suggest that ACT, psychodrama, BA, and BRT may represent effective and feasible approaches for psychological difficulties in people with PD. However, no specific recommendation can be made on the evidence presently available.

A number of suggestions for future research may also be offered from the findings of the present review. In particular, besides the need for more comprehensive investigations of the therapeutic models outlined above, a number of relevant psychological outcomes for people with PD are currently neglected. For instance, although the development of ICDs has a clear psychological component (Delaney, Leroi, Simpson, & Overton, 2012; Delaney, Simpson, & Leroi, 2012), only two studies have evaluated the effectiveness of a psychological intervention for ICDs (Jiménez-Murcia et al., 2012; Okai et al., 2013). Similarly, despite apathy affecting up to 40% of people with PD (den Brok et al., 2015), only two studies to date have explored psychological therapies to target it specifically, both finding promising results (Berardelli et al., 2018; Butterfield et al., 2017).

In addition, even though perceived control is currently considered a critical factor for successful psychological adaptation to chronic illness (Dempster, Howell, & McCorry, 2015; Egede & Ellis, 2008) – and neurodegenerative conditions in particular (Eccles & Simpson, 2011; Simpson, Chatzidamianos, & Eccles, 2015; Zarotti, Coates et

al., 2019; Zarotti, Simpson, & Fletcher, 2019) – no intervention study has specifically addressed it as an outcome in people with PD. However, the results from two qualitative evaluations identified in this review have highlighted the potential of perceived control in supporting the implementation of mindfulness-based therapy (Vandenberg et al., 2018) and psychoeducational programmes (Soundy et al., 2019), further strengthening the case for more thorough explorations of this construct in this population, and its impact on acceptability and response to psychological treatment.

Considering that people with PD experience a progressive loss of function, ability, and confidence as their condition develops, a focus on improving resilience also appears important. To date, however, there have been no studies of psychological therapies in PD with the aim of increasing resilience specifically, with only a trial of cognitive stimulation (Leroi et al., 2019) and a single case using EMDR (Ahmed et al., 2018) exploring it as a secondary outcome. Thus, there is a clear need for future research to consider how resilience can be best enhanced in affected individuals.

PD can also be associated with psychotic problems, such as hallucinations across different sensory modalities (Goetz, Stebbins, & Ouyang, 2011). Although these can fluctuate over the course of the condition, they generally tend to increase over time (ffytche et al., 2017). Research in this area is urgently needed to interpret the importance of psychosocial factors in these experiences (Todd, Simpson, & Murray, 2010) and psychological approaches for psychosis (Louise, Fitzpatrick, Strauss, Rossell, & Thomas, 2018) in the context of Parkinson's. As no study has yet been carried out to evaluate any psychological intervention for psychosis in people with PD – and very little is also known regarding how affected individuals cope with these symptoms – future research in this area should represent a priority.

Finally, the intrinsic limitations of scoping reviews (e.g., lack of quantitative synthesis and formal qualitative assessment of evidence) should be considered when interpreting the abovementioned results. While this methodology was appropriate for the wider aim of the present study, further more focused systematic reviews and meta-analyses are warranted in the future for each therapeutic approach in PD.

## **Conclusions**

The literature available to date shows that a relatively wide range of approaches to psychological interventions has been adopted with people with Parkinson's. Among these, CBT may be the most effective in treating depression and sleep disorders but its impact on anxiety, quality of life, and impulse control disorders is still unclear. For the same reason, evidence is still limited regarding the adoption of mindfulness-based interventions, while the efficacy of psychoeducation programmes alone is currently unproven. As we enter the new decade, more high-quality evidence is required to increase our understanding of psychological interventions for people with PD in general, as well as to confirm preliminary positive findings on the adoption of ACT, BA, BRT, and psychodrama.

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## Tables

Table 1. Logic grid for search strategy.

Population	Interventions
Parkinson* disease	Acceptance and commitment therapy Behavio* therapy Cognitive analytic therapy Cognitive behavio* therapy Cognitive therapy Compassion* focused therapy Counsel* Couple* therapy Dialectical behavioral therapy Emotion focused therapy Emotive behavio* therapy Eye movement desensiti* and reprocessing Family therapy Gestalt therapy Group* therapy Integrative therapy Interpersonal therapy Meditat* Metacognitive therapy Mindfulness Mindfulness-based cognitive therapy Mindfulness-based stress reduction
	Motivational interviewing Narrative therapy Person cent* therapy Psychoanal* Psychodynamic therapy Psychoeducati* Psychological intervention Psychotherap* Rational emotive behavio* therapy Schema therapy Self-management Solution focused therapy Systemic therapy

Table 2. Overview of adopted search terms and identified items per database.

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Search terms

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(Parkinson\* disease AND Acceptance and commitment therapy) OR (Parkinson\* disease AND Behavio\* therapy) OR (Parkinson\* disease AND Cognitive analytic therapy) OR (Parkinson\* disease AND Cognitive behavio\* therapy) OR (Parkinson\* disease AND Cognitive therapy) OR (Parkinson\* disease AND Compassion\* focused therapy) OR (Parkinson\* disease AND Counsel\*) OR (Parkinson\* disease AND Couple\* therapy) OR (Parkinson\* disease AND Dialectical behavioral therapy) OR (Parkinson\* disease AND Emotion focused therapy) OR (Parkinson\* disease AND Emotive behavio\* therapy) OR (Parkinson\* disease AND Eye movement desensiti\* and reprocessing) OR (Parkinson\* disease AND Family therapy) OR (Parkinson\* disease AND Gestalt therapy) OR (Parkinson\* disease AND Group\* therapy) OR (Parkinson\* disease AND Integrative therapy) OR (Parkinson\* disease AND Interpersonal therapy) OR (Parkinson\* disease AND Meditat\*) OR (Parkinson\* disease AND Metacognitive therapy) OR (Parkinson\* disease AND Mindfulness) OR (Parkinson\* disease AND Mindfulness-based cognitive therapy) OR (Parkinson\* disease AND Mindfulness-based stress reduction) OR (Parkinson\* disease AND Motivational interviewing) OR (Parkinson\* disease AND Narrative therapy) OR (Parkinson\* disease AND Person cent\* therapy) OR (Parkinson\* disease AND Psychoanal\*) OR (Parkinson\* disease AND Psychodynamic therapy) OR (Parkinson\* disease AND Psychoeducati\*) OR (Parkinson\* disease AND Psychological intervention) OR (Parkinson\* disease AND Psychotherap\*) OR (Parkinson\* disease AND Rational emotive behavio\* therapy) OR (Parkinson\* disease AND Schema therapy) OR (Parkinson\* disease AND Self-management) OR (Parkinson\* disease AND Solution focused therapy) OR (Parkinson\* disease AND Systemic therapy)

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Table 3. Key characteristics of included studies.

Citation	Category	Design	Sample	Intervention	Relevant outcomes	Relevant measures	Key results
Ghielen et al., 2017	ACT	RCT	I: 19 C: 19	Group body awareness training	Anxiety Self-efficacy	BAI BDI GSES-10 NEADL index PDQ-39 WOQ-19	Significant improvement in emotional well-being for the intervention group, but no changes in self-efficacy
Butterfield et al., 2017	BA	Uncontrolled pretest-posttest	27	Parkinson's Active Living (PAL)	Apathy Depression Quality of life	ADLs UPDRS AES-S GDS LARS PDQ-39	Large effect of treatment at post-intervention on apathy severity Medium to large effect on depression Medium effect on quality of life Changes in apathy and depression maintained at 1-month follow-up
Lundervold et al., 2008	BRT	Multiple baseline single case experimental design	1	BRT	Anxiety	BRS CAS SUD	Systematic increases in relaxed behaviour and decreased ratings of distress and anger at post-intervention, maintained at follow-up Further decreases in distress ratings observed following BRT + imagery and BRT + coping

Lundervold et al., 2013	BRT	Single case	1	Behavioral Relaxation Training (BRT) - 4 sessions	Anxiety	AARP BRS CAS SUD	Systematic increases in relaxed behaviour and decreased ratings of distress and anger at post-intervention, maintained at follow-up  Participant rated BRT as highly acceptable
Berardelli et al., 2015	CBT	Uncontrolled pretest-posttest	7	Group CBT	Anxiety Depression Quality of life	AES BPRS CGI HAM-A HAM-D PDQ8 SCID-I SCID-II	Significant improvements in anxiety, depression quality of life at post-intervention
Berardelli et al., 2018	CBT	Quasi-experiment	I: 9 C: 9	Group CBT	Anxiety Apathy Depression Quality of life	BPRS CGI HAM-A HAM-D PDQL SCID-I UPDRS	Significant improvements in anxiety, depression, and apathy for the CBT group at post-intervention
Calleo et al., 2015	CBT	RCT	I: 10 C: 10	CBT (administered either by	Anxiety Depression	SIGH-A SIGH-D	High effect sizes for treatment at 1-month follow-up for both anxiety and

				telephone or in person)			depression, but only depression reached significance
Cole & Vaughan, 2005	CBT	Case series	5	Individual CBT delivered at home	Depression Quality of life	BDI-II Estimate of daily activities GDS PDQL Visual analogue scale for mood	Clinically reliable reduction of depression in 4 participants, with greater improvement reported by the 2 participants with more severe baseline depression  No change in quality of life
Dissanayaka et al., 2017	CBT	Uncontrolled pretest-posttest	12	Manualised and CBT for anxiety in PD	Anxiety Depression	GAI GDS HAM-A HAM-D PDQL StAS	Significant improvements in anxiety at post-intervention, maintained at both 3-month and 6-month follow-ups  Depression improvements observed only at 3-month.
Dobkin et al., 2006	CBT	Case series	3	CBT intervention	Anxiety Depression	AIFQ BDI HAM-D IQ STAI	Meaningful reductions reported in depressive symptoms over the course of treatment, and maintained at 1-month follow-up  Notable decrease in negative and suicidal thoughts  Only minimal changes in anxiety

Dobkin et al., 2007	CBT	Uncontrolled pretest-posttest	15	CBT intervention tailored for PD	Depression Anxiety	AIFQ BDI HAM-D IQ STAI	Significant decrease in depressive symptoms on both clinician-rated and self-report measures  Nonsignificant improvement trend for anxiety
Dobkin et al., 2011a	CBT	RCT	I: 41 C: 39	CBT intervention tailored for PD	Anxiety Depression Sleep disorders Quality of life	BDI HAM-A HAM-D ISI IQ MOS	Significant improvements in depression, anxiety, quality of life in the CBT group vs clinical monitoring
Dobkin et al., 2011b	CBT	Uncontrolled pretest-posttest	21	Telephone-based CBT	Anxiety Depression Insomnia Quality of life	Brief COPE CGI - Improvement Scale HAM-A HAM-D IQ MOS PSQI SFQ	Significant improvements in depression and anxiety



Dobkin et al., 2018	CBT	Uncontrolled pretest-posttest	34	CBT intervention	Anxiety Depression Sleep disorders Quality of life	Brief COPE Burns Empathy Scale Burns Helpfulness Scale CGI - Improvement Scale HAM-A HAM-D IQ MOS SFQ SPQI	Significant improvements in depression, anxiety, insomnia, and quality of life across all time-points
Dobkin et al., 2020	CBT	RCT	I: 37 C: 35	Telephone-based CBT	Anxiety Depression Quality of life	BDI CGI - Improvement Scale HAM-A MCS MOS	Significant improvements in anxiety, depression, insomnia severity, and quality of life compared to control group
Dreisig et al., 1999	CBT	Quasi-experiment	I: 9 I: 70	Structure CBT programme	Anxiety	The Psychological Profile Questionnaire — PROGRESSOR 230	Significant improvements at post-test in anxiety

Farabaugh et al., 2010	CBT	Case series	8	CBT	Depression Quality of life	ADL Scale ATQ-R CGI - Improvement Scale CGI – Impressions-Severity scale DAS HAM-D Mood Module of SCID-I PSS Schwab-England SF-36 SQ	Significant linear decrease in mean depression scores over Weeks 0 to 12  57% of patients met criteria for remission at endpoint
Feeney et al., 2005	CBT	Case series	4	Group CBT	Anxiety Depression	BDI-II STAI-S	Clinically significant improvement in depression in three out of the four participants  No clinically significant improvement in anxiety
Hadinia et al., 2016	CBT	RCT	I: 16 C: 14	Group CBT	Anxiety Depression Quality of life Sleep disorders	AES BAI BDI-II BELA-P-k ESS	Significantly greater improvement for the CBT group in quality of life

						FKK PDQ-39 PFS	
Heinrichs et al., 2001	CBT	Single case	1	Self-focused Exposure Therapy (SFET)	Anxiety	ACQ LSAS Sleep diaries Sleep measures of interest including wake time after sleep onset, sleep efficiency, sleep onset latency, and total sleep time SPAI SPEFI SSPS STAI-T	Significant short-term and long-term reduction social anxiety in both clinician ratings and self-report measures
Humbert et al., 2017	CBT	Case series (retrospective)	5	Cognitive behavioural therapy for insomnia (CBTi)	Sleep disorders	Sleep diaries Sleep measures of interest including wake time after sleep onset, sleep efficiency, sleep onset latency, and total sleep time	Significant increases in sleep efficiency and decreases in number of awakenings per night CBTi well tolerated and well received by patients

Jiménez-Murcia et al., 2012	CBT	Quasi-experiment	I: 15 C: 45	CBT	Impulse control	GSI SCL-90-R SOGS	No significant differences between groups
Kraepelien et al., 2020	CBT	RCT	I: 38 C: 39	Tailored internet-based CBT	Anxiety Depression Sleep disorders Quality of life	IUS MCQ-30 PDQ-39 PSWQ	Significant improvements in anxiety, depression, insomnia severity, and quality of life compared to controls  Medium effect size for depression, but significantly lower compared to face to face studies  Significant effects for anxiety not accompanied by significant improvement within-group, suggesting the effect could be partly explained by deterioration in the control group
Lawson et al., 2013	CBT	RCT	I: 15 C: 17	CBT-based self-help guided reading resource	Anxiety Quality of life	BBQ CGI – Impression – Severity Scale CGI – Improvement IUS MCQ-30 PDQ-39 PSWQ	Significant reductions observed only for worry and intolerance of uncertainty
Lebrun et al., 2019	CBT	Multiple baseline single case	15	CBTI	Anxiety Depression	BDI-II CSD-E	Significant improvements on insomnia, anxiety, depression, QoL at post-

		experimental design			Sleep disorders Quality of life	DBAS-16 EQ-5D – 3 level version ISI PAS PSAS SCI SES SRBQ-20 USDRS	intervention, maintained at 3-month follow-up
Leroi et al., 2010	CBT	RCT	I: 8 C: 7	Multi-component CBT-based sleep therapy	Sleep disorders Quality of life	Burden scale ESS GDS GHQ-28 NPI PDQ-39 UPDRS	Sleep disorders in improved significantly in both intervention and psychoeducation groups  No between-group differences on any outcome measures  Intervention found to be well tolerated and feasible
Macht et al., 2007	CBT	Case series	3	CBT	Anxiety	BELA-P-k	Improvement over time for patients experiencing psychosocial anxiety
Mohlman et al., 2010	CBT	Single case	1	Combined CBT and Attention Processing Training II (CBT/APT)	Anxiety Depression	BDI PSWQ SCID-I	Participant free of generalised anxiety disorder on the post-treatment assessment

						SIGH-A SIGH-D STAI	Considerable reduction in scores on all anxiety measures from pre- to posttreatment (no significance reported)  Reductions in symptoms of depression (no significance reported)
Okai et al., 2013	CBT	RCT	I: 28 C: 17	CBT based on a treatment manual compiled during the pilot phase of the trial	Anxiety Depression Impulse control	BAI BDI CGI GHQ-28 Impulse Control Behavior Severity Scale (ad-hoc) NPI	Frequency and impact of impulse control disorders significantly reduced over the 6-month period in the treatment group  CBT plus standard medical care appears to be more effective than standard medical care alone in reducing the severity of impulse control disorders in PwPpeople with PD
Osawa et al., 2020	CBT	Case series	11	Brief CBTi	Quality of life Sleep disorders	ISI PDSS SF-36 Sleep diaries	Objective sleep measured by actigraph did not improve, subjective sleep measured by sleep diary improved  No significant changes in quality of life
Patel et al., 2017	CBT	RCT	I: 14 C: 14	Computerised CBTi	Quality of life Sleep disorders	ESS FSS ISI PDQ-8 PHQ-9 PIRS20	Significantly greater improvements in insomnia scores for CBTi group  Change was not significant at intention-to-treat analysis likely due to the high dropout rate in the CBTi group (43%)

Reynolds et al., 2019	CBT	Multiple baseline single case experimental design	9	CBT by videoconferencing or in person	Anxiety Depression	ADIS-5 AS BAI BDI-II GDS OASIS ODSIS STAI	Significant reductions in anxiety and/or depression observed in seven out of nine participants at post-treatment  Most improvements maintained at 6-week follow-up  High adherence, retention, as well as treatment satisfaction and acceptability
Richardson & Marshall, 2012	CBT	Single case	1	CBT for depression	Anxiety Depression	CORE-10 GDS HADS	Reported improvements in global mental health and moderate reductions in depression  No effect on anxiety
Rios Romenets et al., 2013	CBT	RCT	I: 6 C: 6	CBTi	Depression Fatigue Quality of life Sleep disorders	BDI CGI – Change scale Daily sleep diary DBAS-16) ESS ISI PDQ-39 PDSS PSQI SCOPA sleep (PD-specific)	Significant improvement in insomnia severity scores in the CBTi group, but no change in night-time sleep score  Clinician-rated clinical global impression improved significantly

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							SHI
Shinmei et al., 2016	CBT	Uncontrolled pretest-posttest	19	CBT program using manga workbooks	Anxiety Depression Quality of life	BDI-II GRID-HAMD HADS MOS OASIS STAI	Significant improvements in depression at post-intervention, maintained at 3-month follow-up
Tiihonen et al., 2012	CBT	Quasi-experiment	I: 29 C: 23	CBT patient education program (EduPark)	Depression Quality of life	ADL of UPDRS BELA-P-k Mood (analogue) PDQ-39 SDS	Significantly improved quality of life for treatment group at post-intervention No significant differences in depression Good acceptance from participants
Troeung et al., 2014	CBT	RCT	I: 11 C: 7	Group CBT	Anxiety Depression Quality of life Stress	CCL DASS PDQ-39	Significant improvement at post-intervention for CBT group in anxiety and depression, but no differences in stress. Significant and large effects for depression, anxiety, and stress at both 1-month and 6-month follow-ups No significant differences for quality of life over the whole study

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Veazey et al., 2009	CBT	Case series	I: 5 C: 5	One in-person CBT session, followed by 8 weekly telephone CBT sessions	Anxiety Depression Quality of life	SCID PHQ-9 BAI PDQ-39 PDSI	Medium effect size on depression and medium to large on anxiety at post-intervention and follow-up  Small effect sizes on quality of life at all time points were small with no notable differences
Wuthrich & Rapee, 2019	CBT	RCT	I: 5 C: 4	Telephone-delivered manualised CBT	Anxiety Depression Quality of life	GAI GDS WHOQOL	Significant reduction of depressive symptoms at post-treatment, maintained at 1-month follow-up  No significant changes in anxiety and quality of life
Yang & Petrini, 2012	CBT	Uncontrolled pretest-posttest	22	CBT	Sleep disorders	PDSS Sleep diary	Significant improvements in total wake time, sleep efficiency, and overall sleep score at post-intervention and 3-month
Ahmed et al., 2018	EMDR	Single case	1	EMDR	Anxiety Depression Subjective report of trauma	HADS	No change in anxiety and depression  Improvement on subjective reporting of trauma symptoms and resilience at post-intervention and 9 months
Advocat et al., 2016	Mindfulness	RCT (mixed methods)	I: 24 C: 33	Group mindfulness-based lifestyle program	Anxiety Depression Quality of life	DASS FMI HBQ MHLC-B PDQ-39	No significant differences in global quality of life between the two groups at post-intervention and 6 months

Birtwell et al., 2017	Mindfulness	Uncontrolled pretest-posttest	6		Anxiety Depression Quality of life	DASS MAAS PDQ39	Significant improvements in levels of depression and anxiety at both post-intervention and follow-up No significant difference in quality of life
Cash et al., 2015	Mindfulness	Uncontrolled pretest-posttest	29	MBSR group intervention	Anxiety Depression	AS GAD-7 PDQL PHQ-9	Significant reductions in depression No significant changes in anxiety
Dissanayaka et al., 2016	Mindfulness	Uncontrolled pretest-posttest	14	Manualised group mindfulness intervention tailored for PwPpeople with PD	Anxiety Depression Quality of life	FFMQ GAI HAM-D OQ-45 PDQL UPDRS	Significant reduction in anxiety, depression, and quality of life at post-intervention, not maintained at follow-up (smaller sample due to attrition)
Fitzpatrick et al., 2010	Mindfulness	Qualitative evaluation	12	MBCT course	N/A	N/A	MBCT could benefit people with PD and was an acceptable form of group intervention.
Kwok et al., 2019	Mindfulness	RCT	I: 71 C: 67	Mindfulness Yoga for PD	Anxiety Depression Quality of life	HADS HWS PDQ-8 UPDRS	Significant better outcomes for the mindfulness yoga group in anxiety, depression, and QoL at both post-intervention and follow-up.

Pickut et al., 2015	Mindfulness	RCT	I: 14 C: 13	Mindfulness-based intervention	Depression Quality of Life	BDI FFMQ PDQ-39 UPDRS	Significant improvement for the intervention group in mindfulness levels. No significant differences for depression and QoL
Rodgers et al., 2019	Mindfulness	RCT	I: 15 C: 12	Modified MBCT	Anxiety Depression Quality of life	DASS GAI GDS PDQ-39	Significant reduction in depressive symptoms for the MBCT participants at both group and individual levels at post-intervention. No significant effect on anxiety or quality of life at the group level
Son & Choi, 2018	Mindfulness	RCT	I: 33 C: 30	Mindfulness meditation-based complex exercise program (MMBCEP)	Anxiety Depression Quality of life	ADL GDS PDQL PDSS STAI	Significant improvements for quality of life, anxiety and depression
Vandenberg et al., 2018	Mindfulness	Qualitative evaluation of Advocat et al., 2016	16	Group mindfulness-based lifestyle program	N/A	N/A	Reported improved feelings of control, acceptance of disease progression, social relationships, and self-confidence in managing the disease.
Sproesser et al., 2010	Psychodrama	RCT	I: 8 C: 8	Group psychotherapy based on psychodrama	Anxiety Depression Quality of life	BDI PDQL STAI	Significant improvements for depression, anxiety, and QoL for the psychotherapy group at post-intervention

Flores Alves Dos Santos et al., 2017	Psychoeducation	RCT	I: 7 C: 10	Group psychoeducation programme	Anxiety Coping Depression Quality of life	CHIP MADRS PDQ-39 SAS STAI WCC WHOQOL	Significantly greater improvements in anxiety, depression and instrumental coping for the treatment group at 1 year  No significant differences between groups for quality of life
Guo et al., 2009	Psychoeducation	RCT	I: 23 C: 21	Educational programme	Depression Quality of Life	PDQ-39 PMS SDS SEADL	Significant improvement in quality of life  No significant differences in depression
Macht et al., 2007	Psychoeducation	Uncontrolled pretest- posttest	151	Patient education programme	Depression Quality of life	BELA-P-k PDQ-39 SDS	Significant improvements for psychosocial issues  No significant improvements in depression or quality of life
Soundy et al., 2019	Psychoeducation	Qualitative evaluation	18	Peer-led educational intervention for newly diagnosed people with PD	N/A	N/A	Program found as worth-while to improve exercise behaviour and coping mechanisms  Proposed mechanisms of impact included perceived control, social control, hope and action, and individual mindset

*Note.* **AARP** = Abbreviated Treatment Acceptability Rating Profile; **ACQ** = Anxiety Control Questionnaire; **ACT** = Acceptance and Commitment Therapy; **ADIS-5** = Anxiety Disorders Interview Schedule; **ADL** = Activities of Daily Living; **AES** = Apathy evaluation scale; **AES-S** = Apathy Evaluation Scale–Self; **AIFQ** = Adaptive Inferential Feedback Questionnaire; **AS** = Apathy Scale; **ATQ-R** = Automatic Thoughts Questionnaire–Revised; **BA** = Behavioural Activation; **BAI** = Beck Anxiety Inventory; **BAI** = Beck Anxiety Inventory; **BBQ** = Brunnsviken Brief Quality of life scale; **BDI** = Beck Depression Inventory; **BELA-P-k** = Burden Questionnaire for Patients with Parkinson’s disease; **BPRS** = Brief Psychiatric Rating Scale; **BRS** = Behavioral Relaxation Scale;

**BRT** = Behavioural Relaxation Training; **C** = control; **CBT** = Cognitive Behavioural Therapy; **CAS** = Clinical Anxiety Scale; **CBTi** = CBT for Insomnia; **CCL** = Cognitions Checklist; **CGI** = Clinical Global Impressions; **CHIP** = Coping Health Injuries and Problems; **CORE-10** = Clinical Outcomes Routine Evaluation Scale, 10-item version; **CSD-E** = Expanded Consensus Sleep Diary for evening; **DAS** = Dysfunctional Attitude Scale; **DASS** = Depression, Anxiety and Stress Scale; **DBAS-16** = Dysfunctional Beliefs and Attitudes about Sleep; **EMDR** = Eye Movement Desensitization and Reprocessing; **EQ-5D** = EuroQol-5 Dimension; **ESS** = Epworth Sleepiness Scale; **FFMQ** = Five Facet Mindfulness Questionnaire; **FKK** = Questionnaire for Disease-Related Communication; **FMI** = Freiburg Mindfulness Inventory; **GAD-7** = Generalized Anxiety Disorder-7; **GAI** = Geriatric Anxiety Inventory; **GDS** = Geriatric Depression Scale; **GHQ-28** = General Health Questionnaire; **GSI** = Global Severity Index; **GRID-HAMD** = GRID-Hamilton Depression Rating Scale; **HADS** = Hospital Anxiety and Depression Scale; **HAM-A** = Hamilton Anxiety Scale; **HAM-D** = Hamilton Depression Rating Scale; **HWS** = Holistic Well-being Scale; **I** = intervention; **IQ** = Inference Questionnaire; **ISI** = Insomnia Severity Index; **IUS** = Intolerance of Uncertainty Scale; **IUS** = Intolerance of Uncertainty Scale; **LARS** = Lille Apathy Rating Scale; **LSAS** = Liebowitz Social Anxiety Scale; **MAAS** = Mindful Attention Awareness Scale; **MADRS** = Montgomery-Asberg Depression Rating Scale; **MBCT** = Mindfulness Based Cognitive Therapy; **MBSR** = Mindfulness Based Stress Reduction; **MCQ-30** = Metacognitions Questionnaire; **MCS** = Mental Health Composite Score; **MHLC-B** = Form B of the Multidimensional Health Locus of Control; **MOS** = Medical Outcome Study; **N/A** = Not Applicable; **NEADL** = Nottingham Extended Activities of Daily Living index; **NPI** = Neuropsychiatric inventory; **OASIS** = Overall Anxiety Severity and Impairment Scale; **ODSIS** = Overall depression severity and impairment scale; **OQ-45** = Outcome Questionnaire; **PAS** = Parkinson's anxiety scale; **PD** = Parkinson's disease; **PDQ** = Parkinson's Disease Questionnaire; **PDQL** = Parkinson's Disease Quality of Life Questionnaire; **PDSI** = Parkinson's disease summary index score; **PDSS** = Parkinson's Disease Sleep Scale; **PFS** = Parkinson Fatigue Scale; **PHQ-9** = Patient Health Questionnaire; **PIRS20** = Pittsburgh Insomnia Rating Scale; **PMS** = Global patient's mood status; **PSAS** = PreSleep Arousal Scale; **PSQI** = Pittsburgh Sleep Quality Index; **PSS** = Perceived Stress Scale; **PSWQ** = Penn State Worry Questionnaire; **RCT** = Randomised Controlled Trial; **SAS** = Social adjustment scale; **SCI** = Sleep Condition Indicator; **SCID** = Structured Clinical Interview for DSM-IV; **SCL-90-R** = Symptom Checklist-90 items-Revised; **SDS** = Self-Rating Depression Scale; **SEADL** = Schwab and England Activities of Daily Living; **SES** = Self-efficacy for sleep scale; **SF-36** = Short Form Health Survey; **SFQ** = Social Feedback Questionnaire; **SHI** = Sleep Hygiene Index; **SIGH-A** = Structured Interview Guide for the Hamilton Anxiety Scale; **SIGH-D** = Structured Interview Guide for the Hamilton Depression Scale; **SOGS** = South Oaks Gambling Screen; **SPAI** = Social Phobia and Anxiety Inventory; **SPEFI** = Social Phobia Endstate Functioning Index; **SQ** = Kellner's Symptom Questionnaire; **SRBQ-20** = Sleep-related behaviors questionnaire 20; **SSPS** = Self-Statements during Public Speaking Scale; **STAI** = State-Trait Anxiety Inventory; **STAI-S** = State Anxiety Subscale of the STAI; **STAI-T** = Trait Subscale of the STAI; **StAS** = Starkstein Apathy Scale; **SUD** = Subjective Unit of Discomfort; **UPDRS** = Unified Parkinson's Disease Rating Scale; **WCC** = Ways of Coping Checklist; **WHOQOL** = World Health Organisation Quality of Life-Brief.

Figure 1. PRISMA diagram for selection of studies.

