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REVIEW ARTICLE

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Effectiveness of occupational therapy intervention for people with Parkinson's disease: Systematic review

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Abstract

Introduction: Occupational therapists commonly provide intervention that promotes quality of life in people with Parkinson's disease. Existing research supports the effects of multidisciplinary and motor intervention for people with Parkinson's disease. However, few studies have identified the effectiveness of occupational therapy intervention alone. The aim of this review was to examine the efficacy of interventions provided by occupational therapists for people with Parkinson's disease.

Methods: A comprehensive database search of the literature was performed using Medline, EMBASE, PsycInfo and CINAHL between 2003 and January 2018. There were no restrictions on study design and studies with or without a control group were selected for review. Studies were included if intervention consisted of at least 50% of occupational therapy intervention for Parkinson's disease. Two independent reviewers extracted and synthesised data from relevant articles.

Results: In all, 10 studies representing data from 1,343 people with Parkinson's disease and 180 caregivers were included in this review. Occupational therapy interventions focussing on meaningful activities were shown to improve perceived occupational performance. Upper limb therapy programmes were shown to improve upper limb function in the short term though longer-term effects are unclear.

Conclusion: Current research supports interventions which are intermittent, short term and intensive and involve tailored therapy plans working towards an individual's goals. Occupational therapists should implement goal-oriented intervention programmes in conjunction with following the guidance of existing best practice guidelines.

KEYWORDS
adult, occupational therapy, Parkinson's disease, quality of life, rehabilitation

1 | INTRODUCTION

Parkinson's disease is the second most common neurodegenerative disease among older adults in Australia; it is estimated that there are approximately 108,000 people living with Parkinson's disease and around 18% of these people are of working age (Deloitte Access Economics, 2015). Globally, it is estimated that 6.1 million people had a diagnosis of Parkinson's disease in 2016 (Dorsey et al., 2018). While the underlying cause of Parkinson's disease is unknown, it is suspected to be due to a complex interplay between genetic and environmental factors (Kalia & Lang, 2015).

The presentation and prognosis of Parkinson's disease differs between individuals, although progression is broadly classified through five stages describing motor symptoms and functional implications (Hoehn & Yahr, 2001). Common symptoms of Parkinson's disease can lead to diverse impairments of body functions and structure (such as rigidity, tremor, sleep disorder, pain, involuntary movement, impaired gait, fatigue, impaired vision, cognition and muscle tone) as well as limitations in activities in daily care and restrictions in participation of meaningful activities (Raggi et al., 2011). Progression of symptoms is typically slow and the degree of physical disability is usually minimal in the initial stages (Post et al., 2011), although emotional and social consequences can be significant (Chaudhuri, Odin, Antonini, & Martinez-Martin, 2011).

Multidisciplinary input can help the person with Parkinson's disease and their family to alleviate symptoms and to maintain or improve participation in daily life (Deane, Ellis-Hill, Playford, Ben-Shlomo, & Clarke, 2001; van der Marck et al., 2013; Radder et al., 2017). Historically, the role of occupational therapists as a part of a multidisciplinary team has been to support individuals with Parkinson's disease to maintain their usual level of work, leisure and self-care activities, as well as to adapt their roles to maintain quality of life in the later stages of the disease (Dixon et al., 2007; Sturkenboom et al., 2014). Occupational therapy intervention may include education and coping strategies for the individual and their families, exercise programmes, particularly for the upper limb, providing assistive equipment, creating supportive and functional daily routines and suggesting and practising compensatory strategies (movement and cognitive) to carry out daily tasks (Dixon et al., 2007; Radder et al., 2017; Sturkenboom et al., 2014).

Few studies have described the role or efficacy of occupational therapy intervention alone for Parkinson's disease although clinical guidelines do exist (Aragon et al. 2010, Sturkenboom et al. 2011). Two previous systematic reviews (Foster, Bedekar, & Tickle-Degnen, 2014; Murphy & Tickle-Degnen, 2001) examined occupational therapy-related interventions for people with Parkinson's disease. Both reviews reported that there were positive effects associated with occupational therapy-related interventions in terms of improvement in functional mobility and movement activities, promoting individual wellness and improving quality of life. Despite the positive outcomes reported in these reviews, the included studies evaluated a variety of rehabilitation interventions which were not specifically delivered by an occupational therapist. Furthermore, the most recent review by Foster et al was published in 2014 (and involved a search conducted in 2011) and therefore an update of the literature is required. The aim of this review was to examine the efficacy of interventions provided by occupational therapists for people with Parkinson's disease.

2 | METHODS

2.1 | Protocol and registration

The systematic review protocol was submitted on 21st December 2017 and registered with PROSPERO on 27 January 2018 (registration number CRD42018084204).

2.2 | Search strategy

Databases (Medline, EMBASE, PsycInfo and CINAHL) were searched on 18 January 2018. The search strategy was developed and trialled in Medline and was adapted to be used in all included electronic databases. The search strategy was formed using keywords and subject headings for each database and is provided as Data S1. For the purpose of this review, grey literature was not searched.

2.2.1 | Inclusion criteria

There were no restrictions on study design; however, we excluded conference abstracts, protocols and reviews. Studies with or without a control group were included in the review (with no restrictions placed on types of control interventions). As previous reviews revealed that the first studies in this field were published in 2003, the search included studies indexed in the electronic databases between 2003 and January 2018. Only studies published in English were eligible as no resources to translate studies in another language were available. Included studies evaluated occupational therapy interventions for people with Parkinson's disease. We included studies involving multidisciplinary intervention if the occupational therapy component made up more than 50% of the intervention delivered based on the number of consultations provided by an occupational therapist relative to the total number of consultations provided within the intervention.

Citations elicited in the search were independently reviewed by two authors (EW and SB) and studies thought to be eligible were sought in full text. Full-text review was also conducted by two authors independently (EW and SB). Conflicts or uncertainty between reviewers was discussed and a third independent reviewer (KL) was consulted to determine eligibility.

2.3 | Data extraction and synthesis

Study data were extracted into a customised spreadsheet by two reviewers (EW and SB) and checked for accuracy by a third researcher (KL). Extracted data included the following: study design, participant characteristics, intervention type (including duration and frequency), comparators, outcomes assessed and results.

We planned to conduct a meta-analysis if there was sufficient homogeneity within included studies. As this was not the case, a synthesis of the studies is presented involving a narrative approach. Information on all outcomes reported in the included studies (motor performance, cognition, quality of life, mobility and activities of daily living) is presented.

2.4 | Quality assessment

The Cochrane Collaboration's tool for assessing risk of bias in randomised trials tool was used to critically appraise all included randomised controlled trials (Higgins et al., 2011). The tool includes six categories to assess the risk of bias for each study and awards a rating of high, low or unclear for each of the seven categories. The McMaster Critical Appraisal tool was used to critically appraise the remaining non-randomised quantitative study (Law, 1998). Two authors (EW and SB) independently completed critical appraisal and conferred with KL in the case of disagreement.

3 | RESULTS

3.1 | Study selection

The database search produced 5,164 citations, of which 93 were sought for full-text review. Following full-text checking, a total of 10 studies were included in this review. Reference lists of all included studies were checked; however, no additional studies met the inclusion criteria. Details of the study selection process and reasons for exclusion are presented in the PRISMA Flow Diagram (Figure 1).

3.2 | Study characteristics

Nine randomised controlled trials (Clarke et al., 2009, 2016; Lee, Lee, & Hwang, 2011; Morris, Iansek, & Kirkwood, 2009; Sturkenboom et al., 2013, 2014; Taghizadeh, Azad, Kashefi, Fallah, & Daneshjoo, 2017; Tickle-Degnen, Ellis, Saint-Hilaire, Thomas, & Wagenaar, 2010; Vanbellingen et al., 2017; White, Wagenaar, Ellis, & Tickle-Degnen, 2009) were included in the systematic review. The nine trials were reported in 11 papers as one of the trials was reported both as main results and as a process evaluation (Sturkenboom et al., 2014; Sturkenboom, Nijhuis-van der Sanden, & Graff, 2016) and a further trial reported different outcomes in two individual papers (Tickle-Degnen et al., 2010; White et al., 2009). The remaining included study was a case study (Chapman & Nelson, 2014). Study characteristics are presented in Table S1.

Data from a combined total of 1,343 participants with Parkinson's disease as well as 180 caregivers were included from various countries around the globe, including Australia, the United States, the United Kingdom, Korea, the Netherlands, Switzerland and Iran. As expected, most of the studies involved older adults; 5 of the 10 studies included a mean participant age > 70 years. The stage of Parkinson's disease among participants ranged between 1 and 5 on the Hoehn and Yahr (2001) scale where 1 is minimal or no functional disability and 5 is confined to bed or wheelchair unless aided. Nine of the studies presented information about male to female ratios, with 33% of the combined study population being female.

Control group participants were either assigned to a comparative 'conventional' rehabilitation group ($n = 8$) or no intervention ($n = 3$), with one three-armed study included both a 'no intervention' and 'other rehabilitation programme' group (White et al., 2009; Tickle-Degnan et al. 2010). Intervention duration ranged from two to six weeks (Lee et al., 2011; Morris et al., 2009; Taghizadeh et al., 2017; Tickle-Degnen et al., 2010; Vanbellingen et al., 2017; White et al., 2009) up to 8 to 12 weeks (Clarke et al., 2009, 2016; Sturkenboom et al., 2013, 2014), and one study provided intervention for up to 12 months (Chapman & Nelson, 2014). While all studies reported outcomes following intervention, only three of the randomised trials included longer-term follow-up assessment which were conducted at 3, 6, 8 and 15 months (Clarke et al., 2009, 2016; Sturkenboom et al., 2014). Six studies reported on levels of participant adherence to the prescribed interventions; all six studies reported above 63% adherence (Clarke et al., 2009, 2016; Sturkenboom et al., 2013, 2014; Vanbellingen et al., 2017; White et al., 2009).

3.3 | Quality of included studies

Results of the quality assessment are presented in Table S2. Overall, it can be seen that two studies were poorly reported and consequently risk of bias was unclear in several domains (Lee et al., 2011; Taghizadeh et al., 2017). In several studies, it was unclear as to whether there was selective reporting.

3.4 | Efficacy of occupational therapy intervention (based on results of randomised, controlled trials)

3.4.1 | Outcome: Perception of occupational performance

Two studies (Sturkenboom et al., 2013; Sturkenboom et al., 2014) used the Canadian Occupational Performance Measure to examine differences in self-perceived performance in activities of daily living between participants receiving a 10-week home-based occupational therapy and those receiving usual care ($n = 43$, $n = 191$). Sturkenboom and colleagues commenced their research with a pilot randomised trial (2013) followed by a second trial involving a larger cohort (2014). The pilot study revealed a small positive trend ($d = 0.23$) towards the intervention group

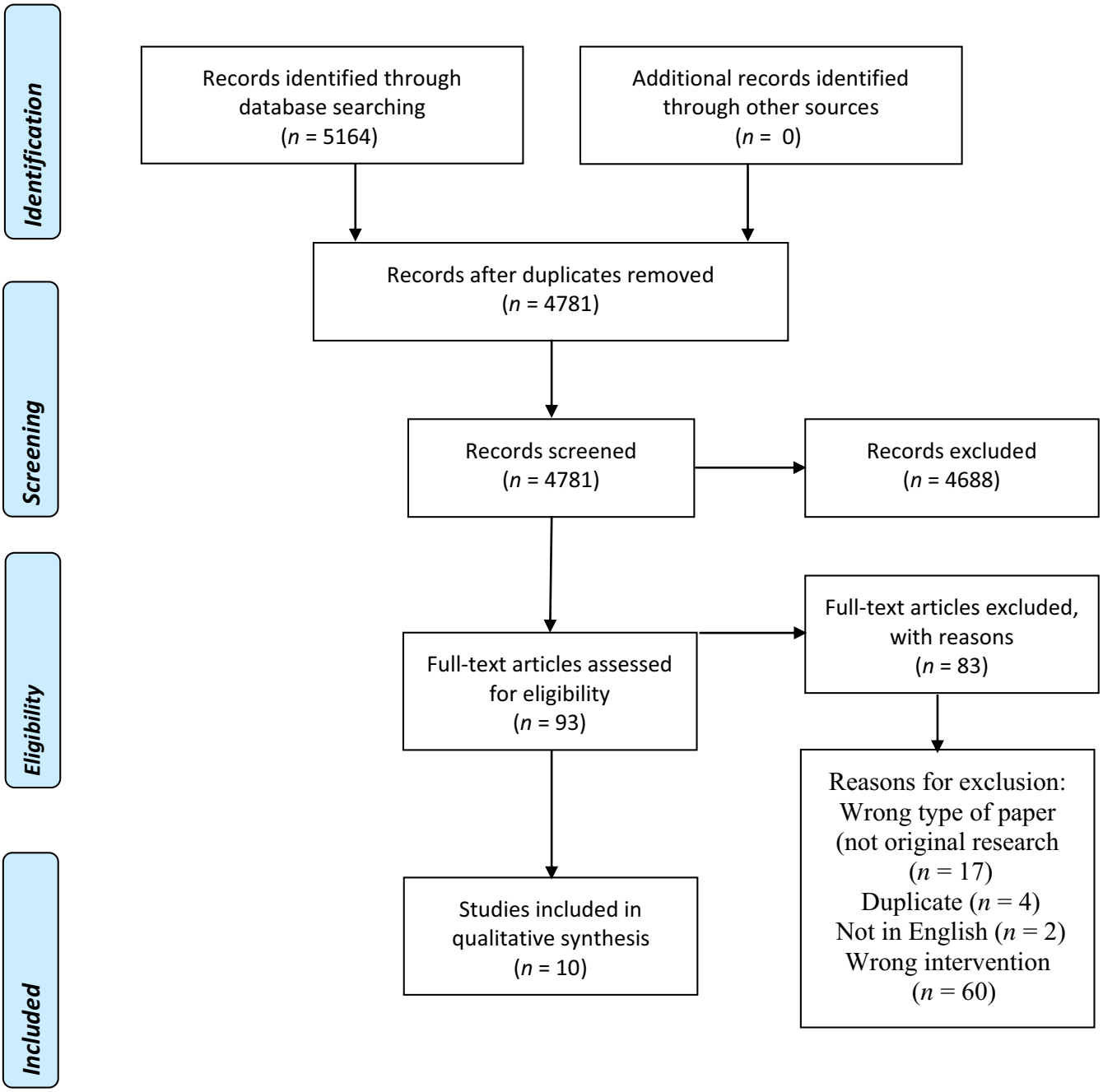

FIGURE 1 PRISMA 2009 flow diagram

post intervention. Subsequently, in the larger trial (2014), at both three months and six months, there was a significant difference in perceived performance between groups in favour of those receiving the occupational therapy intervention (mean difference 1.2 points at 3 months and 0.9 points at 6 months).

3.4.2 | Outcome: Activities of daily living

Two RCTs assessed the efficacy of occupational therapy intervention in maintaining or improving ADL function as measured by the Nottingham Extended Activities of Daily Living scale (Clarke et al., 2009, 2016). Neither trial found a significant difference in outcome between the occupational therapy group and usual care group.

3.4.3 | Outcome: Global function

Three studies measured global function using the Unified Parkinson's Disease Rating Scale (Clarke et al., 2009; Morris et al., 2009; Vanbellingen et al., 2017). None of the studies found that occupational therapy intervention was more

beneficial than other intervention in terms of better scores on the scale. However, Morris (2009) reported that all study participants improved (whether allocated to movement strategy training or exercises) and that there was a trend ($p = .087$) in favour of the group receiving movement strategy training.

3.4.4 | Outcome: Mobility

Three RCTs assessed the efficacy of occupational therapy intervention in improving mobility (Clarke et al., 2009; Morris et al., 2009; White et al., 2009). Morris et al. (2009) reported that those who received movement strategy training made significant improvements in the 10-meter walk test between admission and discharge; however, the movement strategy training was not superior to a programme involving musculoskeletal exercises. The researchers in the same study also failed to detect differences between groups in walking function (Timed Up and Go) and walking endurance. The other two RCTs examining efficacy of occupational therapy for mobility found that community occupational therapy was not superior to usual care (Clarke et al., 2009) and that up to three hours of interdisciplinary rehabilitation (including occupational therapy) was not superior to usual care in terms of improving mobility outcomes (White et al., 2009).

3.4.5 | Outcome: Quality of life

Quality of life was one of the most commonly measured outcomes and reported in six RCTs (Clarke et al., 2009; Clarke et al., 2016; Morris et al., 2009; Sturkenboom et al., 2014; Tickle-Degnen, 2010; Vanbellingen et al., 2017). Unfortunately, meta-analysis was not appropriate given the heterogeneity in terms of occupational therapy intervention and control group treatment. Only one of the studies was able to detect differences between intervention and control groups at follow-up (Tickle-Degnen et al., 2010). Tickle-Degnen et al. (2010) found an association between greater intensity rehabilitation (18 hr or 27 hr) and higher self-reported quality of life.

3.4.6 | Outcome: Upper limb function

Three RCTs (Lee et al., 2011; Taghizadeh et al., 2017; Vanbellingen et al., 2017) examined whether an upper limb focussed programme resulted in improvements in upper limb function. Taghiadeh et al. (2017) found that a sensory motor training intervention alongside constraint-induced movement therapy was effective in improving hand and upper extremity sensory motor function in people with Parkinson's disease; however, whether these gains translated into changes in function was not assessed. Similarly, Vanbellingen et al. (2017) found that people who received a home-based dexterity programme had better outcomes for dexterity (measured with the Nine Hole Peg test) and for dexterity-related ADL (measured using the DextQ-24 questionnaire) than those who received upper limb Thera-band exercises. In the final study, Lee et al. (2011) compared a modified constraint induced movement therapy programme with general upper limb exercises. The authors reported that participants in the intervention group made greater improvements on tests of arm function (Box and Block test, Fugl-Meyer assessment and Action Research Arm Test) (Lee et al., 2011).

3.5 | Efficacy of occupational therapy intervention (based on results of one case study)

In a case study detailing a six-session goal-directed community-based occupational therapy programme, Chapman and Nelson (2014) described how intervention reduced falls, maintained participation in valued activities and increased independence. Intervention was also described as being linked to reduced symptoms of apathy and less worry about the need to conceal the individual's condition.

4 | DISCUSSION

4.1 | Summary of results

This systematic review identified 10 studies (presented in 12 articles) that described evaluations of occupational therapy for people with Parkinson's disease. Six studies have been published since Foster et al. (2014) reviewed the literature on the effectiveness of occupational therapy-related interventions for people with Parkinson's disease. Results of this review suggest that there are short-term benefits from occupational therapy interventions. Specifically, participation in a 10-week programme focussing on home-based therapy and meaningful activity resulted in improved perceived occupational performance (Sturkenboom et al., 2013, 2014) and participation in an upper limb therapy programme resulted in better arm function (Lee et al., 2011; Taghizadeh et al., 2017; Vanbellingen et al., 2017). A diverse range of interventions and comparators are included in this review and so our ability to provide more specific information about effective intervention approaches is limited. Quality of life was the most frequently assessed outcome through the use of the Parkinson's disease Questionnaire (PDQ-39); however, only one of the six included studies found a statistically significant change within the intervention group.

Our systematic review of the literature suggested that time-limited interventions that were delivered at a high intensity were most effective in improving arm function and mobility (Lee et al., 2011; Morris et al., 2009; Taghizadeh et al., 2017; Vanbellingen et al., 2017). Of the studies that provided short-term high intensity intervention, only Morris et

al. (2009) and Vanbellingen et al. (2017) completed follow-up assessments at three months. In both cases, improvements were not sustained and regression in performance was evident. These results suggest that further input may be required to maintain gains over time. Our findings are similar to that of Tomlinson et al. (2014) who reported that the low number of included studies meant that details of the optimal intervention type, dose and setting for people with Parkinson's disease remain unclear. To establish more robust recommendations around the specific types of occupational therapy interventions that are effective and their optimal dose, more research is required. Our findings suggest that short-term high intensity arm function and mobility training interventions that are repeated regularly may help to maintain skills and functional gains for people with Parkinson's disease.

Unfortunately, studies with positive findings related to arm function did not also test whether gains in function transferred to improved ability to manage activities of daily living. Promoting independence and autonomy is a key role for occupational therapists and future studies should incorporate measurement of ADL function to determine whether gains in upper limb function are transferable. Two studies conducted by Sturkenboom et al. (2013, 2014) found improved self-perceived performance in activities of daily living in favour of the occupational therapy intervention. Perhaps therapy programmes that combine upper limb therapy intervention with home-based occupational therapy intervention addressing meaningful activities have the biggest impact for people with Parkinson's disease.

Sturkenboom and colleagues published an additional paper in 2016 describing a process evaluation that was run alongside their randomised controlled trial. The paper provided further support for individualised occupational therapy involving meaningful activities as results showed that 98% of patients and 77% of caregivers were involved in collaborative goal setting and 90% of patients were satisfied with their results (Sturkenboom et al., 2016).

Among the studies that involved upper limb therapy (and reported improved upper limb function), there was diversity in the therapy approaches used. Despite using different approaches, all three intervention programmes produced positive effects for upper limb performance in the short term. These results provide further evidence that short-term upper limb occupational therapy interventions have a positive effect on upper limb function; however, long-term effects remain unclear.

This review only identified two studies that assessed global ADL outcomes (Clarke et al., 2009, 2016), one study of which was underpowered to detect a difference (Clarke et al., 2009). Despite being the most commonly measured outcome, our review only found one of the six studies reported a statistically significant difference between groups for improvement in quality of life. In contrast with the findings of our review, Foster et al. (2014) reported strong evidence that occupational therapy-related interventions can increase targeted areas of quality of life for people with Parkinson's disease. However, the studies they cited as being linked to improved quality of life were not included in our review and involved a cognitive-behavioural intervention provided at high intensity (6–8 weeks, 20 or more sessions).

While intervention tended to focus on ADL function or upper limb function, there have been few studies that have evaluated programmes designed to help people with Parkinson's disease manage non-motor symptoms (fatigue, depression and sensory complaints) (Müller, Assmus, Herlofson, Larsen, & Tysnes, 2013; Santos-García & de la Fuente-Fernández, 2013). Within Australia, services tend to be provided via aged care organisations rather than Parkinson's disease-specific services. This may be a disadvantage to those who access therapy due to the complex nature and individualistic characteristics of the disease. Therapists require specific knowledge of Parkinson's disease symptoms and intervention to provide a holistic approach to treatment (Munneke et al., 2010). For example, specialist skills may be needed in sleep and fatigue, falls, eating, vision, depression and sensory complaints as they have been found to be the most challenging symptoms for individuals (Müller et al., 2013). We suggest that more attention is required from therapists on non-motor symptoms of the disease, with a focus on improving quality of life.

The main limitation of this systematic review is that we excluded studies which involved occupational therapy as one part of a multidisciplinary rehabilitation programme (where occupational therapy comprised < 50% of the intervention). Additionally, in studies that were included in the review that involved a multidisciplinary intervention, results cannot be specifically attributed to occupational therapy overall. It is likely that multidisciplinary intervention programmes may be effective although they do not address our review question. Additionally, limitations in the quality of studies, such as poor reporting of study methods and an unclear establishment of selective reporting, suggest that results should be interpreted with some caution.

Findings from this review indicate that occupational therapy-specific interventions are most effective when delivered intermittently at high intensity in short bouts of therapy. Specifically, home-based therapy with a focus on meaningful activities and patient directed goal setting had the greatest improvement in perceived occupational performance. While this review demonstrated significant results for arm function-specific occupational therapy interventions, limited literature exists on the transfer of improved function on an individual's ability to manage activities of daily living. More research is warranted to determine the effects of specialised occupational therapy programmes designed to target the impact of key symptoms of Parkinson's disease on daily functioning. Additionally, future research should be conducted so that it is possible to determine which type

of intervention is most effective, for which population and when. At the moment, there are few studies and they involve different intervention approaches, different dose and measure different outcomes so it is not possible to draw strong conclusions.

In conclusion, we recommend that occupational therapists address both upper limb function and ADL function simultaneously and offer time-limited and intensive intervention programmes.

5 | KEY POINTS FOR OCCUPATIONAL THERAPY

- Home-based therapy focussing on meaningful activities appears to be most promising in terms of optimising occupational performance.
- Intermittent short bouts of high intensity therapy may be most appropriate.
- Therapists should ensure interventions target the impact of symptoms of concern (such as sleep, fatigue, falls, eating, visual disturbance, low mood and sensory complaints) and their functional implications are addressed.

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CONFLICT OF INTEREST

The authors report no conflicts of interest.

AUTHOR CONTRIBUTIONS

All authors were involved in conceiving the review question and design, conducting the review and drafting and editing the manuscript.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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