# Systematic Review of the Effectiveness of Occupational Therapy—Related Interventions for People With Parkinson's Disease

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#### MeSH TERMS

- · cognitive therapy
- environment
- exercise therapy
- occupational therapy
- Parkinson disease
- self care
- treatment outcome

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**Linda Tickle-Degnen, PhD, OTR/L, FAOTA,** is Professor and Chair, Department of Occupational Therapy, Tufts University, 26 Winthrop Street, Medford, MA 02155; linda.tickle\_degnen@tufts.edu We describe the results of a systematic review of the literature on occupational therapy—related interventions for people with Parkinson's disease (PD). Three broad categories of intervention emerged: (1) exercise or physical activity; (2) environmental cues, stimuli, and objects; and (3) self-management and cognitive—behavioral strategies. Moderate to strong evidence exists for task-specific benefits of targeted physical activity training on motor performance, postural stability, and balance. Low to moderate evidence indicates that more complex, multimodal activity training supports improvement in functional movement activities. The evidence is moderate that the use of external supports during functional mobility or other movement activities has positive effects on motor control. In addition, moderate evidence is available that individualized interventions focused on promoting participant wellness initiatives and personal control by means of cognitive—behavioral strategies can improve targeted areas of quality of life. The implications for practice, education, and research are discussed.

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The objectives of this review were to systematically search the literature and critically appraise and synthesize the applicable findings to address the following focused question: What is the evidence for the effectiveness of interventions within the scope of occupational therapy practice for people living with Parkinson's disease (PD)?

### Background and Statement of the Problem

Parkinson's disease is the second most common neurodegenerative disorder, affecting approximately 1 million Americans. In the United States, the prevalence of PD increases with age from approximately 554 per 100,000 in adults in their 60s to 2,949 per 100,000 in those older than age 85 (Wright Willis, Evanoff, Lian, Criswell, & Racette, 2010). With the aging of the global population, PD is now considered a world health problem and health care priority (Global Parkinson's Disease Survey Steering Committee, 2002). Although PD is typically thought of as a disease of aging, a substantial number of younger adults with the disease are active in the workforce and have small children (Knipe, Wickremaratchi, Wyatt-Haines, Morris, & Ben-Shlomo, 2011).

PD is characterized by a progressive decline in speed, flexibility, fluidity, and coordination of fine and gross motor function throughout the body, including the extremities, trunk, face, and muscles of the voice (Suchowersky et al., 2006). Postural instability creates a high risk for falls. The motor manifestations of PD, which may be mistaken for signs of incompetence, apathy, or a disagreeable personality, are stigmatizing during interpersonal interactions with others,

including health care providers (Tickle-Degnen, Zebrowitz, & Ma, 2011). This stigmatization may contribute to health care disparities documented in this population (Willis, Schootman, Evanoff, Perlmutter, & Racette, 2011). PD is identified as a movement disorder; however, it is increasingly recognized that the disease itself and side effects of antiparkinsonian medications are associated with serious nonmotor problems (Park & Stacy, 2009), including cognitive impairment, such as executive dysfunction and dementia; neuropsychiatric conditions, such as depression, anxiety, and impulse control disorders; and sleep, autonomic, and sensory disturbances (e.g., visual dysfunction and pain).

Activity limitations occur early in the disease and progress over time, necessitating increasing need for support and compromising participation in valued activities and roles (Foster & Hershey, 2011; Hariz & Forsgren, 2011; Schenkman et al., 2011; Shulman et al., 2008). The training of occupational therapy practitioners in aging, normative role performance and participation, and physical and psychological adaptation to disability makes them ideally suited to lead the development and implementation of evidence-based interventions with this population in home, community, and health care settings. This systematic review of the literature describes the documented effectiveness of interventions within the scope of occupational therapy practice and suggests gaps in services, theory, and evidence that warrant continued development. It represents an update to the 2001 research synthesis of evidence about the effectiveness of occupational therapy-related interventions with PD (Murphy & Tickle-Degnen, 2001).

### Method

The articles included in this review were identified through database searches for articles published from January 2003 through May 2011. Bibliographies of selected articles were reviewed for potentially relevant articles. Articles selected for review included studies in which interventions within the scope of occupational therapy practice were administered to people with PD. The evidence from these articles was graded for quality according to the guidelines used in the American Occupational Therapy Association Evidence-Based Practice Project; strong evidence indicates consistent results from well-designed, well-conducted studies (typically two or more randomized controlled trials [RCTs]) that are unlikely to be affected by future studies; moderate evidence indicates results that are sufficient to support the effect of an intervention but with constrained confidence (because of small number or size of studies, inconsistent findings,

or limited generalizability to practice) and the potential to change as more information becomes available; and *low* or *limited evidence* indicates insufficient support for the effect of an intervention on outcomes.

Physical therapy studies focused on general exercise to promote normal movement, production of dual-task gait (functional mobility), or functional fall prevention and postural control were included because these approaches are within the scope and orientation of occupational therapy. Physical therapy studies that focused on gait components, physical parameters of the lower extremities only, motor aspects without a functional performance component, or other interventions outside the scope of occupational therapy were excluded. Speech therapy research was excluded from this review because it is specialized with respect to coordination of breathing and voice in this population, which typically is not the domain of occupational therapy. Finally, although caregiver interventions for families and loved ones of people with PD are very important, studies that were directed only at caregivers were excluded. Detailed information about the methodology and a complete list of search terms can be found in the article "Methods for the Systematic Reviews of Occupational Therapy and Neurodegenerative Diseases" in this issue (Arbesman, Lieberman, & Berlanstein, 2014).

### Results

The database search yielded 4,061 abstracts, 55 of which were included in this review. Thirty-five articles were Level I RCTs, systematic reviews, or meta-analyses; 7 were Level II two-group nonrandomized studies (e.g., cohort, case control); and 13 were Level III one-group nonrandomized studies (e.g., pretest—posttest design). Supplemental Table 1 (available online at http://ajot.aotapress.net; navigate to this article, and click on "Supplemental Materials") summarizes selected articles from this review.

Three categories of interventions emerged from the studies selected for review: (1) exercise or physical activity; (2) environmental cues, stimuli, and objects, and (3) self-management and cognitive—behavioral strategies. All elements may have been present in any single study, but one or two may have been accentuated in the intervention approach or selection of outcome measures. The designs of the studies were subcategorized along a temporal dimension as synchronic or diachronic (Rosenthal & Rosnow, 2008). In the context of rehabilitation research, diachronic studies focus on changes that occur over a longer period of time, beyond a single session, to test the endurance of therapeutic effects across time. Synchronic

studies focus on change elements that are active during the intervention session itself and may be responsible for short-term or long-term effects.

Engagement in Exercise and Physical Activity to Improve Performance Skills and Occupational Performance

Performance Skills. Interventions covered in this section involve unitask and unimodal (i.e., "simple") training, such as progressive resistance training, joint mobilization, postural stability and balance training, gait training, and aerobic fitness activities (e.g., treadmill, walking, cycling). Seven systematic reviews of predominantly diachronic outcomes provided moderate to strong Level I evidence that motor and sensory-perceptual performance skills (the latter skill subtype is related to postural stability and balance) are supported by multisession, repetitive physical exercise tasks and activity training (Crizzle & Newhouse, 2006; Dibble, Addison, & Papa, 2009; Goodwin, Richards, Taylor, Taylor, & Campbell, 2008; Keus, Bloem, Hendriks, Bredero-Cohen, & Munneke, 2007; Kwakkel, de Goede, & van Wegen, 2007; Mehrholz et al., 2010; Stewart & Crosbie, 2009). The evidence is stronger for short-term effects than for long-term effects.

In combination, the syntheses suggest that the improvement of performance skills is most responsive to task-specific compared with task-nonspecific training (Kwakkel et al., 2007). For example, muscle strength is most responsive to training that directly targets the mechanisms that strengthen muscles (e.g., progressive resistive exercise), whereas balance is most responsive to training that most directly targets the postural, kinesthetic, and vestibular mechanisms of balance. In addition, direct performance skill training does not appear to generalize as robustly to more complex occupational performance or quality of life outcomes as it does to specific performance skill outcomes. Two systematic reviews conducted meta-analyses that together suggest that simple motor performance skill training produces approximately one-half standard deviation greater improvement in motor skills in people with PD compared with control conditions (Goodwin et al., 2008; Mehrholz et al., 2010). Generalization effects to nontargeted occupational performance or quality of life outcomes, though generally in a positive direction, were about half as large as taskspecific performance skill effects (Goodwin et al., 2008).

We identified 12 single primary studies with diachronic designs that addressed exercise and skill training effects on motor and sensory–perceptual performance skills that were not covered by the systematic reviews. Of these studies, 5 presented Level I evidence (Allen et al., 2010; Qutubuddin et al., 2007; Sage & Almeida, 2010; Smania et al., 2010; Yousefi, Tadibi, Khoei, & Montazeri, 2009), 3 presented Level II evidence (Dereli & Yaliman, 2010; Dibble, Hale, Marcus, Gerber, & LaStayo, 2009; Nocera, Horvat, & Ray, 2009), and 4 presented Level III evidence (Brittle et al., 2008; Gobbi et al., 2009; Jöbges et al., 2004; Rossi-Izquierdo et al., 2009). These primary studies continue to develop the evidence described in the research syntheses, providing moderate support that exercise programs improve motor performance, postural stability, and balance relative to pretest baseline scores or to no-exercise control conditions. Limited evidence indicates that postural control training has any generalized or lasting effect on fear of falling or fall reduction. Findings suggest with a low degree of evidence that specialized forms or more intense task-specific exercises are more advantageous than usual forms or less intense forms of exercise.

Two studies with synchronic designs that tested simple exercise or physical activity effects on performance skills within a single intervention session present preliminary limited evidence that single-task interventions have immediate effects conducive to performance skill development. Müller and Muhlack (2010) presented Level I evidence that positive effects of PD medication on motor performance skills (reaction time, tapping, peg insertion) were more facilitated by physical exercise than by rest. Elkis-Abuhoff, Goldblatt, Gaydos, and Corrato (2008) presented Level III evidence that simple clay manipulation tasks improved mood.

Occupational Performance. Level I research syntheses on occupational performance interventions are rare (Dixon et al., 2007; Gage & Storey, 2004; Rao, 2010) and must rely on very few and low-powered studies with diverse interventions and outcome measures that cannot easily be integrated in a cohesive manner. Consequently, it is unclear whether the task-specific effects of performance skill training interventions can be achieved from complex (dual or multitask and multimodal) occupational performance training interventions for PD. Little rigorous primary effectiveness research is available on, for example, the effect of self-care training on self-care outcomes or meal preparation training on meal preparation outcomes in people with PD (Kwakkel et al., 2007). A research synthesis on tai chi exercise outcomes provided limited evidence that tai chi enhances motor and postural performance skills in people with PD (Lee, Lam, & Ernst,

Ten single primary studies with diachronic designs that addressed complex functional training interventions were identified that were not covered by systematic reviews. These involved functional mobility and nonspecific activity of daily living (ADL) training and sports and recreational activities (primarily dance). Of these studies, 3 presented Level I evidence (Hackney & Earhart, 2009a, 2009b; Morris, Iansek, & Kirkwood, 2009), 1 presented Level II evidence (Tanaka et al., 2009), and 6 presented Level III evidence (Batson, 2010; Canning, Ada, & Woodhouse, 2008; Hackney & Earhart, 2009c; Stankovic, 2004; Tassorelli et al., 2009; van Eijkeren et al., 2008). Overall, these studies provide low to moderate evidence that complex and multimodal activity training supports short-term improvement in functional movement activities.

Dual-task activity performance, particularly related to balance, such as transporting objects while walking, is responsive to training in which both cognitive and motor performance skills are integrated within the activity performance (Morris et al., 2009). The integration of motor and interpersonal performance skill training in tango dancing, which involves tightly coordinated interpersonal movement with a partner, promises stronger functional mobility and balance outcomes than nonpartnered exercise or less tightly interpersonally coordinated dance forms (Batson, 2010; Hackney & Earhart, 2009a, 2009b, 2009c). Beginning evidence is available that multimodal physical activity intervention has positive benefits for cognition, specifically executive functioning (Tanaka et al., 2009). Long-term improvement is not yet documented with certainty, and the specificity and generality of intervention effects at this level of complex task and activity interventions are not yet documented beyond a low level of evidence.

No synchronic studies of occupational performance interventions met inclusion criteria. That few if any synchronic studies have been performed suggests that researchers may presume that more complex activity interventions require repetition or developmental progression of skills over multiple sessions, rather than a single session, to demonstrate discernible effects.

### Environmental Cues, Stimuli, and Objects to Improve Task and Occupational Performance

Level I research syntheses on interventions for PD that enrich or adapt the performance environment are emerging with the increased understanding of brain responsiveness to environmental stimuli and the context of action (Keus et al., 2007; Kwakkel et al., 2007; Lim et al., 2005; Rao, 2010). It is generally hypothesized that external timing of movement helps compensate for deficits in the internal motor timing mechanism associated with basal ganglia function (e.g., Ma, Trombly, Tickle-Degnen, & Wagenaar, 2004). Lim et al. (2005) conducted a synthesis

of the evidence on rhythmic external cues (audio, video, and somatosensory) and concluded that auditory rhythmic cues had stronger evidence than visual, tactile, or other forms of cues for helping to regulate walking in PD and that there appeared to be instantaneous (synchronic) and multisession (diachronic) effects of these cues. At the time of the synthesis, too little evidence was available to determine whether laboratory training generalized to the home environment or whether walking outcomes transferred to more complex occupational performance outcomes.

Seven single primary studies with synchronic designs were identified that were not covered by systematic reviews. Two provided Level I evidence that investigated simple and complex rhythmic and nonrhythmic auditory cues on functional upper-extremity performance (Ma, Hwang, & Lin, 2009; Ma et al., 2004). Four presented Level II (Rochester, Burn, Woods, Godwin, & Nieuwboer, 2009; Rochester et al., 2005) or Level III evidence (Bächlin et al., 2010; Bryant, Rintala, Lai, Raines, & Protas, 2009) about effects of interventions that involve external rhythmic cuing, cuing that is paired with cognitive strategies for movement, cuing that is provided only when the person's gait freezes, or adaptive equipment that provides security against falling. One presented Level II evidence about the effect of two different types of interview question (positive vs. negative topic) on facial activity and emotional expression in people with PD (Takahashi, Tickle-Degnen, Coster, & Latham, 2010).

These studies provide a moderate level of evidence that environmental context and cue structure are important when people with PD perform simple functional tasks. Performance skills during simple and dual tasks appear to be most facilitated by contexts that are enriched by auditory rhythmic stimuli, provide a safe movement environment for focusing on the functional task, are paired with supervision in cognitive strategies for how large of a movement to make in response to the cue, or elicit positive emotions. Environmental cues that divide attention, focus attention away from the primary task, or elicit negative emotions appear to worsen performance.

Four studies with diachronic designs, all providing Level I evidence, tested whether environmental regulatory effects found in synchronic studies have lasting effects on movement performance (Elston, Honan, Powell, Gormley, & Stein, 2010; Mak & Hui-Chan, 2008; Nieuwboer et al., 2007; Rochester et al., 2010). These studies address gaps identified in the Lim et al. (2005) synthesis, and their findings provide moderate evidence that the use of client-preferred external cues during several weeks of performance of ADLs in the home have positive effects on motor control

that endure for several weeks past the intervention. Still unclear are the length of time these effects are maintained, the intensity of treatment needed to produce enduring effects beyond a few weeks, and the degree to which complex ADLs and quality of life are influenced by enriched or adapted contexts of performance.

Integration of Self-Management and Cognitive— Behavioral Strategies Into Daily Life to Improve Occupational Performance and Quality of Life

We identified 7 primary studies with diachronic designs that addressed the integration of performance patterns of self-management of health and wellness into daily life with PD. Four presented Level I evidence (Guo, Jiang, Yatsuya, Yoshida, & Sakamoto, 2009; Tickle-Degnen, Ellis, Saint-Hilaire, Thomas, & Wagenaar, 2010; Ward et al., 2004; White, Wagenaar, Ellis, & Tickle-Degnen, 2009), 1 presented Level II evidence (Ghahari & Packer, 2012), and 2 presented Level III evidence (A'Campo, Spliethoff-Kamminga, Macht, & Roos, 2010; Carne et al., 2005). In these studies, individualized interventions were focused on promoting participant wellness initiatives and personal control and helping participants modify their lifestyle and improve quality of life. The studies often used a cognitive-behavioral intervention that involved education, goal setting, performance skill training, practice, and feedback related to incorporating habits into daily life. The findings provide moderate evidence that these types of intervention can improve targeted areas of quality of life—that is, if the target is daily functioning in physical activity and participation domains, the effects are greatest in these areas. Effective outcomes occurred in studies that had at least 6- to 8-wk interventions consisting of more than 20 sessions. Limited evidence is emerging that quality of life outcomes can persist for several weeks and up to 6 mo.

No synchronic studies were identified. Self-management interventions directed at home and community participation are predicated on evidence that it takes time, personal initiative, and practice to integrate new performance patterns into daily life.

## Discussion and Implications for Education and Research

The findings of this systematic review suggest that people living with PD benefit from interventions that address physical performance skills and occupational performance through physical activity, provide environmental cues or support to regulate physical performance, and teach self-

management and cognitive-behavioral strategies for integrating performance patterns into daily life.

A majority of the intervention research relevant to occupational therapy and PD addresses physical performance skills. Findings indicate that, at least in the short term, physical activity can improve or maintain physical performance skills among people with PD and that they are able to develop new performance skills through task-specific training. Task-specific training is particularly effective in environments or contexts that are enriched with external supports, such as rhythmic cues, to compensate for loss in basal ganglia functioning.

To date, the demonstrated effects of physical performance skill interventions for people with PD have been primarily task specific in that improvements in trained skills do not translate to improvements in untrained skills. For example, strength training does not improve balance. In addition, the evidence is limited as to whether simple tasks that involve physical action affect cognitive, emotional, or interpersonal performance skills. Another consistent theme from this research is the lack of transfer or generalization of performance skill effects to changes in ADLs or broader occupational performance outcomes. For example, vestibular and sensory—perceptual processing rehabilitation may help reduce balance problems, but only limited evidence indicates that it reduces falls.

Given the variety of PD-related impairments and their far-reaching effects on occupational performance and participation, interventions that address multiple factors in the context of home and community living are likely necessary to change outcomes at these higher levels of function. Syntheses have noted that well-designed, multidisciplinary, and quality of life interventions are needed to address the complex issues of living with PD (e.g., Gage & Storey, 2004; Johnston & Chu, 2010; Rao, 2010), but until recently few, if any, studies took this approach. Emerging evidence suggests that multimodal training interventions may improve multiple performance skill areas and functional activity performance in people with PD. The research on multidisciplinary self-management and cognitive-behavioral interventions, which directly target occupational performance and participation (vs. impairments), is particularly encouraging in terms of effects on quality of life.

Interventions that address cognitive and psychosocial performance skills in people with PD have been understudied, although the need for effective interventions in these areas is well documented. PD has traditionally been classified as a movement disorder, but it is now understood that movement is only one of the functional domains affected by PD. In fact, nonmotor impairments may have

a greater impact on quality of life than motor impairments (Gallagher, Lees, & Schrag, 2010; Martinez-Martin, Rodriguez-Blazquez, Kurtis, & Chaudhuri, 2011; Schrag, Jahanshahi, & Quinn, 2000), with executive dysfunction and depression being particularly functionally limiting early in the disease (Foster & Hershey, 2011; Klepac, Trkulja, Relja, & Babić, 2008). Furthermore, neuropsychiatric symptoms and cognitive impairment are strong contributors to caregiver burden and nursing home placement in advanced disease stages (Aarsland, Larsen, Karlsen, Lim, & Tandberg, 1999; Aarsland, Larsen, Tandberg, & Laake, 2000).

Evidence related to the impact of nonmotor dysfunction in PD on occupational performance and participation is in the early stages compared with the evidence available for motor dysfunction. Occupational therapy researchers can make a unique contribution to rehabilitation for people with PD by generating this evidence and using it to expand the focus of intervention from motor dysfunction and its effect on basic self-care ADLs to cognitive and psychosocial issues and their potential impact on more complex areas of occupation (e.g., instrumental activities of daily living, work, social participation).

Evidence related to occupational performance and productive aging and occupational therapy interventions for other chronic neurodegenerative disorders (e.g., multiple sclerosis, Alzheimer's disease) is relevant for the population of people with PD. Interventions for populations with other diseases can be refined for PD by aligning the intervention more closely with current knowledge about the associations among pathology, body function, activity, and participation in PD. Rehabilitation research is beginning to demonstrate a more cohesive and deeper understanding of the importance of aligning activity and occupation interventions with basic and descriptive biopsychosocial research in PD. For example, partnered dancing to music is an intervention that combines current knowledge about exercise, cognitive and motor activity, interpersonal behavior, and environmental stimuli associated with neural and basal ganglia functioning. Recent work has suggested that in addition to benefiting physical function for people with PD (Duncan & Earhart, 2012), participation in a regular tango dancing class may result in increased engagement in daily life activities and roles (Foster, Golden, Duncan, & Earhart, 2013).

Rehabilitation intervention research in PD often is confounded with group intervention. Receiving intervention in a group context may be particularly healthful for this population, which is at considerable risk of daily life and health care stigmatization and social isolation (Tickle-Degnen et al., 2011). Indeed, people with PD

cite social interaction and support as motivators to participate in interventions (e.g., O'Brien, Dodd, & Bilney, 2008; Ravenek & Schneider, 2009). However, evidencebased practice should be guided by an understanding of the primary mechanism of change of interventions, and a major alternative explanation for many positive findings in the PD rehabilitation literature to date is that involvement in group interventions is beneficial for people with PD regardless of the content of the groups (e.g., Tickle-Degnen et al., 2010). Intervention studies that include active social- or attention-control conditions are needed to determine the primary active change agent of interventions. Future research should also attempt to determine which intervention approaches are best implemented in a group versus individual format and whether certain outcomes are differentially responsive to group versus individual interventions.

People with PD differ substantially in their various needs, and beginning evidence indicates that baseline differences in performance or needs affect responsiveness to rehabilitation. Research is beginning to address systematic variation in the intervention outcomes of people living with PD, and future work must address this issue more clearly in the designs and measurement protocols. In addition, rehabilitation for PD would benefit from a framework for appropriately matching intervention approaches with stage of disease progression, especially in light of the chronic and degenerative nature of PD. For example, newly diagnosed people and those in early stages of disease progression may benefit greatly from interventions that promote the integration of self-management habits and other healthy performance patterns (e.g., exercise, cognitive-behavioral strategies) into daily life. Intervention in the later stages of the disease might focus more on environmental modifications and caregiver education. Longer follow-up to assess maintenance of intervention effects is also needed.

### Limitations

The systematic reviews and primary studies included in this review have several limitations. Most of the systematic reviews did not use methods to determine effect sizes of the interventions that were included, and primary studies rarely provide this information. As a result, it is very difficult to determine the percentage of people who might benefit from the interventions. Most of the primary studies, including those indicated as Level I studies by the classification scheme, have low statistical validity because of low statistical power. This low power is created by sample sizes that are too small to measure the effect of the

intervention, measurement tools that may not directly test the underlying mechanism of change in the intervention, and intervention designs that are of insufficient intensity to produce the desired change.

Most intervention research relevant to occupational therapy and PD is being conducted by physical therapy researchers and is focused on improving or maintaining physical performance skills. Although the results thus far are positive and encouraging, these studies provide limited evidence that the beneficial effects of these interventions are lasting or generalize to improved function at the activity and participation levels. Interventions with an occupational performance or community living perspective are beginning to emerge and are promising in terms of addressing the complex needs of people with PD.

Occupational therapy researchers can make valuable contributions to rehabilitation for people with PD by developing interventions that build on an emerging understanding of PD as a multifaceted and heterogeneous chronic condition with motor and nonmotor effects. These interventions should address physical, cognitive, and psychosocial issues in the context of meaningful occupations in the home and community. Recently, occupational therapy researchers have conducted preliminary work for appropriately powered and large-scale Level I RCTs of occupational therapy intervention for PD (Clarke et al., 2009; Sturkenboom et al., 2013). This work will help establish occupational therapy as an integral part of care for people with PD.

# Implications for Occupational Therapy Practice

In summary, the findings of this review have the following implications for occupational therapy practice:

- Occupational therapy practitioners should encourage their clients with PD to engage in regular physical activity and can help them find appropriate and meaningful forms of physical activity to ensure continued engagement. More complex, multimodal forms of exercise with an interpersonal component may confer the broadest benefits.
- Practitioners can recommend a system of targeted external cues or supports that people with PD and their caregivers can implement to regulate physical performance during daily activities. A substantial amount of training and practice on the use of these supports would likely be necessary, and the long-term effects should be monitored because they are currently unknown.
- Practitioners should consider the impact of PD-related nonmotor dysfunction (e.g., cognitive impairment, depression) on occupational performance and participation.

- Practitioners should incorporate client-centered selfmanagement strategies into intervention with clients with PD to enhance self-efficacy and maintain participation in valued activities and roles, thus mitigating the negative effects of PD on health and quality of life.
- Practitioners can refine interventions from the aging or chronic neurological disease literature for people with PD. Examples of intervention approaches that seem particularly relevant are home modifications and fatigue management programs.
- Although individually tailored treatments in clients' natural environments are important for addressing daily function and independence, social support gained from being in a group setting with other people living with PD is likely beneficial for social participation and overall quality of life. Practitioners can guide their clients with PD toward community resources for this type of social interaction (e.g., programs provided by the American Parkinson Disease Association).

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