Incorporating Lifestyle Medicine Into Parkinson Disease Care

Evidence and Guidance for Clinical Practice

Lifestyle medicine strategies play an important role in managing Parkinson disease and empowering patients and their care partners.

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Parkinson disease (PD) affects ~10 million people worldwide, with anticipated increases in frequency, health care costs, and PD-related disability.[1,2] Medical and surgical treatments can ease symptoms, but proven therapies to slow or stop disease progression are lacking.

Lifestyle medicine (LM) is an evidence-based branch of conventional medicine that leverages daily activities as the primary treatment modality to prevent, treat, and reverse chronic disease. The pillars of LM are physical activity (PA); a whole-food, plant-predominant diet; restorative sleep; stress management; positive social connections; and avoidance of risky substances[3] (Figure 1). For people with PD, LM can amplify medication and surgical benefits, lessen symptoms, improve quality of life, and enhance empowerment.[4] LM may be helpful at all stages of PD, from mild to advanced disease, and may provide ways to delay or prevent disease onset.[5-8] Although long-term, randomized, controlled trials for LM for PD are limited, evidence for use in patient care is growing.[9,10] This article describes how LM applies to PD and offers recommendations for incorporating LM into clinical practice.

Figure 1. The pillars of lifestyle medicine.

Physical Activity and Exercise

PA refers to any movement resulting in energy expenditure.[11] Although often used interchangeably with physical exercise, PA includes not only planned and structured exercise, but also movement-related activities performed during leisure time, work, or household chores. In PD, physical activity and exercise are often diminished because of motor, cognitive, and mood changes; apathy; fatigue; autonomic dysfunction; or comorbidities.[12] One study found that lack of time, fear of falling, and low expectations of outcomes were perceived barriers to exercising in PD.[13]

Both PA and exercise can improve PD motor and nonmotor symptoms (eg, sleep, mood, cognition), as well as quality of life.[14,15] Numerous types of exercise have been studied in PD, including ones incorporating dual-task motor-cognitive training (eg, boxing), cross-body movement patterns (eg, boxing, Nordic walking), and socialization (eg, group classes).

EXERCISES FOR PEOPLE LIVING WITH PARKINSON DISEASE

	Aerobic	Strength	Flexibility	Balance
What does it do?	Supports heart, lung, brain and whole-body health	Builds muscle and strengthens bones	Allows joints and muscles to move more freely	Boosts stability
What are the benefits?	Better health and well-being, mood, memory, digestion, etc.	Improved movement and overall health, less risk of breaking bones	Healthier joints, less pain and injury risk	Smoother walking and less falling
What might it look like?	+ Brisk walking + Nordic walking, also called Urban Poling + Hiking + Jogging or running + Biking + Swimming or water aerobics + Martial arts + Skiing + Canoeing + Skating + Playing basketball, tennis, pickleball or other sports	+ Lifting weights + Working with resistance bands + Bodyweight exercises, like squats, push-ups or sit-ups + Heavy gardening, with digging and shoveling	+ Yoga + Pilates + Targeted stretching of upper body (neck, back, chest, trunk, arms) + Targeted stretching of lower body (hips, knees, ankles, feet)	+ Dance + Tai chi + Non-contact boxing + Ping-pong + Kayaking + Yoga + Pilates
How often should I do this?*	At least 3 days per week 30 to 40 minutes per session Moderate to vigorous intensity (See page 20)	At least 2 to 3 non-consecutive days per week 30 to 60 minutes per session	At least 2 to 3 days per week (daily, if possible) For major muscle groups, hold 30 seconds and repeat 2 times	At least 2 to 3 times per week (the more, the better) 30 to 60 minutes per session

*Adapted from the American Physical Therapy Association and the American College of Sports Medicine exercise guidelines for Parkinson's.

Figure 2. Parkinson disease exercise recommendations.
Adapted from The Michael J. Fox Foundation for Parkinson's Research's Make Your Move: Exercise for brain health and life with Parkinson's 2024 (michaeljfox.org/exerciseguide).

PA recommendations for people with PD are based on American Heart Association guidelines,[16] but also may incorporate flexibility, balance, agility, and multitasking (Figure 2). Unanswered questions remain regarding the best type, frequency, and setting of exercise for people with PD. PA and exercise can be performed in many ways: individually or in groups, with guidance from trained professionals, ambulatory or seated, in person or virtually, and with or without equipment. People with PD should be encouraged to focus on activities that are enjoyable and safe and incorporate motor and cognitive aspects.

Exercise may have both symptomatic and disease-modifying effects on PD.[17] A longitudinal study found that regular exercisers at baseline had not only better quality of life and physical function, but also less disease progression, cognitive decline, and caregiver burden 1 year later.[18] In a population-based cohort study, PA, along with a healthy diet, was associated with a lower rate of all-cause mortality among people with PD.[19]

Exercise benefits may relate to increased dopamine or neurotrophic factors (eg, brain-derived neurotrophic factor [BDNF]), improved neuroplasticity, or targeted neurovascular or neuroinflammatory mechanisms.[20,21] Imaging studies in PD reveal brain changes with exercise; in one study, after a 6-month exercise program, the expected decrease in dopamine transporter availability and neuromelanin content on imaging was reversed in participants with early PD.[22,23] In addition, PA and exercise may play a role in disease prevention. Greater total daily PA in older adults was associated with reduced risk of parkinsonism and slower progression in one study; in another study comparing people with incident PD and controls, those who consistently engaged in high levels of PA had a 51% lower PD risk than those with low levels of PA.[24,25]

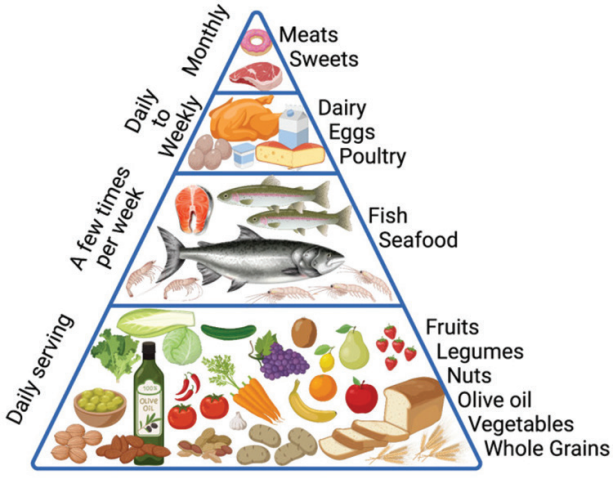

Figure 3. Mediterranean diet.
Adapted from Bisaglia M. Mediterranean diet and Parkinson's disease. Int J Mol Sci. 2022;24(1):42.27

Figure 4. Mediterranean–Dietary Approaches to Stop Hypertension Intervention for Neurodegenerative Delay (MIND) diet.
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Whole-Food, Plant-Predominant Diet

Diet refers to an individual's pattern of eating, or the foods regularly consumed. Diet can shape the gut microbiome, which includes bacteria, fungi, and viruses in the gastrointestinal tract that contribute to immune health, vitamin synthesis, metabolism, and other processes. The gut microbiome composition and function differ in people with PD compared with those without PD. In people with PD, there is evidence of reduced numbers of microbes producing short-chain fatty acids, which have anti-inflammatory properties and help maintain gut epithelial lining, and thus, a shift toward a proinflammatory state in PD.

The Mediterranean diet and the Mediterranean–Dietary Approaches to Stop Hypertension Intervention for Neurodegenerative Delay (MIND) diet are associated with improved gut microbiome, enhanced medication benefit, reduced symptom severity, and potentially slower PD progression.[27] Both diets focus on whole, unprocessed or minimally processed foods, including vegetables, fruits, whole grains, and legumes. The diets allow fish and red wine in moderation, but limit sweets, red meat, and dairy (Figures 3 and 4).

In small, short-term randomized controlled trials, the

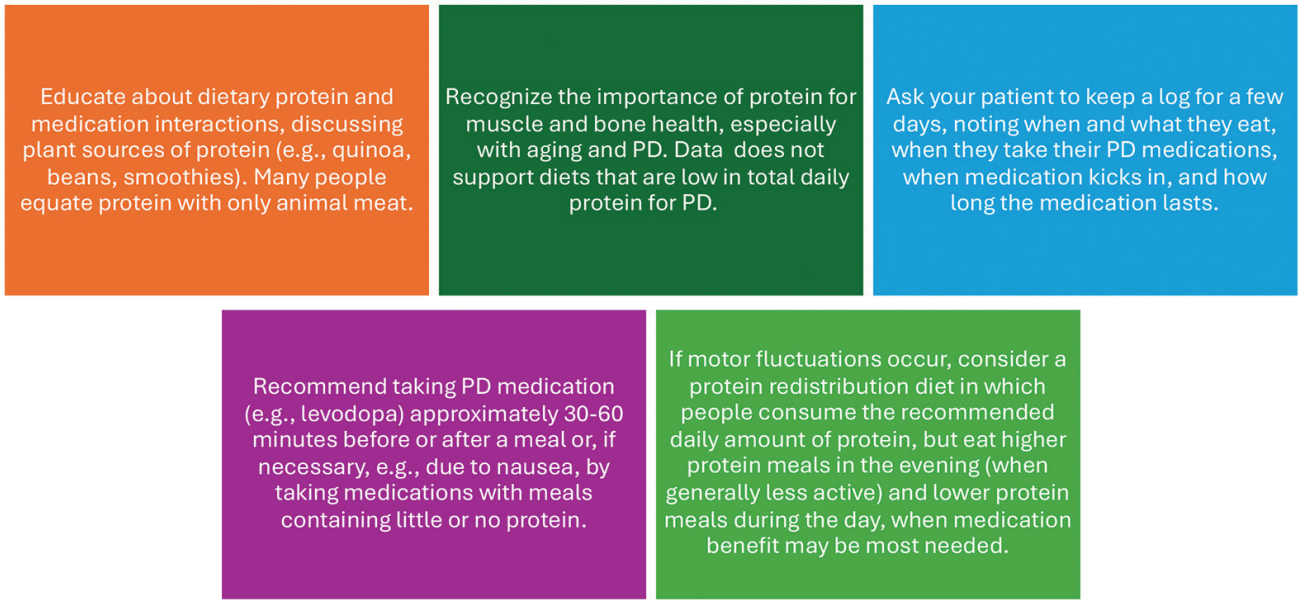

Figure 5. Addressing dietary protein and levodopa interactions in Parkinson disease.

Mediterranean diet led to decreased constipation[28] and improved cognition[29] in people with PD. In observational studies evaluating outcomes reported by people with PD, an association was shown between both diets and slowed PD progression,[30] with one study suggesting greater improvement with the MIND diet over the Mediterranean diet.[31] For people at risk of PD, observational studies have linked these diets to lower rates of PD diagnoses and later age at onset.[32,33] Potential mechanisms of action include antioxidant and anti-inflammatory effects, downregulation of metabolic disease pathways, and positive gut microbiome changes.[27]

Few data are available on the contribution of specific food sources to PD. One observational study noted an association between intake of dairy products (eg, yogurt, ice cream) and faster disease progression[30]; another found a link between frequent low- or no-fat milk intake and PD diagnosis.[34]

The Mediterranean and MIND diets can be modified, with the help of speech language pathologists or dietitians, to address symptoms such as dysphagia, smell loss, "off" time, or motor fluctuations. Interactions between dietary protein and levodopa may contribute to the latter, necessitating separation of medications from meal times (Figure 5).

Restorative Sleep

Sleep dysfunction in PD, which is frequent across all disease stages, includes disturbances of sleep (eg, insomnia, sleep-related movement disorders, sleep-disordered breathing, parasomnias, rapid eye movement sleep behavior disorder [RBD]), wakefulness (eg, excessive daytime sleepiness), and circadian rhythms.[35] Sleep disruption in PD is multifactorial, including neurodegeneration in sleep-regulatory pathways, dysregulation of key neurotransmitters and clock genes, motor and nonmotor symptoms, drug side effects, and primary sleep disorders. Environmental effects (eg, light-dark cycles) may contribute to sleep dysfunction, given circadian system neurodegeneration, dysfunction in hypothalamic suprachiasmatic nuclei and retinal dopaminergic-containing cells, and altered melatonin levels.[36]

Poor sleep in PD may worsen cognitive, emotional, and functional performance; impair driving and activities; predispose to falls and safety risks; and decrease quality of life for individuals and caregivers.[37] However, some people with PD experience sleep benefit, in which they awaken in the morning or after naps with improved motor function, hypothesized to relate to increased dopamine release during sleep or certain genetic mutations, such as Parkin or PINK1.[38]

Management of sleep disturbances depends on the problem being experienced, and referral to a sleep specialist may be helpful. Addressing sleep hygiene is essential. Incorporating lifestyle modifications highlights the interconnectedness of sleep with one's environment, nutrition, exercise, and stress management (Figure 6). Exercise can improve sleep time, phase, and quality, with potential mechanisms involving toxin clearance, increased neurotrophic factors (eg, BDNF), or reduced neuroinflammation.[36] Cognitive behavioral therapy for insomnia, based on changing dysfunctional behaviors and thinking patterns contributing to sleep disruption, has been used successfully in the general population but has not been well studied in PD. Two small studies have revealed improved sleep measures with cognitive behavioral therapy.[39] Other treatments may include medications (eg, for nighttime PD symptoms, restless legs symptoms, RBD, insomnia, daytime

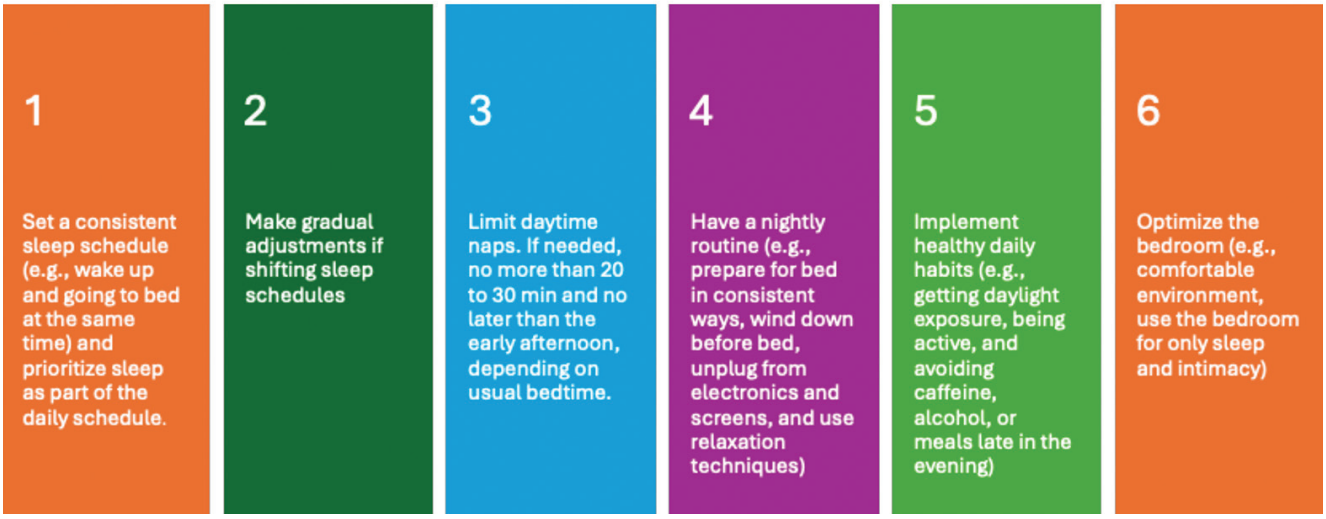

Figure 6. Improving sleep hygiene. Data from Suni E, Rosen D. Mastering sleep hygiene: your path to quality sleep. Updated March 4, 2024. https://www.sleepfoundation.org/sleep-hygiene.[40]

sleepiness) or positive-airway pressure devices for sleep apnea. Although the Sleep Foundation recommends that adults sleep for at least 7 hours each night, the optimal length can vary with age, personal needs, and sleep quality.[40]

RBD can precede synucleinopathies, including PD. However, whether sleep disturbances in the general population are linked to increased risk of PD is not clear. Some population-based studies suggest that worse sleep quality and shorter sleep duration may be associated with a higher risk of developing parkinsonism.[41] Whether disease-modifying therapies, including lifestyle modifications, in people with RBD could prevent neurodegenerative disease or slow progression is unclear.

Stress Management

In one survey, people with PD reported a higher level of stress (ie, a state of worry or mental tension) than people without PD, and higher stress level was linked to a lower quality of life.[42] Acute stress can worsen motor and nonmotor symptoms, especially tremor, freezing of gait, dyskinesia, sleep problems, and depression. Stress also may reduce dopaminergic medication effects.[43] Chronic stress is associated with anxiety and depression in PD.[42] Chronic stress can elevate glucocorticoid levels, which may decrease BDNF and increase inflammatory factors, causing hippocampal and amygdala structural changes and striatal dopaminergic dysfunction. These changes could increase psychologic distress and contribute to disease progression.[44-46]

In the aforementioned survey, >80% of people with PD used physical exercise to manage stress. Nearly 40% used mindfulness (ie, nonjudgmental awareness of the moment) and reported symptom improvement.[42] One meta-analysis of mindfulness and meditation trials in PD showed improved motor symptoms and cognitive function[47]; another analysis suggested decreased levels of anxiety and depression.[46] The mechanisms of the mindfulness benefit are unclear but may include BDNF increases or remodeling of neural networks involved in PD.[48,49]

Mindfulness allows an individual to self-manage and adapt to PD symptoms and other stressors. There are many ways to practice mindfulness, including meditation, yoga, journaling, prayer, reading, or engaging with creative endeavors. Additional methods to decrease stress levels include exercise, mental health counseling and treatment (including medications for anxiety or depression), or talking with loved or trusted ones.

Positive Social Connections

Meaningful social connections can raise resilience to stress,[50] mitigate loneliness, and potentially reduce dementia risk in the general population.[51] Loneliness—the feeling of being socially disconnected even in the presence of others or in relationships—is associated with an increased risk of PD.[52] In addition, having PD is associated with an increased risk of loneliness.[53] Loneliness can occur through all PD stages, but may increase for both people living with PD and their loved ones around the time of diagnosis and with disease progression. Loneliness is associated with greater individual-reported symptom severity and poorer quality of life.[54]

Stigma regarding PD motor and nonmotor symptoms can lead to social withdrawal. For example, tremor, drooling, and slowness may cause social embarrassment, and speech and cognitive changes along with masked facies can affect communication. PD symptoms can affect relationships and lead to early workforce departure.[55] Furthermore, psychological stress associated with loneliness can negatively affect lifestyle

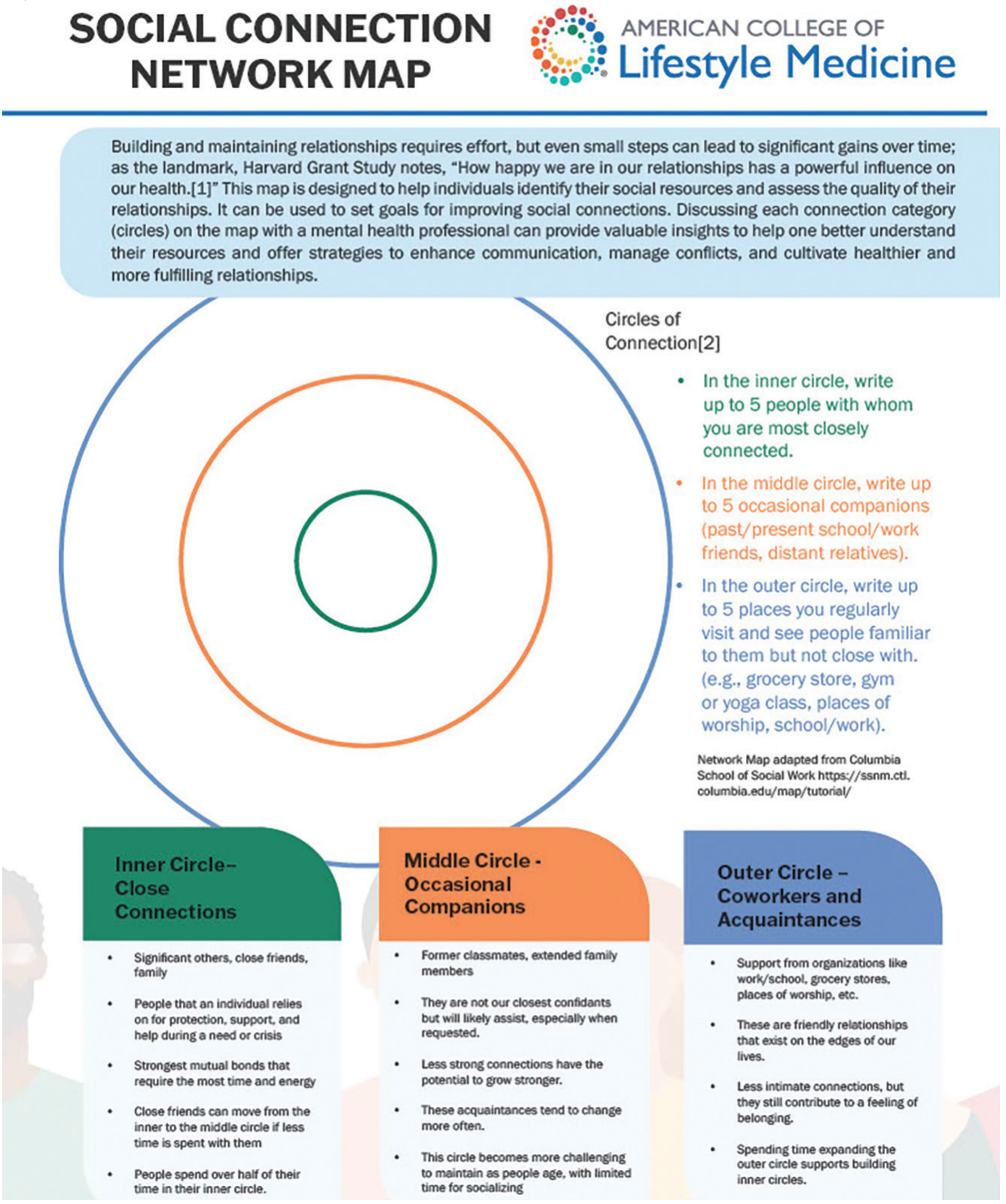

Figure 7. Mapping social connections.
The American College of Lifestyle Medicine offers a toolkit to help evaluate and maximize connections. Create a free account and download the kit at https://connect.lifestylemedicine.org/resources/resource-landing-page

choices (eg, reduced physical activity, poor nutrition).

Maintaining social connections invokes 3 spheres: intimate (eg, marriage, emotional partner, close confidant), relational (eg, a close friendship), and collective (eg, belonging to a group with a shared purpose or interest). Many people with PD and their care partners create positive connections within the PD community through activities such as support groups, online chat forums, exercise classes, research participation, fundraising, or advocacy. Others may connect with their local community through volunteer work, social hobbies (eg, book club) or faith-based activities.

People with PD and their care partners should be encouraged to build personal support networks as part of the care plan, emphasizing quality of connections over quantity (Figure 7). Social prescribing (ie, providing referrals to resources and community activities that foster connection) may leverage expertise from social workers, occupational therapists, recreational therapists, and others.[56, 57]

Avoidance of Risky Substances

In LM, avoidance of risky substances typically focuses on cigarette smoking, alcohol, and illicit drugs. Whereas cigarette smoking remains a leading cause of morbidity and mortality, epidemiologic studies support an inverse association between cigarette smoking and PD risk, with current and former smokers having lower risks of developing PD compared with nonsmokers.[58,59] Whether nicotine or other chemicals in cigarette smoke affect neurodegeneration requires further study, although the health risks associated with cigarette smoking and use of nicotine products are well known.

Regarding alcohol consumption in PD, a systematic review revealed an overrepresentation of never drinkers among people with PD, and most studies do not support an association between alcohol consumption and PD risk.[60] Drugs of abuse such as amphetamine have been associated with increased PD risk and may act by means of neurotoxic effects on the nigrostriatal system.[61] Conversely, phytocannabinoids may have a neuroprotective role in PD, and the endocannabinoid system is involved in central nervous system development and synaptic plasticity. Additional research is needed regarding use of cannabis products in PD. In one survey, 73% of respondents reported medicinal use; improvements in pain, anxiety, agitation, and sleep were reported, as were side effects of dry mouth, dizziness, and cognitive changes.[62] Caffeine—one of the most frequently consumed psychoactive substances—may have a neuroprotective effect in PD, acting potentially through adenosine A2A receptor blockade and related genetic polymorphisms.[63] As such, coffee drinking has been found to confer a lower risk of PD in cohort and case-control studies, with a meta-analysis suggesting a 30% reduction in risk.[64]

Environmental toxins (eg, pesticides, contaminated well water, air pollution, metal ions) are also potential risk factors for PD, with possible effects on dopaminergic neurons, oxidative stress, mitochondrial dysfunction, and neuroinflammation.[4] Studying LM modifications for environmental exposures should be considered for PD risk reduction.

Future Directions

LM strategies play an important role in managing PD and empowering patients and their care partners. Greater understanding of the effects of lifestyle modifications on the symptoms and pathobiology of PD, optimal ways to implement LM activities, and potential contributions of LM to reducing PD risk or slowing progression are needed. Enhancing resources and support systems devoted to LM will enhance benefit and implementation.

Select Resources

Lifestyle Medicine

- Lifestyle medicine: 6 ways to take control of your health: lifestylemedicine.org/wp-content/uploads/2023/06/Pillar-Booklet.pdf
- American College of Lifestyle Medicine: lifestylemedicine.org

Physical Activity and Exercise

- Make your move: Exercise of brain health and life with Parkinson's: michaeljfox.org/exerciseguide
- Parkinson's Foundation: parkinson.org/sites/default/files/documents/professional-exercise-guidelines.pdf
- Physical activity: cdc.gov/physicalactivity
- Guide to overcoming exercise barriers in Parkinson's 2024: parkinsonseurope.org/app/uploads/2024/05/Guide-to-overcoming-exercise-barriers-in-Parkinsons-2.pdf
- American Heart Association recommendations for physical activity in adults and kids: heart.org/en/healthy-living/fitness/fitness-basics/aha-recs-for-physical-activity-in-adults

Diet

- Brain food: Eating well if you have Parkinson's (or worry you might get it): michaeljfox.org/dietguide

Sleep

- Sleep Foundation: sleepfoundation.org

Stress

- PD health @ home: parkinson.org/resources-support/online-education/pdhealth

Social Connections

- Parkinson's buddy network: parkinsonsbuddynetwork.michaeljfox.org ■

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