

Exercise is Medicine for People with Parkinson's Disease

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TINAZ LAB
<https://medicine.yale.edu/lab/tinaz/>

ARTICLE

OPEN



Intense exercise increases dopamine transporter and neuromelanin concentrations in the substantia nigra in Parkinson's disease

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SUMMARY:

<https://medicine.yale.edu/news-article/high-intensity-exercise-can-reverse-neurodegeneration-in-parkinsons-disease/>

Objectives

- Definitions
- Exercise recommendations
- Examples
- Goal-setting
- Survey results

Definitions

Physical activity: Any bodily movement produced by skeletal muscles that uses energy

Physical therapy: Individualized, therapist-guided treatments focused on specific motor or functional goals

Physical exercise: Planned, structured, repetitive, purposive physical activities aimed at maintaining / improving physical fitness

Intensity

High-intensity: 80-85% of age-appropriate maximum heart rate (HRmax) for 30 min

Moderate-intensity: 60-65% of age-appropriate HRmax for 30 min

HRmax:

1) $220 - \text{age}$

Example: HRmax of a 70 year-old person is 150 beat per minute (bpm).

High-intensity goal: 120 - 128 bpm

Moderate-intensity goal: 90 - 98 bpm

2) $208 - (0.7 * \text{age})$

Example: HRmax of a 70 year-old person is 159 bpm.

High-intensity goal: 127 - 135 bpm

Moderate-intensity goal: 95 - 103 bpm

Intensity, *continued*

HR zone:

$$(\text{HRmax} - \text{HRrest}) \times \text{Intensity\%} + \text{HRrest}$$

Start with lower intensity of 50%, gradually progress to higher intensity of 80%

Not everyone can reach these high HR targets

High intensity is not safe for everyone!

Intensity, *continued*

Borg Scale - Rating of perceived exertion (RPE)

RPE Scale	Rate of Perceived Exertion
10	Max Effort Activity Feels almost impossible to keep going. Completely out of breath, unable to talk. Cannot maintain for more than a very short time.
9	Very Hard Activity Very difficult to maintain exercise intensity. Can barely breath and speak only a few words
7-8	Vigorous Activity Borderline uncomfortable. Short of breath, can speak a sentence.
4-6	Moderate Activity Breathing heavily, can hold short conversation. Still somewhat comfortable, but becoming noticeably more challenging.
2-3	Light Activity Feels like you can maintain for hours. Easy to breathe and carry a conversation
1	Very Light Activity Hardly any exertion, but more than sleeping, watching TV, etc

Exercise is Medicine®: A Global Health Initiative managed by the American College of Sports Medicine

<https://www.exerciseismedicine.org/>

- Make physical activity assessment and promotion a standard in clinical care
- Connect health care with evidence-based physical activity resources for people everywhere and of all abilities.
 - **Start where you are**
 - **Use what you have**
 - **Do what you can**

Parkinson's Exercise Guidelines

Exercise recommendations should be tailored to the client's ability, medication status, and stage of disease following health screening.

	Aerobic Activity	Strength Training	Flexibility	Neuromotor/Functional Training Balance, Agility, & Multitasking (BAM)
Frequency	At least 3 days/week	At least 2-3 non-consecutive days/week	At least 2-3 days/week, with daily being most effective	At least 2-3 days/week, with daily integration as possible
Time	At least 30 minutes of continuous per session. Interval training may be considered.	Build to 30-60 minutes per session.	Static Stretching: Hold each major muscle group for 15-30 seconds. Dynamic Stretching: Actively move muscles and joints for 15-30 seconds.	Build to 30-60 minutes of focused BAM activity per session. May integrate with other exercise domains or activities of daily living.
	Consider activities that combine domains to efficiently reach at least 150 minutes of exercise per week.			
Intensity	Start at moderate intensity: 60-65% HRmax (HRmax=220-(0.7*age)) or Rate of Perceived Exertion (RPE) 12-13/20 or 3-4/10. Progress over time (8-12 weeks) to vigorous intensity: 75-85% HRmax or RPE 14-17/20 or 5-7/10, when physiologically appropriate and safe. Teach client to self-monitor.	Start at a comfortable weight that client can lift for 10 repetitions to fatigue. Progress to 2-3 sets of 8-10 repetitions to fatigue while maintaining integrity of movement.	Full extension, flexion, or rotation stretch to the point of slight discomfort. For static stretch: 2-3 repetitions of each stretch. For dynamic stretch: 8-10 movements in each direction. Progress range of motion and static hold as client can tolerate.	Appropriate challenge delivered in a safe manner given the setting (individual or group). Progress time, motor, and cognitive challenges as client improves.
Type	Prolonged, rhythmic activities using large muscle groups (e.g., brisk or incline walking, running, fast cycling, swimming, rowing, elliptical, dancing).	Major muscle groups of the upper and lower body and core using weight machines, resistance bands, or body weight. Include both flexor and extensor muscles. Consider circuit training and resistance training with balance challenges.	Static Stretching: All major muscle groups after exercise. Dynamic Stretching/Active Range of Motion: Prior to intense aerobic and strengthening exercise. Include diaphragmatic breathing and meditation.	Balance: Static and dynamic balance activities include single leg stand, weight shifting, reaching, multi-directional large amplitude movements, and functional training (e.g., steps, floor-to-stand, sit-to-stand, using varied surfaces, perturbations). Agility: Activities that move the body quickly in different directions (e.g., multi-directional stepping, turning, backwards walking, obstacles, sport, dance). Multitasking: Primary motor activity (e.g., walking, balance) with secondary motor (e.g., carrying, head turns, bounding ball) or cognitive task (e.g., counting, listing, recall).
Parkinson's-Related Considerations	Prioritize safety (i.e., ambulatory status, physical assistance, equipment). Risk of freezing of gait, or dystonia that can be worsened with exercise. Consider comorbidities (e.g., musculoskeletal, cardio-respiratory & cognitive). Risk of Parkinson's related autonomic dysfunction, including orthostatic hypotension, blunted heart rate response to exercise, and arrhythmias associated with PD or medications. Recommend using RPE to monitor intensity for PoP with blunted HR response to exercise.	Prioritize posture and body mechanics. Dystonia and dyskinesia may impact exercise selection. Progress with increasing weights. Use free weights with caution. Consider comorbidities (e.g., spinal stenosis, osteoporosis, osteopenia, arthritis & injuries).	Consider rigidity (stiffness) & dystonia (fixed posture) and general worsening of fixed posture with disease progression. Consider comorbidities (e.g., osteoporosis, pain, arthritis and spinal stenosis).	Consider safety, anticipate needs for supervision or assistance due to varied physical ability, cognitive engagement, and attention. Allow upper extremity support when needed. Consider comorbidities (e.g., peripheral neuropathy, cognitive decline, orthostatic hypotension) and risk of freezing of gait.
Time Management	Time allocations per domain of exercise can be exerted with creativity and utilizing time management skills. For example, while aerobic activity is recommended for at least 150 minutes/week, one can incorporate circuit training with other domains of exercise.			

Exercise type	Examples	How often	How long	How intense
Aerobic	Brisk walking, running, elliptical, cycling	3 days/wk	30 min per session	Moderate -> high
Strength training	Weights, resistance bands, body weight	2-3 days/wk (nonconsecutive)	30 min per session	10 reps of comfortable weight -> 2-3 sets of 8-10 reps
Flexibility	Static: Stretch major muscles and hold Dynamic: Neck roll, spinal twist, cat-cow	2-3 days/wk	Static: 15-30 s Dynamic: 15-30 s	Static: 2-3 reps Dynamic: 8-10 reps
Neuromotor /functional training	Functional (sit-to-stand, floor-to-stand) Balance (yoga, tai-chi) Agility (dance, sports) Multi-tasking (walk-bounce ball, jump-count backwards)	2-3 days/wk	30 min per session	-

Examples

Jill is 65 years old, diagnosed with PD 1 year ago. She has always been physically active. She is retired but volunteers at the community center.

- Runs on treadmill for 30 min, x3 per week, starts and ends with 5 min stretching. In nice weather, instead of running on treadmill she jogs outside.
- Goes to the local gym x2 per week where she lifts weights and boxes.
- Takes tai-chi classes x2 per week.

Mike is 70 years old, diagnosed with PD 10 years ago. He is retired and has been exercising since his diagnosis.

- Rides his peloton bike for 15 min on weekdays.
- Goes to HIIT classes x2 per week where he also works with weights.
- Plays golf whenever he can and enjoys long walks in the neighborhood.
- Does balance and flexibility exercises once a week.

Sarah is 45 years old, diagnosed with PD 3 years ago. She works fulltime and has young children.

- Every morning before going to work, she jogs with family dog for 15 min, then uses the rowing machine and free weights for 15 min.
- Plays pickleball with her family every Saturday.
- Takes a yoga class every Sunday.

John is 75 years old, recently diagnosed with PD. He does not have much experience with exercise and has been having balance problems.

- Started going to PT x3 per week. They work on his balance, flexibility, and functional mobility.
- Takes brisk walks for 30 min x3 per week with his wife using walking poles that help him with balance and speed.
- His PT said that free weights may not be safe for him, so he uses resistance bands in a seated position for strength training x2 per week.

Goal-Setting

SMART

Specific

✗ Walk more ✓ 10 min of brisk walking every morning

Measurable

Duration, number of sets, number of repetitions

Achievable

5 min of brisk walking, 1 set of 10 jumping jacks

Relevant

To build up my aerobic exercise capacity

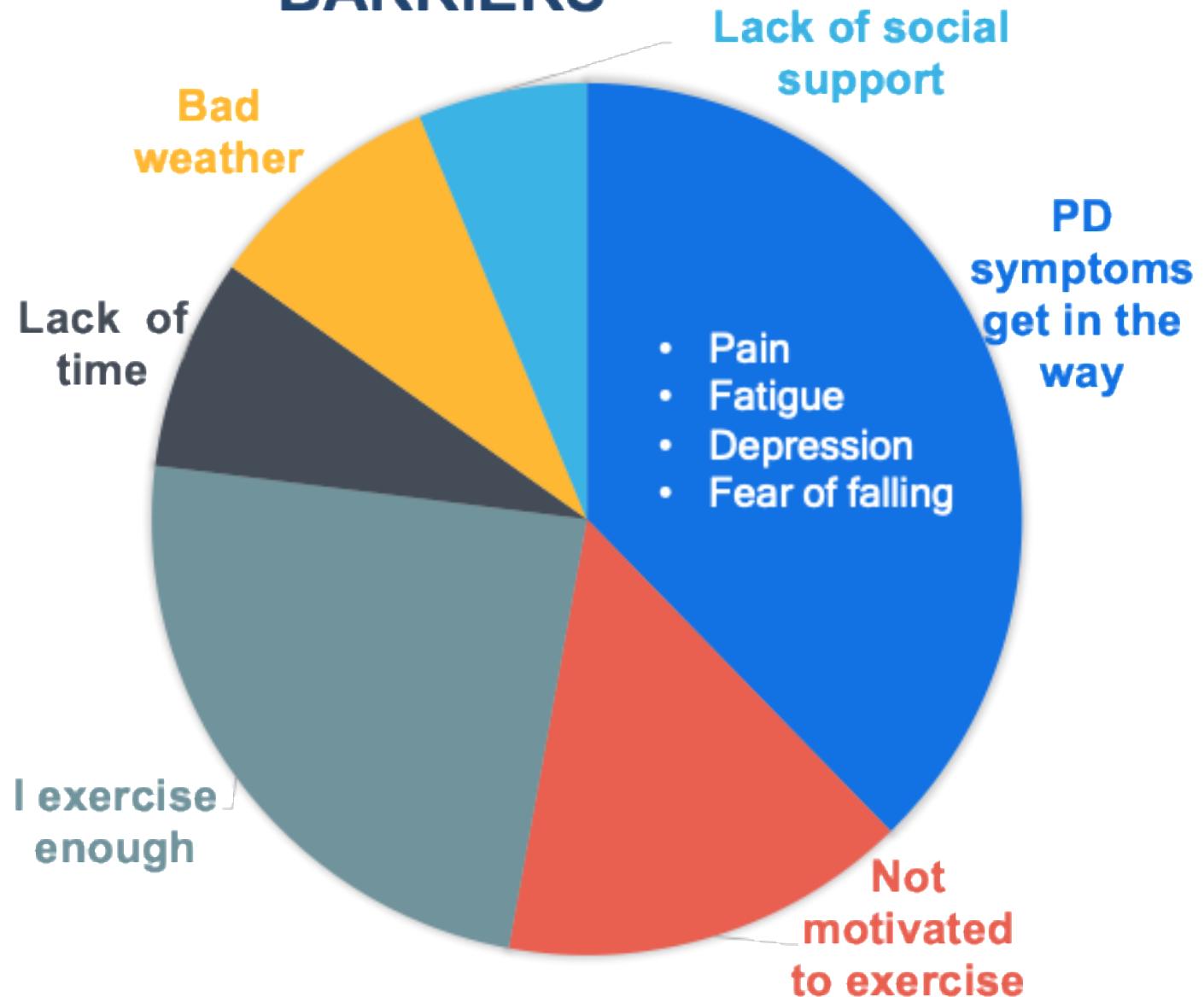
Time-bound

2 weeks

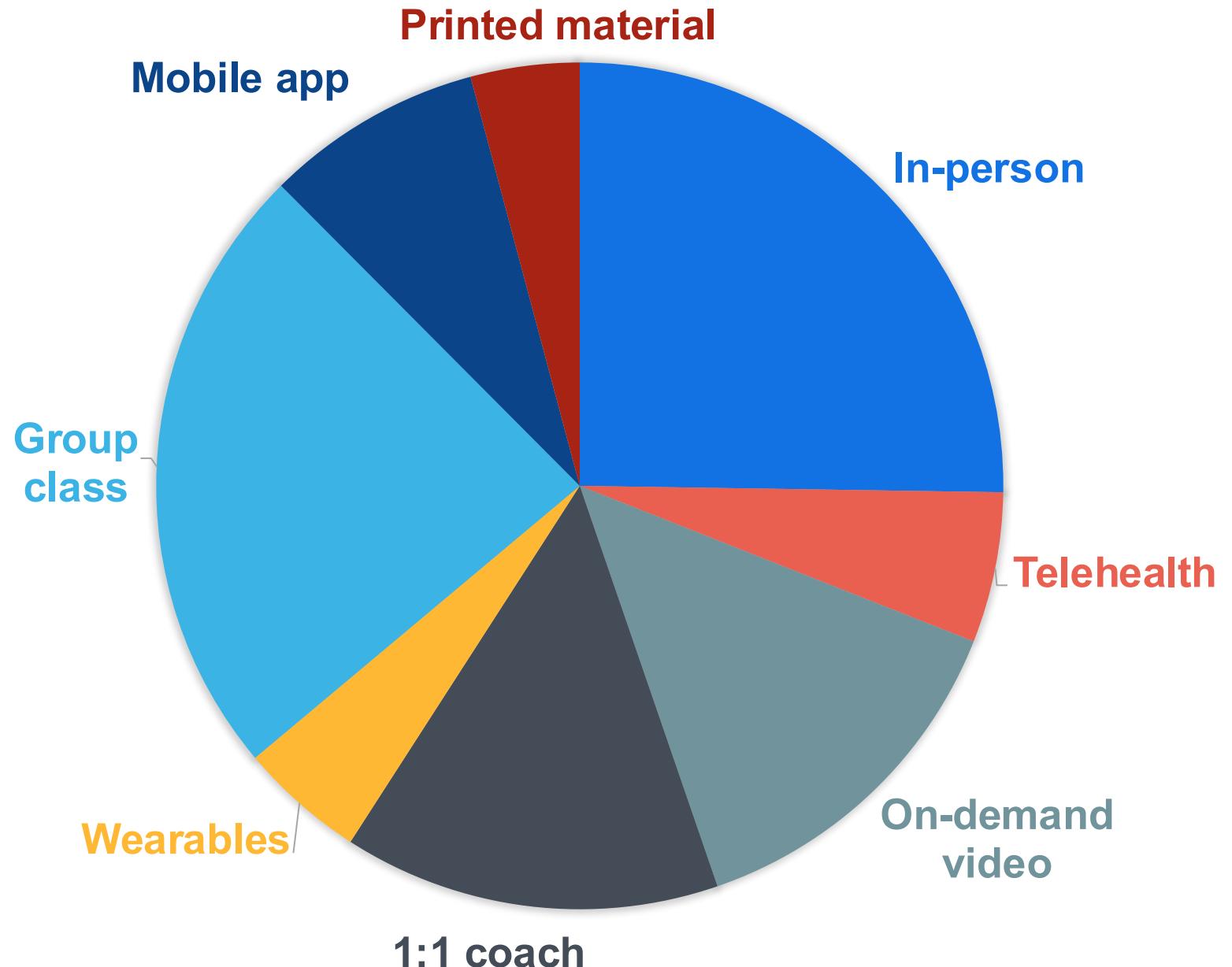
Survey on exercise habits

Age	70 ± 7 years
Sex	60M, 72 F
Race/ethnicity	95% W, 98% NH
Education	86% college and above
Employment	78% retired
Marital status	77% married
Housing	82% single-family home

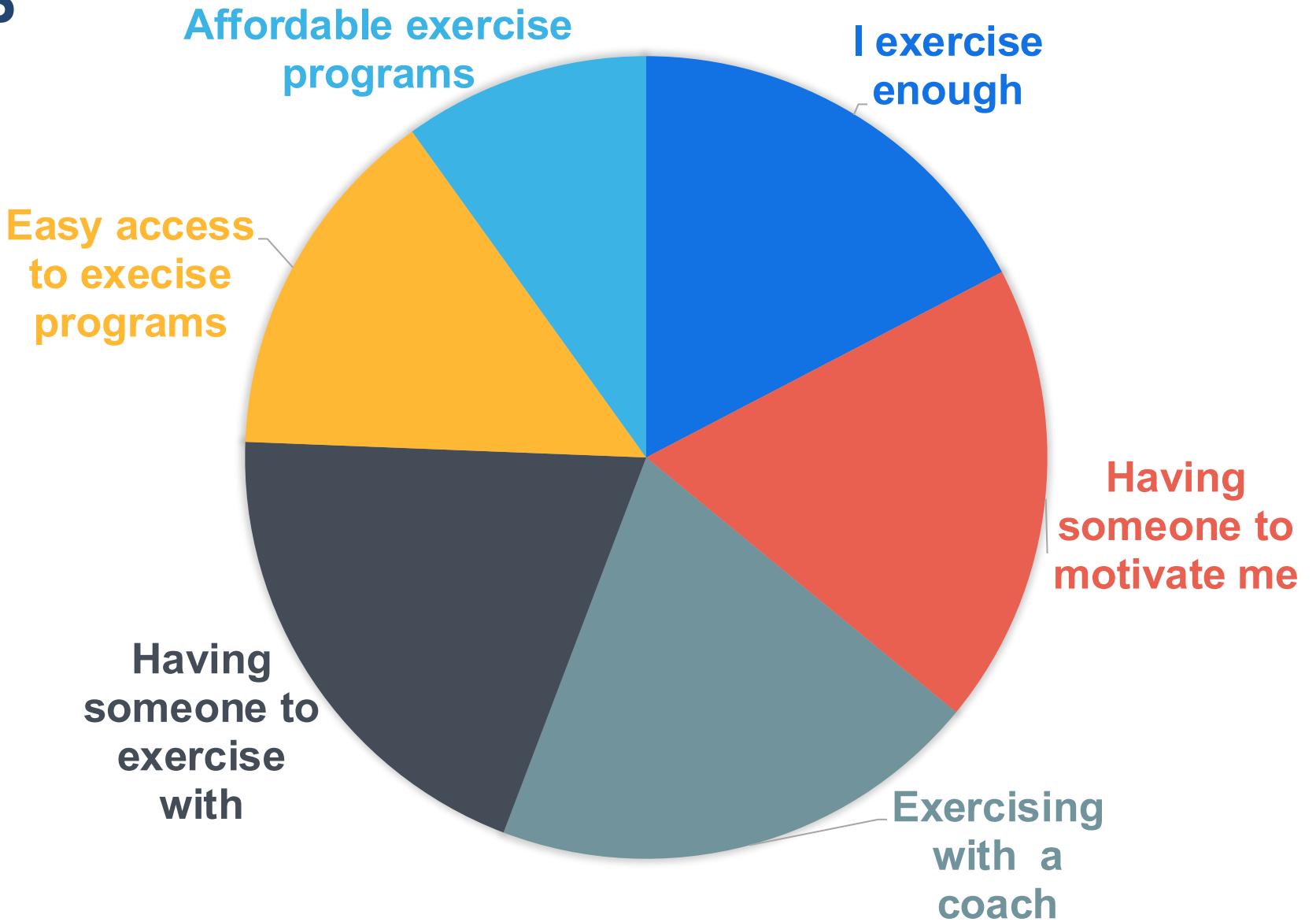
BARRIERS



PREFERRED EXERCISE FORMAT



WHAT WILL HELP YOU EXERCISE MORE?



ANONYMOUS YALE EXERCISE SURVEY

https://yalesurvey.ca1.qualtrics.com/jfe/form/SV_3Q9ramN1Ne9csF8

