

## Canadian Disability Participation Project



The Canadian Disability Participation Project (CDPP) is an alliance of university, public, private, and government sector partners working together to enhance community participation among Canadians with physical disabilities. For more information about this document and other CDPP resources, visit [www.cdpp.ca](http://www.cdpp.ca).



## Disability and Exercise Training: A 6-Step Companion Guide

The goal of this guide is to act as a resource for anyone who prescribes or discusses physical activity with persons with disabilities, including health care professionals (e.g., physicians, physical and occupational therapists), exercise professionals, and individuals who work in recreational programs (e.g., group fitness instructors). It outlines 6 steps professionals can follow to prescribe physical activity for persons with disabilities in a way that promotes **quality participation**.

**Quality participation** can be conceptualized as one's subjective participatory experience and is the result of repeated and sustained quality experience. Six building blocks contribute to a positive quality experience for persons with disabilities:

1. **Autonomy:** having independence, choice, control;
2. **Belongingness:** feeling included, accepted, respected;
3. **Challenge:** feeling appropriately tested;
4. **Engagement:** being in-the-moment, focused, absorbed, fascinated;
5. **Mastery:** feeling a sense of achievement, accomplishment, competence;
6. **Meaning:** contributing toward obtaining a personal or socially meaningful goal; feeling a sense of responsibility to others.

# Step 1: Communicating and Gathering Information



When communicating with a client, take a participant-centred approach. This means acknowledging that the participant has unique knowledge and skills, and should play an active role in building their exercise program.

## A participant-centred approach:

- Aligns with the biopsychosocial model
- Aligns with the principles of **quality participation**
- Emphasizes that while the professional has expertise, they are not the expert
- Creates a **relational space**

## What is a relational space?

A relational space encourages professionals to 'inter-view,' not 'interview,' and promotes ongoing (self) questioning. Rather than treating consultations as assessments, relational spaces encourage reciprocity with participants. By approaching clients in a conversational way and engaging in ongoing (self) questioning, professionals can create an environment that fosters vulnerability, confidence, expertise, and **quality participation**.

To build rapport and balance power dynamics during the initial assessment phase, reframe pre-assessment questions in alignment with the **biopsychosocial approach**:

## Rather than asking:

*What is your diagnosis? Do you have difficulty holding, gripping, or turning things? Does your disability limit your opportunities? Does your health/disability limit your transportation options?*

## Ask:

*How does the activity space impact your participation? How can the activity or exercise space be set up to enhance your participation? How does your instructor's attitude limit or enhance your participation? What design flaws make it difficult for you to hold, grip or use exercise equipment?*

The initial questions are rooted in a **medical perspective**—they are framed to focus on the individual, implying that the individual, their ability, their appearance, etc. is the problem. By reframing pre-assessment questions, you are shifting the focus from the individual to addressing the external barriers affecting their access to physical activity.



Before meeting with a participant, ensure your knowledge of disability language and models is up to date and remember—when in doubt, ask!

# Step 1: Communicating and Gathering Information Continued

Other questions professionals can ask during the initial meet and greet include:

- How do you prefer to be active?
- What kind of equipment makes it easier for you to take part in exercise?
- With whom do you like to be active?
- What do you want me to know to make this a better experience?

These questions can guide programming and help determine what you can do as a fitness professional to facilitate a better exercise experience and encourage long-term adherence to exercise.

When communicating with a client during the initial meet and greet, there are a few resources that can help you gather information and promote **quality participation**:

- The **Measure of Experiential Aspects of Participation (MeEAP)**, available at [www.cdpp.ca](http://www.cdpp.ca)
- **Get Active Questionnaire (GAQ)**, available at [www.csep.ca](http://www.csep.ca)
- **Abilities for Active Living Questionnaire (ALA-Q)**, available at [www.csep.ca](http://www.csep.ca)

It is also important to discuss the **nature of the participant's disability, any secondary conditions or contraindications they experience, their mobility and function, their medications, the environment, and whether they experience cognitive/developmental impairment.**

Ensure that when you are asking the client questions, you are communicating in a way they will understand (e.g., client may use American sign language, or prefer visual image or written materials).

Finally, asking about the client's goals will lead to greater **quality participation**.

Below is an example of an existing resource, the **Measure of Experiential Aspects of Participation**, to help you gather information and promote **quality participation**.

## Guide to using the Measure of Experiential Aspects of Participation (MeEAP)

MeEAP was designed to be conceptually aligned with the six experiential aspects of participation among people with physical disabilities (i.e., autonomy, belongingness, challenge, engagement, mastery, and meaning)<sup>1</sup>. It was also designed to be relevant across the employment, mobility, sport, and exercise life domains.

Before responding to MeEAP items, it is important to first assess whether respondents participate in the four life domains. Here is how we defined the four life domains in the validation of the MeEAP:

**Employment:** Refers to all paid work you have done in the past year. If you have worked more than one job in the past year, please answer the following questions by thinking of your primary employment.

**Mobility:** Refers to moving or getting around from one place to another in your home and community (e.g., travelling from place to place, wheeling or walking; moving as a driver or passenger, using a bus, a taxi or a car).

**Sport:** Refers to your participation in informal, recreational, competitive, or high-level sport (e.g., individual and/or team-sport).

**Exercise:** Refers to your exercise activities (e.g., attending an accessible gym, doing exercise on your own).

For each life domain, respondents need to indicate if they participated in the domain, in one of two ways: (1) yes/no or (2) five options that assess the satisfaction in the amount of participation for each life domain. For example:

Based on the description above, do you participate in [mobility, employment, exercise, or sport] activities?

**Option 1:**

- A. Yes
- B. No

**Option 2:**

- A. Yes – as much as I want
- B. Yes – but more than I want
- C. Yes – but less than I want
- D. No – but I would like to
- E. No – and I do not want to

Respondents are only directed to MeEAP items for the life domains in which they participate. Specifically, respondents who answer A in Option 1, or A, B, or C in Option 2 for a life domain, will be directed to the MeEAP. Any other responses will not result in being directed to the MeEAP for that life domain.

<sup>1</sup>Martin Ginis, K. A., Evans, M. B., Mortenson, W. B., & Noreau, L. M. (2017). Broadening the conceptualization of participation of persons with physical disabilities: A configurative review of recommendations. *Archives of Physical Medicine and Rehabilitation*, 98, 395-402. doi: 10.1016/j.apmr.2016.04.017



Respondents rate their agreement with each MeEAP item using the following 7-point scale:

STRONGLY DISAGREE	DISAGREE	SOMEWHAT DISAGREE	NEITHER DISAGREE NOR DISAGREE	SOMEWHAT AGREE	AGREE	STRONGLY AGREE
1	2	3	4	5	6	7

**Stem:** When engaging in [employment/mobility/sport/exercise], I feel ...

1. I do what is desirable for me	1	2	3	4	5	6	7
2. Free to make my own choices	1	2	3	4	5	6	7
3. I fit in	1	2	3	4	5	6	7
4. Accepted by others	1	2	3	4	5	6	7
5. My skills match the level of difficulty of the activity	1	2	3	4	5	6	7
6. I get just the right amount of challenge	1	2	3	4	5	6	7
7. Entirely focused on what I am doing	1	2	3	4	5	6	7
8. That time passes very quickly	1	2	3	4	5	6	7
9. I can achieve my goals	1	2	3	4	5	6	7
10. Confident in my skills/abilities	1	2	3	4	5	6	7
11. A sense of purpose	1	2	3	4	5	6	7
12. A sense of responsibility to others	1	2	3	4	5	6	7

### SCORING THE MEASURE OF EXPERIENTIAL ASPECTS OF PARTICIPATION (MeEAP)

Autonomy	Average of items 1 & 2
Belongingness	Average of items 3 & 4
Challenge	Average of items 5 & 6
Engagement	Average of items 7 & 8
Mastery	Average of items 9 & 10
Meaning	Average of items 11 & 12

Caron, J. G., Martin Ginis, K. A., Rocchi, M., & Sweet, S. N. (2018). Development of the Measure of Experiential Aspects of Participation for people with physical disabilities. *Advance Online Publication, Archives of Physical Medicine and Rehabilitation*. doi:10.1016/j.apmr.2018.08.183 <https://doi.org/10.1016/j.apmr.2018.08.183>



[cdpp.ca](http://cdpp.ca)

## Step 2: Pre-Assessment Considerations and Contraindications

- 1 COMMUNICATING AND GATHERING INFORMATION
- 2 PRE-ASSESSMENT CONSIDERATIONS & CONTRAINDICATIONS
- 3 CONDUCTING FITNESS ASSESSMENTS
- 4 INTERPRETING AND USING ASSESSMENT RESULTS
- 5 PRESCRIBING EXERCISE
- 6 ADAPTING EXERCISE

Before conducting a fitness assessment, be prepared by understanding common considerations, contraindications, and physiological responses a participant might experience, as these may affect which assessment you choose.

### Considerations

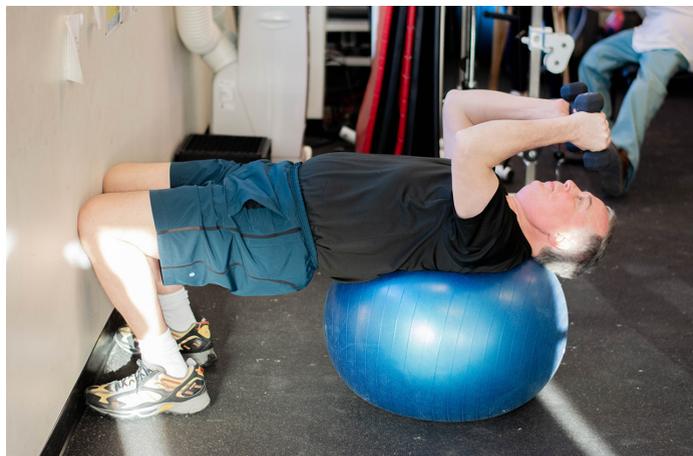
Common health considerations for everyone, whether they experience an impairment or not, include pain, discomfort, nausea, dizziness, chest pain, light-headedness, irregular heartbeat, and shortness of breath. These are the considerations that would typically terminate an assessment.

Considerations more common for individuals living with impairments include equipment transferring, medications, autonomic system dysregulation, orthostatic hypotension, thermoregulation, balance, fatigue, and allergies. Ensure you are aware of all the above considerations prior to conducting an assessment.

### Contraindications

A contraindication is a condition, symptom, or factor that serves as a reason to withhold treatment, procedure, or physical activity due to the harm it may cause someone.

Contraindications can be **relative**, meaning there are some risks to physical activity, but if adaptations, modifications, and considerations are made, the benefits still outweigh the risks.



Conversely, **absolute contraindications** are non-negotiable—if an absolute contraindication occurs, the risks of exercise outweigh the benefits, and no exercise is advised.



RELATIVE  
CONTRAINDICATION



ABSOLUTE  
CONTRAINDICATION

Common contraindications for persons with disabilities include **autonomic dysreflexia, contractures, shunts, pressure sores, seizures, blood clots, and atlantoaxial instability.**

## Step 2: Pre-Assessment Considerations and Contraindications Continued

### Physiological Responses

Before conducting a fitness assessment, consider persons with disabilities' differential physiological responses to exercise, particularly for heart rate (HR) and blood pressure (BP). High BP and HR cutoffs are generally the same as those for individuals without disabilities, but there are some exceptions, outlined below:

### Spinal Cord Injury

- For persons with **Spinal Cord Injury**, HR is 10 to 15 beats per minute (bpm) lower with upper body activity compared to lower body activity at the same intensity. Therefore, use an assessment protocol of 40-65% maximum HR as opposed to the standard 65-80%.

### Developmental Disabilities

- For persons with **developmental disabilities**, maximum HR is 8-20% lower than the age-predicted maximum, meaning these individuals fatigue more quickly.

### Asymmetries

- Persons with **asymmetries** may experience paralysis on one side of the body, meaning measurements must be taken on the opposite side of paralysis.

### Amputations

- For persons with **amputations**, measurements must be adapted to fit the individual. For example, if an individual has had bilateral upper body amputations, consider taking BP measurements at the popliteal fossa. To make this adaptation, you may need a larger BP cuff, and must also note that mid-thigh values may be 20-30 mmHg higher.

### Hypotension

Hypotension is also common among individuals with some types of disabilities. A BP reading of at least 80/50 mmHg is needed to exercise safely.

### Anthropometric Measurements

Anthropometric measurements include weight, height, Body Mass Index, and girth/skin fold measurements. When taking anthropometric measurements, adaptations may be needed to ensure measurements are accurate and the client is comfortable. For example, when measuring weight for a person with a wheelchair, a wheelchair scale may be used.

Above all, ensure critical thinking is used when conducting anthropometric measurements and making HR and BP judgements. Consider variables such as asymmetries, prostheses, and atrophied limbs to ensure you are taking an accurate, individualized approach.



## Step 3: Conducting Fitness Assessments



Before conducting and during a fitness assessment, there are a variety of considerations to make. In general, consider the equipment available to your client, whether modified assessment protocols exist, and the goals of fitness testing.

### Choosing the Protocol

Before conducting a fitness assessment, consider which assessment tools and protocols to use. Performance, ability, body management, locomotor skills, body awareness, and learning or behavioural considerations are all factors to consider when selecting an assessment protocol:

- **Performance:** What are we choosing the test for? Is there a performance factor/standard that is required?
- **Ability:** What is the client's level of function and mobility?
- **Body Management:** How does the patient transfer onto equipment? Can the patient get up/down from the floor? What type of support is required for the participant to do so? How does the client manage spasticity or contracture?
- **Locomotor Skills:** How does the participant move from place to place?
- **Body Awareness:** How does the individual move based on instruction? What is movement pattern like? How is balance and correction of that?
- **Learning/Cognitive:** What is the client's level of motivation? Are there any tools that can be used to assist with instruction, such as visual aids, tactile modelling, demonstration, or technology?

You may not know all these answers before conducting an assessment. Always come prepared with a second choice to ensure the assessment can continue if the initial protocol does not work for the individual.

### Assessment Considerations

There are two types of fitness assessments: normative referenced and criterion referenced assessments.

**Normative referenced assessments** are assessments for which normative data is available, and protocol is standardized. For persons with disabilities, normative referenced assessments are often not relevant because data is only comparable to data from individuals without disabilities. When you conduct an assessment, collect relative data that can be compared to the individual being assessed.

Conversely, **criterion referenced assessments** are more flexible. As clients learn the movement pattern, they become better at performing this type of assessment, so increasing the number of trials will result in better scores.



## Step 3: Conducting Fitness Assessments Continued

An example of a criterion referenced assessment is **Task Analysis**, an assessment that involves the patient completing small, teachable components of a task. Task analysis may help determine unique needs of each participant, as well as bring up any red flags or problems that a professional should be aware of. Task analysis may help you gain knowledge of whether the patient experiences pain with movement or has limited range of motion, whether the exercise is suitable, whether they can perform the task at hand, whether modifications need to be made, and what should be worked on if a given exercise is chosen for program.

**Seated Row**, summarized below, is an example of a task analysis.

### Movement Sequence Cues:

1. 15-degree flexion
2. 100 degree extension
3. Activate core muscles
4. Pull hands into lower chest
5. Retract scapula

Using the Seated Row as an example, participants can be asked to move through the movement sequence. As a fitness professional, you would look at the different components of the sequence from 1 to 5 and ask yourself the following: *Is the participant performing them as expected with appropriate form? Is it helpful to offer teaching cues to encourage the participant to focus on the different components (i.e., knee, hip posture, row, scapula)?*

### Fitness Testing

There are a variety of considerations for conducting different types of fitness assessments, including **cardiorespiratory fitness testing, musculoskeletal testing, and balance and flexibility testing**. Some factors to consider when conducting a fitness assessment include:

- Equipment choice
- Whether modified protocols exist
- Overarching goals of conducting the assessment
- Type of activity
- Medications the client is taking
- Red flags/absolute contraindications the client experiences



### Process vs. Outcome

Emphasizing process versus outcome is important when working with PWDs. Some participants may not be able to follow protocols exactly, but with modifications, you can continue with the assessment. Meet the client where they are at by taking detailed recordings during the process to ensure they can be reassessed at a later point, whether using standardized protocol or not.

## Step 4: Interpreting and Using Assessment Results



When interpreting and using assessment results, there are a few key things to remember, highlighted below.

This section will also go over a case study covering what we have learned so far.

When interpreting and using fitness assessment results, remember that standard fitness assessments may be more useful to establish an individual's baseline rather than compare to normative data. For example, you may not be able to calculate results or compare normative data to VO<sub>2</sub> max, but **comparing past and present data** is an effective way of measuring the patient's progress.

Focus on **emphasizing a client's strengths** rather than focusing on, pathologizing, and correcting deficits.

### Case Study: Meet Shayna

Shayna, a female in her late 40's, recently had a Cerebral Vascular Accident (CVA) of the right middle cerebral artery, causing sensory and motor issues in her left arm and foot-drop in her left leg. After being discharged from the hospital as an inpatient, Shayna attended a rehabilitation hospital as an outpatient where she received physical, occupational, and recreational therapy. Shayna has now been referred to your organization by a recreation therapist to receive an exercise program.

Below, we outline the steps you can take when preparing for and conducting your initial assessment.

### Step 1: Communicating and Gathering Information

First, you remind yourself that language matters and that individuals are so much more than their diagnoses. In your notes, you consciously refer to Shayna as 'an individual who has experienced a stroke.' For your initial meeting with Shayna, you hope to structure the assessment as a conversation where you can learn more about Shayna as an individual, her experiences, and her goals to create a **person-centered approach**.

You plan to incorporate resources that you typically associate with fitness assessments such as the **Get Active Questionnaire** to ensure safe physical activity while also preparing questions to address other aspects such as social and external factors, secondary conditions, and contraindications.



## Step 4: Interpreting and Using Assessment Results Continued

### Step 2: Pre-Assessment Considerations and Contraindications

Through your **inter-view**, you learn a wealth of information about your new client. First, you learn that Shayna has a moderate contracture in her left arm. Shayna also discloses that prior to experiencing the CVA, she was an avid cyclist and member of a recreational cycling club. Shayna explains that her recreation therapist referred her to your organization because her goal is to use exercise to increase her aerobic capacity, balance, and strength of her left leg and arm so she can return to cycling in some capacity in the future.

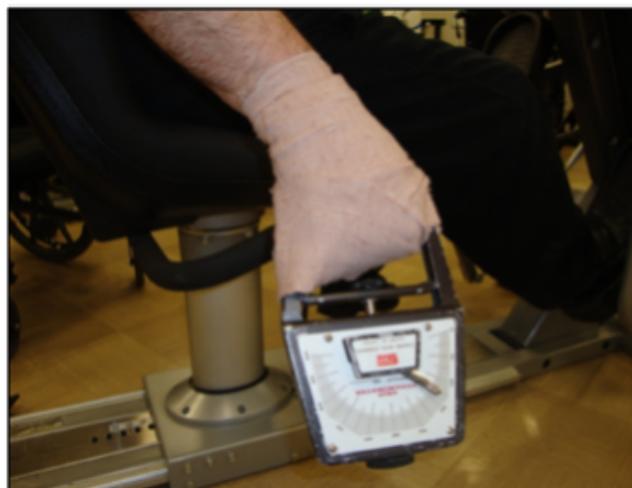
The presence of a contracture affects our fitness assessment as it is an important **contraindication** that can significantly reduce range of motion at affected joints. .

### Step 3: Conducting Fitness Assessments

Based on Shayna's expressed goals for her program, you decide to administer the Modified Astrand-Bike protocol using a recumbent bike for **cardiorespiratory fitness testing**. To better support Shayna's foot during the testing, you secure her foot to the pedal using a tensor bandage foot wrap.

For **musculoskeletal testing**, you administer a Grip Strength test using a hand dynamometer as it can measure isometric strength, and is a good indicator of total body strength.

Have Shayna perform this on both limbs and then use pre/post results to compare within limb for changes. In addition, you also administer the 30 second Sit to Stand test to measure endurance but modify the test by having Shayna hold a 4kg ball to mimic the fatigue of both the arms and legs that occurs when cycling. To accommodate the contracture, you choose to use a medicine ball that has Velcro handles that can be tightened around Shayna's hands to assist with grip. Throughout the testing, Shayna discloses that completing the cardio portion was extremely difficult. However, Shayna expresses great satisfaction with her performance during the Sit to Stand test.



The above image shows a person completing a hand Grip Strength test using a hand dynamometer.

### Step 4: Interpreting and Using Fitness Assessment Results

Although portions of Shayna's testing did not follow the process outlined by the protocols, you still take detailed notes about the testing and the outcomes to be used for comparison at different points in Shayna's exercise journey.

## Step 5: Prescribing Exercise

There are a series of general and disability-specific guidelines to consider when prescribing exercise, including shoulder health, hemiparesis, and stretching, and guidelines for SCI, MS, Cerebral Palsy, and Parkinson's disease.

### General Recommendations

**Shoulder health** is an important consideration for individuals with mobility impairments, including manual wheelchair users. Repetitive high loads on the shoulder while wheeling and navigating an inaccessible environment in a manual wheelchair put stress and strain on the shoulder joint, which can lead to impingements and rotator cuff injuries. While wheeling, the shoulder acts as a weight bearing joint. Exercise can help reduce the risk of an **impingement** occurring and reduce pain of a current impingement.

Recommend upper limb exercises that:

- Provide sufficient intensity to enhance strength and muscular endurance
- Provide stimulus to all major muscle groups to pain-free fatigue (discomfort from exertion is acceptable)
- Combine strength with stretching to reduce pain
- Note: Before conducting shoulder exercise, participants should be taken through a shoulder clearing test.

**Hemiparesis**, reduced muscle strength on one side of the body, is another important consideration. It can be the result of a stroke, Traumatic Brain Injury, Spinal Cord Injury, or Cerebral Palsy, among others.



Hemiparesis can result in altered posture, exaggerated stretch reflexes, and reduced voluntary movement.

When designing your exercise program, you can include:

- **Progressive resistance training** (side specific): Train the affected side at 70-80% RM, but even 40% RM has positive effects
- **Task specific training:** For example, timed sit-to-stands require postural control and dynamic movement
- **Intensive aerobic training:** This is a combination of strength and aerobic training to increase the number of motor units recruited. The recommended intensity for individuals who have had a stroke is 50-70% Heart Rate Reserve.
- **Functional Electrical Stimulation:** A system that uses electrical current to stimulate motor neurons, producing muscle contractions and patterned movements

### What is Functional Electrical Stimulation?

Functional Electric Stimulation (FES) is a system that uses electrical current to stimulate motor neurons, producing muscle contractions and patterned movements. It uses adhesive pads applied over the muscle belly, and can be used in combination with a number of different exercise modalities. FES can be used by individuals experiencing complete or incomplete SCI, stroke, multiple sclerosis, cerebral palsy, TBI, and spine bifida, among other conditions.

## Step 5: Prescribing Exercise Continued

**Stretching** is another important consideration, particularly for individuals with **contractures** and **spasticity**. Note that a contracture is a permanent loss of range of motion. When prescribing stretching, ensure a joint is not stretched past its range of motion. Additionally, stretch slowly, as stretching too fast may trigger the stretch reflex and cause spasticity. Finally, chronic high-load brief stretching can reduce spastic hypertonia and lengthen muscle, decreasing spindle activation.

Stretching should be done for a few minutes at each joint site /5 days per week. Note that the usefulness of stretching for people with neurological conditions may be minimal.

### Specific Recommendations

Specific exercise prescription recommendations exist for a variety of disabilities, including Spinal Cord Injury, Multiple Sclerosis, Cerebral Palsy, and Parkinson's disease. For more information on the various guidelines, visit the websites linked on this page.

- For **Spinal Cord Injury**, consult the Physical Activity Guidelines for Spinal Cord Injury, available at [sciguidelines.ubc.ca](http://sciguidelines.ubc.ca).
- For **Multiple Sclerosis**, consult the Canadian Physical Activity Guidelines for Adults with Multiple Sclerosis, available at [www.csep.ca](http://www.csep.ca).
- For **Cerebral Palsy**, consult the aerobic and strength exercise guidelines for Cerebral Palsy, published by Verschuren et al. (2016) in the Developmental Medicine and Child Neurology Journal.

- For **Parkinson's Disease**, consult Parkinson Canada's Physical Activity and Parkinson's Disease document, available at [www.parkinson.ca](http://www.parkinson.ca).

### Physical Activity Guidelines for Spinal Cord Injury:



### Canadian Physical Activity Guidelines for Adults with Multiple Sclerosis:

#### Guidelines

To achieve important fitness benefits, adults aged 18-64 years with multiple sclerosis who have mild to moderate disability need at least:

- 30 minutes of moderate intensity aerobic activity, 2 times per week, AND
  - Strength training exercises for major muscle groups, 2 times per week.
- Meeting these guidelines may also reduce fatigue, improve mobility and enhance elements of health-related quality of life.

### Physical Activity and Parkinson's Disease:

#### Physical Activity and Parkinson's Disease

##### Get Active and Stay Active!



- People with Parkinson's who exercise fare better over time than those who are not active.
- Physical activity should be initiated early in the diagnosis and be a life-long commitment.
- Engaging in aerobic activity, along with other activities for strength, flexibility and balance, improves Parkinson's symptoms and sense of well-being.

In general, when designing an exercise program for persons with disabilities, keep in mind the client's goals, the nature of their disability, any secondary conditions and contraindications that may be experienced, their environment, and their access to equipment.

## Step 6: Adapting Exercise



When adapting an exercise, the environment, or even yourself, there are a variety of factors to consider. There are also a series of adaptation strategies you can take to ensure exercise is safe and inclusive.

### Some questions to consider when adapting an exercise include:

- Is the client involved in making the adaptation?
- How much impact will the adaptation have on participation?
- Will the adaptation be accepted by the participant? By others involved in the activity?
- Will the client feel like they belong rather than different and centred out?
- Does the adaptation maintain the integrity of the activity?
- Is the adaptation age-appropriate?
- Is the adaptation safe?
- What kind of planning is needed to implement the adaptation (i.e., how realistic is it)?
- Does it promote challenge and encourage mastery?

Considering these questions helps promote **quality participation**.

### Exercise Adaptation Strategies

**Newell's Model of Constraints** is a way of conceptualizing how you might make a successful adaptation. It is based on the idea that 3 categories of constraints, individual, task, and environmental, interact to produce an outcome.

**Cueing** is another strategy for adapting exercise, and can be verbal, visual, or physical. For **verbal cueing**, use clear, specific, and concise cues, 3 to 4 words in length, and avoid idioms. For **visual cueing**, progress through three stages: complete demonstration, partial demonstration, and gestural prompting, limiting how much visual prompting you give as you progress. Finally, for **physical cueing**, progress through the same three stages: complete manipulation, manipulative prompting, and minimal guidance, being sure to ask before touching and describe what you are doing at each stage.

You may also encounter **barriers** when working with a client which can be modified for a successful outcome.



## Step 6: Adapting Exercise Continued

### Useful Equipment Adaptations

There are many pieces of equipment that can be added to a facility to increase accessibility, including:

1. Grip supports for those with limited grip
2. Cuff weights for those with limited strength
3. Medicine balls with handles for those with limited grip strength
4. Therabands
5. Cardio machines with removable seats
6. Weight machines which can accommodate those who do and do not use a wheelchair
7. Cable columns
8. Functional Electrical Stimulation arm and leg bikes

### Adapting Exercise Together

These adaptations were created with members of a CSEP expert panel, including individuals with lived disability experience who shared their stories and adaptation examples in practice:

1. Use a Bosu ball as a leg press
2. Wheel backwards to row
3. Use a skateboard (or 4-wheeled scooter) to introduce jumping
4. Take the seat off the rowing machine
5. Use the weight-stack adapter plates as additional anti-tippers
6. Use weights or bands to secure feet on leg press
7. Use tubing, therabands, and/or yoga straps to support someone through a movement
8. Place yoga blocks behind a person's back to support posture through movement
9. Create a first-and-then board to support individuals with cognitive impairments



## Case Study: Meet Nick

You are preparing an exercise prescription for your client Nick, a 38-year-old individual who experiences MS, to be completed twice a week. Nick uses a power wheelchair for mobility and during your functional assessment, discloses that he feels more comfortable hand cycling than he does biking.

Below, we outline the steps you can take when preparing an exercise prescription for a client.

### Step 3: Conducting Fitness Assessments

For Nick's cardiovascular testing, you chose to use the Physical Working Capacity 150 using an arm ergometer. This PWC 150 protocol is designed to measure the work rate at a heart rate of 150 bpm using either a modified cycle ergometer or an arm cycle ergometer. You secure the ergometer on the table so that the handles are at shoulder height and review the PWC 150 protocol and calculation.



The above image shows a person completing a Physical Capacity 150 test using an arm ergometer.

**Protocol:** Increase the work rate by 10W every 2-3- minutes at a crank rate of 60 rpm until a heart rate of 150 bpm is attained.

**Calculation:** Plot two to three power outputs (W) against HR and draw the 'line of best fit'. Determine the PWC of 150 bpm in W/kg.

### Step 4: Interpreting and Using Fitness Assessments

Although Nick's performance differs from the process that is outlined in the protocol, you are still able to gather useful information that can assist your creation of the exercise prescription.

### Step 5: Prescribing Exercise

You begin by creating the cardio portion of Nick's workout. You recall that Nick can perform some degree of movement in his lower extremities. Based on this information, you choose to use a SCI Fit Recumbent Stepper for Nick's cardio as it allows for work in both the arms and the legs simultaneously. Being aware that Nick's current aerobic capacity has room for improvement as he fatigues quite fast, you decide that interval training would be an effective strategy. You plan to use 2-minute work periods followed by 1 minute of rest, repeating the process 5-10 times.

You then note that a target HR of 75% which equates to about 143 BPM is ideal for Nick's current aerobic activity. As Nick's aerobic capacity increases, you intend to gradually increase the aerobic activity from 10 minutes to 30 minutes.

For functional goals, Nick expresses an interest in increasing the strength in his upper body, especially in his shoulders and chest and increasing his aerobic capacity. Based on Nick's goals and the results from his fitness assessments, you develop the following exercise prescription, available on the next page.

## Case Study: Meet Nick

Cardio	Time	Target HR/RPE	
SCI Fit Recumbent Stepper	2 minutes on 1 minute rest Repeat 4-10x	HR = 130-140	
Exercise	Sets	Reps	Weight
Seated Row (Cybex)	3	10	25 lbs
Machine Chest Press (Cybex)	3	10	25 lbs
Machine Shoulder Press (Cybex)	3	10	20 lbs
Machine Chest Flys	3	10	25 lbs
Seated Chop	3	10	20 lbs
Seated Figure 8s	3	10	10 lbs

### Step 6: Adapting Exercise

Based on the exercises recommended in Step 5, the following adaptations might be useful to support a **quality participation** experience for Nick.

For Nick to perform a seated row, it might take a few trials with different pieces of equipment to perform this exercise. For example, if Nick prefers to complete his exercises while seated in his power wheelchair, he may be able to perform the seated row using a Cybex machine. This would only work if the equipment has a removable seat and Nick is able to wheel close enough to the machine. Other options to perform this exercise would include:

- Complete a seated row motion using a theraband wrapped around the post of a piece of exercise equipment for stability. This would enable Nick to place the Theraband at a height that works for his body.
- For the seated chop exercise, Nick might find it helpful to use a medicine ball that has handles on the side. This would enable him to focus on his posture and performance of the exercise rather than on his grip strength to hold the medicine ball.
- To perform a seated Figure 8, Nick may want to transfer out of his power wheelchair. Ideally there would be a raised table or surface available for Nick to use. This would make it easier for him to transfer and decrease the need for support to get down or up from the ground.

It's important to work with the client when it comes to adapting exercise. Be sure to speak with Nick about if and how to modify the exercises to identify the ways of performing the exercises that work for him!

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