

Inclusive Fitness

HANDBOOK

for fitness professionals



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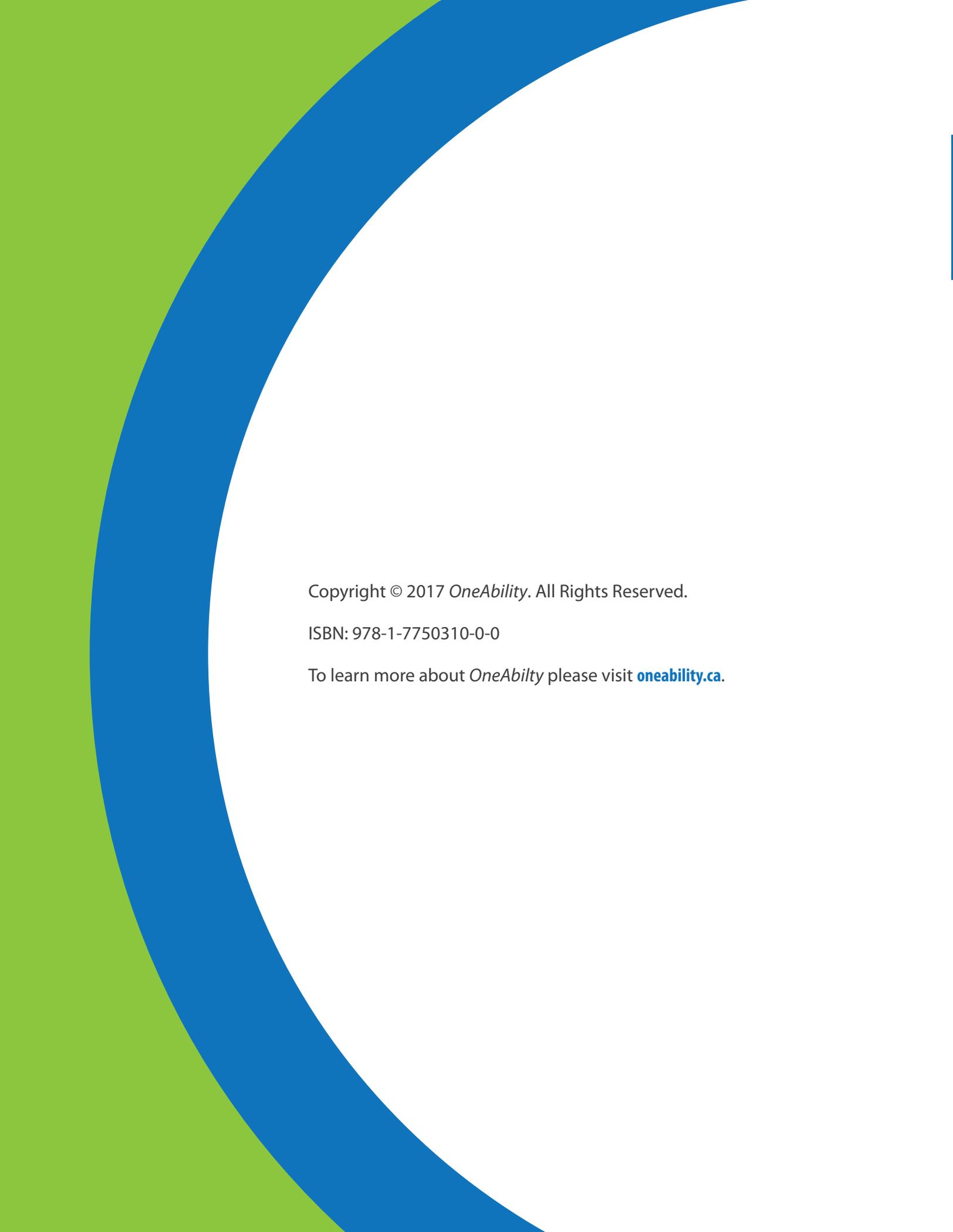
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Introduction

This handbook was created as a resource to support certified fitness professionals while working with clients with different disabilities and various barriers to physical activity. The disabilities profiled in this handbook (amputation, autism, cerebral palsy, Down syndrome and vision impairment) were selected to fill the gap in pre-existing resources. As such, some prevalent disabilities, including spinal cord injuries, were not included in this handbook as other valuable resources currently exist. Please refer to the Appendix of this handbook for a list of resources for working with individuals with spinal cord injuries.

Scope of practice disclaimer

Depending on the client and their health condition, they may be required to obtain clearance to exercise from their physician. Ultimately, it is the responsibility of the fitness professional to confirm with their certifying body and/or insurer that they are covered to train clients with disabilities and chronic conditions within their scope of practice. This handbook does not certify fitness professionals to work with the populations outlined herein, but acts simply as a reference tool to support trained fitness professionals in working with clients with different disabilities.

Accessible and inclusive spaces

Ideally, the training facility should be both accessible and inclusive. This refers not only to the physical environment but applies to the staff supporting the space as well. “Accessibility” refers the provision of equal access to everyone as it pertains to physical environment, transportation, information, public facilities and services¹, whereas “inclusion” refers to including people with disabilities in activities and encouraging them to participate in roles similar to their peers who do not have a disability².

Staff training is imperative to ensure an inclusive environment. Negative public attitudes are a prominent barrier to full participation for people with disabilities³. A good first step is to inquire with the facility staff to determine whether they would benefit from education on how to welcome and support the needs of patrons with a range of abilities as some staff may wish, or need, to know more. As a general rule, all people should be received with equal quality of customer service, in a polite and courteous manner regardless of ability, disability, age, gender identification, sexual orientation, socioeconomic status, race, religion, etc. Encourage staff to avoid assumptions about individuals with disabilities and to ask for permission before

providing assistance as many clients are quite capable of independent action and will request support if needed. Staff should learn to speak directly to the individual with the disability and not just their support worker, if present. Further, staff should be encouraged not to fear making mistakes; however, if they do occur, apologize sincerely to the client and use the experience as a learning opportunity for future interactions.

OTHER CONSIDERATIONS MIGHT INCLUDE:

- learning appropriate language for speaking to, and about, people with disabilities through using “People First language” (see below) and words with dignity,
- familiarizing themselves with emergency evacuation procedures for individuals with limited mobility, who use a wheelchair (i.e. what to do when the elevator cannot be accessed, as in an earthquake evacuation), are visually impaired, who are startled/ confused by loud noises, etc.,
- knowledge of facility accessibility, including locations of accessible washrooms, showers, change tables and lifts, and
- education on legislation for service animals.

Inclusive practices must include creating a supportive environment where staff feel knowledgeable and comfortable engaging with people of all abilities.

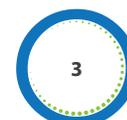
The physical environment should also be made accessible. Consideration should be made for people with physical, cognitive and sensory impairments (i.e. appropriate language, text, braille and symbols on signage; high contrast strips on barriers; accessible parking; barrier-free paths to and throughout the facility that are not separate from other routes; etc.). Several resources exist to help planners create a more accessible facility, including the Rick Hansen Foundation *Planat* app (www.planat.com) that will help rank the accessibility of a venue. Beyond basic accessibility features, different environments may require location-specific staff training. For example, in an aquatic environment, staff should learn how to use the pool lifts, whereas in a fitness center, staff may need to learn how to use accessible gym equipment and accessories. Fitness professionals should consider how their client with a disability will move from station to station. For example, if the client is a wheelchair user or has vision impairment, one must ensure they can safely access the facility and the equipment, ideally with minimal assistance to help foster independence. If the client is ambulatory, note whether they have an altered gait and ensure there are clear paths to the equipment to reduced tripping hazards.

There are valuable resources listed in the Appendix of this handbook to assist in creating accessible spaces and inclusive environments. Fitness professionals should seek out additional training opportunities and help to promote inclusion where they work in order to support full participation for people with disabilities.

People first language

Using appropriate language when referring to any group of people will help to reduce prejudice, misconceptions and stereotypes⁴. An individual is not defined by their circumstances, so it is more appropriate to refer to the person first and their disability second. For example, the correct terminology is not “Down’s person”, it would be “a person with Down syndrome”. In addition to person first language, words with dignity should also be used. For example, do not suggest a person is “suffering from” a specific disability, they simply “have” that disability (e.g. “Amy has cerebral palsy”, not “Amy is suffering from cerebral palsy”). Additionally, equipment that assists individuals with disabilities are helpful tools and aids that promote independence, they are not burdens to the individual (e.g. “Tom is a wheelchair user”, not “Tom is wheelchair bound”). The following list is “*Words with Dignity*”, produced by the Active Living Alliance for Canadians with a Disability⁵.

| INSTEAD OF... | USE... |
|---|---|
| Disabled, handicapped, crippled | Person(s) with a disability |
| Crippled by, afflicted with, suffering from, victim of, deformed by | Person who has... or, Person with... |
| Lame | Person who is mobility impaired |
| Confined, bound, restricted to or dependent on a wheelchair | Person who uses a wheelchair |
| Deaf and dumb, deaf mute, hearing impaired | Person who is deaf, hard of hearing |
| Retarded, mentally retarded | Person with a developmental disability |
| Spastic (as a noun) | Person with cerebral palsy |
| Physically challenged | Person with a physical disability |
| Mental patient, mentally ill, mental, insane | Person with a mental illness, Person who has schizophrenia |
| Learning disabled, learning difficulty | Person with a learning disability |
| Visually impaired (as a collective noun) | Persons who are visually impaired, blind |



Amputation

Background

Individuals who have had an amputation will have a portion, or all, of one or more limbs removed. Amputations are classified based on the following characteristics:

- whether the amputation is of the upper extremities, or lower extremities,
- the location of the amputation along the extremity (i.e. the portion of the limb affected, for example, “above knee” or “below knee”) and
- whether the amputations are unilateral or bilateral (i.e. one side or both sides)⁶.

Please note, in addition to the classifications listed previously, this section of the handbook may also help with developing training programs for individuals born without a portion, or all, of one or more limbs as the result of a congenital deformity.

4

Upper extremity amputations are most commonly due to trauma (e.g. crush or cut injuries, or electrical shock) or environmental injuries (e.g. frostbite). Additionally, some individuals are born without an arm and/or hand. Although some may choose not to use prostheses for daily living, they may use a custom socket for specific activities such as cycling or rowing, or another type of grip aid to help with activities. Further, fitness and strength programs incorporating the individual’s prosthetic may be very beneficial as it can permit a wider range of exercises and assist with balance.⁷ Such prosthetics may include harness-suspended socket designs with triceps cuffs, partially or fully padded sockets, or silicone suction suspension systems.⁷ As with lower-limb prosthesis, there are many different designs and materials available, so it may be that a combination of technologies will best support the individual in their physical activities.⁷

In North America, lower extremity amputations are most often the result of peripheral vascular diseases and diabetes, followed by trauma and curative tumor treatment.⁸ Due to the challenge of walking, individuals with lower extremity amputations often face heightened barriers to physical activity as compared to those who have had an upper extremity amputation. Lower extremity amputations increase the energy output of walking, and the energy output becomes greater as the level of amputation above the knee rises and if the amputation is bilateral versus unilateral.⁹ This increase in difficulty can contribute to a sedentary lifestyle which may ultimately result in the individual acquiring secondary diseases.⁸

There are many benefits of physical activity for people who have had an amputation, including increasing fitness levels, an improved ability to perform tasks of daily living¹⁰ as well as the other benefits physical activity can have for those without an amputation.

Recommendations for fitness professionals

Functional, bilateral performance will be an overall goal of the training programs for individuals with an amputation. Within the program, a major focus should be the consideration of the client's balance and positioning, particularly in relation to their activities.^{11,12} For example, an individual with a unilateral lower extremity amputation will have less mass in their lower body to balance loads whilst sitting and they may find certain positions are more challenging when playing wheelchair sports as the counter-weight from the legs is absent, particularly on one side.¹³ Likewise, an individual with a unilateral upper extremity amputation will also experience asymmetries that can affect balance in sport and recreation. As such, a goal to increase strength might first require improving balance and core stability to mitigate the stress caused from asymmetry. Further, the program will require strategies to ensure the unaffected limb is not overloaded in order to prevent stress injuries or skin breakdown. For both individuals with upper and lower limb amputations there are many pieces of equipment that can be used or adapted to assist in exercise and recreation. For example, Tensor bandages, Velcro strapping, specialized grips (e.g. "Active Hands") and/or cuffs can help secure the individuals hands or limbs to a standard cable machine;¹² weight harness systems can facilitate upper-limb exercises; and more specialized cuffs and activity-specific prostheses are available on the market for specific sports and activities. Please see the Appendix section for resources that outline many sport-specific upper-extremity prostheses.

A second major consideration for fitness professionals will be whether the client uses any type of prostheses as the prosthesis itself can be incorporated into the program when appropriate.¹¹ Fitness professionals should monitor the integrity of the skin where the residual limb meets the prosthesis for skin health.⁸ Dampness following exercise or ill-fitting stump socks and/or prostheses can lead to complications including skin breakdown, blisters and hair follicle infections.⁸ The fitness professional should speak with their client to assess skin tenderness and whether skin breakdown is present prior to exercise and encourage proper hygiene, such as changing damp stump socks and selecting the right thickness of sock to prevent issues from arising.^{8,13} If there are any concerns, refer the client to a medical professional.

It is also useful to understand the reason for which the amputation occurred, as this will assist in better understanding possible secondary complications and creating a suitable training plan for the individual. For example, if the amputation was the result of disease or vascular complications, the fitness professional should consider that associated diseases may be present and the possible risks that come from training. However, if the amputation is the result of trauma and the client has received appropriate rehabilitation, the fitness professional may approach the training program in a more similar fashion to that of the general population.¹²



Safety concerns

ENVIRONMENT

Consider the temperature of the training environment as an amputation will result in less body surface area to disperse heat and can lead to an increased risk of overheating. Additionally, sweat may accumulate in the stump sock and lead to skin breakdown.

SPECIALIZED EQUIPMENT:

- When using specialized equipment to attach to a load, ensure the individual is able to balance. In particular, consider foot positioning with upper extremity amputations. Bolstering or propping may also assist the individual in using weighted loads.
- Avoid hanging weights off the residual limb as this can lead to shear forces.¹²

PSYCHOLOGICAL CONCERNS

Consider the psychological state of the individual, particularly if they have experienced significant trauma. Exercise can positively influence mental health, but be mindful of your scope of practice and refer to specialized practitioners when appropriate.

GENERAL CONSIDERATIONS:

- Begin the assessments focusing on balance, posture, core strength, symmetries and stability.¹² Watch for proper technique and whether the individual is improperly compensating for a movement.
- Energy expenditure is often increased when using a prosthetic. Monitor the client for over exertion and avoid exhaustion of muscles that are relied upon in the non-amputated limbs.
- Skin breakdown or infection can lead to long-term complications that will influence training. Monitor skin integrity and regularly change stump socks when they are wet.
- Determine whether the individual has any scarring, nerve damage, muscle mass removal or atrophy that may impact their range of motion or ability to complete particular exercises.
- Phantom-limb pain may be present in individuals who have had an amputation. This pain can be treated with medications that can lead to drowsiness which may impact performance and safety in the gym. Encourage open communication with the client to understand the potential impact of their medications.



From the experts

Jackie Gay is a professional writer, university lecturer and Paralympic silver-medalist sailor with an amputation. The following advice from Jackie is for fitness professionals (J. Gay, personal communication, April 6, 2017).

Working with Amputees – Advice for the Fitness Professional from the frontline!

“This chapter covers the basics on working with amputees: core training first to build strength and balance, counter weights and/or strapping for double-amputees (especially) who are playing wheelchair sports, managing skin conditions and muscle loss in stumps, respecting the individual’s preference over wearing or not wearing their prosthesis for strength and conditioning. My perspective on this is perhaps a little unusual, because I am a sailor and don’t wear my prosthesis for my sport. I do sometimes use it for gym work, but in preparation for the Paralympics, my trainers all agreed that we should try and mimic the situation of being in the boat, plus I have scarring and skin issues so it made sense to ditch the leg for training. Remember that many people will not be comfortable with this, however if you get to know them well it may be worth suggesting it as it eliminates skin issues and challenges both the amputee and the trainer to be creative and grow!

Prior to my amputation (traumatic) and sailing career I had never been in a gym in my life. I was fit, strong and outdoorsy and saw no need to use a gym. However as soon as my sailing career got serious I was sent to a trainer and it was a complete revelation to me – the understanding of my body that I gained, the improvements in balance, core strength, the use of weights (which I would have avoided like the plague if given the choice...) and my sheer untapped potential (that everyone has!) were completely unexpected. Now, I would recommend anyone to go to an experienced trainer, the one-to-one attention and disability-specific input you will get are invaluable. My trainers were all professionals who were keen to work with me and curious about how they could adapt ‘standard’ exercises to my situation – they even brainstormed on their own time thinking of ways to access and strengthen the muscles in my left side that are underused in daily life.

So this is my top tip for fitness professionals – get interested, be passionate! Treat working with adapted athletes as a challenge to develop your skills. You are in a powerful position because you are a wholly positive, forward-looking, goal-orientated influence in an individual’s life. Be prepared to push people but also be conscious of underlying situations or conditions that may be influencing attitudes or behaviour. Get to know your clients, find out what makes them tick. Many people with disabilities have a conflicted relationship with their bodies – their bodies that no longer work in the same way, that look and feel different from ‘normal’. This is a challenge, but the stronger, fitter and more active a person becomes, the more they can make peace with their bodies and then the sky is the limit. I understand that there is literally nothing I cannot do now, whereas when I first lost my leg I was convinced that the doors of the future were closed to me. I know it, I can do it and I also recognize that it is up to me. No excuses!”



CLIENT INFORMATION

Jake is 25 years old and a new wheelchair basketball participant. He has a right lower-limb amputation below the knee as a result of a motorcycle accident 2 years ago. He is medically stable and been cleared by his medical team to take part in a fitness program to improve his strength and stamina. Jake has come to see you for advice, techniques and a program.

INFORMATION FROM ASSESSMENT

- Previous experience with exercise program: little to none
- Activity preferences: general physical activity and sport, including hiking and a background in recreational hockey. Understands he needs to build strength to help with wheelchair basketball and overall long term health and return to activity.
- Goals include:
 - increase effectiveness of stair climbing,
 - improve wheelchair push technique and improve power output and
 - regain overall strength lost after the accident for everyday life.
- Time commitment: 2-3 days per week
- Access to equipment: local recreation facility is nearby
- Special considerations: able to wear prosthetic while exercising, no secondary complications from the accident, very motivated to get started but a bit hesitant on how his body will handle it



SAMPLE PROGRAM – WEEK 1

SA = Single Arm **FW** = Free Weight **BB** = Barbell

FW SPLIT SQUAT

3 sets | 8 repetitions per side

Loading unilaterally is generally more effective in lower limb amputees due to mobility differences with a prosthetic causing asymmetry in loading. Be sure to consider load on prosthetic.

SA, FW BENCH PRESS

3 sets | 8 – 12 repetitions per side

Single arm will challenge balance and stabilization and better mimic the demands on wheelchair basketball.

FW STEP UP

3 sets | 8 repetitions per side

Watch affected side for proper step alignment. Use a railing or other support if balance is a concern.

SA STANDING CABLE ROW

3 sets | 8 – 12 repetitions per side

Challenges standing balance and core stability.

SWISS BALL BRIDGE WITH CURL

3 sets | 8 – 12 repetitions

Ball allows more adaptation to the differences of the mobility from the prosthetic. Could use a suspension trainer (such as a TRX) if client is not wearing prosthetic or if you would like to challenge each limb independently.

CABLE PALOFF PRESS

3 sets | 8 – 12 repetitions per side

Watch for posture changes on affected side. Could use a split stance to assist with balance.

AEROBIC

1 set | 20 minute duration

Rowing, Ski-Erg, wheeling at a moderate pace. Use the “talk test” to monitor exertion levels (i.e. is the client able to continue conversation). Utilize modalities that incorporate upper body and add short, intense intervals to improve power output and sport-transfer.

SAMPLE WORKOUT

As you will notice, this program looks quite similar to programs for anyone starting out with limited weight training or general fitness experience. Exercise repetitions and sets are moderate, total number of exercises are relatively low and the program alternates between upper and lower body exercise to minimize excessive fatigue. This program also does not require specialized equipment or large amounts of space. If Jake had an upper limb amputation, this program may still be used with the assistance of a prosthesis or grip aid depending on the level of the amputation, or if he was comfortable completing the tasks one-handed.

PROGRESSION TIPS

As much as possible, increase weights and repetitions symmetrically across the two sides of the body to prevent further development of asymmetries. Keep dialogue open regarding changes in the skin at the prosthetic, changes in perception of pain or sensation and fatigue on the unaffected side throughout the first few weeks. If unexpected complications arise (i.e. pain at the amputation site or beyond regular muscle soreness), adjust the weight/repetition load and consider alternative movements before progressing. When in doubt, refer the participant to a medical professional to ensure a long-term, positive experience.



Autism

Background

Autism spectrum disorder (ASD) is a complex developmental disorder that is characterized by:

- challenges with social interaction, including challenges with social-emotional exchanges and developing and maintaining relationships, little or no social initiation, and difficulty joining into social interactions,
- impairments in non-verbal communication, including differences in eye contact, challenges in interpreting nonverbal communication, including interpreting tone, body language and facial expressions and
- repetitive behaviors and adherence to routines and ritualized patterns of behavior.¹⁴⁻¹⁶

It should be noted that “*intellectual disabilities*” and “*developmental disabilities*” refer to different disorders. “*Intellectual disability*” refers to the group of disorders characterized by limited cognitive capacity and difficulty with behaviours requiring adaptation, while the term “*developmental disability*” is a broader category of often lifelong disability that can include intellectual capacity, physical functioning, or both¹⁷. Autism is categorized as a developmental disability.

The characteristics of autism, combined with safety concerns such as elopement¹⁸ and deficits in motor skills such as balance and coordination^{19,20} can pose additional barriers to individuals with ASD in becoming active through sport and recreation²¹.

Each individual with ASD is unique and their strengths, skills and barriers should be assessed individually. Some participants may be extremely athletic and may only require changes in instructional techniques, not necessarily the movement itself. Others may require programming changes that encourage safely learning challenging motor skills without discouraging participation.

“If you’ve met one individual with autism,
you’ve met one individual with autism.”

~ Stephen M. Shore

It is important for individuals with ASD to participate in physical activity, as they are more likely to have difficulties with weight management than individuals without a developmental disability.²² Further, physical activity not only increases general fitness and improves health indicators, but can also increase positive behaviours and decrease negative behaviours for individuals with ASD.^{23,24} Research indicates that training for practitioners (including fitness and recreation centre staff) is important to foster a positive environment for individuals with ASD and to be equipped with effective tools to support any learning difficulties or challenging behaviors they may have.²⁵ Such training is available, and highly recommended, from organizations such as **Sport for Life** or **Canucks Autism Network**. Canucks Autism Network and viaSport have collaborated to create a free online webinar and tip sheets for recreation staff that are available on each organization’s website (www.canucksautism.ca/training, www.viasport.ca/resources).

There is currently limited research specific to strength and conditioning programs for clients with ASD, though techniques such as Behavioural Skills Training (BST) are supported in the literature.²⁵ These techniques include using “learning loops” that include clear verbal instructions, effective prompts and praise for the correct behaviour or approximation of the correct behaviour.²⁵ Further, clearly outlining rules and expectations through the use of visual schedule and clear instructions will contribute to the success of participants.²⁵

Recommendations for fitness professionals

Strategies to implement:

DISCOVERY

Get to know the client, their interests, dislikes and triggers. Ask their caregivers or support network for tips on behavioural management techniques and motivators that work best for the client.

MOTIVATORS:

- Utilize themes or objects that motivate the client in the fitness program. Be creative! As an example, a video from the **National Center on Health, Physical Activity and Disability** (NCHPAD) shows a fitness professional reading a chapter from the client’s favorite book in place of a clock to determine the length of time at each exercise station.²⁶ Watch the video at nchpad.org/Fitness~Professionals#video-6
- Since each client will be motivated by something unique to them, try to incorporate their interests into the exercise program. For example, if the client is interested in action heroes, consider putting images of their favorite heroes on the specific equipment they are meant to use in their program as a motivator to move from station to station.



MANAGING EXPECTATIONS:

- Provide information on what to expect in the program in advance to assist in decreasing anxiety.
- Clearly lay out rules and expectations using techniques like a visual schedule. [Canucks Autism Network](#) has free resources available to build these.

MANAGING BEHAVIOR

If there is inappropriate behaviour, provide clear and specific feedback about what the individual should do instead. When an appropriate behavior is displayed, the fitness professional can reinforce the specific appropriate behavior through acknowledging that it was done correctly.

NOTE: Be clear about the specific behavior that is being acknowledged when behavior is praised. (e.g. “Thank you for waiting patiently while I explained the exercise. Well done!”).

COMMUNICATION:

- Use short, clear phrases with specific and direct language.
- Use a “show and say” technique.²⁷ In addition to verbal cues, use pictures, videos (including video feedback of the client themselves), modeling and physical guidance to help clients through the step-by-step procedures.
- Create a task analysis: break a skill down into each of the smaller steps required to perform the skill. Some individuals with autism may require more repetitions to learn a new skill and a task analysis can help fitness professionals track progress with smaller steps within teaching progressions.



Safety concerns

People with ASD may exhibit challenging behavior such as bolting behaviour, or the tendency to wander, which can lead to risk of bodily harm.¹⁸ Speak to the client or their care network (i.e. parents, support staff, siblings, etc.) to determine whether or not this is a risk for the client and inquire about successful strategies to manage these behaviours. Strategies may include informing other staff of these behaviours so they are prepared to react appropriately should any issues arise.

Some individuals with ASD may have hyper- or hypo- reactivity to sensory input, sometimes coupled with unusual interest in sensory aspects of environment.¹⁶

- This may result in the client underreacting to painful stimulus, so be sure to check thoroughly for injury if an incident occurs.
- Alternatively, the client may become hyper stimulated by a noisy, crowded environment of a gym facility. Typically, hypersensitivity can be reduced through repeated exposures to the environment and increased predictability. Use a visual schedule and keep staffing supports consistent to increase familiarity with the overwhelming environment and to reduce anxiety.
- If a client becomes overwhelmed it is likely that they will not be able to process auditory information effectively. After ensuring the client is safe, it is usually best to wait until they begin to feel more regulated before issuing further instructions.
 - If this occurs, have a supportive and constructive conversation afterwards that includes making a plan about how to reduce anxiety next time the same situation occurs. For individuals who have limited communication abilities, include the caregiver network in crisis planning.
 - Help the individual learn to recognize the signs of escalating anxiety and encourage them to learn to identify when they need a break and ask for some time away from the activity to rest and regulate (e.g. to take a water break).



From the experts

Dr. Stephanie Jull (PHD, BCBA-D) is the Director of Programming at Canucks Autism where she applies her background in Special Education (PHD) and Board Certified Behaviour Analyst (BCBA-D) certification to lead and oversee innovative professional development, program development, program partnerships and training initiatives. The following tips are from Dr. Jull (personal communication, February 1, 2017).

7 THINGS TO KNOW

when supporting someone with autism:



Photo credit: Canucks Autism Network

1. Each individual is unique. Acknowledge that the person you are training as an individual person/athlete first (i.e. what are their likes, dislikes, motivators) and start there.
2. Individuals on the autism spectrum may or may not have intellectual disabilities or language impairment; these characteristics are NOT part of the autism diagnosis.
3. Like any other athlete, the keys to success include understanding the person, having a strong, positive relationship with them and understanding what motivates them. Get to know what the individual enjoys and invest time in building rapport.
4. Many individuals with autism benefit from well-structured programs. Provide specific information about what will happen (i.e. which exercises, how many repetitions, how long, etc.) and cue transitions (e.g. "One more repetition and then we are done"). Provide a visual support when possible to make the information as clear as possible (e.g. use a written schedule or pictures to indicate each activity).
5. If the person with autism is struggling with a social situation or expected behaviour, provide specific information about what he or she needs to do. Don't assume they are deliberately "breaking the rule"; many individuals with autism do not pick up on expected social cues without specific feedback.
6. Keep instructions short and clear; long strings of verbal instruction may not be effective.
7. Focus on success and celebrate the small victories along the way.

CLIENT INFORMATION

Terry is 16 years old, has mild autism and faces some challenges which include some difficulty with managing group dynamics, repetitive verbal communication and challenges with eye contact. He is physically healthy but his parents are concerned he is not getting enough physical activity now that he has aged out of many of the programs designed for children and youth with autism. His parents have shown him some strength training movements with limited success and feel he would benefit from a fitness professional's perspective.

INFORMATION FROM ASSESSMENT

Ask the client:

- What did he like from his previous programs?
- What did he dislike from his previous programs?
- What are his general interests (hockey, animals, video games, etc.)?
- Did his previous instructors have any successful techniques to enhance participation?

Goals:

- From the parents – increase physical activity and learn new skills
- From the client – have fun, make new friends
- Time Commitment: 1-2 days/week, 60min per session
- Access to equipment: limited
- Special considerations: Terry has not bolted from a new environment in a long time but will freeze up and limit communication in stressful situations. When experiencing extreme anxiety, Terry will flap his hands and pace.

SAMPLE PROGRAM – WEEK 1

FW = Free Weight **SL** = Single Leg

GENERAL WARM UP

1 set | 5 – 10 minutes

Make it fun. Can be following lines around track, set up an obstacle course or use a rowing machine if balance is a concern (try the fish game on Concept2 ergs).

MED BALL CHEST PASSES

3 sets | 12 – 15 repetitions

Use a light weight and choose a ball texture he is comfortable with (e.g. a smooth medicine ball).

CABLE SQUAT TO ROW

3 sets | 12 – 15 repetitions

Counterweight helps with balance compared to FW. Adding the row will improve coordination between upper and lower body.

FW CURL TO PRESS

3 sets | 12 – 15 repetitions

Will develop coordination related upper body movement.

BOSU STEPS

3 sets | 8 – 12 repetitions per side

Complete these weighted or un-weighted; use it as a fun balance challenge.

TENNIS BALL TOSS

3 sets | 20 repetitions

Try SL, high toss, varying speeds as a fun coordination challenge.

This program incorporates some classic strength training movements intermixed with Physical Literacy development skills. This is to help bridge the gap between child and youth programs to those more appropriate for teens and adults. Also, physical literacy development exercises can be quite fun and are beneficial for all ages! The repetitions are moderate to high as research shows positive results with repetitive movement; however you may need to adjust if your client loses focus easily.

Before your first session, it is ideal to meet with the participant and their parent/aid/friend and give a facility orientation. This will help the client become comfortable with the environment more quickly and will provide an opportunity for you to observe any stress responses should they arise. This is also a good time to determine the best location for your session (i.e. open gymnasium, a section of fitness centre, a closed yoga/dance studio etc.).

Before the start of each session, front load the information to your client to help them better prepare for the workout ahead. This can be accomplished with a clear programming write-up on a white-board and concise movement descriptions and demonstrations. A client with ASD may not pick up on sarcasm and could interpret most things said as literal. Be direct and demonstrate the movement that is desired rather than one that is not. The level of challenge should be such that the client experiences far more success than failure especially in early attempts. To help with this, you can provide simple choices (e.g. "Would you like to do 12 or 15 reps?"), which can help the client feel empowered to complete their workout. This can help to increase confidence and improve long-term adherence.

PROGRESSION TIPS

Adding new or complex movements may take time; try small bouts of exposure to a new movement, gradually increasing the duration or number of repetitions. Also, inform the client a session in advance if a change will occur in the following week to ensure a smoother transition.

AEROBIC TRAINING

Research shows that a focus on aerobic activity has a positive impact on both weight management and reducing autism-specific impairments.¹⁵ Most studies showed improvements in behaviour after a 20-minute time period using a variety of modalities such as walking, jogging, roller-skating, cycling and even the game "Dance Dance Revolution".¹⁵ Find an activity that the client enjoys, is safe and appropriate and use a heart rate monitor or a Rate of Perceived Exertion (RPE) scale. You may also choose to use a modified scale, with relatable images versus numbers, depending on what your client responds to.

Cerebral palsy

Background

Cerebral palsy (CP) is a non-progressive disorder that affects the body's movements and coordination. There are many different causes of CP, as well as different classifications based on the type of movement disorder and/or the number of limbs involved.²⁸ As with any disorder, not all individuals diagnosed with CP have the same symptoms and movement patterns. Individuals with CP may exhibit a range of muscle tightness or spasm, difficulty with fine or gross motor skills (including speech), abnormal perception and sensation and/or involuntary movements.^{12,28} These characteristics can vary based on multiple factors including environment, emotions and age.^{12,28} Research on strength and conditioning programs for individuals with CP is limited,²⁹ but it is documented that physical activity can help individuals with CP improve health outcomes and performance and decrease loss of function and mobility.³⁰

Recommendations for fitness professionals

Prior to initiating any exercise program, the client should consult with their physician to ensure that participation in the program would be appropriate and to identify any limitations or restrictions. Exercise programs for individuals with CP should begin early in rehabilitation, be incorporated into community programming and take a collaborative approach between the client's various practitioners.³⁰ Fitness professionals who are training clients with CP will need to manage "abnormal movements" and be aware of their client's medication and medical history when prescribing exercises or training intensity.³¹ Thus, fitness professionals should speak to their client's physical and occupational therapists to better understand the individual's diagnosis and how it might influence strength and conditioning programming. A fitness professional should inquire specifically about any required exercise considerations related to the client's medical history (i.e. medication, surgeries, injections, etc.) as these factors can alter movements and changes in medication can affect the client's balance, muscle tone, muscle spasms and general wellness.²⁸ Awareness of these factors will help decrease frustration for both the client and fitness professional and will help in establishing realistic outcomes.

As in the general population, fitness programs for individuals with CP should involve all components of physical fitness (i.e. strength, flexibility, cardiovascular and muscular endurance, balance, agility, etc.) to enhance health, function and mobility.³⁰ Programs for clients with CP may differ from general programs in movement pattern capabilities, equipment and exercise selection.³² The exercises chosen may require accommodations using props, customized equipment (e.g. grip aids) or other creative solutions. Other considerations specific to CP

include being aware of primitive reflexes that may impede motion or make using certain equipment more dangerous (e.g. avoiding free weights when tonic reflexes are present)¹². Each individual with CP will have their own unique strengths and barriers, so fitness professionals must support open communication with their client to work with the individual's needs.

Safety concerns

MEDICATION AND MEDICAL HISTORY:

Ask the client about their medications, injections and surgeries, as these may affect their movement patterns and/or motivation to exercise. Be aware that changes in medication dosage and/or type may affect movement abilities.

ENVIRONMENT:

- Consider adjusting the temperature of the training environment as cold spaces can lead to spastic muscle responses or a reduced range of motion. Alternately, be considerate of hot temperatures, as the risks of exercising in hot environments for individuals with CP do not differ from the risks for individuals without CP.
- Physical accessibility should be addressed; consider choosing an area free of objects to reduce tripping hazards, or choosing exercises that can be completed within close proximity to one another.

SPECIALIZED EQUIPMENT:

- If the client has spastic hands, investigate whether they can grip equipment. If not, try using grip aids. The use of grip aids may vary depending on type of exercise (push versus pull), plane of movement (horizontal versus vertical) and load.
- If the client presents tonic reflexes, avoid the use of free weights or other equipment that could fall and injure them¹² and instead utilize machines that help control movement.

GENERAL CONSIDERATIONS:

- Begin the assessments similar to that of a non-adapted population, including assessments of asymmetries and strength differences. Considering the individual's medication, medical surgery and injection history, work on movements that benefit the client's sport or goals.
- An exercise program should begin with establishing movement control. Once the movement is appropriately controlled, strength exercises can be introduced.¹²
- Individuals with CP may exhibit smaller muscle cross-sectional area (CSA) in the affected limbs which will result in a lower force generating capability.^{33,34} A training program goal should include appropriate training volume to increase muscle CSA in the affected limbs.

- Spasticity may cause changes in the mechanical properties of muscles and tendons, resulting in muscular contractures.³⁵ Muscle contractures are associated with reduced muscle belly length and longer tendon lengths³⁶ which results in resistance to movement and affects gross motor function.³⁷ Muscle power production is highly dependent on muscle belly length and CSA, therefore it may benefit the individual to incorporate exercises that increase muscle belly length. Consult with a specialist if you are unsure of which exercises would be appropriate for this.
- Exercises focusing on limb extension (e.g. push exercises) will be helpful for this population. Exercises targeting knee, hip and elbow extension are of particular benefit as the muscles in these areas seem to be affected more by spasticity and abnormal dynamic muscle activation patterns.
- Due to decreased mechanical efficiency, individuals with CP can have up to 50% less work capacity leading to early onset of fatigue. You may also notice a higher than expected exercise response as it pertains to heart rate, blood pressure and/or lactate levels. Utilize tools to monitor the individual and adjust programming as appropriate (e.g. incorporate more rest between sets).³⁸

COMMUNICATION

Some individuals with CP will have speech difficulties. Ask the individual to repeat themselves if you do not understand them. If you are unable to understand the individual, ask for help from their family, friends or caregivers.

From the experts

Tessa Gallinger (BSc., NCSA CSCS) is the Adapted Strength and Conditioning Specialist at Canadian Sport Institute Calgary and works with development to national level para-athletes. The following quotes are from an interview with Tessa (personal communication, February 15, 2017):



“Keep a watchful eye for appropriate movement, not simply task completion. It’s important to make sure the client is not risking movement quality simply to complete the task.”

“I have been surprised by the load some clients with CP are able to manage; it was more than I expected. If the client is hemiplegic, consider adding another set or two on the affected side to reduce the strength differences between the affected and unaffected side.”

Photo credit: Dove Holland

CLIENT INFORMATION

Sarah is 24 and has hemiplegic cerebral palsy affecting the right side of her body, including her right arm, hand, leg, foot and torso and some issues with depth perception. She has been physically active the majority of her youth and teens with activities such as swimming, horseback riding and hiking, but finds certain tasks are becoming more difficult now that she has a full-time desk-job. She does not have any issues with spasms or tremors but her coordination can become worse when she is tired or sick. She is looking for a program to help her regain and increase strength so she can continue to participate in the activities she enjoys.

INFORMATION FROM ASSESSMENT

Ask the client:

- What is her previous experience with fitness training and how did her body respond?
- Does she use a grip aid on her affected side?
- Is she taking any medications that might affect her ability to exercise?
- What movements are particularly challenging for her?

Goals:

- build overall strength and stamina,
- improve coordination on her affected side if possible and
- find movements that are challenging ,yet fun, and do not feel like she is doing 'rehab' drills.
- Time Commitment: 2 days per week, 60min per session
- Access to equipment: goes to local recreation centre to swim and can use the fitness centre
- Special considerations: Sarah finds balance on uneven surfaces to be difficult and has some challenges with stairs on her affected side.

SAMPLE PROGRAM – WEEK 1

SA = Single Arm **FW** = Free Weight **BB** = Barbell

SA FW BENCH PRESS

3 sets | 6 – 8 repetitions per side

Consider a grip aid and guiding movement with client. If grip is an issue but no aid available, utilize a cable machine.

SMITH MACHINE SQUAT

3 sets | 6 – 8 repetitions

The Smith Machine will decrease risk of a dropped bar and allow her to focus on foot position and movement versus grip strength.

SEATED LOW ROW

3 sets | 6 – 8 repetitions

Watch for the unaffected side pulling more than the affected side. Can do SA if major strength difference side to side.

LUNGE

3 sets | 8 – 10 repetitions per side

Consider using a box for support and to help with tracking of the back leg and knee. If balance is a concern, replace with a split squat.

BB SA LANDMINE PRESS

3 sets | 6 – 8 repetitions per side

Will assist in path of movement and requires less grip strength than a dumbbell press.

BIRD DOG

3 sets | 6 – 8 repetitions per side

Will help develop cross body coordination. Utilize a light band to have something for the client push against to help control movement.

The format of the workout is designed to alternate upper and lower body movements to prevent excessive fatigue which can exacerbate symptoms. At times, your client may unexpectedly exhibit drastic decreases in quality of movements; this is an indicator of fatigue and it is best to allow for more rest within and between sessions.

For some individuals it can be beneficial to challenge the affected side more than the unaffected side by incorporating progressive volume increases. However, the affected side may also exhibit more fatigue and need lower loads. Have a conversation with the client in advance and let the client determine if they think the response will be positive or negative based on previous experiences and be ready to adjust where appropriate.

Before your first session determine what grip supports, if any, your client will need and if they have any challenges with hearing or vision. This information will help you determine the best training space and equipment to use. If you do not have a grip aid where one is required, you may choose to use fixed equipment out of necessity and safety, but watch for overcompensation of the unaffected side.

Stretching research is limited and inconclusive for individuals with CP and experts in the field do not report range of motion increases and maintenance on the affected side. In the short term, stretching can increase range of motion, so fitness professionals may choose to incorporate mobility drills before the workout to take advantage of this increased range of motion in the upcoming strength exercises.

PROGRESSION TIPS

For individuals with cerebral palsy, learning a movement may take longer due to potential issues with coordination. Determine the overall objectives of the program and how much support each movement will require. Progression for each individual will be different and it could be to work towards independence in training allowing the client to exercise unsupported, or it might be training to achieve a goal, movement or activity through increasing strength or flexibility.

Down syndrome

Background

Down syndrome (DS) is the most common genetic cause of developmental disability³⁹ and individuals with DS may experience a wide range of general medical and cognitive complications, including endocrine disorders, heart and respiratory problems, language deficits and intellectual disability.⁴⁰⁻⁴² Further, individuals with DS may also experience musculoskeletal challenges such as muscle hypotonicity, joint hyperflexibility and decreased bone mass^{39,42}. These factors can affect the quality of voluntary muscle control and perception of body position, potentially leading to increased musculoskeletal injuries and alterations in power development and gait.^{39,42} Compared to the general population, individuals with DS show increased body mass index (BMI) and obesity rates, decreased muscular strength and decreased posture quality, control and balance.^{39,42,43} These deficits may be the result of physical inactivity or lack of opportunity to practice skills in school or community settings.^{39,43} Additionally, it is hypothesized that the combination of muscle hypotonicity, obesity, hormone irregularities and motor development delays may result in exercise being more difficult for individuals with DS and may deter them from pursuing physical activity.⁴²

It is important for individuals with DS to participate in exercise programs because musculoskeletal and cardiovascular health are important for overall wellbeing and improve the ability to complete tasks of daily living.³⁹ There have been documented improvements in muscular strength and endurance and aerobic fitness for individuals with DS as a result of exercise programs, positively influencing their ability to perform daily-living activities.^{39,42} More research is required to determine the long term effectiveness of exercise interventions and whether the interventions have an effect on BMI or psychological variables for individuals with DS.⁴²

INTERESTING FACT

The term “Down syndrome” was originally used by John Langdon Down to describe a group of people with the characteristics of Down syndrome. Mr. Down did not have Down syndrome himself, so the correct usage of the term is that an individual has “Down syndrome”, not “Down’s syndrome”.⁴

Recommendations for fitness professionals

As with any client, understanding their goals, interests and abilities will enable the fitness professional to identify effective motivation techniques for the client; adaptations to movements may not be necessary.

- Use slow, short and simple instructions to support the client's understanding of the instructions³⁹.
- Complete a task analysis to teach the movement or skill in smaller pieces.
- Complete a functional movement evaluation of a new client. Due to potential delays in motor development observed in this evaluation, the fitness program might initially focus on developing basic motor skill development (i.e. physical literacy), before sport-specific skill development.^{13,44}
- Weight lifting can begin when an athlete has reached the "Learning to Train" stage of the Long Term Athlete Development Model.⁴⁴
- Clients may experience challenges with skill transfer between environments, or with changes in routine or fitness professionals.¹³ Fitness professionals should collaborate with caregivers to determine the best techniques to use for behaviour management.



Safety concerns

The client should request clearance from their physician prior to initiating an exercise program:

- Ensure medical clearance to exercise for atlanto-axial instability, congenital heart conditions, underdeveloped circulatory system, or low respiratory capacity.¹³

NOTE: Athletes that have atlanto-axial instability may be at risk for significant injury with hyperextension or flexion of the neck and should seek clearance to exercise from a Licensed Medical Professional.⁴⁵

- Ensure their medications are not contraindicated for exercise.

NOTE: The fitness professional should request to be made aware of changes in medications should they potentially impact performance and behavior.¹³

- Ensure appropriate supervision for client safety and understanding. A maximum ratio of 1 staff for 3 participants is recommended.⁴²
- Establish and enforce clear rules for behavior.¹³

HIGH RISK EXERCISES:

- Free weights may be contraindicated due to the motor skill level required to complete these movements and potential balance issues creating safety concerns.⁴²
- As with any client, if comfort level and skill level permits, the fitness professional may choose to progress the client to free weights over time.

BE AWARE OF HYPER FLEXIBILITY:

- Hyper flexibility may diminish the stretch reflex, thus negatively impacting plyometric abilities and power output (i.e. throwing, jumping, sprinting).⁴²
- Hyper flexibility may decrease joint stability and increase risk of injury, particularly in exercises like overhead squats.⁴²
- Exercises that place high pressure on joints should be avoided (e.g. triceps dips or behind-the-neck presses).⁴⁴



From the experts

Brent Lohmer (BSc. Exercise Science, NSCA-CSCS, CSEP-CPT) is a provincial coach for Special Olympics Powerlifting and is a 2015 Special Olympics North American Coach of the Year Nominee. The following is training advice from Brent for working with individuals with Down syndrome (personal communication, April 19, 2017):

A. LIGAMENTOUS LAXITY AND HYPOTONICITY

Athletes with Down syndrome have lower levels of muscle tone (hypotonicity) and tend to have higher levels of ligamentous laxity. As a result, getting into positions for exercises is quite easy for them, but it can be deceiving. They may just be “hanging out” in these positions, not actually creating any tension or exhibiting control. Creating tension is important not only for ensuring optimal muscle activation throughout the movement but also for preventing undue strain on passive structures such as ligaments.

Methods that we have used for creating tension include:

1. Creating hip external rotation torque for lower body, closed-chain exercises where the distal segment is fixed (e.g. squat, deadlift).

We always focus on visual cueing for our athletes with Down syndrome, so we show them that the knees should point out to the side slightly. To do this, we have to slightly abduct and externally rotate the hips using the cue “ripping the floor apart”. We have found this to be effective in creating tension in the hips when doing lower body, closed-chain exercises.

2. Creating shoulder external rotation torque for upper body, closed-chain exercises (e.g. push-up) or exercises where the athlete can rotate their arms into a bar (e.g. barbell bench press, barbell row, chin-up).

When doing push-ups, bench press, inverted row and chin-ups we have our athletes “screw their hands into the bar/floor” thus creating shoulder external rotation torque. Again, we keep it visual, so we “show the pits of our elbows to our heads/face/ears” and have them follow along and mimic our movements. This is the upper body equivalent of “ripping the floor apart” in lower-body, closed-chain exercises.

3. Eccentric emphasis

It is relatively easy for our athletes to drop into the bottom of an exercise (e.g. squats), but they are not optimally recruiting the proper musculature. To slow things down and create tension on the descending portion of an exercise, we will emphasize at 3 or 4 second eccentric phase in our movements. We have found this to be effective in generating tension and encouraging control in squats, deadlifts, bench press, rows and pull-up variations.



4. Reactive neuromuscular training with bands or manual resistance

Finally, as it relates to hypotonicity and ligamentous laxity, we will provide external resistance to create tension in our movements. For example, an athlete may be able to get into a squat position below 90 degrees of knee and hip flexion but their knees may go into valgus, or the knees may be in a neutral position but there is no tension holding their knees out. To remedy this, we will put a mini-band around the knees, or provide manual resistance to the knees to give tactile feedback to the client. We tend to resort to using manual resistance as we can adjust the tension more easily to accommodate the athlete's current ability. Not only does this create tension in the hips and prevent knee valgus, it also allows athletes to keep the trunk more upright in squats without extending through the spine.

B. VISUAL LEARNING AND FOLLOWING ALONG FOR EVERY REPETITION

Athletes learn from three primary means - visually, kinesthetically or through auditory cues. We have found that our athletes with Down syndrome respond best to visual cueing. Our coaches have discovered that if we can perform the movements alongside the athlete, the technical execution of the exercise is optimized. So, in the case of coaching a deadlift, we will set up alongside our athletes, unlock our knees (slightly bend the knees), reach back with our hips (bend at the hips) while keeping the spine neutral, squeeze our glutes and then drive through with our hips (extend our hips).

C. ATLANTO-AXIAL INSTABILITY AND MAINTAINING AND NEUTRAL CERVICAL SPINE IN THE DEADLIFT AND SQUAT

Athletes should be cleared by a physician for atlanto-axial instability before participating in any physical activity, but we should still take measures to ensure the safety of our athletes in regards to the cervical spine. When deadlifting and squatting, a common cue is to "keep the head up" or "eyes on the horizon," thus taking the cervical spine out of a neutral position. These cues are contraindicated for athletes with atlanto-axial instability. For these athletes, the cervical spine should have a slight inward curve. When coaching our athletes with Down syndrome, who have a predisposition to atlanto-axial instability, we want to ensure that we maintain that slight inward curvature and not allow it to become exaggerated. We coach our athletes to keep the distance between the chin and the chest the same through the whole movement. We will, again, get right beside them and point out to them how our head and neck looks when we deadlift and when we squat.



CLIENT INFORMATION

Jane is 32 years old and has Down syndrome. She currently lives semi-independently with a caregiver and works part time at the local movie theater. Jane is very social and loves to take part in community events, especially anything involving dance and music. Her family would like her to try something new and hopefully learn some new fitness related skills to help maintain her independence and manage her weight, which has been a challenge at times.

INFORMATION FROM ASSESSMENT

Ask the client and/or their care team:

- Do they have previous physical activity experience?
- Do they have any health related challenges?
- What are their likes/dislikes?
- What is their response to stressful situations?

Goals:

- From the family – weight management
- From the client – make friends and have fun
- Time Commitment: 2-3 days per week
- Access to equipment: the local recreation facility is nearby
- Special considerations: Jane has some coordination issues involving compound movements (i.e. jumping or lunging). She also has some issues with depth perception and may be hesitant with balance drills. Jane has also expressed she is nervous but very excited to begin.

SAMPLE PROGRAM – WEEK 1

SA = Single Arm **FW** = Free Weight **BB** = Barbell

LADDER AND/OR PARTNER GAME

3 – 5 sets | 1 repetition

Choose 3-5 different types of movements for a great warm up that is challenging and fun. Incorporate social interaction for Jane's goal of having fun.

BALL PASS

3 sets | 12 repetitions

Can be weighted, un-weighted, or can incorporate balls of different sizes and passes in different directions. This will challenge coordination in a fun environment.

HURDLE STEP

3 sets | 12 repetitions per side

Short hurdles that knock over easy. Can progress to a hop or run if appropriate. Challenges coordination.

PUSH UP

3 sets | 12 repetitions

Variations include from standing with hands on the wall, the knees, or full body push-ups.

BOX SQUAT

3 sets | 12 repetitions

Teach squat mechanics with a safety in place.

AEROBIC

1 set | 20 minutes

Try rowing, biking, or walking at a moderate pace. Use the "talk test" (i.e. is the client able to continue conversation) to monitor exertion levels.

Before starting the program, it is ideal to have the client visit the facility to see the space and meet yourself and the staff. This is a great time to chat with their support team to learn more about challenges and opportunities for the client to help inform exercise selection. For Jane's program, the goal is to familiarize her to a fitness environment while still keeping it fun. Many of the movements are designed to challenge her coordination to tolerate progression to new exercises. Further, as Jane loves to dance, an improvement in coordination can lead to further confidence and safety in dancing, thus leading to increased opportunities for physical activity. By focusing on fun, the fitness professional can build rapport and lower stress levels, thereby increasing the likelihood of Jane's long-term participation, commitment and enjoyment.

PROGRESSION TIPS

Changes in space, equipment or technique may cause anxiety for some clients. Inform clients in advance of the change and be prepared for possible temporary regressions as they learn and adapt to the change. General progression in terms of strength and endurance may also take longer than expected due to the physiological changes noted in the background section. This may affect program duration so program accordingly and be ready to adapt.

Vision impairment

Background

Nearly 500,000 Canadians have a significant vision impairment, which includes individuals who have had a total, partial and/or progressive vision impairment over time and can refer to decreased visual acuity, a narrowed visual field, decreased depth perception or impaired sensitivity to contrast.^{13,46} For an individual to be considered legally blind, they must have a best corrected visual acuity of less than 20/200.⁴⁶ Most individuals with blindness have some residual vision and can see some dark and light contrast.¹² Vision impairment can be congenital (i.e. present from birth), or can be acquired after birth from trauma or disease such as age-related macular degeneration, diabetes or obesity.⁴⁶ Up to 75% of vision impairments are treatable or preventable and the Canadian National Institute for the Blind recommends regular exercise, in addition to regular check-ups from eye care professionals, to avoid preventable vision impairment.⁴⁶

Despite the positive benefits of physical activity on vision, only 1% of individuals with vision impairments participate in sport and research indicates that people with visual impairments often have decreased fitness levels and higher energy requirements in daily living as compared to their peers without vision impairments.^{13,47,48} For individuals who have been blind from an early age, there is an increased difficulty in creating visualizations of the movement skill or strategy as compared to individuals who have acquired vision impairments later in life.¹³ This can pose an increased barrier to physical activity and can result in the individual taking longer to learn a skill.¹³ It is important to support opportunities for individuals with vision impairment to participate in physical activity as an active lifestyle can help improve health, social inclusion and self-empowerment and can reduce the incidence of secondary health conditions.⁴⁸

INTERESTING FACT

Canadian Blind Sports indicate that children with total vision impairments may take up to 8 trials of an activity to understand the activity to a level that a child with full sight can achieve from one sighting.⁴⁷

Recommendations for fitness professionals

LEARNING ADAPTATIONS:

- Be aware that skill acquisition may take longer for individuals with congenital vision impairment and it may take many more trials for the individual to understand the movement.⁴⁸
- In order to develop fundamental movement skills, individuals with vision impairment may require increased instruction and encouragement to assist their learning.⁴⁷

COMMUNICATION TIPS:

- Never assume an individual needs assistance, always offer to help before assisting.⁴⁸
- Ask the client about their communication preferences.
- Speak normally, without exaggerated pronunciation or heightened volume. Use clear, descriptive communication and, with permission, use physical cuing.¹³
- When using descriptive language, give immediate feedback and try explaining the activity or movement in different ways if the person does not understand.
- When you approach an individual with vision impairment, announce your arrival and address them by name; be sure to also indicate when you are leaving or moving away.¹²
- Cue words such as “see” and “look” are acceptable.
- Describe the surroundings to the individual when starting an activity and inform them if equipment has moved during the activity.⁴⁸



PHYSICAL GUIDING:

- Ask the individual if you can physically guide them to different parts of a station or location. If they agree, ask them how they would prefer to be guided. They may choose to hold the crook of your elbow and follow slightly behind. Be sure to communicate if there are obstacles or hazards to avoid.
- When approaching something for the client to sit on, ask them if you can guide their hand to the back of the chair, or to the seat itself.
- With permission, you may demonstrate a movement to the individual with vision impairment by using your hands to move the individual’s limbs through the motion, or use a hand-over-hand technique.⁴⁸ Hands-on feedback to correct form may also be beneficial, but explain verbally where you are going to touch to ensure they are comfortable and that you do not startle them.

SERVICE ANIMALS:

- Some individuals with vision impairment may use a cane, specialized glasses or service animals (e.g. guide dogs) to assist them in their daily lives.
- Learn the provincial legislation on service animals. Inquire about facility-specific policies and procedures as well.
 - In British Columbia, the *Guide Dog and Service Dog Act*⁴⁹ states that a guide or service dog team may access public spaces and shall not be interfered with in exercising their right of entry, nor can there be a fee charged for the dog's entry.
- Ask the owner before interacting with the animal. As a general rule, do not pet or interfere with service animals while they are on duty.

EXERCISE AND EQUIPMENT ADAPTATIONS:

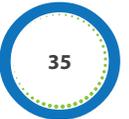
- For running, the individual with vision impairment may benefit from a guide to direct them. This can be accomplished by the guide and the individual holding either end of a tether.⁴⁸
- Audible balls (e.g. balls with bells inside of them) can be used for catching and passing, or objects with high colour contrast.
- Placing textured stickers or buttons on equipment will allow the participant to find on/off switches, speed adjustments, etc.

Safety concerns

Ask the individual about any comorbid conditions that may influence their ability to exercise. If there is anything of concern, ensure they have been cleared by a physician to participate in the exercise program.

TO NOTE:

- individuals who have glaucoma should not workout at high intensities because glaucoma weakens eye vasculature and excessive stress may cause the vessels in the eye to rupture¹² and
- individuals who have a detached retina could have the condition worsen by physical blows, so be sure to choose appropriate exercises and activities (M. Lonergan, personal communication, February 22, 2017).
- Establish a clear signal to alert individuals with vision impairment of imminent dangers (e.g. establish a verbal cue that would have them stop their movement immediately in event of danger).¹³
- Consider the environmental noise of the location. Ensure it is quiet enough for the individual to hear instructions.¹³



From the experts

Mike Lonergan is the Program Director at BC Blind Sports, has won numerous coaching awards and is a Burnaby Sports Hall of Fame Inductee. The following is advice from Mike on working with a new client with vision impairment (personal communication, February 22, 2017):

“Start by asking what they can see (i.e. light, color, shape, etc.) and when they lost their vision.”

“An individual’s movement capacity will be different based on when they lost their vision and this can influence the rate that they learn motor skills. Based on their past experience you may need to guide them differently (i.e. hand-over-hand physical guidance versus descriptive verbal cues). For some individuals you may need to be more hands-on than with others.”

QUOTE FROM A CLIENT

“I believe that the most beneficial way to start coaching a person with a visual impairment is to ask them what they need to be successful. Oftentimes I get asked how much I can see and I find it much more useful to tell people what I need from them. People with visual impairments are at different stages in their vision loss, some may have just lost it, while others may have been born blind. It is important that people share the information that they feel comfortable sharing.”

~ Georgia Pike, University of Victoria student who became visually impaired in 2014



CLIENT INFORMATION

Kate is 45 years old and an avid cyclist. Over the last 5 years she has been experiencing a degenerative eye condition that has narrowed her field of vision (she describes it as “looking through a pin hole”), but is otherwise healthy. She is still cycling on a tandem bike with her partner, but has found she is losing strength in other areas as she is moving more cautiously and doing less high intensity activity due to the vision change. She would like a program that she can learn to do independently at home.

INFORMATION FROM ASSESSMENT

Ask the client:

- Is there any risk that exercise will exacerbate the vision impairment?
- What and how far can you see?
- Do you have issues with depth perception and balance?
- Do you have a guide animal or use a cane?
- Will you bring a friend or guide?
- What do you need to be as successful as possible?

Previous experience with exercise programs: used to do outdoor boot camp style workouts 1 – 2 times per week, incorporating a combination of light free weights and aerobic activities.

Goals: maintain strength while working out independently

- Time Commitment: 3 – 4 days per week
- Access to equipment: equipment at home, local recreation center
- Special considerations: consider balance and physical space flow and layout

SAMPLE PROGRAM – WEEK 1

FW = Free Weight **BB** = Barbell **KB** = Kettle Bell

KB SQUAT

3 sets | 8 – 12 repetitions

Olympic KBs have large easy to grab handles and large surface areas for holding.

FW SHOULDER PRESS

3 sets | 8 – 12 repetitions

If standing creates balance issues, can be done seated.

KB DEADLIFT

3 sets | 8 – 12 repetitions

Does not need to load plates or use bars, easy to stay in one space.

STANDING BANDED ROW

3 sets | 8 – 12 repetitions

Back strength, postural awareness.

FW REVERSE LUNGE

3 sets | 8 – 10 repetitions per side

Easier to balance by stepping backward than significantly changing the center of balance moving forward. If unstable try body weight only. Make sure space is clear.

CYCLE INTERVALS

45 seconds hard | 15 seconds easy

If Kate has a guide dog, consider having a space for the dog to rest that will allow it to be near and see Kate. If Kate is going to be working out with a sighted guide, then consider them in your program as well.

PROGRESSION TIPS

For Kate's program, it is important to remember the goal is independence in exercising. Ideally, the program would be designed using equipment she has, or is willing to get, or utilizes a smaller area in the facility to prevent travelling large distances to get equipment. Aside from having a visual impairment, Kate would be trained similar to any other 45 year old cyclist as long as techniques and programs can accommodate to the possible challenges a visual impairment can bring.

APPENDIX

Tools and resources for fitness professionals

GENERAL TRAINING AND INCLUSION RESOURCES

Active Living Alliance for Canadians with a disability (ALA) provides nationally coordinated leadership, support, encouragement, promotion and information that facilitates healthy, active living opportunities for Canadians of all abilities across all settings and environments. Find resources and other tools on the ALA website. ala.ca

Bright Hub Education provides information and resources for educators and has a section for working with people with disabilities. brighthouseeducation.com/special-education

Canadian Disability Participation Project is an alliance of partners working together to enhance community participation among Canadians with physical disabilities. *Their Physical Activity, Active Living and Sport Resource Catalogue: Online Resources for Canadians Living with Disabilities* can be found online at the link below. cdpp.ca/sites/default/files/Physical%20Activity,%20Active%20Living,%20and%20Sport%20Resource%20Catalogue.pdf

Canadian Paralympic Committee is a non-profit, private organization with 27 member sports organizations dedicated to strengthening the Paralympic Movement and provides links to programs and resources on their website, including a tool for finding an activity for individuals with disabilities. paralympic.ca

Coaching Association of Canada (CAC) educates coaches through its national program. coach.ca. “**Coaching Athletes with a Disability**” handbook. A CAC resource specific to coaching individuals with a disability. coach.ca/files/Coaching_Athletes_Disability_update2016.pdf

Get Active Now (www.getactivenow.ca) is a dynamic, forward-thinking charity focused on improving the lives of people with disabilities and has published the following helpful guide for activity adaptations: lin.ca/sites/default/files/attachments/Activity%20Adaptations.pdf

Kids Included Together (KIT) is a nonprofit dedicated to promoting acceptance of differences by teaching people how to meaningfully include children with disabilities or complex needs. KIT provides online and on-site training, coaching and consulting. kit.org

National Center on Health, Physical Activity and Disability (NCHPAD) is a public health practice and resource center on health promotion for people with disability and has a selection of videos and resources specifically for fitness professionals. www.nchpad.org. The NCHPAD **YouTube channel** has many videos on demonstrating creative techniques for training individuals with disabilities and building rapport with clients. youtube.com/user/NCPAD

OneAbility is a collaborative of community partners in Greater Victoria that aims to provide leadership to enhance the adapted sport and physical activity landscape, including providing training and resources around inclusion. In the resource section of the OneAbility website, there are many tools and links available for fitness professionals. oneability.ca

Person First Language Chart is an educational resource on appropriate language to use when referring to individuals with disabilities. <https://nebula.wsimg.com/3c88c164d8932feef20cc0ddfa8cf11a?AccessKeyId=9D6F6082FE5EE52C3DC6&disposition=0&alloworigin=1> **Positive Behaviour Support Guide: pbsc.info/aide/**

Rick Hansen Foundation develops programs and initiatives to raise awareness, change attitudes and remove barriers for people with disabilities in the built environment. For facility accessibility checklist and rating tool, visit the Planat app link below. planat.com. For other inclusion links and resources, visit the following link: rickhansen.com/Our-Work/School-Program/Resources/Disability-links-and-resources/Top-10-Tips-for-Working-with-a-Student-with-a-Disability



Sport for Life develops physical literacy and quality sport for ALL Canadians. Specific resources for individuals with disabilities are found here <http://sportforlife.ca/athletes-with-disabilities>. Their website has many valuable resources. sportforlife.ca

The Inclusion Club offers a selection of videos, resources and training tools to help educate and inform people about different aspects of inclusion. theinclusionclub.com

TopShape Inc. offers training in *Adaptive Fitness for Professionals* and includes a comprehensive manual for working with many different disability types. topshapeinc.com

AMPUTATION

Amputee Coalition is dedicated to enhancing the quality of life for amputees and their families, improving patient care and preventing limb loss. Their website hosts many resources, including one outlining advanced exercises for people with amputations. amputee-coalition.org/resources/advanced-exercises-for-people

Center for Assistive Technology and Environmental Access website has many resources, including the document on *Sport and Recreation Adaptations for Upper Extremity Prostheses*. atwiki.assistivetech.net/index.php/Sports_and_recreation_adaptations_for_upper_extremity_prostheses

Digital Resource Foundation for the Orthotics & Prosthetics Community have made many resources available online (oandplibrary.org), including the *Atlas of Limb Prosthetics: Surgical, Prosthetic, and Rehabilitation Principles*.⁷ oandplibrary.org/alp

National Center on Health, Physical Activity and Disability (NCHPAD) recommends the following texts for exercise programs for individuals with lower extremity amputations (nchpad.org).

Strengthening and Stretching for Lower Extremity Amputees (Gailey & Gailey, 1994),

Balance, Agility, Coordination and Endurance for Lower Extremity Amputees (Gailey & Gailey, 1994),

Home Exercise Guide for Lower Extremity Amputees (Gailey, Gailey & Sendelback, 1995) and

Physical Fitness: A Guide for Individuals with Lower Limb Loss (Burgess and Rappoport, 1991).



AUTISM

Canucks Autism Network (CAN) provides sport and recreation programs for individuals and families living with autism, while increasing awareness and providing training and resources to communities across British Columbia. canucksautism.ca/training

CAN, in partnership with the **Pacific Institute for Sport Excellence (PISE)**, have published the “*I CAN Develop Physical Literacy*” Resource Guide and visual aids available at piseworld.com/physical-literacy-resources

Autism Fitness provides resources and training for professional developing fitness and Physical Education programs for individuals with Autism Spectrum Disorder. autismfitness.com

Autism Fitness Toolbox provides equipment, books and resources to support effective, fun and meaningful fitness and Adaptive Physical Education programs individuals on the autism spectrum. autismfitnesstoolbox.com

Autism Speaks is dedicated to promotion solutions, across the spectrum and throughout the lifespan, for the needs of individuals with autism and their families through advocacy and support; increasing understanding and acceptance of autism spectrum disorder; and advancing research into causes and better interventions for autism spectrum disorder and related conditions. www.autismspeaks.org

Coming in 2017...

Special Olympics Canada will be releasing an online training module specific to autism.

Coach.ca will be updating and releasing their autism training resource.

CEREBRAL PALSY

American Academy for Cerebral Palsy and Developmental Medicine is an academy of health professionals dedicated to providing multidisciplinary scientific education and promoting excellence in research and services for the benefit of people with and at risk for cerebral palsy and other childhood-onset disabilities. For their *Physical Fitness and Exercise for Adults with Cerebral Palsy*, visit the link below. aacpdm.org/UserFiles/file/fact-sheet-fitness-083115.pdf

Cerebral Palsy Association of British Columbia is an independent charitable organization that provides support, education and information to raise awareness of cerebral palsy in the community; to assist those

living with cerebral palsy to reach their maximum potential; and to work to see those living with cerebral palsy realize their place as equals in a diverse society. For more exhaustive overview of the different types of CP, please refer to “*A Guide to Cerebral Palsy: Your Pathway to Understanding*”:²⁸ bccerebralpalsy.com

Cerebral Palsy International Sport and Recreation Association is an international sports organization governing and promoting sport and recreation for Cerebral Palsy and related neurological conditions throughout the World. cpisra.org

DOWN SYNDROME

Canadian Down Syndrome Society is a national non-profit organization providing information, advocacy and education about Down syndrome. The CDSS website has many valuable resources. cdss.ca

Special Olympics BC is dedicated to enriching the lives of individuals with intellectual disabilities through sport. Their website has a host of resources specific to athletes, coaching and more. specialolympics.bc.ca

Special Olympics Canada is dedicated to enriching the lives of Canadians with an intellectual disability through sport. The organization provides e-learning opportunities and runs three recognized National Coaching Certification Program (NCCP) coach trainings that all Special Olympics coaches undertake. specialolympics.ca

VISION IMPAIRMENT

Active Living Alliance for Canadians with a Disability has useful tip sheets specifically for individuals with blindness/visual impairment. <http://lin.ca/sites/default/files/attachments/blind-visual-impairment-tip-sheet.pdf>
http://wm.p80.ca/Org/Org23/Content/TipSheets/Tips/blind_vi.asp

British Blind Sport helps people who are blind and partially sighted get active and play sport. In their “Education” section of the website, there are several resources available, including “*A Guide to Visually Impaired Friendly Sport*” britishblindsport.org.uk

British Columbia Blind Sports and Recreation Association is dedicated to facilitating participation and encouraging skill achievement in all aspects of physical activity for British Columbians who are blind, visually impaired,

deaf-blind, or who are blind/visually impaired and have additional disabilities. They host an equipment loan program, provide trainings and education and provide activity instruction programs throughout BC. bcblindsports.bc.ca

BC Blind Sports also has an Early Intervention resource (manual and DVD) titled “*Encouraging Physical Activity for Preschoolers with Visual Impairment*” as well as a fitness manual for seniors. Although these resources are targeted to preschool families and seniors, they have valuable information for any age and individual, including community programs about the development of physical literacy and ways to adapt programming.



Canadian Blind Sports is a not for profit association serving individuals who are blind, visually impaired, deaf-blind, or are blind and have additional disabilities and their families and other supporters. Their website resource section links to guides for physical activity and recreation for adults with vision impairments. canadianblindsports.ca

Canadian Council of the Blind is the largest membership based organization of the blind in Canada. The CCB deals with the ongoing effects of vision loss with specific programs to encourage active participation in local communities through education, sports and recreation and employment. ccbnational.net

Canadian National Institute for the Blind – BC and Yukon provides community-based support, knowledge and a national voice to ensure Canadians who are blind or partially sighted have the confidence, skills and opportunities to fully participate in life. Their website is a host for many resources related to supporting individuals with vision impairment. cnib.ca/en/bc-yukon/Pages/default.aspx

Perkins School for the Blind e Learning is a comprehensive, accessible professional development offering covering topics ranging from academic and vocational skills to compensatory and adaptive skills and beyond. perkinselearning.org/scout/specific-sports-activities-blind-visually-impaired

Vision Aware helps adults who are losing their sight continue to live full and independent lives by providing timely information, step-by-step daily living techniques, a directory of national and local services and a supportive online community. Their website hosts many valuable resources for sport and exercise. visionaware.org/info/everyday-living/recreation-and-leisure/sports-and-exercise/123



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SPINAL CORD INJURIES

SCI-U provides online courses which promote active and healthy lifestyles for people with spinal cord injuries (SCI). The content is displayed with the use of videos that have been created by people with SCI, service delivery professionals and medical professionals. Furthermore, researchers evaluated the content to ensure for the effectiveness of the project. SCI-U's course on Physical Activity introduces benefits of and guidelines for physical activity as well as different strategies to overcome barriers to lead physically active lives. sci-u.ca/p207

SCI Action Canada is a partnership of community-based organizations and university based researchers working together to advance physical activity knowledge and participation for people living with spinal cord injury. In partnership with McMaster University and Rick Hansen Institute, SCI Action Canada provides the first evidence-based physical activity guidelines developed specifically for people with spinal cord injury. sciactioncanada.ca/guidelines

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