

## Introduction to Exercise and Disabilities

Barriers against people with disabilities doing fitness

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Contraindications regarding fitness for people with disabilities

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## Chronic pain vs. fitness programming

### **Chronic Pain**

An unpleasant sense of discomfort that persists or progresses over a long period of time.

### **Fitness for Chronic Pain**

Choosing a program that is right for you.

Check with your Doctor prior to any exercise program.

Choose exercises that are right for your body and mind set.

Start slow and work your way into more intensity for example light weights with more repetitions to start then work to heavier weights with less repetitions.

Rule of thumb if you cannot feel the exercise after 2 -3 repetitions increase your weights, if you can not do more than 2-3 repetitions decrease your weights.

When starting a cardio program start light, if you feel light headed or winded slow down first instead of stopping completely. One of the best cardio programs to start with for chronic pain is walking. You can build a program by walking at a regular pace for 3-4 minutes then do a minute faster to assist with building endurance.

## Safety and Exercise

Exercise safety is extremely important in the prevention of injury and improvement of physical health. Knowing exercise safety is especially important when you are dealing with or are an individual who has any type of medical condition. This is because the individual's needs may be different to those of a perfectly healthy individual. Exercising in an unsafe manner defeats the purpose of exercising all together as it may prevent the exercise from working or cause the exercise to work in a different way.

### General Safety Tips:

- seek medical attention or advice if:
    - you feel pain or discomfort while exercising
    - you have pain that resembles the signs of a heart attack, i.e. chest pain, pain in arms, or through the shoulder pains
    - extreme breathlessness
    - rapid or irregular heartbeat
    - \*\* individuals who begin exercise and already have a medical condition are highly recommended to talk to their doctor before they begin exercise\*\*
    - Become dizzy or experience cold sweats
  - Begin physical activity by warming up
  - Always cool down after exercising and stretch your muscles for a good amount of time in order to prevent injury and pain
  - Stick to an exercise regimen or schedule in order to prevent over excursion
  - If you have a joint that is prone to injury, insure that it is properly supported before you begin exercise
  - Everyone should see their doctor on a regular basis
  - It is important to prevent dehydration: drink lots of water before, during and after exercise- drinking too much water is just as dangerous as not drinking enough, the symptoms of having too much water in your system are: headache, swelling of hands and feet, and a low temperature
  - Do not exercise in extreme conditions- i.e. environments that are too hot or too cold
- Hyperthermia= too hot
- Symptoms include: irritability, discomfort, weakness, nausea, headache, and cramps
  - Tips to avoid hyperthermia: be hydrated, protect yourself from the sun (sun screen, covered up, wear hat)
  - Exercise during cooler parts of the day
  - Reduce the intensity of the workout
  - It takes close to two weeks to adjust to exercising in a hotter climate

- Hypothermia= too cold
  - Symptoms include: shaking, discoloured limbs, loss of feeling in some parts of the body, numbness
  - tips: wear layers of clothing, spend more time warming up and cooling down after physical activity, drink lots of fluids
  - protect yourself from the sun
  
- Proper technique while participating in fitness:
  - Ensure you are holding equipment that is handheld properly
  - Ensure protective gear and equipment is the proper size for your body
  - Avoid bouncing while participating
  - Protect your back, ensure that your thighs take the majority of the weight when participating in any physical activity
  - Get advice from a personal trainer, coach, assistant, or fitness expert
  
- Equipment safety:
  - Wear appropriate shoes for the activity
  - Perform regular safety checks
  - Consult with knowledgeable
  - Always wear the proper protective equipment
  
- Exercise and being active at night:
  - Exercise with a friend/ let other know where you are and what you are doing
  - Wear bright clothing, carry a phone, workout in a well lit area
  - If you are cycling attach light to your cycle
  - If you feel at all unsafe than pick a different time/ place to exercise
  
- listen to your body:
  - have at least one, or two recovery days per week in which you do not exercise at all
  - if you feel breathless, take it easy and slow down
  - monitor your training and your heart rate during your training
  - if you injure yourself, be sure to rest and allow it to heal before you resume your regular exercise routine

Above Information was taken from:

State of Victoria, "Exercise Safety." Better Health Channel

October 2007 13 Mar 2009

<[http://www.betterhealth.vic.gov.au/bhcv2/bhcArticles.nsf/pages/Exercise\\_safety?OpenDocument](http://www.betterhealth.vic.gov.au/bhcv2/bhcArticles.nsf/pages/Exercise_safety?OpenDocument)>.

*Back Safety Tips during Exercise:*

*How can back injuries be prevented?*

*Posture:* During physical activity it is important for individuals to keep a straight posture. This will help to prevent back injury from occurring. An example of good posture is keeping the shoulders and back straight. An example of bad posture is hunching the back and shoulders forward slightly.

*Body mechanics:* This term refers to the way that as humans we perform tasks, such as lifting, bending, or stretching. To ensure a healthy back, it is important to bend at the knees and not the back when picking up objects. When lifting stand close to the object and keep your back as straight as possible. When working pace and take frequent breaks, this should be the same whether sitting or standing. Extra props such as back belts have not been proven extremely effective.

*Above Information taken from:*

Medical College of Wisconsin., "Three Key Components in Back Injury Prevention." Health Link 2002-01-31 16 Mar 2009

<<http://healthlink.mcw.edu/article/1012425715.html>

## Motivation

### **Definition:**

In order to participate in, or have the want to do something different, individuals must have the motivation to do it, or they will not see the point in doing it. The use of motivation requires a variety of communication, incentives and structure. Using motivation tactics on others when teaching a program or class is a great way to ensure that they are having fun and enjoying what they are doing to the fullest.

### **Tactics:**

1. Consequences: it is important to never threaten the participants in anyway, instead make individuals aware of the consequences that may happen, but to never enforce them
2. Pleasure: provide individuals with rewards that are pleasurable to them and make them happy. This encourages them to participate therefore giving them motivation.
3. Performance Incentives: give individuals incentives that will encourage them to stay motivated.
4. Detailed Instructions: Giving individuals detailed instructions helps them to know exactly what they are to be doing therefore they will be less hesitant towards what it is they are doing and more motivated and comfortable in accomplishing their goals. This helps to achieve a specific result
5. Have the individual choose both short term and long term goals:
6. Kindness: This goes a long way, the sweeter you are to an individual the more comfortable and confident they will feel in themselves and the happier in general they will feel.
7. Deadlines: individuals tend to be most productive when they have a deadline to meet, therefore if an individual sets a goal to do something, have them set a dead line that they should have this task completed by and this in turn should motivate them to complete it on time.
8. Team spirit: positive energy and thoughts towards an activity and getting involved in something with a team will help individuals to have more fun with the task they are completing and therefore keep them motivated to keep coming back because they are enjoying themselves so much. In addition to this, most individuals do not want to let other down, so if they are a part of a team they are less likely to quit or stop doing a certain task in fear that it will effect others negatively
9. Recognition for an individual's achievement: if an individual achieves one of their goals or accomplishes something new than it is important to recognize that in them and encourage them to keep going as well as ensure them that they are doing a great job. This will make them feel like someone cares and will motivate them to keep going.

10. Personal stake: it is important for the fitness assistant to realize what stakes and what personal investments individuals have in the task. By understanding the individuals wants and needs you are ensuring to give them what they want therefore motivating them to continue.
11. Focus on the outcome of the situation: focus on what you want the individual to do and help them to attain their goal
12. Give individuals the trust and respect that they deserve: everyone is participating because they want to be, and it is important to recognize that different tasks are difficult for different individuals. Something that you find easy may be one of the hardest things one of the participants has ever done. This is why it is important to help them through it and respect them for trying their best.
13. Create challenges: Individuals thrive when in competition and are happy to be progressing towards a certain goal. This will create more enthusiasm and keep them motivated.
14. Allow them to be creative: this allows individuals to be more optimistic and feel like they have some control of their goal and plan.
15. Give constructive criticism: letting individuals know what they are doing wrong so they can fix it and feel more confident about reaching their goal. This will keep them motivated to keep going in their task as they will know that the mistake is corrected and that they are performing the task correctly.
16. Demand improvement: if someone is doing okay demand that they do great! This will motivate them and let them know that you care about the outcome and want them to do their very best!
17. Make it fun! If an activity is fun, individuals are more likely going to want to continue having fun
18. Create opportunity's :for individuals to advance, which will give them more motivation to keep going
19. Communication: talk to them about their program and what they are doing, this will help to avoid potential problems.
20. Make the program stimulating: mix it up and do not make the individuals to the same thing every time. Providing variety in their routines will give them an extra reason to keep showing up

### **The seven rules of motivation:**

1. set a goal to reach, but follow a path in order to reach it
2. make a goal of finishing what you start
3. hang around other individuals who have similar interests to yours
4. learn the way that you learn best, for example, you may learn through doing things hands on, where as others learn from seeing something be done before they do it
5. use what you are naturally good at, or stronger at to your advantage
6. learn more about something you are interested in but currently know little about
7. take risks- this is a motivation because you do not know the outcome of what you are going to do therefore this makes it intriguing and something that many people are drawn to

Above information taken from:

---Robert L. Webb, "seven rules of motivation." seven rules 2000  
Web.29 Apr 2009. <[http://www.motivation-  
tools.com/elements/seven\\_rules.htm](http://www.motivation-tools.com/elements/seven_rules.htm)>.

---John Jorgensen, "Increase Motivation." Pick the Brain August 23rd,  
2007 Web.29 Apr 2009. <[http://www.pickthebrain.com/blog/21-proven-  
motivation-tactics/](http://www.pickthebrain.com/blog/21-proven-motivation-tactics/)>.



## **The Brain and Exercise**

By interacting with the world through perception and action, your brain learns and grows. Both mental stimulation and physical exercise improves brain function and protects against cognitive decline.

No matter what age, the human brain continues to 'adapt and rewire' itself by growing new neurons. Severe mental decline is often caused by a disease, whereas the majority of age-related memory or motor skill loss occurs from inactivity and lack of mental stimulation. 'In other words, use it or lose it.'

### **Mental Exercise for a Better Brain**

As a child our brains are absorbing a tremendous amount of information through new discoveries and developing lifetime skills. With mental exercise and stimulation our brains can continue to grow, even in an older age.

By considering your brain a muscle, you must find opportunities to 'flex it'. These activities may include: reading, crossword puzzles, Scrabble, start a new hobby, or learn to speak a foreign language. By being able to challenge the brain in early years the 'cognitive reserve' is able to build up to counter brain-damaging diseases.

A psychologist found that elderly people who regularly play bingo has minimized their memory loss and improved their hand-eye coordination. Bingo helps individuals of all ages to 'remain mentally sharp'.

### **Physical Exercise for a Better Brain**

'Most of us know that physical exercise is good for our general health, but did you know that physical exercise is also good for your brain?' The word exercise derives from a Latin root meaning "to maintain, to keep, and to ward off." To exercise means to practice, put into action, train, perform, use, improve.

Walking is a great form of exercise for your brain; it increases blood circulation and the oxygen and glucose that reach your brain. 'Walking is not strenuous, so your leg muscles don't take up extra oxygen and glucose like they do during other forms of exercise.' 'Movement and exercise increase breathing and heart rate so that more blood flows to the brain, enhancing energy production and waste removal.' Research had shown that through exercise, cerebral blood vessels can grow.

A walking study of senior citizens showed that regular walking has significant improvement in memory skills compared to sedentary elderly people. Walking also helped improve their 'learning ability, concentration, and abstract reasoning.' It was also shown that the risk of stroke was reduced by 57% in people who walked as little as 20 minutes a day.

Above taken from:

<http://www.fi.edu/learn/brain/exercise.html>

### **Side Effects of Medications**

When working with individuals with disabilities sometimes their medication may affect their ability to workout. It is important to know if the participant is on any medication that may affect their ability to fully participate in activities. Medication has a range of side effects that should be researched.

For example:

Stimulants taken for ADD and ADHD may cause the following side effects:

- Difficulty sleeping
- Loss of appetite
- Headaches
- Upset stomach
- Irritability, mood swings
- Depression
- Dizziness
- Racing heartbeat
- Tics

[http://helpguide.org/mental/adhd\\_medications.htm](http://helpguide.org/mental/adhd_medications.htm)

During the early stages of treatment, some side effects that individuals may experience when taking antipsychotic medication include: drowsiness, restlessness, muscle spasms, tremor, dry mouth, or blurring of vision.

Individuals who have taken antipsychotic medication for a prolonged period of time may develop Tardive Dyskinesia (TD). This is a disorder that is characterized by involuntary movements. These movements affect the mouth, lips, and tongue along with the trunk and other parts of the body such as arms and legs.

[http://mentalhealth.about.com/cs/psychopharmacology/a/antipsy\\_3.htm](http://mentalhealth.about.com/cs/psychopharmacology/a/antipsy_3.htm)

### Exercise as a Release for Sexual Tension:

- exercise has been a proven release of many different forms of tension within the body
- breathing exercises will also help with this type of release, example of a simple breathing activity:
  - sit or stand in a relaxed position
  - count to five while inhaling slowly
  - while breathing out, count to eight
    - tips: as you are breathing allow your stomach to expand visibly

- this activity does not take up a large amount of time and has been proven to be effective
- exercise is a great release of both physical and mental tensions
- physically: by improving your cardio functioning it strengthens your heart, increases oxygen in your body, lowers fats and cholesterol levels
- Mentally: it provides a release for negative emotions such as frustration, irritability and anger- it also improves and individuals mood by releasing endorphins into the body which are a pleasure chemical thus releasing sexual tension

### Adaptable Equipment and Program Design

What equipment is best for your facility, clients and budget?

Assess:

Type of clientele

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Fitness needs/goals

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Types of equipment

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Staffing requirements

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Budget requirements

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What is the FITT principle?

Frequency

Intensity

Time

Type

Working Muscles and Program Design

Now asses this yet again with your client needs and what opportunities there may be in the community.

### **Key things when developing a fitness program**

Ensure the client has medical clearance and Parmedx/ParQ signed

Provide a safe environment for client, if a home based program ensure the area where they are going to do their fitness is free of hazards i.e. cords to trip on, unstable objects that may fall etc.

Calculate into their program if they are already doing fitness elsewhere.

Ensure proper stretching at the end of the workout holding the stretch for 30-60 seconds.

Set up a complete schedule of when they are coming to see you or you to them or doing their program on their own at home.

Keep track of their progress.

Change up the program every 4-6 weeks based on the clients needs.

Encourage your client, provide motivation and a fun environment so the keep coming back and continuing on their own.

Anxiety

### Define:

Anxiety is a feeling of apprehension, nervousness, fear or worry. Examples of anxiety include worry about a loved one or anticipation about taking a quiz or a test. The symptoms are typically related to the heart, lungs, nervous and gastrointestinal systems. Symptoms of anxiety include, but are not limited to: upset stomach, diarrhea, trouble breathing, or the feeling that you are about to have a heart attack. Anxiety may be caused by a mental or physical condition, or be the effect of drugs (possibly all three). Examples of conditions that are associated with anxiety include: anaemia, asthma attack, infection, drug intoxication or withdrawal.

### Types/ Levels:

The common types of anxiety include these mental conditions:

**Panic Disorder:** In addition to experiencing panic attacks, individuals with panic disorder typically experience upset stomachs, palpitations, dizziness, and shortness of breath.

**Generalized Anxiety Disorder:** Those who suffer from this condition experience worries that are on the mind more often than they are not on the mind and these worries interfere with the individual's ability to sleep and function.

**Phobic Disorders:** Individuals with phobias experience fear of one object that may be so strong when they are facing that fear that an anxiety attack occurs. An example of a common phobia is arachnophobia, which is the fear of spiders.

**Obsessive Compulsive Disorder:** Individuals with OCD often suffer from distressing thoughts (obsessions) or repetitive actions (compulsions). Examples of these actions include an obsession about germs, or a particular order something goes in.

**Separation Anxiety Disorder:** This disorder is related to children who become overly anxious in response to anticipating or being separate from their caretaker. Examples of times children experience these feelings include, bed time and being dropped off at school.

### Limitations/ Factors:

The typical factors that bring the onset of anxiety include, but are not limited to: stress related to work and school, stress in marriage or friendships, financial stress, illness related stress, stress from an emotional trauma, and lack of oxygen. The symptoms of anxiety are mentioned above. Because of these reasons it is important that when exercising individuals do not feel stressed or pressured in anyway. Exercise should act as a release of tension and improve over all quality of life for these individuals.

### Sex Ratio:

Research on the ratio of males and females that suffer from this disorder is not common and as of now there is no solidified answer to this question; however we do know that it does in fact affect both males and females.

### Note:

Factors of physical activity that relieve tension and anxiety include, but are not limited to: decision making, meaning of the activity, distraction from worry, and improved self image. There are scientific factors that make a difference as well, such as: an increase of blood flow to the brain, release of hormones, stimulates the nervous system, and increases morphine like substances in the body which in turn improve the individual's mood. It is also noted that an individual's anxiety level will be high when they first begin to workout, however when they are finished it is typical that their anxiety level is significantly lower. The effects of exercise may wear off quite quickly; therefore if the individual suffers from chronic anxiety, they may need for workout once a day.

Also note your program design, if there are a lot of sit to stand exercises this may heighten someone's anxiety so try to avoid a standing to floor exercise back to back.

### Cardio Training:

It is important for these individuals to perform cardio fitness at a pace that will allow for the proper amount of oxygen, progressing as their lung capacity increases. The level of cardio and activity will depend on the individual and their current fitness level. Examples of appropriate exercises include, but are not limited to running/ jogging, walking, cycling, swimming, steps, and aerobics. Team sports are appropriate as well, but it is important to make sure that the individual wants to partake in the activity before hand.

### Strength Training

Much like cardio training it is important that the activity is tailored to the individual's needs and wants, and according to what they are able to partake in. Individuals with this condition can use: body resistance, free weights, weight machines, and resistance bands. Breathing is an area of focus, and again it is important that the individual does not over do their strength training because that could cause an unwanted anxiety attack. Never use the Malsalva breathing technique with individuals with anxiety. Chose weights carefully as to not to cause stress with exertion.

#### *Squats*

Stand with feet shoulder width apart, toes forward. Bend legs at knee and hips, lower torso between legs and then stand up again.

#### *Bicep Curls with Resistance Band*

Stand in the middle of the band with feet shoulder width apart, bending knees slightly. With arms at side, hold the ends of the band in each hand (palms facing forward). Flex at elbow and curl band to about shoulder level. Keep back straight while only elbow joint should move.

#### *Dumbbell Overhead Extensions (Triceps)*

While sitting or standing, hold dumbbell straight over head with one or two arms. Bend elbow so the weight is lowered behind head and the lift straight up again.

### Flexibility Training:

After completing strength and cardio training it is important for individuals to stretch in order to prevent any injuries to the muscles and joints. In addition to this, flexibility training has been found to be relaxing therefore it is quite enjoyable for individuals with Anxiety conditions.

#### *Shoulder, mid-back, arms, hands, fingers and wrist stretch*

Interlock fingers together and then turn palms out. Hold arms straight out at shoulder height.

#### *Calf Stretches*

Stand a little way from a wall and lean on it with your hands. Place right foot in front of you with the leg bent and the left leg straight behind. Move hips towards the wall until you feel the stretch in the calf of the left leg. Make sure the left heel is flat on the floor and toes are pointed straight. Switch legs.

Balance: For individuals who suffer from anxiety balance is just as important as someone who does not. Some exercises they can perform in order to maintain their balance include but are not limited to, walking in a straight-line, using props-such as a bosu ball, and standing on one foot. Having good balance will help to prevent individuals from falling and will improve coordination.

### Yoga

Yoga naturally uses a slow paced, slow breathing exercise technique, which is opposite to the symptoms and characteristics of anxiety. Yoga helps decrease the causes of anxiety within ones mind. Anxiety characteristics such as shortness of breath, fast pulses and heartbeats get soothed by steady but gradual supply of oxygen and reduction in circulation due to yoga.

Seated Yoga is great to do with participants who have anxiety issues.

### Contraindications:

A major contraindication for individuals who suffer from anxiety is performing exercises that cause them to feel stressed or suffer an anxiety attack. This is why it is important to know what the individual is comfortable with and what they are capable of. Always ask for exercise feedback from the participant to ease them and to help you create your program Another contraindication of performing fitness while having an anxiety condition is taking part in an activity that is going to (as mentioned above) strain their breathing too much.

### Resources

1. [http://www.emedicinehealth.com/anxiety/page2\\_em.htm](http://www.emedicinehealth.com/anxiety/page2_em.htm)  
Christopher J Minas, "Anxiety." eMedicine Health 2000 12 Feb 2009  
<[http://www.emedicinehealth.com/anxiety/page2\\_em.htm](http://www.emedicinehealth.com/anxiety/page2_em.htm)>.
2. [http://www.holisticonline.com/Remedies/Anxiety/anx\\_exercise.htm](http://www.holisticonline.com/Remedies/Anxiety/anx_exercise.htm)  
Holistic Online, "Exercise." Anxiety 1998 13 Feb 2009  
<[http://www.holisticonline.com/Remedies/Anxiety/anx\\_exercise.htm](http://www.holisticonline.com/Remedies/Anxiety/anx_exercise.htm)>.
3. <http://www.sport-fitness-advisor.com/resistance-band-exercises.html>  
Sporting Excellence Ltd., "Sports Fitness Advisor." Resistance Band Exercises 4  
June 2009
4. <http://www.yogamiracles.com/yoga-articles/yoga-for-anxiety.htm>  
Yoga Miracles, "Yoga Tips and Techniques from Experts." Be Free From Anxiety with  
Yoga 2009 4 June 2009

## Brain Injuries:

### Definition/ Levels:

Brain injury is unpredictable in its consequences. Brain injury affects who we are, the way we think, act, and feel. It can change everything about us in a matter of seconds.

### *An Injured Brain:*

When a brain injury occurs, the functions of the neurons, nerve tracts, or sections of the brain can be affected. If the neurons and nerve tracts are affected, they can be unable or have difficulty carrying the messages that tell the brain what to do. This can change the way a person thinks, acts, feels, and moves the body. Brain injury can also change the complex internal functions of the body, such as regulating body temperature; blood pressure; bowel and bladder control. These changes can be temporary or permanent. They may cause impairment or a complete inability to perform a function.

### *Traumatic Brain Injury (TBI):*

Traumatic brain injury is an insult to the brain, not of a degenerative or congenital nature but caused by an external physical force, that may produce a diminished or altered state of consciousness, which results in an impairment of cognitive abilities or physical functioning. It can also result in the disturbance of behavioural or emotional functioning. These impairments may be either temporary or permanent and cause partial or total functional disability or psychosocial maladjustment.

Some causes include:

- An outside force impacts the head hard enough to cause the brain to move within the skull or if the force causes the skull to break and directly hurts the brain.
- A direct blow to the head can be great enough to injure the brain inside the skull. A direct force to the head can also break the skull and directly hurt the brain. This type of injury can occur from motor vehicle crashes, firearms, falls, sports, and physical violence, such as a hit or strike with an object.
- A rapid acceleration and deceleration of the head can force the brain to move back and forth across the inside of the skull. The stress from the rapid movements pulls apart nerve fibers and causes damage to brain tissue. This type of injury often occurs as a result of motor vehicle crashes and physical violence, such as Shaken Baby Syndrome.

### *Acquired Brain Injury*

An acquired brain injury commonly results in a change in neuronal activity, which affects the physical integrity, the metabolic activity, or the functional ability of the cell. An acquired brain injury may result in mild, moderate, or severe impairments in one or more areas, including cognition, speech-language communication; memory; attention and concentration; reasoning; abstract thinking; physical functions; psychosocial behaviour; and information processing.

Some causes include:

- Airway obstruction
- Near-drowning, throat swelling, choking, strangulation, crush injuries to the chest

- Electrical shock or lightening strike
  - Trauma to the head and/or neck
  - Traumatic brain injury with or without skull fracture, blood loss from open wounds, artery impingement from forceful impact, shock
  - Vascular Disruption
  - Heart attack, stroke, arteriovenous malformation (AVM), aneurysm, intracranial surgery
  - Infectious disease, intracranial tumours, metabolic disorders
  - Meningitis, certain venereal diseases, AIDS, insect-carried diseases, brain tumours, hypo/hyperglycemia, hepatic encephalopathy, uremic encephalopathy, seizure disorders
  - Toxic exposure- poisonous chemicals and gases, such as carbon monoxide poisoning
- Above information from: [http://www.biausa.org/Pages/causes\\_of\\_brain\\_injury.html](http://www.biausa.org/Pages/causes_of_brain_injury.html)

#### Male to female ratio:

Statistics indicate that the incidence of brain injury is two times greater in men.

<http://biac-aclc.ca/en/what-is-it/>

This may be because some men put themselves into more vulnerable situations such as fights, high risk contact sports, type of work, and of higher rate of motor vehicle accidents.

#### How it affects the body:

Note that every individual and brain injury is unique. What one individual may experience as a result of a brain injury is not the same as another individual. Some of the most common effects of a brain injury results in memory loss, impaired reasoning skills, and tendency toward "one track thinking," they may also have physical disabilities such as paralysis of the limbs or loss of vision and/or hearing. Some people experience varying degrees of speech impairment. Others may be able to speak, but due to cognitive impairments, have difficulty organizing their thoughts into meaningful speech. Some people lose their sense of smell, suffer from headaches or have to cope with having seizures.

Above information from: <http://biac-aclc.ca/en/what-is-it/>

#### Some Exercise Benefits

- May become less depressed.
- Better at cognitive thinking
- Physically healthier
- TBI, assist with blood flow to the brain
- Positive effects on balance
- Increase body awareness
- Assist with muscle imbalances
- Improve quality of life

### Contraindications:

Contraindications for individuals with brain injuries will vary from person to person; this is why it is important to know their medical history. Other safety factors to take into consideration include: Spotting the individual and aiding them when they need help, monitoring their heart rate, blood pressure, body weight and composition, fatigue, identify the risk factors, know emergency contacts and keep up to date records.

### Cardio Fitness:

This type of training can be a challenge for individuals with brain injuries. This may be because some could lead sedentary lives (characterized by sitting and remaining inactive for most of the day) and may have poor balance traits. Walking, dancing, bicycling, jumping rope and rowing are just a few activities that can be done for cardio fitness. Some benefits include reduced risk of heart conditions/ stroke, increased lung and heart efficiency, weight loss, and improved circulation. Some things to take into consideration when developing a training program for individuals with brain injuries are: medical record, their capabilities, limitations and needs, give them positive feedback, and to be familiar with the signs of overexertion.

Programs need to be based on repetition and once program change is due perhaps changing one exercise at a time instead of the whole program. If the entire program is changed without warning this may put the participant in distress and it will bring them out of their routine.

Try to schedule each session the same time and day each week and keep a log for the participant to take home listing progress, exercises, tips and stuff to work on at home listing as much detail as possible.

### Strength Training:

The benefits of a strength program for individuals with a brain injury include, but are not limited to: increased strength, improved muscle endurance, loss of body fat, increased metabolic rate and muscle mass, improved self esteem and body awareness, and social benefits. It is important for the trainer to know the client, what they are capable of and their medical history, to prevent any contraindications from occurring. Depending on the individual, body resistance, machines, free weights and bands are all appropriate to use for strength training. If an individual cannot grip free weights safely use weights that can Velcro onto arms and legs.

### *Sample Exercises*

### *Hip Adduction- Basic*

Lye on your side and raise the lower leg 3 to 5 inches off of the ground, hold the position for 3 to 5 seconds. Return to the starting position, and repeat.

#### Intermediate

Add resistance such as an ankle band

#### Advanced

If side lying still, add and arm up. Or try the exercise standing, still with bands  
Add an unstable surface such as a Bosu ball.

### *One-Arm Chest Fly with Resistance Band- Basic*

When sitting or standing, have a resistance band attached to a sturdy object at shoulder height. Hold the handle with one hand and keep arm straight (elbow slightly bent) at shoulder level. Bring the arm in towards the mid-chest and back out to start.

#### Intermediate

Change the resistance

#### Advanced

Add an unstable surface or a squat or lunge with the fly

### *Chest Press*

Lye on your back and start with hands just above the sides of your chest and holding free weights or using a resistance machine. Push the weight straight up until your elbows are nearly fully extended.

### Flexibility Training:

These activities are very important, as individuals with brain injuries are known to suffer from ataxia, which is a condition that causes reduced range of motion, spasticity, and in-coordination. The benefits of this type of training include: increased range of motion, increase in muscular strength, relaxation, improved balance, less muscle soreness. Demonstrating, modifying and aiding the individual may be necessary for success. Yoga and Pilates are also beneficial ways for individuals with brain injuries to perform flexibility training and may provide the same, if not more benefits as regular flexibility training.

### *Back and Side Stretch*

Keeping your hips straight ahead in the chair, turn your upper body to the right. Turn so you are looking over your shoulder. Hold, and repeat on the other side.

Caution: Persons with spine-stabilizing hardware, such as Harrington Rods, may be restricted in twisting. Persons with chest or back injuries should have their doctor's approval before doing this exercise.

### *Shoulder Shrug*

The shoulder shrug helps relieve stiffness and tension in the shoulders and neck. Pull the top of your shoulders up towards your earlobes and hold. Relax completely and repeat this several times.

Balance:

A large amount of individuals who have brain injuries suffer from poor balance, therefore it is an important area of focus. Individuals can start by simply standing on one foot and once they have improved, can move onto using props, such as a bosu ball. Individuals may require spotting, or an object to hold onto until they are comfortable performing the activity on their own.

NCPAD, "Disability/Condition: Acquired Brain Injury." NCPAD 03-01-2007 5 Feb 2009  
[http://www.ncpad.org/disability/fact\\_sheet.php?sheet=111&section=](http://www.ncpad.org/disability/fact_sheet.php?sheet=111&section=)

## Cerebral Palsy

Definition: Cerebral Palsy (CP) is a group of non- progressive nervous disorders that affect body movement and muscle co-ordination. It is present at birth or appears in the first three years of life.

The effects of cerebral palsy vary widely from individual to individual. At its mildest, cerebral palsy may result in a slight awkwardness of movement or hand control. At its most severe, CP may result in virtually no muscle control, profoundly affecting movement and speech. Depending on which areas of the brain have been damaged, one or more of the following may occur:

- muscle tightness or spasms
- involuntary movement
- difficulty with "gross motor skills" such as walking or running
- difficulty with "fine motor skills" such as writing or doing up buttons
- difficulty in perception and sensation

### Causes of Cerebral Palsy

Any damage to the developing brain, whether caused by genetic or developmental disorders, injury or disease, may produce cerebral palsy. This damage interferes with messages that are related between the brain and the body.

Factors which may cause cerebral palsy include:

- multiple births (e.g. twins, triplets)
- a damaged placenta which may interfere with fetal growth
- sexually transmitted infectious diseases, e.g. AIDS, herpes, syphilis, gonorrhoea
- poor nutrition
- exposure to toxic substances, including nicotine, alcohol and drugs
- Rh or A-B-O blood type incompatibility between mother and infant
- chromosome abnormalities
- biochemical genetic disorders
- chance malformations of the baby's brain
- a labour which is too long or too abrupt can cause damage. Poor oxygen supply may destroy brain tissue.
- German measles during pregnancy
- small pelvic structure
- premature delivery
- caesarean or breech delivery
- effects of anaesthetics, analgesics

In early childhood, cerebral palsy can occur if a young child's brain is damaged by:

- infections such as meningitis
- brain haemorrhages
- head injury following falls, car accidents or abuse
- drowning accidents
- poisoning

### Types of Cerebral Palsy:

#### Classification By Number of Limbs Involved

- Quadriplegia - all 4 limbs are involved.
- Diplegia - all four limbs are involved. Both legs are more severely affected than the arms.
- Hemiplegia - one side of the body is affected. The arm is usually more involved than the leg.
- Triplegia - three limbs are involved, usually both arms and a leg.
- Monoplegia - only one limb is affected, usually an arm.

### How it affects the Body:

#### *Classification by Movement Disorder*

(1) Spastic CP- Spastic muscles have increased resistance to being stretched because they are tight and stiff. Clumsy movements are produced when they become overactive when used. Normal muscles work in pairs: when one group contracts, the other group relaxes, to allow free movement in the desired direction. Spastic muscles become active together and block effective movement. This muscular "tug-of-war" is called co-contraction. Spasticity may be mild and affect only a few movements, or severe and affect the whole body.

(2) Athetoid CP- Athetosis leads to difficulty in controlling and co-ordinating movement. People with athetoid cerebral palsy have many involuntary writhing movements and are constantly in motion. They often have speech difficulties.

(3) Ataxic CP- Ataxic CP is the least common form of cerebral palsy. People with ataxic CP have a disturbed sense of balance and depth perception. They usually have poor muscle tone (hypotonic), a staggering walk and unsteady hands.

#### Combined Classifications

The classifications of movement disorder and number of limbs involved are usually combined (e.g. spastic diplegia). These technical words can be useful in describing the type and extent of cerebral palsy, but they are only labels. A label does not describe an individual.

Above taken from:  
<http://www.ofcp.on.ca/aboutcp.html>

### Contradictions:

Some individuals will be able to work on strength exercises in a standing position with physical assistance from the instructor, while others will have to perform the exercise routines from a chair.

Certain individuals with cerebral palsy have a condition known as athetosis. This condition results in involuntary movements that occur in one or more of the person's limbs. The movements are uncontrollable and are often referred to as slow and

"writhing." Facial muscles are also involved, which make the person appear to be laughing or crying.

### Cardiovascular Fitness:

Cardio exercises promote circulation as well as muscle flexibility and strength. Activities such as dancing can also be a great way to improve mobility, breathing and circulation. Arm and leg cycling are great exercises for cerebral palsy along with jogging, walking and stair climbing.

### Strength Training

Individuals with cerebral palsy often have difficulty engaging in activities that stretch muscles and tendons, causing their muscles to grow slower than their bones. This results in contracture, one of the most serious complications of cerebral palsy. Strength training works to reduce the chances of developing contracture by keeping the muscles strong and limber. Strength training is aimed at significantly improving gross motor skills such as standing, walking, and sitting.

### *Leg Raises*

If the individual is in a wheel chair or has poor balance attach ankle weights to their legs. If the individual has low muscle tone in legs go without weights to start off. In a seated position, slowly raise the leg up and then slowly lower it and repeat.

### *Arm Curls*

If individual experiences uncontrolled movements free weights should not be used. In this case use weight such as the ankle weights that can be attached to the arm. Curl the arm up towards shoulder and then release back down.

### Flexibility

Individuals with cerebral palsy have increased tone and tend to get very tight muscles. Therefore it is extremely important to perform daily stretches to keep arms and legs limber so the child can continue to move and function. By stretching several times daily, flexibility and range of motion are increased.

### *Knees to Chest*

While lying on the floor, pull your knees into your chest and clasp your hands under your knees. Gently press your hips to the floor.

### *Side Stretches*

While sitting reach one arm down to the side, and lean your upper body to that side. Raise the other arm over your head. Hold and then repeat on other side.

### Aquatics

Swimming is becoming a popular form of exercise for individuals with cerebral palsy. Water improves flexibility, encourages movement and helps keep weight and strain off the bones

and joints. It is important to note that cold water can increase muscle tone, but warm water often has a relaxing effect and help reduce muscle tone.

Above from:

[http://www.ncpad.org/exercise/fact\\_sheet.php?sheet=107&section=813](http://www.ncpad.org/exercise/fact_sheet.php?sheet=107&section=813)

Yoga:

The practice of Yoga poses (asanas), followed by deep relaxation, can help to reduce high muscle tone. Holding an asana gives the muscles and tendons a relaxing stretch, releasing overall stress and tightness throughout the musculature and around the joints. At the same time that asanas are relaxing the body, they also provide just enough resistance to exercise low muscle tone areas of the body. In this way asanas actually improve both high and low muscle tone problems in individuals with cerebral palsy.

Above from: <http://www.specialyoga.com/>

## Downs Syndrome

### Definition:

Humans are typically born with forty six individual chromosomes. Downs syndrome is a genetic condition that is caused by being born with an extra whole or half chromosome (MediResource Inc., 2009). It causes delays in the way child develops, both physically and mentally. Physical and mental functioning can vary greatly from individual to individual. DS can be diagnosed before the child is born. The cause of DS remains unknown, and there is no known way to prevent it, however it have been proven that women of the age of thirty five and above are at more of a risk of having a baby with Downs Syndrome.

(Scott, 2008)

### Types and Levels of Downs Syndrome:

Trisomy 21 is the most common type of Downs Syndrome and accounts for roughly ninety five percent of all cases. It is the presence of an extra chromosome 21. In the individual with Downs Syndrome each cell makes access amount of chemicals that are regulated by the chromosome 21 genes. The Other two types of DS are Translocation (2-3 percent of individuals with DS have this type) and non-disjunction {Mosaicism} (two percent of individuals with downs syndrome have this type) (MediResource Inc., 2009). Both of these types of DS are the result of a different process taking place, in which and extra partial chromosome is the result.

(MediResource Inc., 2009)

### Male/ Female Ratio:

More individuals with Downs Syndrome have been found to be male rather than female (Genet, 2002).

### Down Syndrome and Exercise:

With over 80 clinical characteristics seen in individuals with Down syndrome, the physical characteristics most related to exercise are: muscle hypotonicity (muscles have the ability to be stretched far beyond normal limits), hypermobility of the joints or ligamentous laxity (increased flexibility in their joints associated with increased susceptibility to subluxation and dislocation), mild to moderate obesity (greater among adult women with mental retardation than men with mental retardation), an underdeveloped respiratory and cardiovascular system, short stature (short legs and arms in relation to torso), and poor balance and perceptual difficulties.

(MediResource Inc., 2006)

### Contradictions:

An individual with Down syndrome can participate in most forms of physical activity. Overall, this is a healthy population that enjoys the social aspects of physical activity.

However, it is important to note that hypotonia and hypermobility are often associated with lordosis, dislocated hips, kyphosis, flat pronated feet, forward head, and atlantoaxial instability (AAI).

Individuals with DS have a 17% chance of getting Atlantoaxial Instability (AAI), which is a cervical disorder which is an increased laxity between the first and second cervical vertebrae. Individuals with AAI have a greater risk of acquiring a spinal cord injury. Individuals with AAI should be cautious when lifting heavy weights and playing contact sports.

Individuals with DS also have a greater chance of having a congenital heart defect and anaemia, therefore during exercise heart rate should be monitored regularly.

Levels of learning abilities vary in individuals with DS and can range from near normal to severe disability. In most cases these individuals will be slower to reach developmental mile stones and will have a learning disability to a certain degree. Good support systems and good physical health will help in developing the individual's ability to learn.

### Cardio Fitness

The goal of an aerobic training program for individuals with Down syndrome is to increase cardiovascular fitness. It is important to monitor heart rate and blood pressure whenever possible to determine the intensity level of the activity and to avoid early-onset fatigue.

TIPS: Great ways to increase cardio is by walking, jogging, stationary cycling, and low impact aerobic dance.

It has been found that individuals with Down Syndrome have a maximum heart rate that is ten percent lower than other individuals with different types of cognitive disabilities. The effects of cardio training on individuals with DS are positive, however, it takes a longer program to see the results. Cardio fitness will improve the individual's endurance level and strengthen their breathing and heart rate. Walking, jogging, stationary cycling and low impact dance are all examples of good exercises for individuals with DS. It is recommended to monitor the individual's heart rate and blood pressure levels in order to avoid early onset fatigue.

### Strength Training:

Demonstrate the exercise, provide supervision and encouragement. The goal is to maximize strength in the larger muscle groups. Circuit training is effective for individuals with DS.

### Flexibility:

Individuals with Down syndrome are extremely flexible, their muscles and joints can be stretched further than an individual without DS. Because of the hyper mobility and extra flexibility of individuals with DS, it is not recommended for them to partake in flexibility exercises.

### Yoga and Pilates:

Individuals with DS can benefit from Yoga and Pilates. The goals of using these methods should include improving balance, coordination, mental clarity, social development, and increased strength.

Yoga poses (asanas) help to tone and strengthen the entire body. Asanas also benefit the internal organs and help to balance and revitalize the endocrine glands. For this reason individuals with Down syndrome who practice Yoga stay slim and flexible, while those who do not practice Yoga tend to put on weight as they age. In conjunction with yogic breathing exercises, which have a beneficial effect on the central nervous system, asanas facilitate the development of body awareness, concentration and memory.

Pilates may benefit the participant with its controlled movements and smaller muscle recruitment and is excellent for cross training. It is also one of the best non impact workouts around. It may heighten coordination and awareness levels, strengthen joints as well as the core, which can aid in daily activities and help keep their weight down.

TIPS: The poses that are performed should avoid the focus of stretching and flexibility and target toning and strengthening. If laying on back you may want to place a pillow under their neck.

#### Balance:

Individuals with DS typically have poor balance. This is because their torso and limbs are not in proper proportion. They may also suffer from poor eyesight, flat feet, and atlantoaxial instability. Some sample exercises include balancing on a bosu ball, or wall exercises such as lifting a leg up and holding it for 5 seconds and repeat while using the wall for support with one hand.

TIPS: To improve balance have individual stand on a bosu ball (have them hold on to a chair if cannot stand on it alone). Participants can also try balancing on one foot (stay close to a chair or wall for support).

(NCPAD, 2007)

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### Seated Abs and Back Exercises for Individuals in Wheelchairs

For all of the below activities individuals are to complete anywhere from 15-30 reps depending on their personal situation.

#### Seated Crunches:

To perform seated crunches the individual will place their hands behind their head, ensure their stomach muscles are tightened and bend towards the floor. If this needs to be modified and the individual need help bending forward an assistant can pull them forward while the individual pulls back in order to get resistance and workout their abs.

Note this exercise may not be suitable for individuals with osteopenia or osteoporosis

#### Seated Crunches Targeting Oblique's:

The individual will perform crunches alternating movements from side to side. These crunches target different muscles in your torso. These muscles are located along the side of the body. Again, if the individual needs assistance to perform these crunches, an assistant can pull them, while the individual pushes back.

Note this exercise is not recommended for individuals with osteopenia or osteoporosis

Abdominal Twists: The individual will tighten their stomach and twist from side to side. It is important that they keep a straight posture. Much like the other abdominal activities the individual can have an assistant if they are having difficulty performing the activity.

Note this exercise is not recommended for individuals with osteopenia or osteoporosis

Note: If the above activities are not enough of a challenge the individual can hold a hand weight while they perform them. The weight amount is up to the individual who is performing the activity, but it is important to remember to start light and work your way up.

Ball squeeze: With a soft medium size ball, the individual is to tighten their abdominal muscles and squeeze the ball as many times as they can.

Ball Tap: The individual will squeeze and hold a medium size soft ball while an assistant taps the ball. It is important that the individual keeps their abdominal muscles tight while they perform this activity.

Abdominal and Leg lift: The individual will place their arms behind their head and begin to perform crunches in which they lift opposite elbow and opposite leg and put them together.

Ball Toes Tap: With good posture, place a ball under the individual's foot and have them press down. It is important that the individual tighten their abs for this activity.

Chest squeeze with medicine ball: Holding a medicine ball of the weight of your choice, tighten your abs and push the ball away from your chest taking two breaths in and pull the ball towards you taking two breaths out. It is important that the individual keeps a good posture throughout this activity.

#### Seated Swimmer

Place a fit disc or towel behind the participants back if required and have them lift opposite arm and leg and hold for 2 breathes to assist with back care.

#### Seated Spine Stretch Forward

Enhances flexibility of the spine

Inhale and lift your arms up to the ceiling, exhale draw in your abs and round your back into the chair reaching your arms in front, inhale reach your arms a little further and exhale to come up one bone at a time, place your hand on their back and have them roll up by following the pace of your fingers up their back.

Note this exercise may not be suitable for individuals with osteopenia or osteoporosis

## Games

You may want to introduce some "fitness style" games to your participants to assist with:

- Enhance self-competence.
- better ability to socialize with others, including greater tolerance and understanding,
- enriched capabilities for team membership,
- greater adaptability and resiliency,
- enhance anatomy awareness

Example games are listed below from Hutton House

These games are based on participants, type of disability, ability to read, and their ability to interact with a group

### Fun Fitness Game Instructions:

The game can be played with any amount participants. Individuals will roll the dice and count to the space their number lands on. The spaces are color coated and based on the color of the space landed on, the individual will either pick up a 'moving (cardio) exercise' card such as marching on the spot or a 'muscle exercise' card such as a squats. The individual will then complete the activity written on the back of the card and move forward on the game board.

Muscle Exercise Cards: If you land on an orange space you are to pick up a card that has an orange dot on it. All of these cards contain fitness activities that are targeted at muscular strength.

Moving (Cardio) Exercise Cards: If you land on a yellow space you are to pick up a card that has a yellow dot on it. All of these cards contain activities that target cardiovascular endurance.

Fun Fitness Game Instructions:

The individual will roll two dice. One of the dice's contains the number of repetitions of an activity that an individual will do and the other die contains the activity they are going to perform cardio or muscle card. This game can be performed with an unlimited number of participants. After playing this game, it is important that all participants stretch.

Ex 6 orange- squat 6 times

Ex 6 yellow- march on the spot for 60 seconds

The idea is to be creative and to show progression in the game and a purpose so you may want a basic to an intermediate one.

In your game, present a purpose for it, a list of instructions, ways to progress. Try to think of items that you can use within your limits to assist, for example if you have no fitness equipment what can be used to replace it for example plastic bottles full of water to replace hand weights.

Group Activity # 1

Develop a Nutritional Game to teach participants how to eat healthy while following Canada's Food Guide.

Include portion sizes, benefits of a variety of foods, and the effects of eating unhealthy

Group Activity # 2

Develop a game for participants in wheelchairs that will assist with their mobility and cardio endurance

Group Activity #3

Develop a travelling game, whether it is a game to play while travelling for a vacation or a home based program.

**Adaptable Equipment used at Hutton House.**

**Gymstick** <http://www.gymstick.ca/>  
**Bendy Bar- Body Bar Flex** <http://www.bodybar.com/>  
**Small Bands** <http://muscleup.ca/shop/index.php>  
**Pilates Stick** <http://www.pilatesstick.com/>  
**Xco Trainer** <http://www.fitter1.com/>  
**Fit Discs** <http://www.fitter1.com/>  
**Bosu Balance** [www.bosu.com](http://www.bosu.com)  
**Equalizers** [www.lebertequalizer.com](http://www.lebertequalizer.com)

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