



ACSM Sports Medicine Basics

HEALTH-RELATED FITNESS FOR CHILDREN AND ADULTS WITH CEREBRAL PALSY



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Children and adults with cerebral palsy (CP) have lifelong challenges with movement, function and mobility that impact their ability to socialize, engage in meaningful activities with their peers, gain employment and attend college, all of which impact quality of life. Individuals with CP are often told that their condition is nonprogressive, thus giving the impression that the physical challenges they face stabilize once they reach adulthood. While the neural lesions are not progressive, the levels of independent function and mobility do not stabilize and most often deteriorate once a child enters adolescence and adulthood. These changes in function and mobility, which lead to increased falls, may be a consequence of the severity of the impairment, personal choice for daily activities, aging and musculoskeletal changes related to the primary disability, or to secondary conditions that develop because of the primary disability.

All members of society have become more sedentary over the past decades, but more so for children and adults with CP due in part to the high energy costs and subjective fatigue and pain associated with movement and daily activity. To decrease, at least in part, these losses in function and mobility,

the promotion of health-related physical fitness should be included early in the rehabilitation program of these individuals. Because of the consequences of inactivity and sedentary behaviors, innovative forms of physical activity and exercise for persons with mobility impairment need to be developed and implemented. Ideally, these programs would be offered in the community and would reflect collaboration of practitioners from the fields of rehabilitation (physical and occupational therapy) with physical educators and exercise physiologists. Choosing activities that individuals prefer, and focusing training on sport or activity specific goals will increase motivation and may increase the likelihood of lifestyle changes. Options for adaptations of sports for people with different abilities and individual preferences for physical activity should be supported. New technology, such as interactive videogames (e.g., Wii™, Kinect™), may increase motivation to participate in exercise.

Fitness for persons with or without CP should be viewed from the perspective of the way fitness enhances health, function and mobility, and should include the following elements: cardiorespiratory endurance, muscular endurance, muscular strength, muscle power,

balance/agility, body composition and flexibility.

Research has shown that children and adults with CP have a greater energy cost of locomotion, decreased muscle strength, decreased rate of force development, decreased maximal aerobic power and earlier reports of subjective fatigue, limited range of motion and pain than their typical peers. Yet individuals with CP have been shown to have similar or greater endurance than typical individuals. Therefore, training protocols should focus on the ability of a muscle to produce rapid movement with load rather than endurance. Research studies examining the effects of strength and resistance training for persons with CP have consistently shown that they can increase both their muscle strength and endurance with no adverse effects on spasticity or movement patterns, decrease reports of pain and fatigue, and increase quality of life. General consensus is that individuals with CP are under dosed in terms of frequency, intensity, volume/time and velocity during training exercises.

Guidelines for exercise training for persons with chronic diseases and disabilities such as CP have been suggested and include the following:

1. Training exercises should be supervised by qualified professionals trained in strength and conditioning including physical and occupational therapists and exercise physiologists.
2. For the person with significant movement limitations, moderate to vigorous training of aerobic capacity may be difficult to attain, therefore the reduction of sedentary behaviors may be a more feasible intervention through enhanced opportunities for sitting and standing during the day as opposed to lying down. For individuals with mild to moderate impairment, aerobic capacity can be enhanced through higher levels of activity, such as walking over ground or on a treadmill, or use of an ergometer or bicycle.
3. Train single joint movements, one side at a time, e.g., elbow flexion, elbow extension.
4. Train muscles in the available active range of motion. Many people with CP do not have full active movement through the joint range.
5. Some combinations of joint positions may not be possible, for example shoulder flexion with elbow and wrist extension, and moving within the available range is required.

6. Train the movement prior to progressing the weight or the velocity of the movement
7. Training power in the available range of active movement will reduce the probability of eliciting spastic responses when moving at high velocities
8. Calculating 1RM max may be difficult. Therefore using 1 RM max calculator using a 10 rep max to calculate 1 RM may be more feasible.

Exercises and physical activity should be started gradually, with close supervision by qualified professionals. The therapist or trainer should take a detailed history (e.g. medications, recent Botox injections, past surgeries, pain) and should document the presence of limitations of range of motion, seizures and associated disorders involving the visual, auditory, sensory, hearing, speech or cognitive systems. Special safety considerations should be included for all exercise programs. Strapping may be indicated for the hands and feet to exercise equipment, the pelvis in the wheelchair for proper positioning, or the thighs to prevent adduction of the hips. The use of gloves during wheelchair exercise is also recommended. For swimming programs, the use of flotation devices should be considered.

Manual assistance may also be needed for proper alignment during exercise programs. Close supervision may be needed to prevent injury or falls. Even individuals with severe motor impairment can experience physical activity and exercise, but they may need more assistance or special adaptations. In certain cases, cognition may be a limiting factor, as it may affect their ability to understand the use of equipment or follow commands for movement. Collaboration among physical and occupational therapists, exercise physiologists and physical educators can result in effective, meaningful activity plans. Health-related physical fitness for persons with CP should be developed in the same model as fitness for all of us: start early, be easily available and continue throughout the life span.

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