Weight Training for Those With Physical Disabilities at Idaho State University

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WEIGHT TRAINING IS A COMPONENT of a healthy lifestyle. The American College of Sports Medicine includes weight training in its recommendations for exercise prescription (1). The importance of weight training is becoming increasingly recognized for all populations, and this includes individuals with physical disabilities.

Many strength training professionals are discovering that including lifters with physical disabilities often only means applying basic and sound weight training principles to a nontraditional group of weight trainers. People with physical disabilities, whether they are competitive athletes, recreational lifters, or just interested in improving their functional abilities, can gain many benefits from a properly designed weight training program.

Manufacturers, publishers, and strength training professionals have begun to recognize the need to address those with physical disabilities who are interested in weight training. Manufacturers are building adaptive equipment, the amount of literature on the topic is increasing (5, 7, 8), and strength training professionals are writing articles on weight training and lifters with physical disabilities (4, 6).

In 1982 the Cooperative Wilderness Handicapped Outdoor Group (C.W. HOG) and the Department of Physical Education and Dance at Idaho State University created a variety of activity based courses such as weight training, swimming, aerobics, and snow skiing. In 1990 water skiing was added. In addition, an instructor course was created to prepare students to be instructors for activities involving people with physical disabilities. The Department of Physical Education and Dance offers these activity classes for academic credit.

Weight Training Class
Included in the program is a weight training class. Enrollment in this class has reflected a population with a variety of physical disabilities including spinal cord injury, stroke, muscular dystrophy, arthritis, amputation, head injury, blindness, and deafness. The class is conducted in the weight training room at Idaho State University (Photo 1) and is also available to students without physical disabilities.

During the 1st day of weight training class, students complete a medical history questionnaire and liability waiver. The questionnaire requests extensive information on medical background, disability, and current level of physical activity. The liability waiver alerts the student to the small but potentially dangerous situations associated with weight training and physical activity.

Contraindications
Once the questionnaires are completed, the instructor, a Certified Strength and Conditioning Specialist, reviews them for potential contraindications toward weight training. Possible contraindications include the presence of multiple sclerosis, neuromuscular disease (muscular dystrophies, amyotrophic lateral sclerosis), postpolio syndrome, high resting blood pressure (>140/90), and

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stabilizing rods in the case of spinal cord injuries.

When a potential contraindication is identified, the student may be asked to see a physician or physical therapist to get specific exercise guidelines, or the student and instructor may both decide that weight training is not a reasonable activity for the student.

Objectives

One objective of the weight training class is to teach the students how to determine and monitor their heart rate. For the class, the age-adjusted maximal heart rate is used. In other words, training heart rate is defined as 220 - age x intensity, with intensity varying between 60 and 85%. Students begin at 60% since most of them were sedentary before joining the class.

Students who are not able to take an accurate pulse by physical manipulation are taught to use the Borg RPE Scale (2). The original scale ranges from 6 (very, very light) to 20 (very, very hard) and is used to give quantitative measurement to perception of exertion. The numbers correlate to heart rate (60-200 bpm).

Students usually begin with 12, which is identified as "somewhat hard" exertion. The revised scale uses a range of 0-10, in which 0 = "nothing at all" and 10 = "very, very strong." Students begin with an intensity on this scale of 4 or 5. They are able to see a copy of the scales while exercising so they can become familiar with the system.

Equipment

Students have access to a variety of aerobic machines: Monark stationary bikes, Schwinn aerodyne bikes, a Concept II rowing ergometer, Nordic Track cross-country ski machines, and a Saratoga hand cycle (Saratoga Access & Fitness, Inc., Ft. Collins, CO).

After aerobic training the students go to the weight room, which contains free weights (Photo 2) as well as the following machines: a Universal Multi Station Gym; Champion cable crossover; pec dec; vertical bench press; lat pulldown; biceps and pullover machines; Cybex leg press; leg extension, leg curl, and seated row machines; Nautilus leg curl, triceps, and biceps machines; and a ParaGym 1000.

ParaGym 1000. The ParaGym 1000 (ParaMed Exercise Equipment, Jackson, MS) has many features designed for lifters with disabilities (Photo 3). One such feature is a weight stack beginning at 2-1/2 lbs and increasing in 2-1/2-lb increments up to 10 lbs, at which point the plates begin increasing in 5-lb increments.

The machine has a counterweight mechanism. This means when a lifter is able to lift 15 lbs easily but 20 lbs is too much, the lifter may add any combination of 1-1/4 and 2-1/2-lb weights on the counterweight system to get a suitable resistance.

The machine has three attachment bars of varying length which can be used from three pulleys: upper, middle, and lower. Two of the bars have rings welded onto them so that lifters who are unable to grip the bar may do so by wearing wrist cuffs.

The wrist cuffs, leather wrist straps with padding on the inside
to prevent pressure sores and skin irritation, are wrapped around the lifter's wrists and adjusted to fit with a buckle. Each wrist cuff has a ring attached to it. The wrist cuffs are attached to the bars by a carabiner, a metal clasp with a spring-loaded gate that closes automatically.

Besides using bars, the ParaGym employs a number of loop straps that are also attached with carabiners. Lifters can place their wrists into the loops and perform the weight training movements.

The ParaGym has numerous safety features. It has a seatbelt to prevent lifters from being pulled out of their wheelchairs when doing lat pulldown (Photo 4) and biceps curl exercises. It also has four wheelchair tiedowns and two stabilizing rods (Photo 5). The tiedowns keep the wheelchair from moving around. The stabilizing bars can be adjusted to prevent the rear wheels of a manual chair from moving forward or backward.

**Instruction**

Novice lifters receive individual workout instruction. To facilitate this time-intensive instruction, students from an Instructor of Adaptive Sport class assist with the one-on-one instruction. Many of the students from that class have physical disabilities themselves and were members of the weight training class; thus they have already had the experience of learning proper techniques.

Students typically begin with a standard routine of bench press, leg press, lat pulldown, leg extension, pec dec, leg curl, pullover, triceps pushdown, and biceps curl exercises. The routine is adjusted for individual situations such as not including the leg press for a lifter with paraplegia. As students progress, additional exercises such as lunges, step-ups, upright rows, and reverse pushdowns may be added.
Students strive to finish one set at a weight that allows them to complete 10 reps easily. If the smallest resistance offered by a machine is too heavy to allow 10 reps, the student is instructed to perform as many repetitions as can easily be completed. Students are told they should feel as though they could have completed 2 or 3 more reps.

As the student gains confidence and learns proper technique, the number of sets is increased to 2 and then to 3 sets. Normally students increase to 2 sets during the 2nd week of class. When 3 sets can be completed easily, the student increases the amount of weight lifted while the number of sets and reps remains at $3 \times 10$.

The students themselves determine when to increase sets and weights. The instructors continually monitor technique and provide verbal and kinesthetic feedback (Photo 6). Many students are new to weight training movements.

Verbal cues such as "bend your knees," "slow and controlled," and "don't hyperextend your legs," along with physical manipulation through the full range of motion, help the students learn proper techniques. The instructors periodically quiz students about the names of weight training movements, proper technique, and which muscles are exercised by specific movements.

After the weight training session, students perform abdominal training and stretches. Stretching is an important component of an exercise program (3). A number of stretches are taught for the quadriceps, hamstrings, calves, groin, chest, triceps, and deltoids.

### Strength Measurement

Students are given the option to measure preclass and postclass strength levels using a 1-RM. Preclass measurements are taken after the 2nd week of class so that the student has had a chance to become familiar with the specific movements and proper techniques. Those wishing to determine their 1-RM are teamed with an assistant instructor, who adjusts the machine to fit the student's body. These measurements are noted on the student's 1-RM sheet so that the same settings are used during postclass measurement.

The student begins by selecting a weight he or she can complete easily for 10 reps. After a short rest the student selects a weight he or she can complete for 6 reps, then selects a weight close to his or her perceived 1-RM and attempts 1 rep.

The student then attempts progressively heavier weights until he or she can no longer complete a repetition correctly or does not...
wish to try another one. The assistant instructor provides feedback and encouragement and monitors technique. Measurements are alternated between those testing upper body and those testing lower body strength.

Postmeasurement is completed during the last 2 weeks of class. The student and same assistant instructor complete the sequence. Results have no correlation with the course grade; they are strictly for the individual student to note improvement.

■ Conclusion

More and more people with physical disabilities are discovering the benefits of weight training. It is our business as strength training professionals to provide them with proper knowledge and instruction.

■ References


James B. Wise, a certified therapeutic recreation specialist and a strength and conditioning specialist, taught the weight training class described in the article for 9 years. He is currently completing the requirements for a PhD in Recreation and Leisure from the University of Utah.