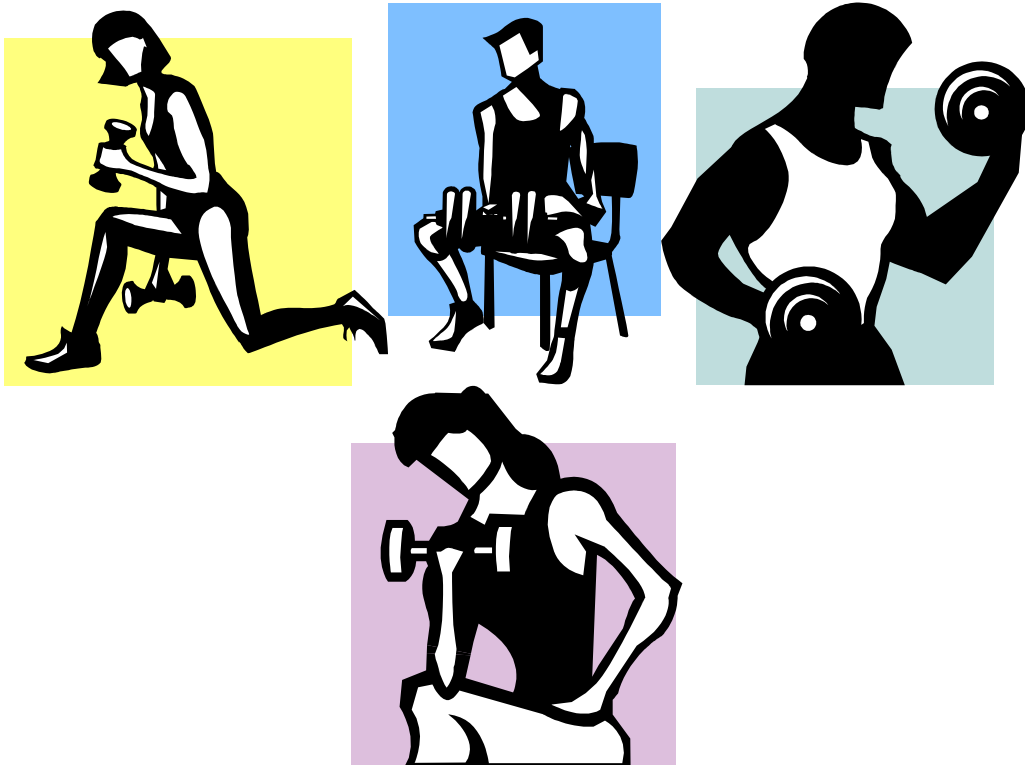


Fitness Weight Training



**West Valley College
Physical Education**

Fitness Weight Training

Physical Activity

Committing to participate in a physical activity program is an important step toward living a healthy lifestyle. Research has shown that maintaining an active lifestyle contributes to increased longevity and quality of life.

There are three main components of an overall physical activity program: aerobic exercise, flexibility training, and strength training.

- 1) Aerobic exercise focuses on improving cardiorespiratory and cardiovascular health (e.g., walking, running, hiking, treadmill, elliptical trainer).
- 2) Flexibility training involves stretching muscles in an effort to maintain and increase mobility (e.g., yoga, stretching).
- 3) Strength training focuses on increasing or maintaining muscle mass through resistance exercises (e.g., weight training, yoga).

What is Weight Training?

Weight training is an effective tool for improving or maintaining strength, endurance, and overall fitness. It involves controlled movements of skeletal muscle in an effort to move an external load. This can be accomplished by using machines, free-weights, and exercises involving body weight. Individuals participating in a weight training program can expect improvement in body tone and strength. Incorporating a weight training program as part of a complete fitness plan will contribute to increased weight loss/control, balance and coordination, and a better overall sense of well-being.

Benefits

- **Burn Calories:** Adding 3 pounds of muscle *increases metabolic rate* by 7%, which causes the daily caloric requirements to increase by 15% at rest. In addition, base metabolic rates can stay elevated up to 24 hours after a strength training workout; therefore the body burns calories at a faster rate after weight training.
- **Strong Bones:** Weight training places stress on connective tissues, bones, and muscles. The body responds by re-enforcing areas that have been “worked-out”, making them stronger and more able to handle increased workloads. This leads to increased protection against osteoporosis.
- **Active Aging:** As people age, muscle mass, strength, endurance, and bone mineral density all decrease. There is a 40-50% decrease in muscle mass between 25 and 80 year olds—a 10% decrease per decade! Incorporating strength training into a life-long commitment to physical activity will help curb the decline in muscle mass, potentially leading to many healthy and active years ahead.
- **Better Health:** Weight training improves insulin sensitivity, lowers LDL (bad) and raises HDL (good) cholesterol levels. Blood pressure is also lowered and heart contractility improves.
- **Mood:** Alertness, energy, and overall attitude are likely to improve.

Adaptations

A number of physiological adaptations occur at the onset of a weight training program. Initial strength gains are primarily due to neural adaptations as the body learns to synchronize nervous impulses and activate various muscle fibers in an effort to maximize force production. Muscle recruitment patterns are improved as synergistic muscle groups contribute contractile efforts to movement. Thus, strength gains achieved during the beginning of a training program are largely a reflection of the body's ability to learn *how* to weight lift.

Overload Principle: Increasing resistance through a series of training sessions effectively overloads muscle. The body responds to this progressive stress by creating more muscle to handle the additional workload. As one continues through a progression of overloading muscles, strength gains due to hypertrophy will start to occur.

Weight Loss: Do not expect localized fat reductions from focused workouts, i.e. abdominal crunches will not necessarily metabolize fat from the abdominal area. Energy during a workout is obtained from available sources throughout the body. The key is creating an energy imbalance with caloric expenditure exceeding caloric intake. Fat will slowly disappear through dedication and commitment.

Individual Differences: It is important to remember that each individual will respond in their own unique way to a training program. Physiological changes are limited by genetic disposition and applied effort. It should be noted that women do not typically achieve bulky muscle. Rather, they can expect a leaner body due to greater fat loss with respect to muscle gain.

Average Energy Expenditure Values:

Cycling: 30-50 kcal/mile

Running: 100 kcal/mile

Swimming: 400 kcal/mile

** Strength Training: 11 kcal/min **

Long-term Training Adaptations

- Decrease in body weight
- Decrease in percent body fat
- Slight increase in lean body weight
- Increase in bone mineralization
- Improvement in neural activation and coordination of muscles
- Increase in muscular strength and endurance
- Increase in flexibility
- Improvement in fitness
- Improvement in quality of life
- Improvement in self-concept and self-esteem

About Muscles

Muscles are comprised of primarily two types of muscle fibers (cells):

Slow-twitch muscle fibers are associated with endurance activities. They contribute to force production at slow speeds of movement and longer durations.

Fast-twitch muscle fibers are associated with speed and power activities. They contribute to force production at faster speeds of movement and shorter durations.

Training Guidelines

Exercise all major muscle groups to achieve overall fitness. Train larger muscles first, progressing to smaller muscles throughout the workout.

Upper Body: front and back of arms, shoulders, chest, and upper back

Torso: abdominals, obliques, and lower back

Lower Body: front and back of thighs, calves, and buttocks

Pre-Exercise

- **Get Hydrated:** Drink a sport drink or water within an hour before exercise to ensure proper hydration.
- **Warm-up:** It is generally recommended to perform a warm-up prior to moderate or strenuous activity. A warm-up elevates body temperature, priming the muscles for movement by increasing muscle blood flow, increasing speed of nervous impulses, and decreasing joint fluid viscosity. The warm-up is also considered to be an important part of injury prevention.
 - Warm-ups in the weight room
 - *General* warm-ups consist of non-specific body movements (e.g., 5-10 minute jog on a treadmill or an easy pedal on a lifecycle)
 - *Specific* warm-ups involve muscle movement similar to the exercise performed in more strenuous activity (e.g., 50% resistance set prior to weight training activity)
- **Stretch:** Stretching is an effective means of increasing flexibility and reducing muscle tightness. It should be performed after warming up, while resting between sets, and post exercise. Breathe slowly and methodically while stretching, holding the stretch in a relaxed state. Do not bounce while stretching and do not push a stretch beyond personal limits. Muscle tension should diminish while holding a stretch: if pain is felt, or the tension increases, you are pushing too far.

During-Exercise

- **Dress Properly:** Wearing comfortable clothing that allows freedom of movement is an important aspect of any training program. However, loose, baggy clothing can be dangerous as it may get entangled in equipment. Breathable, athletic clothing is a good choice for most activities and will help maintain equipment. Jeans and other abrasive materials should be avoided as they breakdown bench materials more readily. Shoes with a closed, protected toe should be worn at all times.
- **Stay Hydrated:** Try to keep up with sweat loss during exercise by consuming liquids.
- **Have a Goal:** When exercising, it is a good idea to set measurable goals in order to monitor progress. In weight training, one might wish to increase muscularity, or improve muscular endurance. Depending on the desired outcome, the focus of a workout will differ.

Getting Lean: To lose weight, calories burned must be greater than calories consumed. A strength training program combined with proper nutrition will help achieve this goal. Circuit training and endurance training programs lend themselves toward this goal.

Gaining Size: To gain muscle mass, calories consumed must be greater than calories burned. The key is ensuring lean muscle mass is gained—not fat. Progressively overloading muscles during a training program with a focus on hypertrophy will help achieve this goal.

- **Avoid Injury:** Lift weights in smooth, controlled motions. Maintain proper lifting and breathing techniques. If pain is felt, stop exercise and seek advice from an instructor.
- **Practice Good Etiquette:** It is important to remember that weight training equipment is shared among all participants. Between sets, stand up and allow others an opportunity to perform a set while you rest. This maximizes equipment availability and you can also serve as a spotter if necessary.
- **Keep it Clean:** Help maintain a clean and sanitary environment. Bring a small towel to clean off any sweat from benches and handholds.

Post-Exercise

- **Stretch:** The muscles are warm and primed for flexibility training. Research is mixed as to whether or not stretching aids in injury prevention; however, stretching is definitely beneficial toward increasing flexibility.
- **Re-fuel:** After weight training, muscles need to have their energy (glycogen) stores replenished. Try to eat carbohydrate rich foods (fresh fruits, energy bars, pretzels, and sport drinks) within 30 minutes following a workout. In addition, mix in a little protein.
- **Re-hydrate:** Hydration is essential to maintaining blood volume and delivering oxygen and fuel to muscles. Try to replace weight lost during exercise by drinking water and/or sport drinks during recovery.

Safety and Proper Lifting Technique

While resistance training is a safe and proven method for increasing muscular strength and maintaining functional fitness, there is an inherent risk of injury exacerbated by improper lifting techniques. Therefore, it is critical to understand and develop the necessary skills to perform an exercise in the proper manner using an appropriate resistance.

Ask yourself the following questions:

- Has your doctor ever said that you have a heart condition and that you should only participate in physical activity recommended by a doctor?
- Do you feel pain in your chest during physical activity?
- In the past month, have you had chest pain when you were not doing physical activity?
- Do you lose your balance because of dizziness, or do you ever lose consciousness?
- Do you have a bone or joint problem that could be made worse by a change in your physical activity?
- Is your doctor currently prescribing drugs for your blood pressure or heart condition?
- Do you know of any reason you should not participate in physical activity?

If you answered yes to one or more questions, if you are over 40 years of age and have been inactive, or if you are concerned about your health, consult a physician before taking a fitness test or substantially increasing your physical activity. If you answered no to each question, you have reasonable assurance of your suitability for fitness testing and training.

(ACSM - <http://www.acsm.org/health%2Bfitness/pdf/brochures/FreeWeightsbrochure.pdf>)

During the early phases of a resistance training program, individuals undergo neural and physical adaptations that prepare the body for the rigors of handling an increased workload. Individuals will likely succumb to the effects of DOMS (delayed onset muscle soreness), especially if excessive strain is experienced during eccentric muscle contractions. The first two weeks of training should focus on lifting technique with a gradual increase in load. Some soreness should be expected, gradually decreasing throughout a training program.

Be careful not to overtrain. The body needs time to recover from heavy workouts; failing to allow for this can lead to excessive fatigue and reduced performance.

Back

Maintaining a moderately arched back during most lifts will provide the greatest amount of stability and protection. Do **NOT** increase the arch during a lift!!!

Spotting

A spotter serves as a safety measure for heavy lifts and exercise to fatigue. The spotter provides encouragement and help when needed. Always ask for a spot whenever lifting heavy weights or if you feel you might need one. This is especially important if failing to lift a load results in weight resting on top of your body (e.g., bench press).

Breathing Patterns

Always breathe while weight training and maintain proper breathing patterns by exhaling during the exertion phase of a lift. For example, while performing a bench press, inhale as the weight is lowered; exhale while the weight is pressed back to the starting position.

Useful Weight Training Tips

- **Maintain proper nutrition and stay hydrated**
- **Warm-up prior to exercise**
- **Perform exercises through full range of motion**
- **Use relatively light weights with new exercises**
- **Add more weight if you can perform two or more repetitions beyond repetition goal for two consecutive workouts**
- **Sequence from larger to smaller muscle groups during exercise**
- **Exercise your entire body**

Common Mistakes in the Weight Room

- **Unbalanced weight-training programs**
- **Bad form**
- **Overtraining**
- **Not adjusting machines to body size**
- **Not focusing on workout**
- **Poor gym etiquette**
- **Unrealistic goals**

Designing a Workout Program

Applying the FITT Principle: Selecting Exercises and Putting Together Program

(Fahey et al., 2005)

Design your program to maximize the fitness benefits but minimize the risk of injury.

A. **Frequency** of Exercise

1. For general fitness the ACSM recommends 2–3 days per week for weight training
2. Allow muscles at least 1 day of rest between workouts.

B. **Intensity** of Exercise: Amount of Resistance

1. The amount of weight lifted determines the way the body will adapt and how quickly it will adapt.
2. To build strength rapidly, lift weights as heavy as 80% of your maximum capacity. For endurance, choose 40–60% of your maximum.
3. Rather than continually assessing maximum capacity, base weight on the number of repetitions you can perform.

C. **Time** of Exercise: Repetitions and Sets

1. To improve fitness, you must perform enough repetitions to fatigue your muscles.
 - a. A heavy weight and a low number of repetitions (1–5) builds strength.
 - b. A light weight and a high number of repetitions (15–20) builds endurance.
 - c. For general fitness, do 8–12 repetitions of each exercise. For older and more frail people (50–60 years of age and above), 10–15 repetitions with a lighter weight is appropriate.
2. A set is a group of repetitions of an exercise followed by a rest period.
 - a. Exercise scientists have not identified the optimal number of sets for increasing strength.
 - b. For general fitness, 1 set is sufficient. Most serious weight trainers perform 3 or more sets of each exercise.
 - c. The rest period allows the muscles to work at high enough intensity in the next set to increase fitness.
 - d. The length of your rest interval depends on the amount of resistance: If you are training to develop strength and endurance for wellness, rest 1–3 minutes between sets. If you are training to develop maximum strength (and are lifting heavier loads), rest 3–5 minutes between sets.

Load and Repetition Guidelines

Goal	Load (%1RM)	# Of Repetitions
Strength	≥ 85	≤ 6
Hypertrophy	67-85	6-12
Endurance	≤ 67	≥ 12

Based on NSCA recommendations

Rest Period Recommendations	
Rest Period	Repetitions
<1 min	>13
1-2 min	11-13
2-3 min	8-10
3-5 min	5-7
>5 min	<5

Kraemer (2003)

D. Type or Mode of Exercise

1. A complete weight training program works all the major muscle groups, including neck, upper back, shoulders, arms, chest, abdomen, lower back, thighs, buttocks, and calves.
2. Usually, 8–10 different exercises are required in order to work all major muscle groups.
3. A balanced program includes exercises for both agonist and antagonist muscle groups.
4. Exercise the large-muscle groups first and then small-muscle groups.

E. The Warm-Up and Cool-Down

1. You should do both a general warm-up (such as walking) and a specific warm-up for the exercises you will perform.
2. For cool-down, relax for 5–10 minutes after exercising and stretch to help prevent muscle soreness.

F. Making Progress

1. To begin training, choose a weight you can easily move through 8–12 repetitions for 1 set.
2. Gradually add weight and (if you want) sets until you can perform 1–3 sets of 8–12 repetitions for each exercise.
3. If you can do more than 12 repetitions, add weight until you can do only 7 or 8.
4. You can expect to improve rapidly during the first 6–10 weeks of training; after that, gains come more slowly.

G. More Advanced Strength Training Programs

1. If you desire to achieve greater increases in strength, increase the load and the number of sets and decrease the number of reps.
2. Cycle training, in which the sets, reps, and intensity of exercise are varied, may be useful for making greater gains in strength.

Fahey, T, Insel, P. M., & Roth, W. T., (2005). *Fit & Well* (6th ed.). McGraw-Hill.

Kraemer, W. (2003). Strength training goals: Designing workouts to meet patients' goals. *The Physician and Sports Medicine*, 31(8).

Terminology

- ⊙ **Abduction** – Lateral movement away from the midline of the body
- ⊙ **Adduction** – Medial movement toward the midline of the body
- ⊙ **Agonist** – A muscle in a state of contraction, opposed by its antagonist
- ⊙ **Antagonist** – A muscle that can move a joint opposite of the agonist
- ⊙ **Atrophy** – A decrease in the size of muscle fibers
- ⊙ **Concentric** – Shortening of muscle during contraction
- ⊙ **Core Exercise** – Recruits one or more large muscle areas and involves two or more primary joints
- ⊙ **Eccentric** – Lengthening of muscle during contraction
- ⊙ **Extension** – Straightening the joint resulting in an increase of angle
- ⊙ **Flexion** – Bending a joint resulting in a decrease of angle
- ⊙ **Frequency** – Number of training sessions in a given time period (e.g., number of times per week)
- ⊙ **Muscle Fiber** – A single muscle cell, usually classified according to strength, speed of contraction, and energy source
- ⊙ **Muscular Strength** – The amount of force a muscle can produce with a single maximum effort
- ⊙ **Muscular Endurance** – The ability of a muscle or group of muscles to remain contracted (sustain a level of muscular force) or to contract repeatedly
- ⊙ **Load** – Amount of weight being lifted
- ⊙ **Hyperplasia** – An increase in the number of muscle fibers
- ⊙ **Hypertrophy** – Enlargement of muscle fibers
- ⊙ **Isometric** – Static contraction of a muscle
- ⊙ **Isotonic** – Contraction of a muscle against a natural resistance
- ⊙ **Isokinetic** – Contraction of a muscle against a consistent force at a constant speed
- ⊙ **Overload Principle** – Muscle growth is a response to a progressive increase in load
- ⊙ **Repetitions (Rep)** – Number of times an exercise is performed during one set
- ⊙ **Repetition Maximum (RM)** – Maximum resistance that can be moved a specified number of times; 1 RM is a one lift max, 5 RM is the maximum weight that can be lifted 5 times
- ⊙ **Set** – Grouping of a number of repetitions followed by a rest period
- ⊙ **Synergist** – A muscle assisting another muscle during a lift