Muscle Fitness

Dr. Tia Lillie
Health Benefits of Muscular Fitness

- Strength and muscular endurance promote muscular fitness and provide important health benefits
  - Avoiding back problems
  - Reducing risks of injury
  - Reducing risks of osteoporosis
Muscular Strength

- Able to lift a heavy weight
- Able to exert a great force
Muscular Endurance

- The ability to perform repeated muscular contractions
Terminology

- **Hypertrophy** – Increase in the size of the muscles as the result of strength training.

- **Absolute Strength** – The maximum amount of force one can exert
  - Example: the maximum number of pounds or kilograms that can be lifted on one attempt

- **Repetition Maximum (RM)** – The maximum amount of resistance one can move a given number of times
Definitions

- **Sticking Point** – The point in the range of motion where the weight cannot be lifted any farther without extreme effort or assistance.

- **Plyometrics** – Training technique to develop explosive power.
Relative Strength

- The amount of weight lifted relative to the person's body weight
- Measured as a ratio:

\[
\text{Relative Strength} = \frac{\text{weight lifted (lb.)}}{\text{body weight (lb.)}}
\]

- When expressed relative to lean body weight, women have similar relative strength as men!
Sample Calculation

- **Question:** Who’s stronger:
  - A: 250 pound person who can lift 200 pounds
  - B: 150 pound person who can lift 175 pounds

- **Answer:** B
  - A: relative strength = $\frac{200}{250} = 0.80$
  - B: relative strength = $\frac{175}{150} = 1.17$
Resistance Training Principles

- Overload
- Progression
- Specificity
- Rest / Recovery
Facts about Resistance Training

- Everyone can gain strength and endurance

- NOT everyone will improve to the same extent (genetic predisposition)
  - Adaptations depend largely on the muscle fibers type distribution. Fast twitch muscle fibers adapt more readily.
Factors Influencing Strength

- Gender
- Age
- Anatomy
- Genetics – Muscle fiber type
- Drugs
  - Anabolic steroids
  - Human growth hormone

Note: These drugs are highly dangerous and have permanent and life-threatening consequences.
Muscle Fiber Types

- **Fast Twitch Fibers**
  - Stain light in color
  - More anaerobic
  - Suited to strength and speed activity

- **Slow Twitch Fibers**
  - Stain dark
  - More aerobic
  - Suited to endurance activity
Myths about Resistance Training

- No pain - no gain
- Makes you “muscle bound”
- Fat can be converted into muscle
- Extra muscle turns to fat if not used
- Has masculinizing effect on women
Stimulus for Endurance

- **F:** every other day
- **I:** 40-70% 1RM
- **T:** 2-5 sets 15-25 reps

<table>
<thead>
<tr>
<th>Resistance (% of 1 RM)</th>
<th>Muscular Strength</th>
<th>Repetitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Load Low Reps</td>
<td>Muscular Strength</td>
<td></td>
</tr>
<tr>
<td>Mod Load Mod Reps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Load High Reps</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Stimulus for Overall Muscle Fitness

- **F:** every other day
- **I:** 60-70% 1RM
- **T:** 2-3 sets 8 - 15 reps

<table>
<thead>
<tr>
<th>Repetitions</th>
<th>Resistance (% of 1 RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscular Strength</td>
<td></td>
</tr>
<tr>
<td>High Load Low Reps</td>
<td></td>
</tr>
<tr>
<td>Mod Load Mod Reps</td>
<td></td>
</tr>
<tr>
<td>Low Load High Reps</td>
<td></td>
</tr>
<tr>
<td>Muscular Endurance</td>
<td></td>
</tr>
</tbody>
</table>
Stimulus for Strength

- **F**: every other day
- **I**: (80% 1RM)
- **T**: 3 sets < 8 reps

Muscular Strength

Muscular Endurance

**Resistances (% of 1 RM)**

- **High Load Low Reps**
- **Mod Load Mod Reps**
- **Low Load High Reps**
Training Considerations

- Start slowly
- Use good technique
  - Lift in a controlled manner
  - Exhale during effort – Workload
  - Inhale on the non-workload phase
  - Bring weight down slowly
- Allow time for recovery
- Expect plateaus
Types of Contractions
Concentric vs. Eccentric

Concentric (shortening) LIFTING

Eccentric (lengthening) LOWERING

Both phases can build muscle!
Concentric & Eccentric

- **Exhale during the work phase**
  - Work phase = Concentric phase (shortening or contraction of the muscle group)
  - Resistant force < Muscle force (Muscle force used to lift the wt.)

- **Inhale during the non-work phase**
  - Non-work phase = Eccentric phase (lengthening of the muscle group)
  - Resistant force > Muscle force (Gravity helps to lower wt.)
Order of Exercise

- Large muscle groups first
- Small muscle groups first (pre-exhaust)

There are many different ways to order exercises within a workout.
Muscle Groups

- Sport-specific training
- Overall muscle balance

Most resistance training programs should include exercises for all major muscle groups
Isotonic

Isometric

Isokinetic
References
