

Empire Fitness would like to thank Mr Wayne Westcott PhD and www.ssymca.org for the following

Youth Exercise Info

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Youth Strength Training: Why and How

By Wayne L. Westcott, Ph.D.

As our society becomes more sedentary and young people spend more of their time in non-physical pursuits (television, video games, movies, computers, etc.), we see progressively lower levels of physical fitness in increasingly larger numbers of boys and girls. Over a 15-year period, childhood obesity has increased over 50 percent and super obesity has more than doubled. As a result, Type II diabetes, formerly called adult onset diabetes, has become prevalent in teenagers and even preadolescents.

Body Composition

Research has shown that strength training is the best means for improving body composition in youth, as it addresses two major problems in many preadolescents, namely, too little muscle and too much fat.

Public School Study

In one of our public school studies, the underfit and overfat fifth graders who participated in a basic and brief strength training program gained significantly more muscle and lost twice as much fat as a matched group of students who did not perform strength exercise. Perhaps most important, the strength trained students made such noticeable physical improvements that the strength exercises were subsequently included in the standard physical education program.

Bone Development

The most critical time for developing strong bones is during the childhood years. Recent research indicates that strength training is about six times more effective for building bone in preadolescent girls than it is in young, middle-aged or older women. Contrary to the myth that strength training is detrimental to young bones (no such medical report has ever been documented), it is actually the best way to develop a strong musculoskeletal system.

Physiological Response

Because children have low levels of testosterone, some people assume that they cannot increase their muscle strength or that any strength gains are temporary. Our studies have consistently shown significant strength gains (15 to 100 percent) in preteens who complete a two-month training program. Moreover, after two additional months of no strength exercise, the strength trained youth retained 50 percent of their strength gain and were still significantly stronger than their non-training peers. Children, like women and seniors who also have low levels of testosterone, respond most favorably to strength exercise.

Performance Enhancement

In our most recent study, female figure skaters (average age 10 years) did one or two brief strength workouts a week. After 10 weeks of training, the preadolescent participants increased their overall strength by 67 percent, their vertical jump by 13 percent, and their skating performance by major proportions according to their coaches.

Training Guidelines

The skaters performed one set of 10 basic strength exercises for 13 to 15 repetitions each. We recommend using higher repetitions with moderate weightloads, as we have found significantly greater increases in children's strength and endurance when training with 13 to 15 repetitions compared to training with 6 to 8 repetitions.

After 15 years of youth strength training programs with no injuries, we are confident that this activity is safe and beneficial (physically and psychologically) for children. A sensible strength training program enhances musculoskeletal development, encourages self-confidence and elicits a physically active lifestyle.

Youth Strength Training Guidelines

1. Select basic exercises for major muscles.
 - a. 4 exercises x 3 sets each
 - b. 6 exercises x 2 sets each
 - c. 12 exercises x 1 set each
2. Perform 10 to 15 repetitions per exercise.
3. Increase resistance by 1 to 3 pounds upon completing 15 repetitions.
4. Use slow movement speed (4 to 6 seconds per repetition).
5. Use full movement range.
6. Train 2 or 3 nonconsecutive days per week.
7. Train under adult supervision.
8. Train safely.
9. Train progressively.
10. Train consistently.

Bodyweight Exercises vs. Weight Machines

For most boys and girls, bodyweight exercises are not appropriate because their muscles are unable to lift their bodyweight. For example, fewer than 50 percent of all children can do a single pull-up and not many more can complete a properly performed bar dip, push-up or sit up. With weight machines, however, every child can use a resistance that permits 10 to 15 perfect repetitions. Most weight machines allow 1 to 3 pound increases that facilitate safe, systematic, and successful programs of progressive resistance exercise.

Youth Strength Training Equipment

In our experience, boys and girls under 12 years of age appear to do better training on youth-sized resistance machines. However, children 12 years and older can train effectively on standard weightstack machines, especially when using pressing movements (leg press, chest press, incline press, shoulder press, triceps press, assisted bar dip, etc.) and pulling movements (seated row, pull-down, assisted chin-up, etc). Youth under five feet tall have difficulty aligning their joint axes of rotation with machine axes of rotation, so rotary exercises (leg extension, leg curl, triceps extension, biceps curl, etc.) are not recommended.

Author Credentials

Wayne L. Westcott, Ph.D., is co-author with Dr. Avery Faigenbaum of the new youth strength training book, *Strength and Power for Young Athletes* by Human Kinetics Publishers.

Strength Training for Teenagers

Wayne L. Westcott, Ph.D. and Cynthia J. Long

We have learned that there are essentially two types of teenagers, those who enthusiastically participate in sports programs and those who have little interest in physical activities. Be assured that the vast majority of teenage boys and girls in our increasingly sedentary society remain firmly entrenched in the latter category. Actually, both groups of teenagers need to do regular strength training but for different purposes. Athletes typically use some muscle groups much more than other muscle groups, setting up muscle imbalances that frequently lead to sport-specific injuries. For example, knee problems in runners, shoulder problems in swimmers, back problems in gymnasts and elbow problems in tennis players. Generally speaking, teenage athletes benefit most from a comprehensive program of strength exercise that effectively addresses all of their major muscles, thereby eliminating weak links in their musculoskeletal system and reducing the risk of overuse/imbalance injuries. We recommend a combination of free-weight and machine exercises that include single-joint and multi-joint actions.

We encourage coaches to bring their teams to our exercise center during the off seasons. We train the athletes on a Tuesday-Thursday or a Monday-Wednesday-Friday schedule, between 3:00 to 4:00 p.m., which is typically a low use time in most fitness facilities. As an example, over a four-year period the coach of one local high school bussed 24 girls from the track and cross-country teams to our fitness center every Monday, Wednesday, and Friday during the summer and winter off-seasons. These teenage athletes performed one set each of 12 exercises that provided total body training in about 30 minutes by completing one of two machine circuits that we reserved for their use. Over these four years this team won four New England cross-country championships and lost only one athlete due to injury (a broken ankle from stepping in a woodchuck hole).

As you might guess, strength training motivated athletes is much easier than motivating sedentary secondary students to start a strength-training program. Teenagers who are under fit or overfat seem to be especially embarrassed about exercising in a fitness facility. Of course, these are the youngsters who have the most to gain from strength training so we must develop programs that encourage their participation. We offer two such programs that have proven particularly successful with younger teenagers (13, 14, and 15 year olds). The more popular teen fitness program incorporates a full circuit of weightstack machines (single and multiple muscle exercises), and features both adult and older teen instructors. This 10-week class typically consists of 10 to 15 boys and girls (about equal in number), and meets twice a week from 3:00 to 4:00 p.m. Although discipline is seldom a problem, we emphasize more social interaction among the non-athlete classes to make the program more enjoyable for these otherwise inactive teens. We have also found that a higher teacher-student ratio (one instructor for every four to five participants) results in better class attendance and training compliance with the less fit teens.

Our more recent youth fitness endeavor has been a carefully designed and closely supervised program for instructing young teenagers in the proper performance of free-

weight exercises. This class meets once a week (Saturday late morning) in the free-weight facility, and is well received by both the participants and their parents. In both programs, teenagers who demonstrate acceptable levels of competence, confidence, manners and maturity are certified by the instructional staff to use the facilities and equipment on their own after completing their classes. Contrary to our cautious expectations we have experienced essentially no problems or member complaints regarding our teen strength training programs or the graduates who have become respectful and respected fellow exercisers in our fitness center. Keep in mind that your teenage program participants today will be your adult members tomorrow, so it makes good sense to prepare them properly for a lifetime of physical activity.

Suggested Strength Exercises for Teenage Athletes

Exercise	Target Muscles
Machine Leg Extensions	Quadriceps
Machine Leg Curls	Hamstrings
Machine Hip Adductions	Hip Adductors
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Barbell Squats or Machine Leg Presses	Quadriceps, Hamstrings, Gluteals
Machine Chest Cross	Pectoralis Major
Barbell or Machine Bench Press	Pectoralis Major, Anterior Deltoids, Triceps
Machine Pullover	Latissimus Dorsi
Dumbbell Bent Row or Machine Pulldown	Latissimus Dorsi, Biceps
Machine Lateral Raise	Deltoids
Dumbbell or Machine Shoulder Press	Deltoids, Upper Trapezius, Triceps
Dumbbell or Machine Arm Curl	Biceps
Dumbbell or Machine Arm Extension	Triceps
Bodyweight or Machine Trunk Curl	Rectus Abdominis
Bodyweight or Machine Trunk Extension	Erector Spinae
Machine Neck Flexion and Extension	Neck Flexors and Extensors