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Article Title: Strength Training for Prepubescent and Adolescent Children

By: Matt Kathol

## Strength Training for Prepubescent and Adolescent Children

By Matt Kathol of Human Performance Athletics

Many parents are concerned about their children's health while doing strength training exercises. The most common questions being:

- Will it stunt my child's growth?
- Is it safer and healthier to avoid strength work until my child is an adolescent or adult?
- Will the exercises permanently damage their tendons, ligament, and joints at such a young age?
- Will my child burnout by performing too much exercise at young age?

These common questions will be addressed in this brief review of clinical research.

Strength, or anaerobic training is really any exercise that lasts less than a minute and is done at an intensity over +/- 75%. Thus, lifting weights, jumping hurdles, sprints, speed ladder work, and plyometrics are considered strength movements. In this brief article, I will provide you information about strength training and how to do it safely. I did not address endurance, or aerobic, training in this article, but I would put high intensity aerobic exercise in the same category as strength training. This means that any high intensity exercise can be stressful mentally and physically.

The following are a list of points that I have extracted from clinical research that is pertinent to our topic:

- Boys reach full height at 18 years old and girls at 16 old.
- During fetal development, as well as during the initial 14-22 years of life, membranes and cartilage are transformed into bone through the process of ossification, or bone formation. Bones are fused by the early 20s. On average, girls achieve full bone maturity several years before boys.
- Calcium is an essential mineral that we must obtain through our diet for our entire life. Furthermore, there are many other nutrients that support all 10 systems of the body. Therefore, a well balanced diet is essential to optimal health.
- Exercise is an essential part of bone growth. Although exercise has little or no influence on bone lengthening, it does increase bone width and bone density by depositing more mineral in the bone matrix, which increases the bone's strength. Evidence suggests the prepubertal years may be the most opportune time to lay down bone in response to an exercise stimulus.
- Muscle mass peaks in females at age 16-20 and in males at 18-25 years old, unless it is increased further through exercise, diet, or both.
- Children are limited in their maximal anaerobic (strength) and aerobic (endurance or cardiovascular) abilities, because these systems don't fully mature until adulthood. Example: One reason strength work for prepubescent and adolescent boys and girls is controversial is because muscle building hormones (androgens) are still low.
- Most studies suggest that there is very little risk in strength training. In fact, resistance training might offer protection against injury. Still, the study suggests a conservative approach for

preadolescents. Here's an amazing study! In one study, prepubescent boys and girls took part in a 9-week progressive resistance training program. They exercised 25-30 min per day, 3 days each week. Their mean strength gain was 42.9% compared with a 9.5% increase in a nontraining control group. In reading these studies you'll find that none of the subjects demonstrated any damage to the epiphyses, bones, or muscles as a result of strength training. All studies show immense strength gain with strength training, but little change in muscle mass in prepubescent children. The likely determinants of the strength gains achieved are: improved motor skill coordination, increased motor unit activation, and other neurological adaptations. Strength gains in adolescents result primarily from neural adaptations and increases in both muscle size and specific tension.

- Resistance training for children should be prescribed in much the same way as for adults. Specific guidelines (see chart below) were established at a workshop in 1985 by a group representing eight different professional organizations: the American Orthopedic Society for Sports Medicine, the American Academy of Pediatrics, the American College of Sports Medicine, the National Athletic Trainers Association, the National Strength and Conditioning Association, the President's Council on Physical Fitness and Sports, the U.S. Olympic Committee, and the Society of Pediatric Orthopedics.

<u>RESISTANCE TRAINING RECOMMENDATIONS FOR PREPUBESCENT CHILDREN</u>
Resistance Training equipment :
1. Equipment should be of appropriate design to accommodate the prepubescent's size and degree of maturity.
2. Equipment should be cost effective.
3. Equipment should be safe, free of defects, and inspected frequently.
4. Equipment should be located in an uncrowded area free of obstructions with adequate lighting and ventilation.
Program Considerations:
1. A preparticipation physical exam is mandatory.
2. The child must have the emotional maturity to accept coaching and instruction.
3. There must be adequate supervision by coaches who are knowledgeable about strength training and the special problems of prepubescents.
4. Strength training should be a part of a comprehensive program designed to increase motor skills and level of fitness.
5. Strength training should be preceded by a warm-up period and followed by a cool-down.
6. Emphasis should be on dynamic concentric actions.
7. All exercise should be carried through a full range of motion.
8. Competition is prohibited.
9. No maximal lift should ever be attempted.

Prescribed program:
1. Training is recommended two or three times a week for 20- to 30-min periods.
2. No resistance should be applied until proper form is demonstrated. Six to 15 repetitions equal one set; one to three sets per exercise should be done.
3. Weight or resistance is increased in 0.5- to 1.4 kg (1- to 3-lb) increments after the prepubescent does 15 repetitions in good form.

Also, Kraemer and Fleck, noted physiologists, have established basic guidelines for the progression of resistance exercise in children. Review the chart below:

BASIC GUIDELINES FOR RESISTANCE EXERCISE PROGRESSION IN CHILDREN	
AGE	CONSIDERATIONS
7 or younger	Introduce basic exercises with little or no weight: teach exercise techniques.
	Develop the concept of a training session.
	Progress from body weight calisthenics, partner exercises, and lightly resisted exercise.
	Keep volume low.
8-10	Gradually increase the number of exercises and training volume.
	Practice exercise technique in all lifts: keep exercises simple.
	Start gradual, progressive loading of exercises, carefully monitoring toleration to the exercise stress.
11-13	Teach all basic exercises and training volume.
	Continue progressive loading of each exercise.
	Introduce more advanced exercises with little or no resistance.
	Progress to more advanced youth programs in resistance exercise.
14-15	Add sport-specific components.
	Emphasize exercise techniques.
	Increase volume.
16 or older	Move child to entry-level adult programs after all background knowledge has been mastered and a basic level of training experience has been gained.

In a thorough review of prepubescent training, Malina (Perspectives: in exercise science and sport medicine: Youth, exercise and sport; 1989) believes that strength training had no apparent effect on growth in height. It does however affect weight and body composition.

It appears clear, from my professional opinion, that the countries brightest exercise physiologists feel that strength training is safe, and necessary. I totally concur as a professional strength and conditioning specialist with over 20 years of experience.

The programs that I've created for my personal training clients and athletes place a lot of attention on using proper biomechanics form when performing all exercises. I specifically design the conditioning program to address their needs and to mimic many of the movements that they will use in their respective sport(s). I will evaluate the athlete's posture and gait (walking/running analysis) regularly to note progress. This will also allow me to prescribe an individualized program for each athlete.

I'm not a believer in performing maximal aerobic or anaerobic (strength) with prepubescent children for two reasons. One, their bodies are not developed enough to handle maximal stresses on the 10 systems of the human body. Second, my goal in life is to get people of all ages addicted to good exercise and nutrition habits. Therefore, I want these kids to have fun and not burn out. As an athlete, I understand this having been a wrestler and boxer in college. I saw many kids drop their sport in high school or college because they were over trained or over coached. I want these kids to reach their full genetic potential as athletes, but not at the expense of getting injured or burned out.

Go to this website to see a sample of some of the exercises that we're doing:

<http://www.nutritionandexercise.com/kidtraining.htm>

I hope that this article was informative and helpful. I will continually add new articles and refine existing content on my website. E-mail me if you'd like to be added to my e-mail list. You'll receive articles on a number of topics and a monthly health newsletter. [mattk@nutritionandexercise.com](mailto:mattk@nutritionandexercise.com)

Best of Health,

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