

Exercise Benefits in Children: Preventing Osteoporosis Since Youth

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Why Train Kids?







Organized Children's Sports: North America

Team Sports

- Baseball
- Gridiron Football
- Soccer
- Ice Hockey
- Basketball
- Other: Field hockey, lacrosse, rugby, etc.

Individual Sports

- Gymnastics
- Swimming
- Tennis Skating
- Distance running
- Triathlon
- Other: Dance, cycling, riding, rodeo, etc.



Benefits of Training: The Child Athlete

- **Enhance Performance**
- Prevent Injury
- Health & Fitness
- Bone Health





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Injury Prevention

1. ACSM: Smith, A, Andrish, J, Micheli, L,
The Prevention of Sports Injuries in Children & Adolescents. Med. Sci Sports Exercise. 25:1-7, 1993
2. Hejna, Rosenberg, A. et al.
The Prevention of Sports Injuries in High School Students Through Strength Training. Nat'l. Strength & Conditioning Assoc. J. 4=28-31, 1982

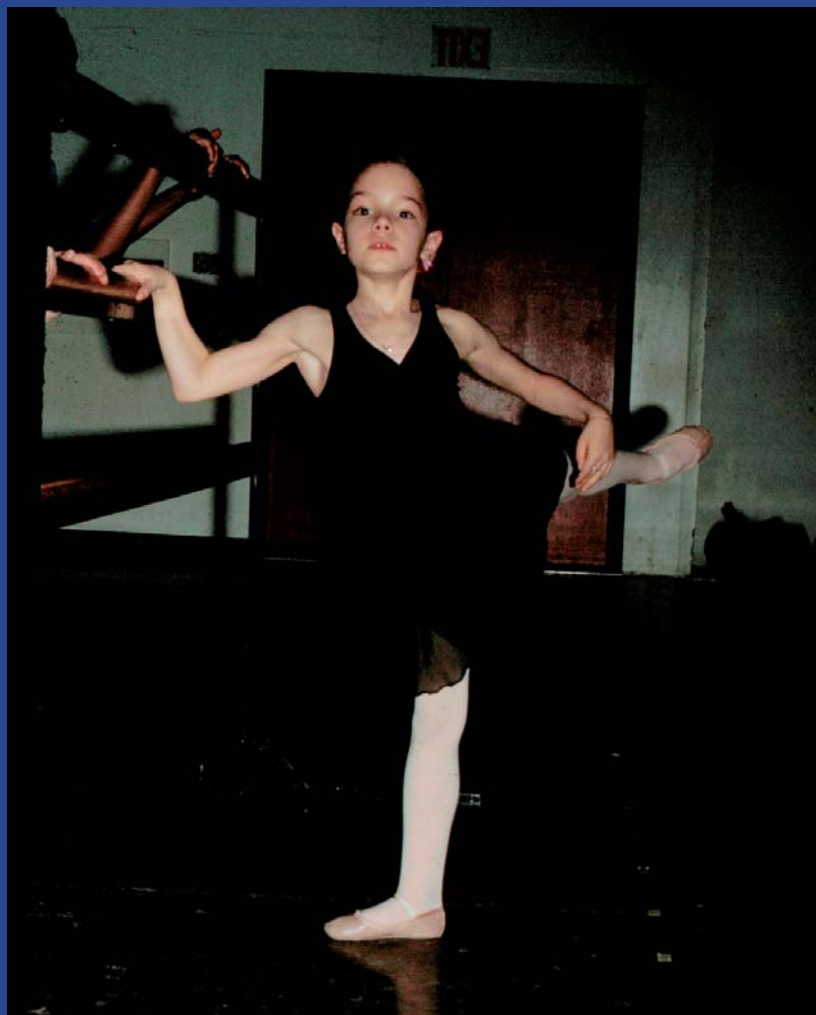


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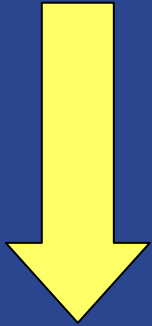






Childhood Exercise → **Childhood Health**

?



Adult Exercise → **Adult Health**



Benefits of Training: The Child Athlete

- Enhance Performance
- Prevent Injury
- Health & Fitness
- **Bone Health**



Bone Health

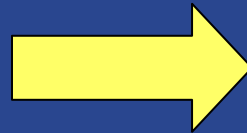
Morris, F, Naughton, G, et al.

**Prospective Ten Month Exercise Intervention in
Pre-Menarchal Girls: Positive Effects on Bone
and Lean Mass**

J. Bone Miner Res. 12=1453-1462, 1997



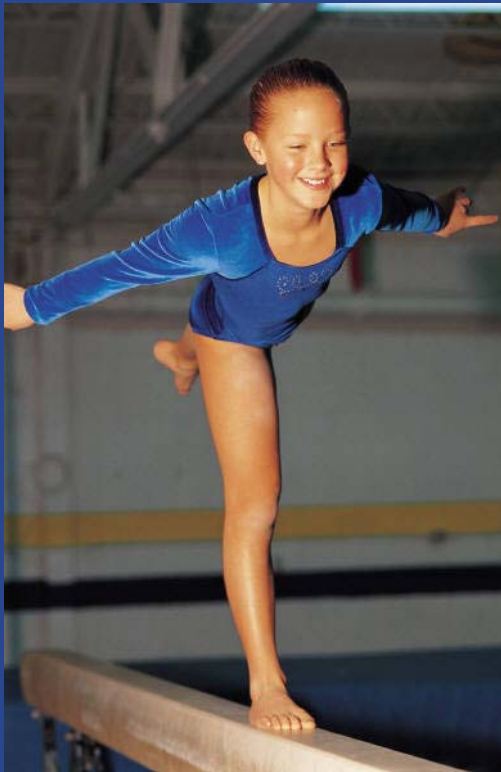
Childhood Exercise



Adult Bone Health?



Gymnastics



Skeletal Benefits of Pre-Menarcheal Gymnastics Are Retained After Activity Cessation

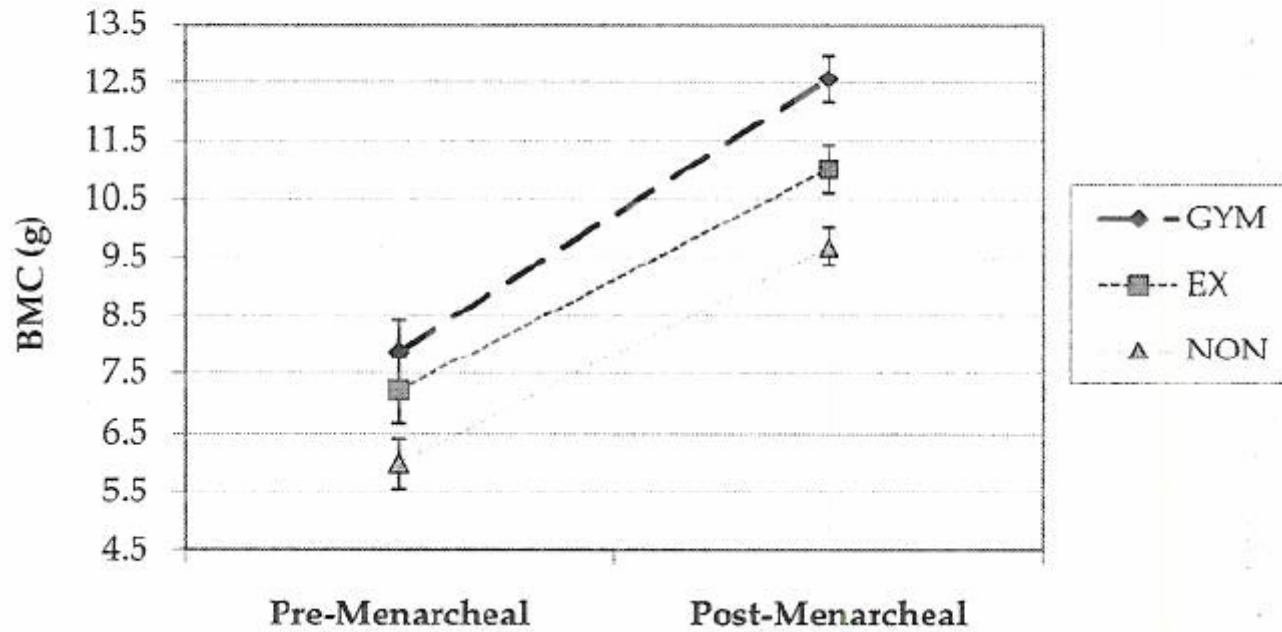
Scerpella, T et al.

Ped. Ex. Sci. 22: 21-23. 2010

3 year long study



Adjusted Means by Activity Group





The Female Athlete Triad

- Amenorrhea
- Osteopenia
- Disordered Eating

Overuse Injury: Stress Fracture



Sports Training: The Child Athlete

- **Cardiovascular**
- Musculoskeletal
 - Strength
 - Flexibility
- Nutrition
- Skills
- Psychological



Rowland, TW (ed)

**Developmental Exercise
Physiology, Human Kinetics**

Champaign, Illinois 1996



Pediatric Runners



VO2 Max



Pulse Rate

But adaptation less than adults



Sports Training: The Child Athlete

- Cardiovascular
- **Musculoskeletal**
 - **Strength**
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Strength Training For Children



Strength

The ability to exert force against an external resistance

- Joint – Muscle specific
- Technique specific



Strength Training: Children

- **Safe?**
- Increase ? (Mechanism)
- Benefits?



Strength Training: Children

- Safe?
- **Increase ? (Mechanism)**
- Benefits?





Special Considerations: Child Strength Training

- Close, qualified supervision
- Variety
- Resistance: Pre-Overload
- Repetitions: 10-15 (50-70% 1RM)
- Rest (2-3 x/week)



Pre-Season Conditioning for the Pre-Adolescent Athlete

Faigenbaum A, Micheli L,
Pediatric Annals
29=156-161, 2000



Strength Training: Children

- Safe?
- Increase ? (Mechanism)
- **Benefits?**



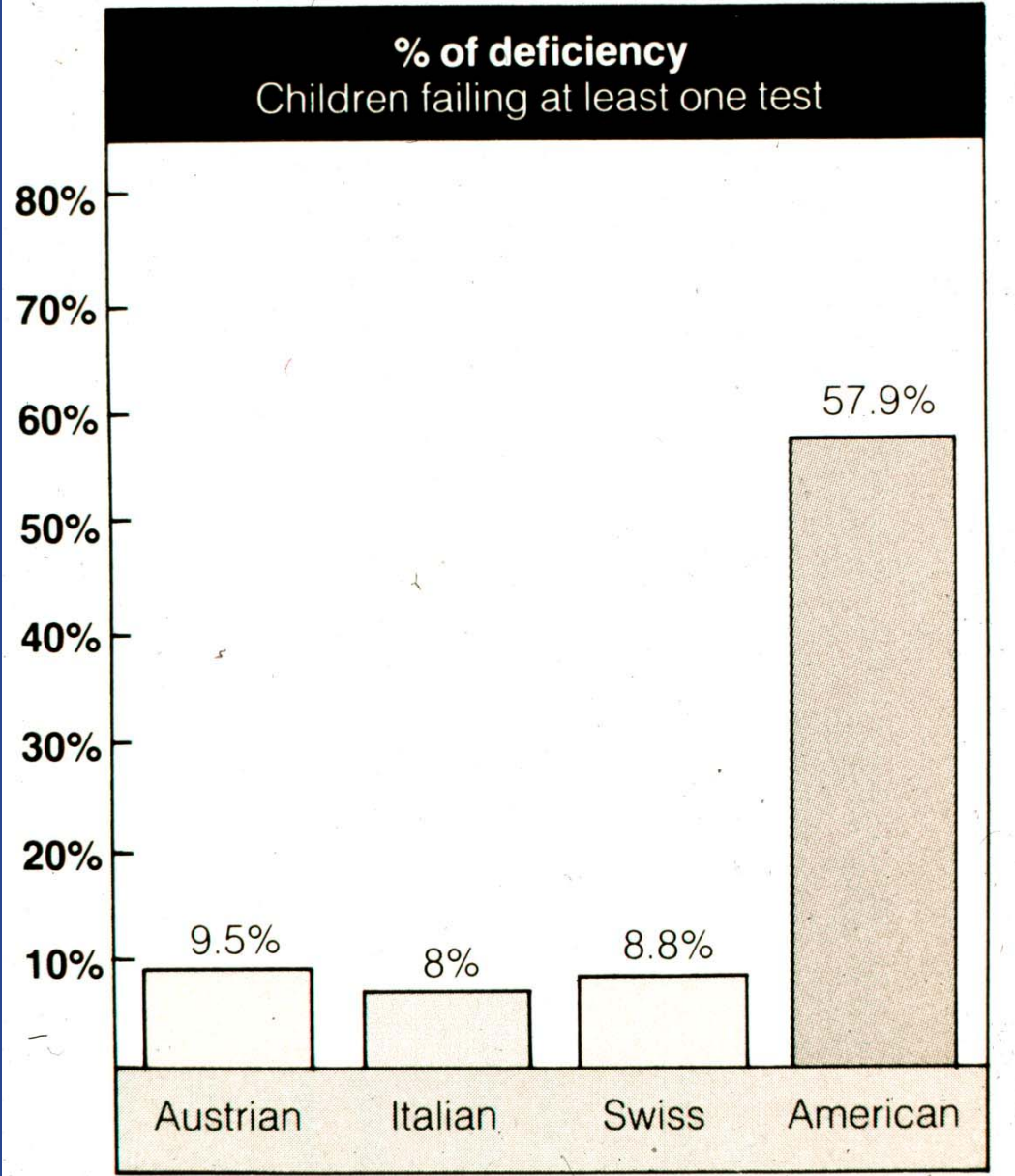
Sports Training: The Child Athlete

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Flexibility Training: Do Kids Really Need It?







Sitting Inactivity



Flexibility

- Ballistic (Sport/Dance Specific)
- Slow Stretch (30 sec.)
- Facilitative (PNF)



Sports Specific: Gymnastics

Enhanced shoulder flexibility in female gymnasts
decreases low back pain extension stress



The Child Athlete Sports Training:

- Cardiovascular
- Musculoskeletal
 - Strength
 - Flexibility
- **Nutrition**
- Skills
- Psychological



Nutrition: The Young Athlete



The Young Athlete: Nutritional Concerns:

- **Dehydration-Increased heat susceptibility**
- Junk food/Fast food: Vitamin, mineral deficiency
- Obesity
- Eating disorders





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Nutritional Concerns: The Young Athlete

- Dehydration-Increased heat susceptibility
- **Junk food/Fast food:**
Vitamin, mineral deficiency
- Obesity
- Eating disorders



Typical Adolescent Food Habits

- Meal Skipping
- Snacking
- Consumption of Fast Foods
- Dieting

Vulnerable to Nutrition Deficiencies

- Calcium
- Vitamin A
- Iron, Ascorbic Acid



Nutritional Concerns: The Young Athlete

- Dehydration-Increased heat susceptibility
- Junk food/Fast food: Vitamin, mineral deficiency
- **Obesity**
- Eating disorders



Adolescent Obesity

- Caloric Intake
- Exercise
- Compliance
- Family



Nutritional Concerns: The Young Athlete

- Dehydration-Increased heat susceptibility
- Junk food/Fast food: Vitamin, mineral deficiency
- Obesity
- **Eating disorders**



Female Athlete Triad



Female Athlete Triad (ACSM)

- Disordered eating
- Amenorrhea
- Premature osteoporosis
- Overuse injuries: Stress Fx.



Body Composition

**Female Athlete / Dancer
> 13% BWF**



Nutritional Supplements

- **Males More Likely**
- Females: Calcium, Iron
- Performance Enhancement
- Creatine



Nutritional Supplements

- Males More Likely
- **Females: Calcium, Iron**
- Performance Enhancement
- Creatine



Nutritional Supplements

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Nutritional Supplements

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Anabolic Steroids



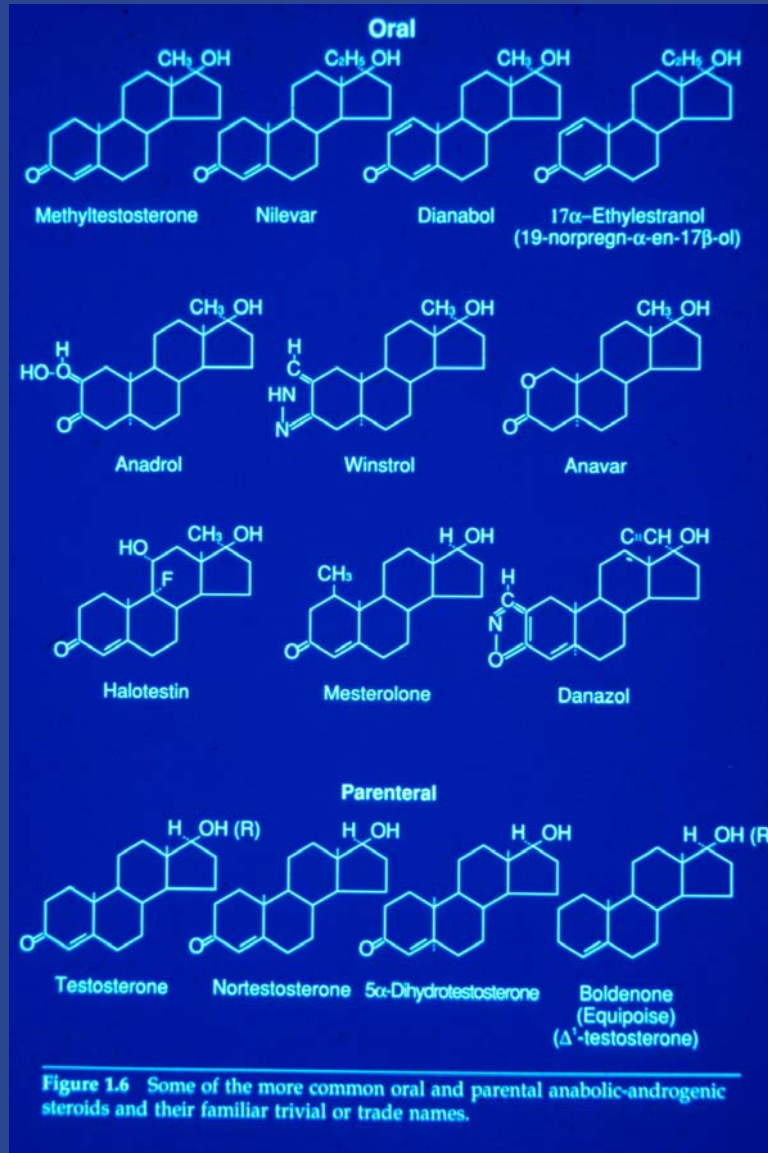


Figure 1.6 Some of the more common oral and parental anabolic-androgenic steroids and their familiar trivial or trade names.

Faigenbaum, A., Westcott, W. et al.

**Anabolic Steroid Use by Male and
Female Middle School Students**

Pediatrics 101: E6, 1998



Anabolic Steroids: Risks

- Liver=Failure, tumors
- Mood Change: "Roid Rage"
- Heart Disease
- Growth Arrest
- Female=Hirsution, baldless
- Acne



Androgenic = Masculinizing

Anabolic = Tissue building



Growth Hormone



Drug Testing



Nutritional Supplements: Doping



Carbohydrate Loading



Strength, Endurance and Body
Composition are more important than
body weight.



Sleep



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 - Flexibility
- Nutrition
- **Skills**
- Psychological







Sports Training: The Child Athlete

- Cardiovascular
- Musculoskeletal
 - Strength
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- Skills
- **Psychological**



Organized Sports

Concerns

- Emotional Stress
- Endurance/Heat stress
- Injury





Sports Psychologist

- Focus
- Competitive Stress



Who Does The Training?





IOC Consensus Statement: Training the Elite Child Athlete

REFERENCES

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**The Adolescent Athlete: A Practical Approach
Micheli L, Purcell L eds. 2007 Springer Verlag; 410-413**







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