

# What to Expect: Gymnastics During Athlete Maturation



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3/7/2022



# Paradox of Youth Sport

- Impact of Youth Sport:
  - **Positive:** physical fitness, social development, mental health, bone health, cognitive development
  - **Negative:** risk of injury, burnout/dropout, body image/disordered eating, performance expectations, impact on future physical activity



Positive & negative outcomes influenced by our approaches to training load, education, athlete development, psychological influences, and **recognition of differences in maturation**



Let's start a **CONVERSATION** about the influences of physical and mental maturation



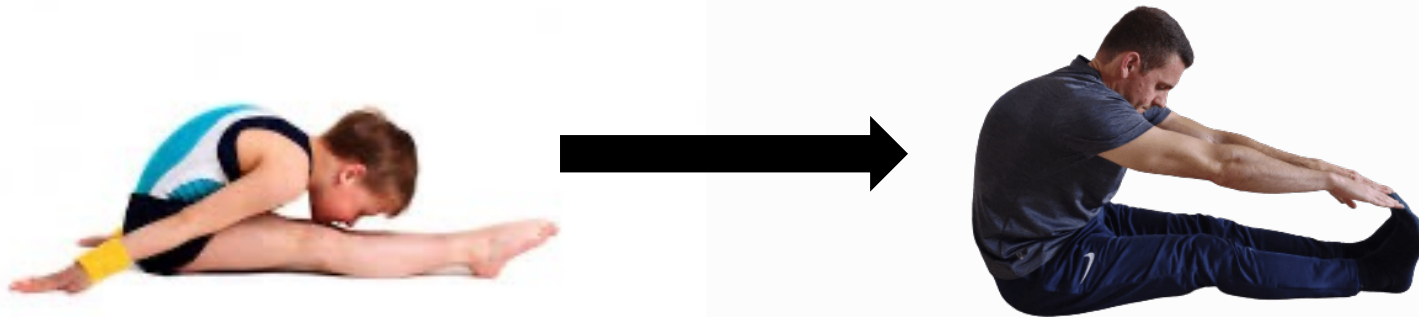
# Details of Puberty – Physical Maturation

- Pubertal Growth Spurt
  - Common measure: Peak Height Velocity (PHV)
- Significant gains in stature and mass
- Normal development: rate and onset variable but sequence (ht/wt/muscle) of events is the same for everyone
- Between 12-16yo, individuals of the same age can be 4-5 years apart developmentally

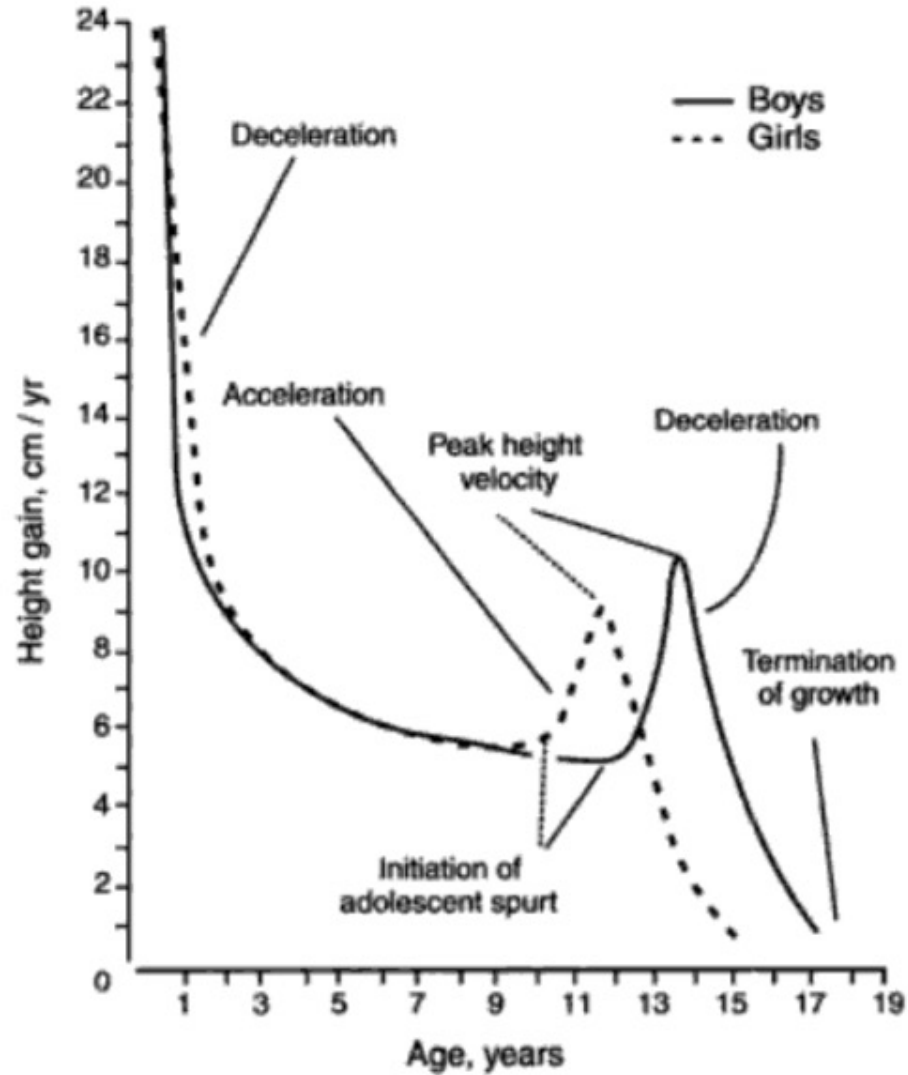


# Physical Maturation

- Male Maturation: Later onset for boys but much higher magnitude of change
  - PHV – Age 14
  - Growth Spurt: Ht/Wt/Muscle – significant quick gains
  - Predisposition to **fat-free mass** gain
  - Flexibility Decreases
    - Created by growth mismatch – skeleton grows faster than muscle & tissue



## Velocity Curve for Height



Malina RM, Bouchard C, Bar-Or O. Growth, maturation, and physical activity. Second ed. Champaign, Ill: Human Kinetics; 2004.

# Physical Maturation - Variable Timing

- Timing of maturation is variable per athlete



- Physiologic adaptations will therefore vary amongst athletes of the same age



- Influences athlete/parent/coach expectations and evaluation of sport performance



# Maturation & Musculoskeletal Injury

Rapid physical development

+

Increased sport demand

=

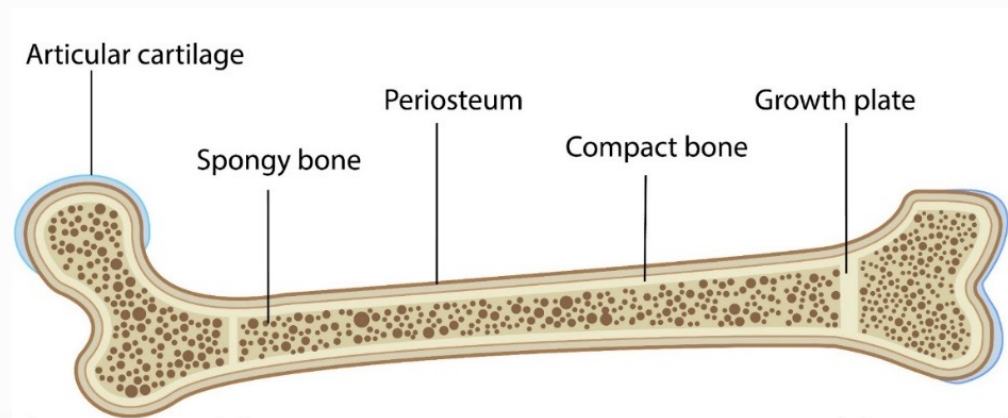
Risk for injury

- Encountering higher work loads during peak of growth & maturation will increase injury risk



# Maturation & Musculoskeletal Injury

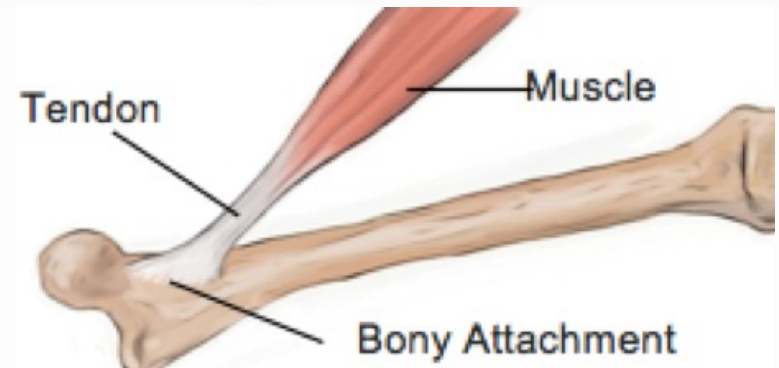
- Higher rate of injury documented within 6 months of PHV:
  - Decreased bone density precedes PHV
    - = Increased risk for fracture
  - Imbalanced growth of bone and soft tissue
    - = Increased force to weaker tissue (growth plate)





# Why are Injuries so Common at this Age?

- Prior to and During PHV:
  - Bone growth > muscle/tendon growth
    - Stress on open growth plates
    - Impact on flexibility
  - Bones less dense
    - Susceptible to overuse
- After PHV
  - Increased body weight (bone density)
    - Formerly “strong muscles” now “weak”
  - Increase in muscle bulk/strength
- Training intensity vs. recovery



# Psychological Impact

- Gymnast at risk for negative psychological consequences during growth spurt due to:
  - Quick musculoskeletal changes that can affect performance
  - Variable impact and timing of maturation compared to peers
    - Mismatch in performance compared to peers
  - Inappropriate expectations by athlete/coach/parent relating to training volume and performance



# Psychological Impact (cont.)

- Increased injury risk can also cause negative psychological consequences:
  - Stress of their first injury
  - Stress of recurrent injury
  - Anxiety regarding return
  - Time lost from training and competition
  - Pressure to return quickly (inappropriate expectations)



# Psychological Impact

- Frustration
- Anger
- Anxiety
- Fear of failure
- Fear of re-injury
- Depressed mood
- Low self esteem
- Lack of motivation
- Overwhelmed
- Isolation
- Self doubt
- Negative self talk



**Table 4** Symptoms of overtraining syndrome/burnout<sup>180 188 207</sup>

Fatigue	Insomnia	Loss of appetite
Depression	Irritability	Weight loss
Bradycardia or tachycardia	Agitation	Lack of mental concentration
Loss of motivation or interest	Decreased self-confidence	Heavy, sore, stiff muscles
Hypertension	Anxiety	Restlessness
Sleep disturbances	Nausea	Frequent illness

Myer, Gregory & Jayanthi, Neeru & DiFiori, John & Faigenbaum, Avery & Kiefer, Adam & Logerstedt, David & Micheli, Lyle. (2015). Sports Specialization, Part II: Alternative Solutions to Early Sport Specialization in Youth Athletes. *Sports health*. 8. 10.1177/1941738115614811.



# Common Reasons for Dropout

Boredom (“just not fun anymore”)

Lack of motivation

Perceived lack of success

Injury

Other conflicting interests

Burnout



# Prevention Strategies

- Training Volume:
  - Age vs. training hours per week
  - Adequate rest days
  - Cross train to vary muscle groups
  - Skill and routine reps



# Prevention Strategies



- Optimize support system
  - Coaches
  - Family
  - Teammates
  - Medical
- Education: Athletes, coaches, parents
  - Injury
  - Psychosocial aspects
  - Expected impact of physical maturation
  - Return to play
  - Resources





# Coping Strategies:

- Self Care:
  - Sleep
  - Nutrition
  - Hydration



# Coping Strategies - Sleep

- Optimal sleeps leads to Improved:
  - Performance
  - Recovery
  - Prevention
  - Healing
- Suboptimal sleep can impact:
  - Motor function
  - Motivation
  - Focus
- Recommended hours of sleep per night:
  - 6-12 y.o. : 9-12 hours
  - 13-18 y.o.: 8-10 hours



# Coping Strategies – Nutrition

- Caloric Needs in Boys:
  - Age 9-13: 1600-2600 calories
  - Age 14-18: 2,000-3,200 calories
  - Teenage high-level athletes may require up to 5000 calories per day



# Coping Strategies – Nutrition

- Protein:
  - Injury repair
  - Meat, poultry, fish, eggs
- Carbohydrates:
  - Fuel for muscles
  - Fruits, starchy vegetables, whole grains
- Fat:
  - Low dietary fat associated with stress fractures
  - Avacados, nuts, extra virgin olive oil, canola oil
- Iron:
  - Iron deficiency associated with higher injury rates
  - Lean red meats, lean pork, poultry, beans, dark green vegetables, dried fruits, pastas
- Bone Healing:
  - Vitamin D, calcium
  - Milk, yogurt, soy, rice, orange juice
- Vitamins and Minerals:
  - Tissue repair, antioxidants
  - Vit. A, C, E, zinc



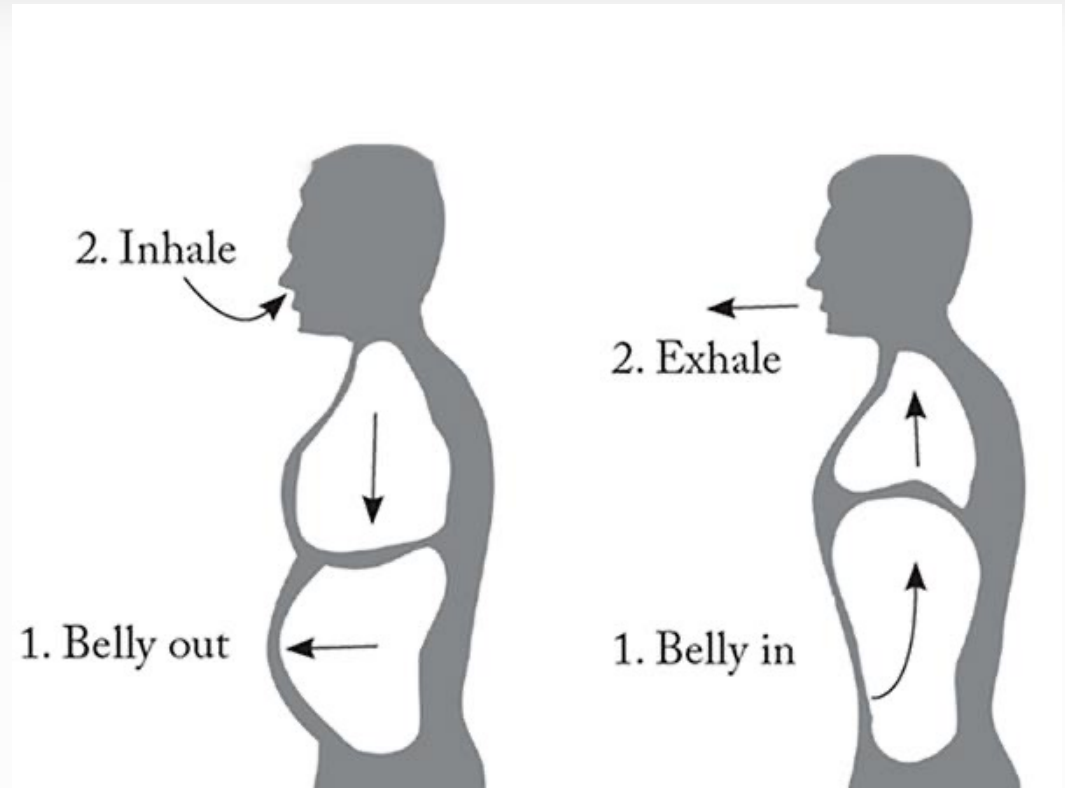
# Coping Strategies – Cognitive

- Positive self talk
- Thought stopping
- Imagery
- Mindfulness



# Coping Strategies – Physical

- Relaxation
  - Deep breathing training
  - Progressive muscle relaxation
  - Biofeedback training



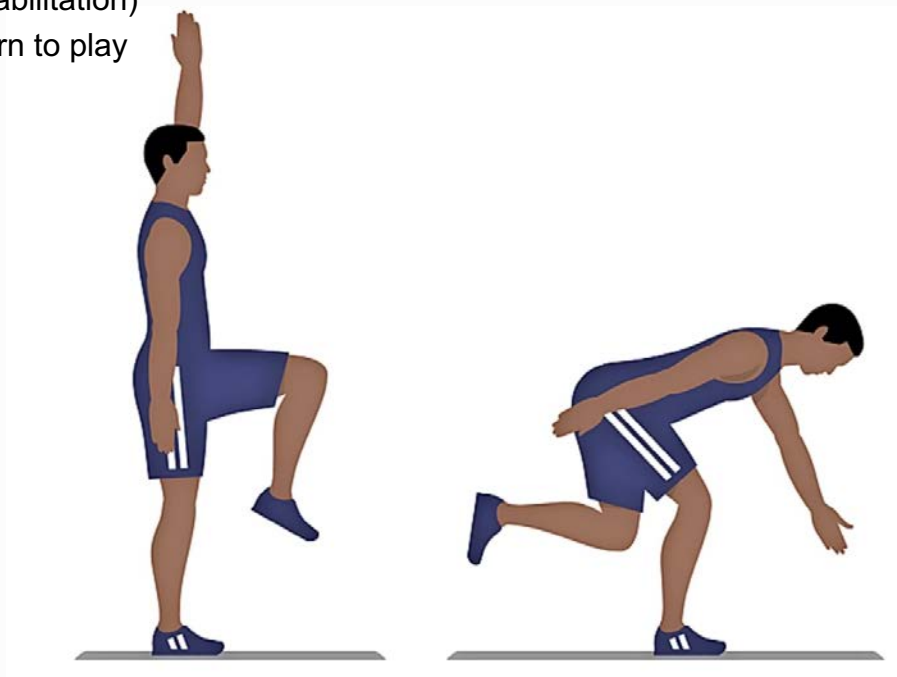
# Coping Strategies - Behavioral

- Goal setting
  - “SMARTER”
  - Maintenance of skills and flexibility > developing new skills



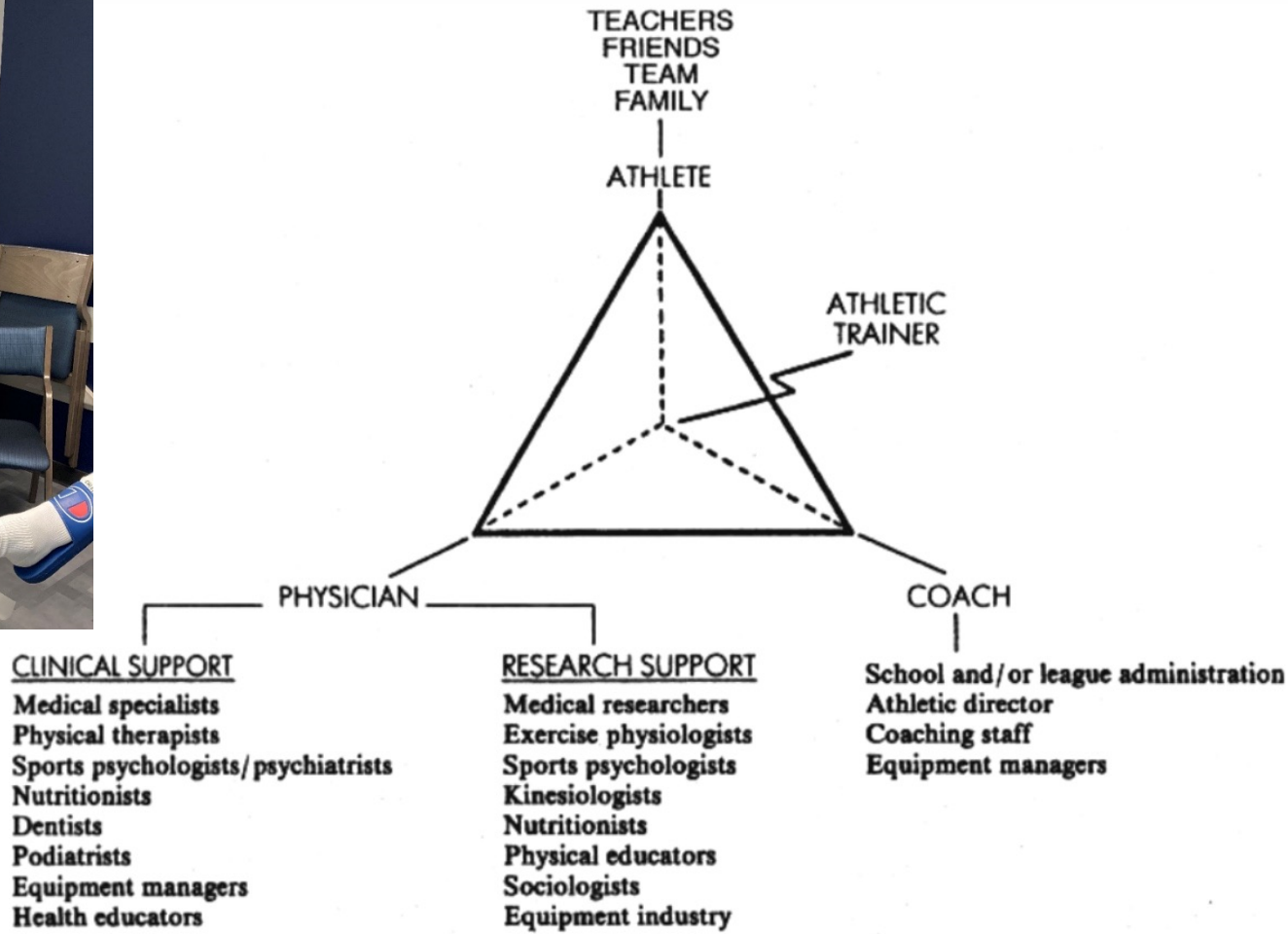
# Return to Sport After Injury

- Physical readiness:
  - Physically being able to return to sport after completion of:
    - Treatment (surgery, immobilization, relative rest, rehabilitation)
    - Progressive return to play
- Psychological readiness:
  - Confidence to return
  - Motivation to get back to pre-injury level
  - Realistic expectations





# Multidisciplinary Approach



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## **KAREN D. COGAN**

### **Sport Psychologist for Acrobat and Combat Sports**

Dr. Karen Cogan is a licensed psychologist and certified consultant, AASP and currently serves as the sport psychologist for acrobat and combat sports at the United States Olympic Committee. In her current role, she consults with athletes and teams, including the U.S. Freestyle Moguls Ski team and the U.S. Taekwondo Team. She has attended four Olympic Games (2002, 2006, 2008, and 2012) as the sport psychology consultant for several Olympic medalists and their coaches.

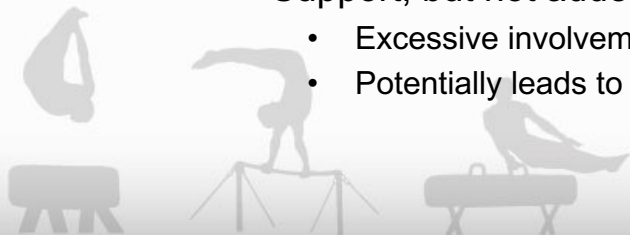
In 2000, she published her first book, *Sport Psychology Library: Gymnastics*, and her work has appeared in sport related journals.

She is a member of the American Psychological Association, where she has served as the secretary treasurer and council representative for the Exercise and Sport Psychology Division 47 of APA. She also is a member of the Association for Applied Sport Psychology, where she has served on the executive board.



# Social Support

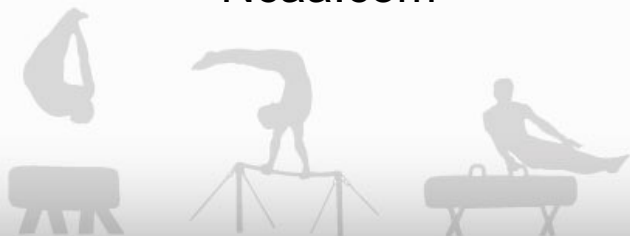
- What can YOU do as a parent/coach?
  - Emotional support
    - Self esteem
    - Listening
    - Encouragement
    - Empathy
  - Tangible support
    - Driving to practice, appointments, etc.
    - Providing nutrition
    - Financial support (lessons, equipment)
- What to avoid
  - Blaming child for mistakes
  - Comparing to teammates
  - Expressing disappointment in performance
- Delicate balance...
  - Support, but not added pressure
    - Excessive involvement perceived negatively
    - Potentially leads to added stress



# Benefits of Youth Gymnastics

Physical Fitness	Self esteem
Teamwork	Resilience
Leadership	Growth mindset
Time management	Bone health
Peer interaction/Social development	Cognitive development

Ncaa.com



# Thank You!



**David Kruse, MD**  
*Medical Director, USA  
Gymnastics*



**Kim Krantz, PT, DScPT, SCS, FACHE**  
*Chief of Athlete Health and Wellness*



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