WWSAC Sports Science Panel
Kim Hornbeck, MD
Annie Weiss MS, RD, CD
Mick Collins, PT, DPT
Evolution of the Pediatric Athlete

- Nearly 60 million youth between ages 6-18yo participated in organized athletics in 2008
- Up from 52 million in 2000
- Concurrent drop in school-based PE
- Sports environment centered on development of specific skills (pitching, tumbling, dribbling etc.) rather than a core foundation of physical principles (flexibility, endurance, balance)
Reasons for Participation in Sports

• Fun!
• Improve coordination and athletic skills
• Improve self esteem
• To stay fit
• Social interaction
• Life skills
Fitness Benefits of Participation in Sports

• Improves:
  – Cardiorespiratory endurance
  – Muscular strength and power
  – Muscular endurance
  – Flexibility
  – Coordination, agility and balance
  – Body composition
  – Bone mass
When are kids ready to participate in sports?

• Multi-faceted question based on whether kids are ready:
  – Physically
  – Emotionally
  – Mentally
  – Fitness Defined
Sports Readiness by Age

• Pre-school (age 3-5)
  – Increased level of difficulty can lead to frustration
  – Very ego-centric
  – Developmental focus should be on:
    • Activities requiring varied movement (skipping, running) on different surfaces
    • Activities that challenge postural control and balance (hopscotch)
    • Activities that require different forms of body control (tumbling and turning)
Sports Readiness by Age

• Middle childhood (age 6-11)
  – Balance improves with better integration of visual, vestibular and proprioceptive input
  – Begin to form body image
  – Males begin to separate from females with regards to strength and power
  – Developmental tasks should focus on:
    • Perceptual motor skills
    • Decision making skills
    • Problem solving skills
  – AAP recommends age 6 to begin team sports
Sports Readiness by Age

• Adolescents (age 12-18)
  – Effects of puberty
  – Growth spurt with subsequent adjustments to new body dimensions
  – Developmental tasks should include:
    • Adjusting to physical change
    • Improving basic skill
Culture of Youth Sports

• Shift in youth sports culture where definition of success is tied to attainment of “elite” status instead of participation as foundation for healthy lifestyle

• Push driven by coaches and parents who have eyes on college scholarships and professional contracts
Single Sport Specialization

- Alone not a problem
- Rather the intensive year round training in a single sport at the exclusion of other sports causes issues.
- Subjects body to same, repetitive microtrauma and overuse
- Highly emphasized in media with focus on athletic prodigies
- Unfortunately the desire to specialize early is flawed on multiple fronts
Soccer as a Specialist Sport

• Soccer is considered to be a specialized sport
• Polls of NCAA and High School athletes all rank soccer highly as sports that athletes specialized in prior to age 12
NCAA Sport Specialization

**KEEPING SCORE**

Trends in sport specialization by age 12 appear to be similar across all divisions. These sports are the exceptions:

- **MEN'S SPORTS**
  - Basketball: 39%, 39%, 36%
  - Tennis: 56%, 56%, 25%
  - Golf: 23%, 20%, 12%
  - Baseball: 32%, 44%, 37%
  - Lacrosse: 12%, 32%, 19%

- **WOMEN'S SPORTS**
  - Basketball: 55%, 43%, 25%
  - Tennis: 72%, 57%, 28%
  - Golf: 27%, 22%, 16%

NCAA women are slightly more likely to have specialized in their sport by age 12.

**ONE SPORT BY AGE 12**

- **Across all three divisions by sport, the percentage of female college athletes who specialized in their sport by age 12. (Top 10 sports listed.)**
  - Gymnastics: 88%
  - Soccer: 61%
  - Ice Hockey: 57%
  - Swimming: 53%
  - Tennis: 49%
  - Basketball: 44%
  - Softball: 44%
  - Volleyball: 23%
  - Golf: 22%
  - Lacrosse: 18%

- **Across all three divisions by sport, the percentage of male college athletes who specialized in their sport by age 12. (Top 10 sports listed.)**
  - Soccer: 63%
  - Ice Hockey: 59%
  - Tennis: 45%
  - Basketball: 40%
  - Baseball: 37%
  - Swimming: 35%
  - Football: 30%
  - Golf: 28%
  - Wrestling: 24%
  - Lacrosse: 20%

At least 90 percent of female college athletes say they started competing in these sports by age 9:
- Gymnastics 95%
- Soccer 94%
- Softball 90%
- Ice Hockey 90%

At least 90 percent of male college athletes say they started competing in these sports by age 9:
- Ice Hockey 97%
- Soccer 96%
- Golf 92%
High School Sport Specialization

Sport specialization in female athletes

Of the 768 female athletes who played a certain sport, the following proportions reported “specializing” in that sport, defined as significantly sacrificing time with friends and family or participation in other sports. Overall, 41.2 percent of female athletes said they had a primary sport in which they focused their attention and training.

- Soccer: 38.2% specialized
- Softball: 23%
- Basketball: 18.7%
- Gymnastics: 15.8%
- Tennis: 16.7%
- Track: 3.5%
- Volleyball: 24.7%

Source: University of Wisconsin School of Medicine and Public Health
JACOB BOGAGE/ THE WASHINGTON POST
High School Sport Specialization

Sport specialization in male athletes

Fewer than 30 percent of the 757 male athletes surveyed reported “specializing” in that sport, defined as significantly sacrificing time with friends and family or participation in other sports. Of the male respondents who reported playing a sport, the following percentages specialized in that sport.

<table>
<thead>
<tr>
<th>Sport</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseball</td>
<td>9.4%</td>
</tr>
<tr>
<td>Basketball</td>
<td>19.2%</td>
</tr>
<tr>
<td>Football</td>
<td>9.6%</td>
</tr>
<tr>
<td>Soccer</td>
<td>38.4%</td>
</tr>
<tr>
<td>Tennis</td>
<td>36.8%</td>
</tr>
<tr>
<td>Track</td>
<td>1.9%</td>
</tr>
<tr>
<td>Wrestling</td>
<td>12.8%</td>
</tr>
</tbody>
</table>

Source: University of Wisconsin School of Medicine and Public Health
JACOB BOGAGE/THE WASHINGTON POST
Multi Sport Participation

- Fransen et al (2012) – 735 boys, 10-12yo
  - Multi sport athletes performed better on standing broad jump and gross motor coordination than single sport athletes
- DiFiori (2002) – cohort of D1 athletes
  - Found that 88% had participated in 2-3 sports as children, with majority (70%) not specializing until 12yo
  - Found that athletes who spend more hours per week playing their sport than their age are 70% more likely to experience a severe injury
Overtraining

• No scientifically determined guidelines on how much is too much, what is physically beneficial vs. physically harmful
• Rose et al found a direct correlation of injury risk with increased weekly hours of sports participation
• Injuries in pediatric population are more common during peak growth velocity
• More likely if underlying biomechanical problems are present or if training regimen is not varied
Burnout

• Series of psychological, physiologic, and hormonal changes that result in decreased sports performance.
• Defined by Smith as a response to chronic stress when a previously enjoyable activity is no longer so.
• Common manifestations:
  • Chronic muscle/joint pain
  • Personality changes
  • Elevated resting HR
  • Decreased sports performance
  • Fatigue
  • Lack of enthusiasm
AAP Recommendations

• Limit 1 sporting activity to a maximum of 5 days per week with at least 1 day off from any organized physical activity
• Athletes should have at least 2-3 months off per year from their particular sport
• Participate on only 1 team during a season
• Weekly training time, number of reps, or total distance should not increase by more than 10% each week

http://pediatrics.aappublications.org/content/138/3/e20162148

http://pediatrics.aappublications.org/content/119/6/1242
In Summary

SPORTS SPECIALIZATION AND INTENSIVE TRAINING IN YOUNG ATHLETES

Benefits of Youth Sports
- Leadership
- Fun
- Self-esteem
- Teamwork
- Physical activity skills
- Peer socialization

By the Numbers
- As many as 70% discontinue playing organized sports by age 13
- Only 1% high school athletes who receive any scholarships
- Between 3-11% high school athletes compete at the college level
- At least 50% athletic injuries related to overuse
- Between only .03-.5% high school athletes reach professional level sports

Guidance
- Recovery
  - Taking 1 month off from a sport at least 3 times per year allows for physical and psychological recovery
- Injury Prevention
  - Having at least 1-2 days off per week from a sport can decrease the chance for injuries
- Early Diversification & Later Specialization
  - Providing a greater chance of lifetime sports involvement, lifetime physical fitness, and possibly elite participation
- Primary Focus
  - Learn lifelong physical activity skills and have fun
- Play a Variety of Sports
  - Participating in multiple sports decreases the chance of injury, stress, and burnout
- Specialization
  - Delaying specializing in a single sport until late adolescence may lead to a higher chance of accomplishing athletic goals

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Warm-up Program

• Components
  • Dynamic stretch
  • Muscle activation
  • Strength, plyometrics and balance
  • Can include technical exercises

http://www.soccercoachingpro.com/soccer-warm-up-drills/

http://competitorspot.com/soccer-warm-up-guide/
Dynamic Warm-Up

• Typically includes:
  • Dynamic stretching
  • Agility and plyometric activities
  • Specific motor pattern movements
• Prepares body for competition by:
  • Improving core and muscle temperature
  • Enhancing nervous system function
  • Using similar movement patterns
Why Dynamic?

• More appropriate for preparing the body acutely for competition, reducing injury risk and improving performance when compared with static stretching
• Has been shown to improve hamstring flexibility and quadriceps strength
• Can be performed appropriately within 15mins timeframe
• Allows incorporation of technical warm-up components
Static stretching

- **Increases flexibility long term**, which will maintain healthy tissue length
- Has not been shown, when performed immediately before activity, to significantly reduce injury rates
- Static hamstring stretching shown to be detrimental to hamstring:quad ratio, thus potentially increasing risk for LE injury
- Static stretching shown to acutely impair the following performance measures: strength, power, balance, and performance time
FIFA 11+

• Warm-up and injury prevention program developed to lower injury risk
• Females aged 13-17
  – 1055 experimental, 837 control, 1892 total
• Players with higher compliance had significantly lower injury risk than those with intermediate compliance

http://www.yrsa.ca/pdf/Fifa11/11plus_workbook_e.pdf
**The 11+**

**PART 1  RUNNING EXERCISES • 8 MINUTES**

1. **RUNNING STRAIGHT AHEAD**
2. **RUNNING HOP CUT**
3. **RUNNING CIRCLING PARTNER**
4. **RUNNING HIP CONTACT**
5. **RUNNING QUICK FORWARDS & BACKWARDS**

**PART 2  STRENGTH • Plyometrics • Balance • 10 MINUTES**

1. **THE BENCH STATIC**
2. **THE BENCH ALTERNATE LEGS**
3. **ONE LEG LIFT AND HOLD**
4. **SIDEWAYS BENCH RAISE & LOWER HIP**
5. **SIDEWAYS BENCH WITH LEG LIFT**
6. **HAMSTRING BEGINNER**
7. **HAMSTRING INTERMEDIATE**
8. **HAMSTRING ADVANCED**
9. **SINGLE-LEG STANCE HOLD THE BALL**
10. **SINGLE-LEG STANCE THROWING BALL WITH PARTNER**
11. **SINGLE-LEG STANCE TEST YOUR PARTNER**
12. **SQUAT WITH TOE RAISE**
13. **SQUAT WALKING LUNGES**
14. **SQUAT ONE-LEG SQUATS**
15. **JUMPING VERTICAL JUMPS**
16. **JUMPING LATERAL JUMPS**
17. **JUMPING BOX JUMPS**

**PART 3  RUNNING EXERCISES • 2 MINUTES**

1. **RUNNING ACROSS THE PITCH**
2. **RUNNING REVERSING**
3. **RUNNING PLANT & CUT**

**Knee Position**

- **Correct**
- **Incorrect**

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FIFA 11+ Kids

- Studies found improved physical performance in just 4 weeks compared with traditional warmup
- Decreased injury risk and decreased associated healthcare costs for participants

**Exercise 1: Jog & Look at the Coach (to stop)**
- 3×5 stop commands
- 3×6 stop commands
- 3×5 stop commands
- 3×5 stop commands
- 3×5 stop commands

- Listen to the command
- Watch for the command
- Keep the ball in the hands and listen to the command
- Keep the ball in the hands and watch for the command
- Juggle the ball and listen to the command

**Exercise 2: Skating Hop**
- 2x10 hops (5 on each leg)
- 2x10 hops (5 on each leg)
- 2x10 hops (5 on each leg)
- 2x10 hops (5 on each leg)
- 2x10 hops (5 on each leg)

- Practice how to land on one leg
- Keep the ball in the hand
- Balance the ball on one hand
- Touch the ground with the ball
- Balance and stretch forward with the ball

**Exercise 3: One Leg Stance**
- 1x right/left and 5 assists per player
- 1x right/left and 5 assists per player
- 1x right/left and 5 assists per player
- 1x right/left and 5 assists per player
- 1x right/left for ca. 20 seconds

- Throw the ball
- Circle the ball around the leg & throw it
- Pass the ball
- Throw the ball & play it back
- Challenge your balance

**Exercise 4: Push Up**
- 2x, until each kid rolls 1x the ball (max. 8 kids)
- 3x at 10 seconds
- 3x at 10 seconds
- 3x at 10 seconds
- 3x at 10 seconds

- Make a tunnel & roll the ball underneath
- In a plant position & roll the lower legs on the ball
- Keep position & roll the ball between hands
- Keep position & roll the ball between hands and feet
- Hands on the ball & challenge your position

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School Based Injury Prevention Program


• A neuromuscular training program in junior high schools (11-15yo, n=725) successful in reducing sport related injury and improving measures in adiposity and fitness
INJURY PREVENTION WARM-UP PROGRAM

AEROBIC COMPONENTS

1. FORWARD RUN - 2 laps around the gym. Hop and high knee as far as possible.
2. FORWARD RUNNING, WITH SKIPPING - Knees aligned over the ankles, and tightly bending on knees.
3. FORWARD RUNNING, WITH KNEE LIFTS - Leaning tightly on the hands with correct alignment of the knees over the ankles on landing, and not allowing the knees to buckle inward.
4. FORWARD RUNNING, WITH HEEL KICKS - Alternating heel kicks with each foot.
5. SIDEWAY SHUFFLES - Knees over the ankles, not allowing the knees to buckle inward.
6. ZIGZAG RUNNING - Correct alignment over the center of the body on takeoff, trying to land with equal weight on both feet.
7. FORWARD RUNNING WITH INTERMITTENT STOPS - Starts with correct alignment over the ankles.
8. SPEED RUNS - Maintaining correct running form and using breath.
9. JUMPING - Two-legged squat jumps off the toes. Touch down feet off the toes, and knees are straight. Flex the knees 3 times and progress to 10 repetitions, progress by increasing the position closer to the goal.
10. PLANK - Plank on elbows. Hands off the ground, and alternate leg lifts.
11. SIDE PLANK - Plank on elbows. Alternate leg lifts and reaching.
12. HAMSTRINGS - Squat and move the hand to the knee. Slowly lower the hand and move the leg back. Repeat.
13. LUNGEs - Static jumps. Front foot to a 90-degree angle. Focus should be on landing all 3 points of the foot. Jump back and repeat.
14. WOBBLE BOARD - 1) Two-foot balance. Stand with both feet on the wobble board. Body weight should be centered. 2) One-foot balance. Stand on one foot and repeat.
15. BALANCE PAD - 1) Single leg balance. Stand on one foot, with the legs extended and feet shoulder-width apart.

STRENGTHENING COMPONENTS

16. INNER LEG STRENGTH - Stand on one leg. Alternate leg lifts.
17. LEG KICKS - Alternate leg kicks with each foot.
18. LEG CIRCLES - Alternate leg circles with each leg.
19. LEG STRETCHES - Alternate leg stretches with each leg.
20. ARM STRENGTH - Alternate arm lifts with each arm.
21. ARM STRETCHES - Alternate arm stretches with each arm.
22. CORE STRENGTH - Alternate core lifts with each arm.
23. CORE STRETCHES - Alternate core stretches with each arm.
24. FULL BODY STRETCHES - Alternate full body stretches with each arm.

BALANCE COMPONENTS

25. EYES OPEN - One-foot balance.
26. EYES CLOSED - One-foot balance.
27. EYES CLOSED - Two-foot balance.
29. EYES CLOSED - Three-foot balance.
30. EYES OPEN - Three-foot balance.
31. EYES CLOSED - Four-foot balance.
32. EYES OPEN - Four-foot balance.
33. EYES CLOSED - Full body balance.
34. EYES OPEN - Full body balance.
35. EYES CLOSED - Full body balance.
36. EYES OPEN - Full body balance.
37. EYES CLOSED - Full body balance.
Dynamic stretches

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Muscle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee hug</td>
<td>Hip extensors</td>
</tr>
<tr>
<td>Quad pull</td>
<td>Quadriceps, hip flexor</td>
</tr>
<tr>
<td>Kick outs</td>
<td>Hamstring</td>
</tr>
<tr>
<td>Heel toe walks</td>
<td>Anterior tibialis</td>
</tr>
<tr>
<td>Walking calf</td>
<td>Gastrocnemius</td>
</tr>
<tr>
<td>Over/under gate</td>
<td>Groin</td>
</tr>
<tr>
<td>Balanced gluteal</td>
<td>Piriformis, gluteals</td>
</tr>
<tr>
<td>Inch worm</td>
<td>Gastrocnemius, hamstring</td>
</tr>
</tbody>
</table>
# Muscle Activation

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Exercise</th>
</tr>
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<tbody>
<tr>
<td>Hip matrix</td>
<td>Spiderman</td>
</tr>
<tr>
<td>Ankle matrix</td>
<td>Forward run</td>
</tr>
<tr>
<td>Lunge with rotation</td>
<td>Backward run</td>
</tr>
<tr>
<td>Lunge with lean</td>
<td>Shuffle forward</td>
</tr>
<tr>
<td>Side shuffle with squat</td>
<td>Shuffle backward</td>
</tr>
<tr>
<td>Carioca</td>
<td>Butt kicks</td>
</tr>
<tr>
<td>Walking RDLs</td>
<td>High knees</td>
</tr>
<tr>
<td>Quick skip</td>
<td>Bounds</td>
</tr>
<tr>
<td>Power skip</td>
<td>Hop-scotch</td>
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</tbody>
</table>
# Strength, plyometrics, balance

<table>
<thead>
<tr>
<th>Core strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bench (front plank)</td>
</tr>
<tr>
<td>Bench alternating legs</td>
</tr>
<tr>
<td>Bench one leg lift and hold</td>
</tr>
<tr>
<td>Sideways bench (side plank)</td>
</tr>
<tr>
<td>Sideways bench with hip raise</td>
</tr>
<tr>
<td>Sideways bench with leg lift</td>
</tr>
<tr>
<td>Russian hamstrings</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hip strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squats with toe raise</td>
</tr>
<tr>
<td>Squats walking lunges</td>
</tr>
<tr>
<td>SL squats</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL stance hold ball</td>
</tr>
<tr>
<td>SL stance throw ball to partner</td>
</tr>
<tr>
<td>SL stance with partner test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plyometrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL vertical jumps</td>
</tr>
<tr>
<td>SL lateral jumps</td>
</tr>
<tr>
<td>DL cross jumps</td>
</tr>
</tbody>
</table>
Cool Down

• Components
  • Gradually reducing intensity cardio
    • Skips, light jog, arm swings
  • Dynamic stretches
  • Static stretching
    • Hamstrings, quads, gastroc, hip flexors, hip adductors, piriformis, IT band
Sample Practice Warm Up

• 10-15mins in length
• Can be incorporated into technical work with ball
• Should follow theme of session
• Vary setups to keep it fresh and engaging
• Example
  – Grid 20 x 20, each player with a ball
  – Dribbling in a crowd, with skills/turns
  – Pause every 1-2mins to incorporate dynamic stretch, strength, balance or plyometrics
Sample Game Warm Up - Soccer

- 30-35mins in length total
  - *Have team arrive 45mins before to prep
- 10mins of dynamic stretches, muscle activation without ball
  - Two lines of players, 3 cones
- 7-8mins technical component
  - Passing patterns, dribbling activity
- 7mins working on transition games
  - Three team possession drill
- 5mins on functional or position specific drills
  - Attackers and GKS – crossing and finishing
  - Defenders – swinging ball across back line, shifting through pressure, cover, balance scenarios
- 3mins quick feet, agility, fast twitch muscle activation
  - Sprints, in and out of cones, back/forth over lines
Periodization

• What is periodization?
  – Periodization is the systematic planning of athletic or physical training
  – The aim is to reach the best possible performance in the most important competitions of the year
  – It involves progressive cycling of various aspects of a training program during a specific period

https://sportmedbc.com/article/periodization-phases-success
Periodization

• Preparation Phase
  – General: high volume, low intensity, low technique (e.g. running program for base fitness)
  – Specific: decreasing volume, increasing intensity, increasing technique (adding in interval or sprint training, technical work)

• Competition Phase
  – Low volume, high intensity, high technique

• Transition Phase
  – Decreasing volume, decreasing intensity (e.g. cross training, off-season strength program)

Thank You!

Mick Collins, PT, DPT
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CHW Central Scheduling (for PT)
414-607-5280
More of this, Less of that
1190 athletes (7-18 yrs)
  - 822 injured, 368 uninjured

Injured athletes
  - Reported more total hours of physical activity
  - Reported more hours of organized sports activity

Sports-specialized training was an independent risk for injury

Young athletes participating in more hours of sports per week than number of age = 2x higher risk of injury
Too Much, Too Soon

- Study of 2721 HS athletes (Jayanthi et al. 2013)
  - Linear relationship between hrs sport participation and risk of injury
  - Training volume >16 hours per week = increased risk of injury

- Early sport-specialization
  - Earlier retirement from sport
  - Decreased chance of reaching elite status
    - D1 NCAA athletes more likely to have been multi-sport athletes in HS
    - Of 322 athletes invited to 2015 NFL Combine, 87% played multiple sports in HS
  - Children who specialize early may not develop optimal neuromuscular patterns
    - Skill transfer with sport diversification

Figure 1. Relationship of injury to exposure hours in high school athletes.
Kids ≠ Little Adults

- Physes (growth plates), apophyses & articular cartilage less resistant to tensile, shear & compressive forces
- Lower bone mineral density
- Lack of muscle mass
- Increased joint hypermobility
- Imbalances in growth and strength

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Pelvic/Hip Apophysitis

- Hip/buttock pain that is worse with activity
- Acute or chronic
- Misdiagnosed as muscle strain
Pelvic/Hip Avulsion Fx

- Forceful contraction or elongation
  - Sprinting, kicking, leaps, splits

- 80% sports related, boys>girls

- Painful “pop” in hip or buttock

- Limp, difficulty walking

- +/- swelling/bruising
Not “just a sprain”

- Open growth plate = more likely to fracture
ACL injuries

• Most sport-related

• National High School Sports-Related Injury Surveillance Data:
  – Highest rates:
    • girls’ soccer
    • boys’ football

• Higher rates in girls (2-8x)

• Non-contact > contact
Why Females?

- Hormonal factors
- Anatomy:
  - Smaller intercondylar notch
  - Smaller ACL
- Higher incidence of:
  - Ligamentous laxity
  - Knee valgus
  - Femoral anteversion
Poor mechanics

- Decreased activation of hamstrings
- Decreased hip/knee flexion
- Increased dynamic knee valgus
ACL Injury Prevention

• Bracing
  – Insufficient evidence re: risk reduction
  – May decrease risk of MCL injuries in certain groups collegiate players

• Neuromuscular training programs
  – Multiple studies demonstrate effectiveness
  – Greatest reduction of injury risk in females 14-18 yrs
    • 72% risk reduction <18yrs
    • 16% risk reduction >18yrs

➢ http://www.aap.org/cosmf
Female Athlete Triad

Nattiv et al. 2007, ACSM Female Athlete Triad Position Stand
Low Energy Availability

– Unintentional
  - Increasing training without increasing intake
  - Eating low calorie foods
  - “Forgetting” to eat or being “too busy” to eat

– Intentional
  - Disordered eating
  - Eating disorders
    – Anorexia
    – Bulimia
Recognition

- Eating habits
- Obsessions
- Weight loss
- Fatigue
- Mood changes
- Decreased performance (athletic/academic)
- Change in menses
- Stress fractures or other injuries
The Effect of Lace-up Ankle Braces on Injury Rates in High School Football Players
Timothy A. McGuine, Scott Hetzel, John Wilson and Alison Brooks

• RCT 1460 athletes, 46 high schools
• Use of lace-up ankle brace
  – 68% decrease in ankle injuries in those with no hx
  – 60% decrease in ankle injuries in those with hx
  – No effect on injury severity

The Effect of Lace-up Ankle Braces on Injury Rates in High School Basketball Players
Timothy A. McGuine, Alison Brooks and Scott Hetzel

• RCT 2081 athletes, 50 high schools
• Use of lace-up ankle brace:
  – 57% decrease in ankle injuries in those with no hx
  – 70% decrease in ankle injuries in those with hx
  – No effect on injury severity
Ankle Injury Prevention Programs for Soccer Athletes Are Protective
A Level-I Meta-Analysis

Nathan L. Grimm, MD, John C. Jacobs Jr., BS, Jaewhan Kim, PhD, Annunziato Amendola, MD, and Kevin G. Shea, MD

Investigation performed at the Department of Orthopaedic Surgery, Duke University Medical Center, Durham, North Carolina

• 4121 male and female soccer players, children and adults

• Neuromuscular training program = 40% decreased risk of ankle injury

NM program + brace = further reduction?
Concussion

• Girls > boys in gender matched sports
  – Hormonal factors?
  – Decreased neck strength
  – More likely to report

• Girls tend to report more severe symptoms

• Female sex associated with longer recovery time
Summary of Prevention

- One sport, one team per season
  - Multiple sports/teams: avoid “doubling up” on a single day
- 1-2 days of rest from sports per week
- Participate in organized sports training for no more hours per week than their age in years
- 2-3 months rest per year from focused, sport-specific training
  - remain active through free play and cross training activities
- Return to sport gradually - increase training volume and intensity over several weeks.
- Encourage participation in multiple sports, especially at young ages, and delay sport-specialization until late adolescence (exception: early-entry sports)
- No playing through pain or altered mechanics
- Consider pre- and in-season neuromuscular training programs to decrease risk of knee and ankle injuries
- Lace-up ankle brace for those with recurrent ankle sprains and consider bracing prophylactically
Thank You!

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Mequon
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Nutrition for healthy young athletes

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**Female Athlete Triad**

- **Disordered Eating**
  Abnormal eating habits and excessive exercise can keep the body from getting enough nutrients.

- **Menstrual Dysfunction**
  Physical stress, poor nutrition, or low percentage of body fat can lead to changes in hormones that stop menstrual periods.

- **Osteoporosis**
  A halt in the menstrual cycle can interfere with the body’s ability to build bone, which can lead to stress fractures and breaks.

*Source: American Academy of Orthopaedic Surgeons*
Pre-Exercise Eating

• Meal Timing
  • 3-4 hours before exercise

• Meal Composition
  • High in slow-acting CHO & lean protein; low in fiber/fat
  • Right before activity high in fast-acting CHO

• Hydration
  • Rec but not exact: 4 hrs before: 17-20oz water/sports drink
  • Drink NORMAL

• Snack Timing
  • 30-60 minutes before exercise

• Snack Composition
  • High in CHO, moderate in protein, low in fiber/fat
Eating During Exercise

• CHO should be provided for exercise lasting over an hour
• Timing...let’s discuss
• Composition...let’s also discuss

• Hydration
  • Dependant on sweat rate
  • Average: 5-10 oz water every 15-20 min
  • Sports drinks: 6-8% CHO solution
Post-Exercise Eating

• Timing of Recovery
  • Within 30 minutes post-exercise

• Composition
  • 4:1 ratio of fast acting CHO to lean protein
  • Likely 15-25g but let’s discuss

• Meal Timing
  • Then, after recovery, eat ~2 hours after

• Meal Composition
  • High in slow acting CHO and lean protein, low in fiber and fat

• Hydration
  • 16-24 oz water for every lb lost – but we don’t always know this...
But we gotta travel...now what?!

- **Eat all the foods.**
- There is no such thing as a good food or bad food; healthy food or unhealthy food

- So what does that mean...
- Focus on balance and moderation...and for athletes, timing of all foods, not restriction.

- For example...
Why EAT ALL THE FOODS?

• Because of Eating Disorders...I’ve treated athletes with an ED as young as 8 years old.

• Anorexia Nervosa (AN)
• Bulimia Nervosa (BN)
• Binge Eating Disorder (BED)
• Rumination Disorder (self-stimulation)
• ARFID
• Pica
Risk Factors...

• Gender

• Age: Teens & 20’s most common

• Personality, sensitive, impulsive, self-critical, perfectionistic

• Family history/genetics

• Sports- ballet, wrestlers, swim, gymnastics, running, etc.

• Critical sensitizing events (teasing, bullying, trauma etc.)

• Racial group (value of slimness within group)

• Low self esteem

• Traumatic event or significant change

• Family dysfunction

• Fear of maturation

• Relationship issues

• Interest Groups (i.e. modeling) / Social Media; Advertising

• Work/environment problems
For as serious as a kiddo might be about their sport, or even more so their parents and coaches, you have to remember they are still kiddos who suffer in the long run when there is an imbalance of pressure.
As kiddos, they require A LOT OF FOOD.

• Do not EVER tell a kiddo they are eating too much.

• Young athletes need to fulfill energy needs for: growth, athletics, and daily needs for vital organs including the brain and heart.

• Growth for any child is “calorie-hungry” leaving the child athlete with greater demands.

• Short-term weight loss can hurt performance: strength, speed, and stamina typically occur with restricted nutrition and hydration.
A young athlete’s meal plan may look like this:

• **Pre-exercise**: Clif Bar
• **Fueling during**: Large banana with Gatorade
• **Post-exercise breakfast**: 1 cup dry oatmeal with 1 cup milk; drizzling of honey, peanut butter, and a bowl of fresh fruit or raisins to top oats
• **Early lunch**: Turkey sandwich with cheese, Greek yogurt, fresh fruit, 4 fig newton cookies
• **Snack**: Handful of trail mix with milk or fruit yogurt
• **Dinner**: Hamburger on a bun with sweet potato fries (equaling whole sweet potato), steamed broccoli with drizzling of olive oil, and chocolate chip cookie or dish of ice cream
• **Snack**: Graham crackers with peanut butter