



When to Say No.

Is There a Grey Zone Where Should We Be Discouraging Sport Participation?

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Sports Medicine

Hospital for Special Surgery

Disclosures

The logo for HSS (Harvard School of Health Services) is a blue square with the letters "HSS" in white.

I have no relevant financial disclosures for this or any lecture at this conference

The Overall Ethos of Sports Medicine



“We will get you **back to your field of choice** as quickly and safely as possible”

AI – “A Sports Medicine Physician, or Sports Medicine Doctor, is responsible for helping athletes prevent and heal from injuries alongside their athletic training. Their duties include diagnosing musculoskeletal conditions, developing physical therapy plans and giving nutritional advice that suits a highly active lifestyle.”

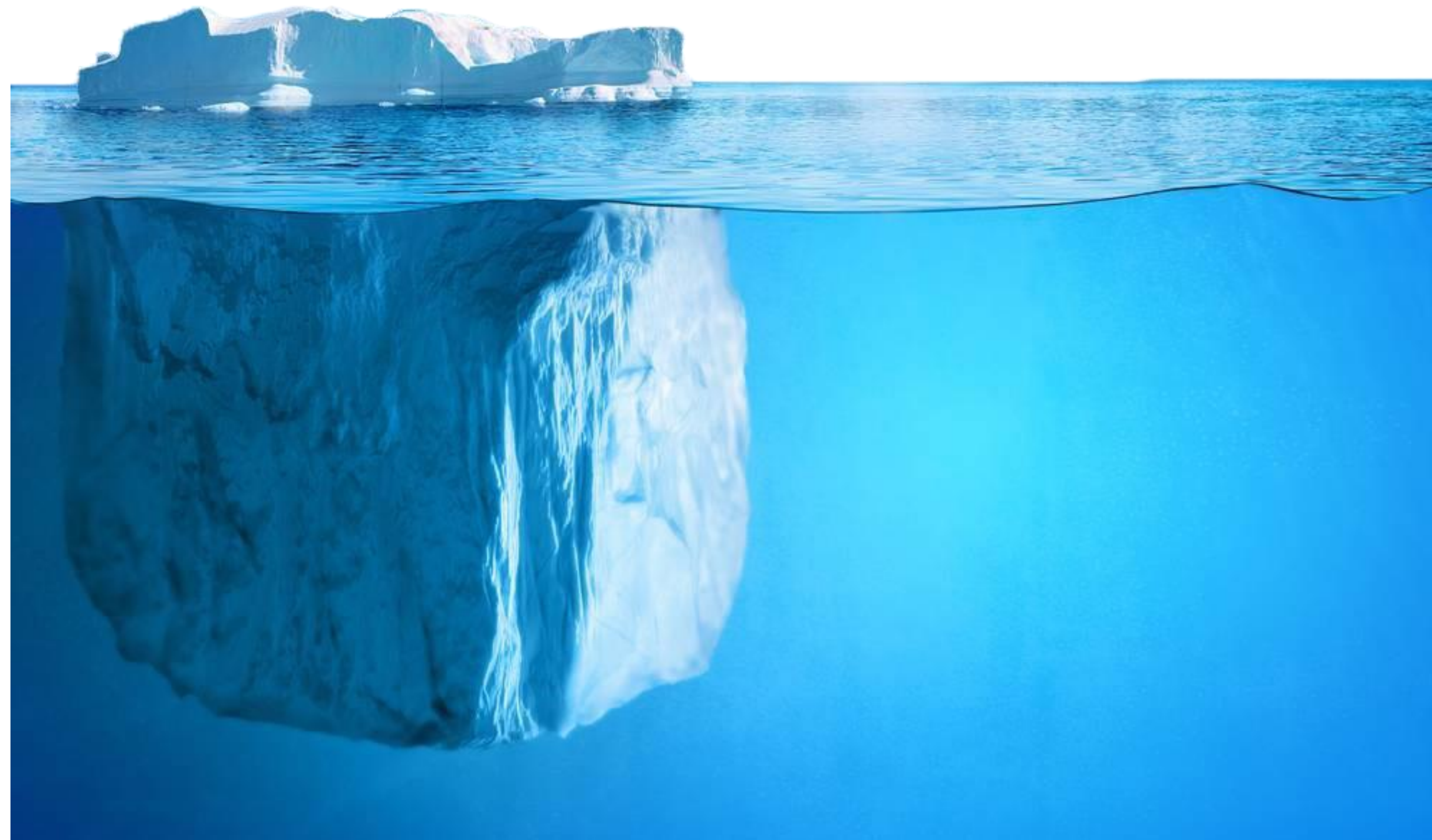
Like all things – a spectrum....

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100% Cleared

100% Held

Grey Area



**Are we
always
doing the
best for
our
patients?**

Sport Disqualification

- Overall – disqualification from sport due to medical condition is exceedingly rare
- .3-.9% of athletes are disqualified from sport due to medical issues annually (Kurowski 2020)
- 3.2% - 7.4% are referred for further testing based on PPE (Kurowski 2020)



Not All Sports Are Created Equal

Collision Sports

1. Football
2. Ice and Field Hockey
3. Soccer
4. Wrestling
5. Basketball
6. Diving
7. Lacrosse
8. Rodeo
9. Ski jumping
10. Water polo
11. Team handball

Limited Contact Sports

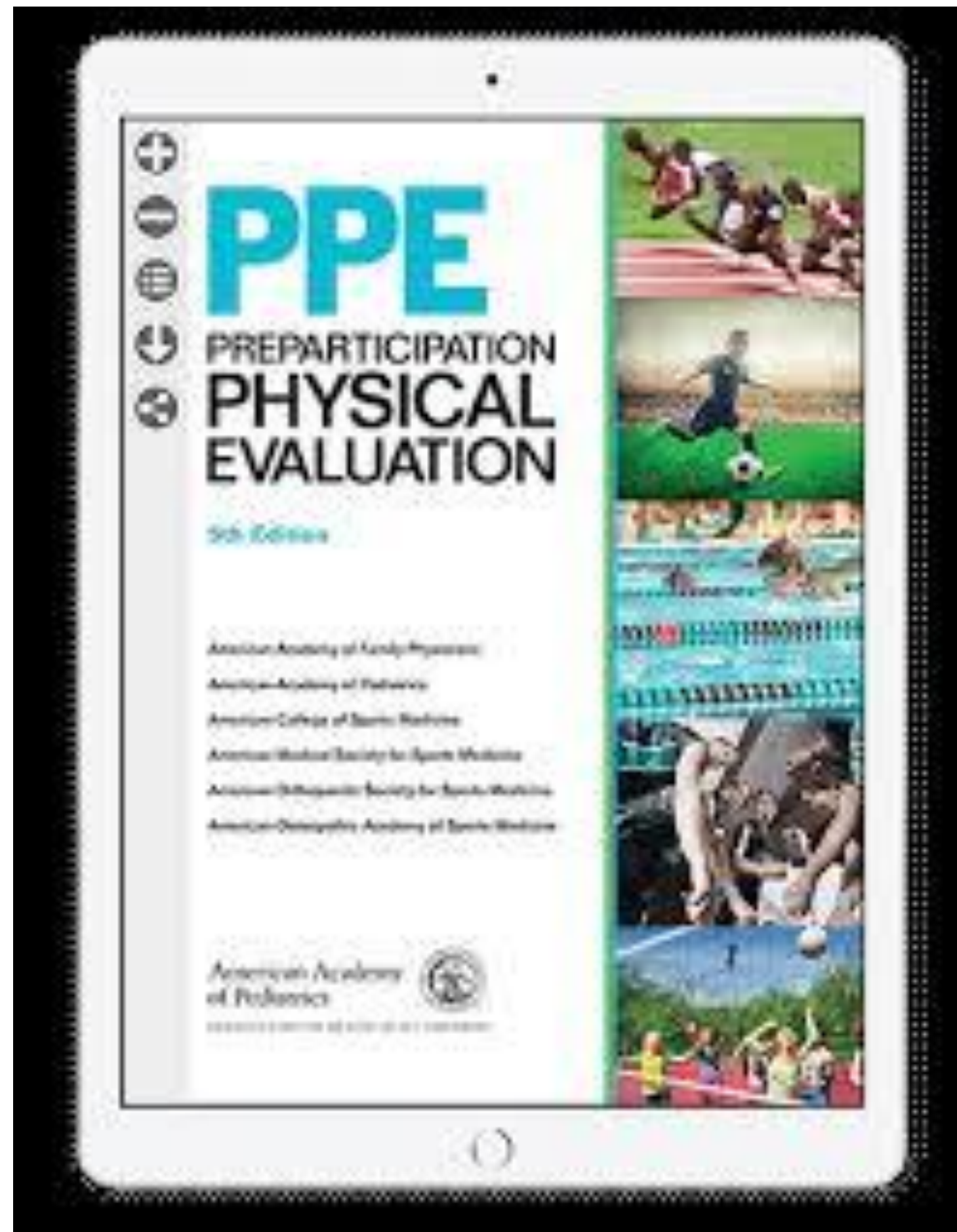
1. Baseball
2. Cheerleading
3. Diving
4. Floor hockey
5. Softball,
6. Gymnastics
7. Field events (High jump, Pole vault)
8. [Skiing](#) (Nordic or Alpine [Skiing](#))
9. Volleyball

Non-Contact/Strenuous

1. Running
2. Rowing
3. Sailing
4. Swimming
5. Tennis,
6. Weight lifting
7. Field events (Shot put, Discus, Javelin)

Things we know: disqualifying factors in sport participation

Preparticipation Screening



Guidelines for pre-sport clearance

Guidelines for pre-sport further testing

Guidelines for pre-sport disqualification

- Overview of the Preparticipation Physical Evaluation
- PPE 5th Edition
 - Medical History
 - Mental Health and Substance Use Screening
 - Physical Exam
- Clearance Limitations and Special Considerations
- Clearance for Special Populations

History of the Preparticipation Physical Evaluation (PPE)

- Long been used to determine medical eligibility for youth sports
- 1st PPE recommendations published in 1992
- No outcomes-based data to support the ability of the PPE to reduce injury or illness
- The content of the PPE has been recommended, debated, and extensively reviewed over the past several decades
- Medical societies recognize the important role the PPE plays in the health care of athletes



PPE 5th Edition

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- Published by the American Academy of Pediatrics in 2019
- The PPE5 is the most comprehensive, up-to-date guidelines on the PPE
- Contains consensus recommendations from multiple stakeholder medical societies:
 - American Academy of Family Physicians
 - American Academy of Pediatrics
 - American College of Sports Medicine
 - American Orthopaedic Society for Sports Medicine
 - American Osteopathic Society for Sports Medicine
 - American Medical Society for Sports Medicine

PREPARTICIPATION PHYSICAL EVALUATION WORKING GROUP AND AUTHORS

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- “A rigorous attempt by the writing group to identify and outline evidence-based and expert opinion principles and practices in the examination and medical eligibility decision”
- Contains new recommendations regarding mental health in athletes
- Also addresses the specific needs of certain groups:
 - Female athletes
 - Transgender athletes

PPE PREPARTICIPATION PHYSICAL EVALUATION

5th Edition

Editors

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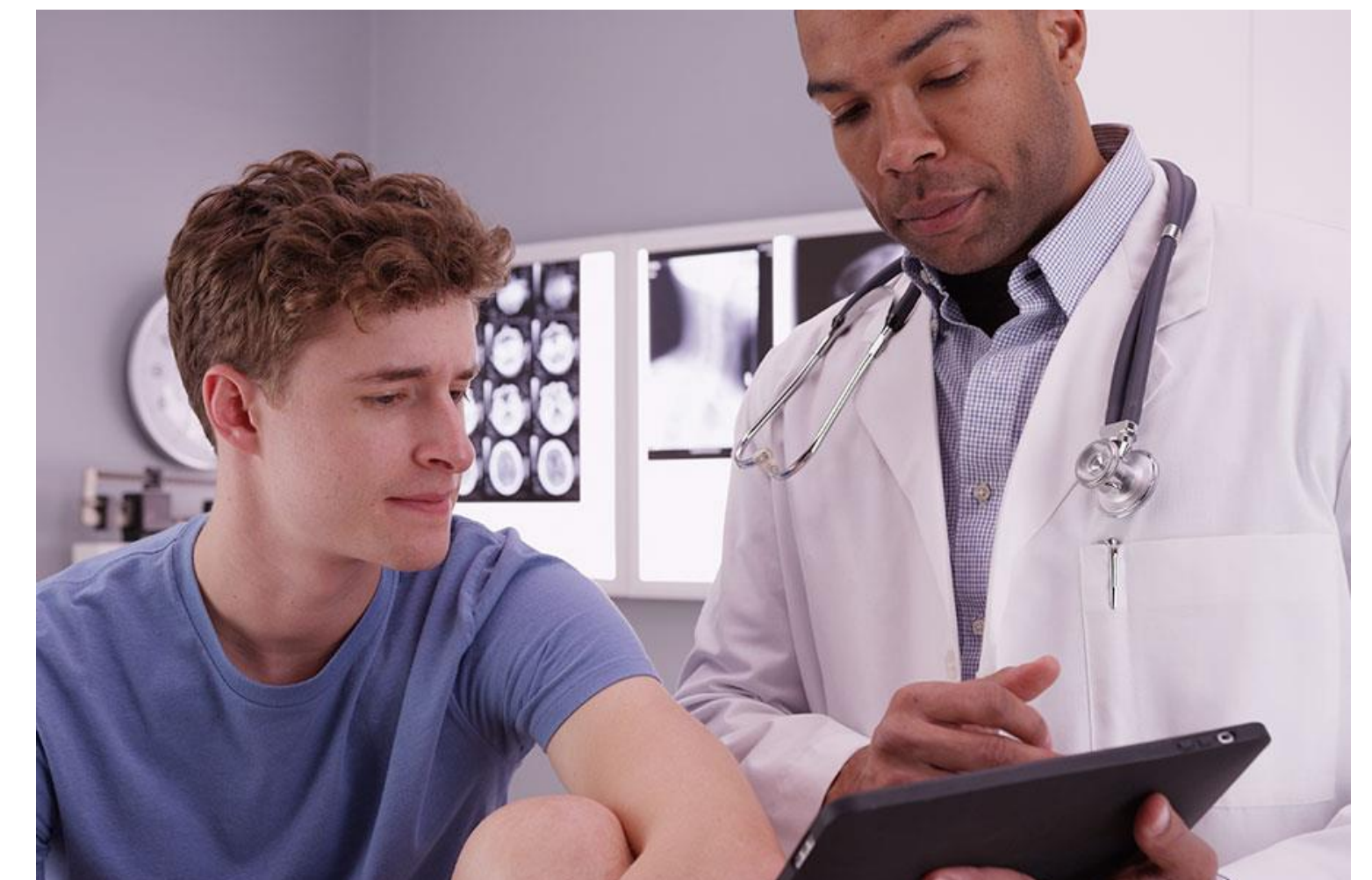
American Academy
of Pediatrics



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PPE Goals

1. Determine general physical and psychological health
2. Evaluate for life-threatening or disabling conditions
3. Evaluate for conditions predisposing to injury or illness
4. Provide an opportunity for discussion of health and lifestyle issues
5. Serve as an entry point into a health care system for adolescents without a health care or medical home



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Setting and Timing of the PPE

- PCP in the setting of the primary medical home:
 - Has access to medical records
 - Can adjust treatment of chronic medical conditions
 - Can incorporate the exam into routine health supervision examinations
- Performed well in advance (~6 weeks) of preseason practice to allow time to evaluate, treat, or rehab any problem identified

Physical Examination – Cardiovascular Exam

- The AHA recommends that the PPE includes:
 - Auscultation for heart murmurs
 - Palpation of femoral pulses to exclude coarctation of the aorta
 - Examination for the physical stigmata of Marfan syndrome
 - Brachial artery BP taken in the sitting position



Physical Examination – Cardiovascular Exam

Auscultation for Heart Murmurs



Physical examination

- 11. Heart murmur‡
- 12. Femoral pulses to exclude aortic coarctation
- 13. Physical stigmata of Marfan syndrome
- 14. Brachial artery blood pressure (sitting position)§

‡ Refers to heart murmurs judged likely to be organic and unlikely to be innocent; auscultation should be performed with the patient in **both the supine and standing positions (or with Valsalva maneuver)**, specifically to identify murmurs of dynamic left ventricular outflow tract obstruction

Table 6A-5. Significance of Abnormal Heart Murmurs

Auscultatory Finding	Significance
<ul style="list-style-type: none">Harsh, loud (usually ≥ grade 3), systolic ejection murmurLoudest right upper sternal borderIncreases with maneuvers that decrease venous return (ie, Valsalva, or moving from squatting to standing)	HCM-associated LV outflow tract obstruction
<ul style="list-style-type: none">Systolic ejection murmur heard best at right upper sternal borderRadiation to neckDiminishes with maneuvers that decrease venous return (ie, Valsalva) and increases with maneuvers that increase venous return (ie, squatting)	Aortic stenosis
<ul style="list-style-type: none">Holosystolic murmur heard best at the apexRadiation to axilla	Mitral valve regurgitation and possible dilated cardiomyopathy or HCM
<ul style="list-style-type: none">Diastolic murmur heard at right upper sternal borderMurmur accentuated with hand grip (increased systemic vascular resistance)	Aortic valve insufficiency and possible Marfan syndrome or bicuspid aortic valve
<ul style="list-style-type: none">High-frequency diastolic murmur heard best at left upper sternal border	Pulmonary valve insufficiency from primary pulmonary hypertension (Graham Steele murmur)
<ul style="list-style-type: none">Soft early systolic murmur heard best at the upper sternal border while supine (increased venous return)Murmur often absent or diminished when standing or sitting and with Valsalva maneuver	Physiological (hyperdynamic) flow murmur in a well-trained athlete

Abbreviations: HCM, hypertrophic cardiomyopathy; LV, left ventricular.

Physical Examination – Screening Musculoskeletal Exam

- A screening MSK exam can be used for asymptomatic athletes with no previous injuries
- If the athlete has either a previous injury or other signs or symptoms, the screening exam should be supplemented with relevant elements of an anatomic site-specific examination
 - Pain/Tenderness
 - Effusion
 - Atrophy/muscle bulk asymmetry
 - Limitations in strength or range of motion
 - Obvious deformity

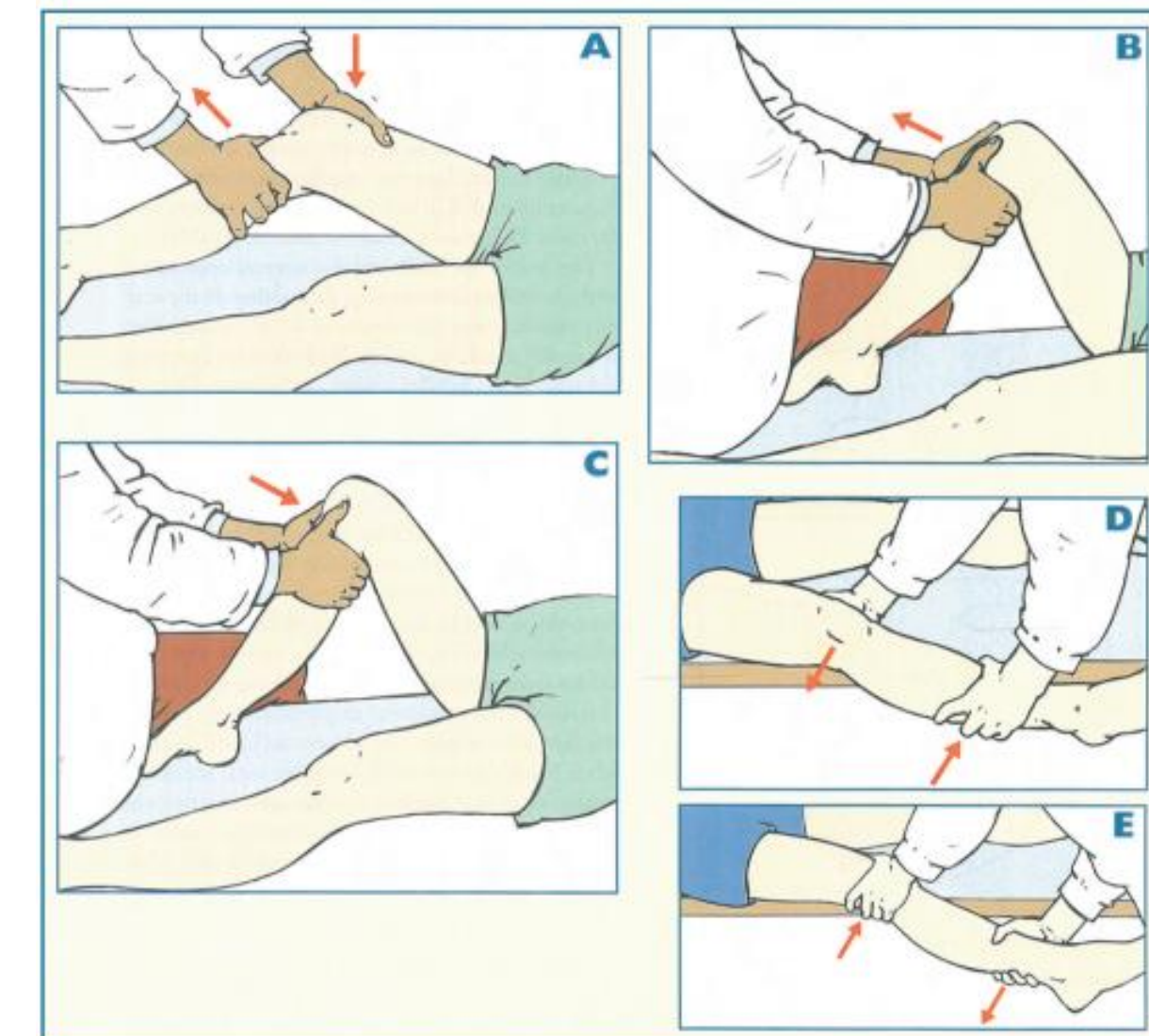


Figure 6G-12. Assessing Ligamentous Instability of the Knee

Physical Examination – Screening Musculoskeletal Exam

Instruction:	Observations:
Spread fingers; make fists	Hand and finger motion, strength, and deformities
Tighten (contract) quadriceps; relax quadriceps	Symmetry and knee effusions
“Duck walk” away and toward examiner	Hip, knee, and ankle motion



Physical Examination – Screening Musculoskeletal Exam

Instruction:	Observations:
Back to examiner, extension	Shoulder symmetry; scoliosis
Knees straight, touch toes	Scoliosis, hip motion, hamstring tightness
Raise up on toes, heels	Calf symmetry, leg strength



Frequency of the PPE

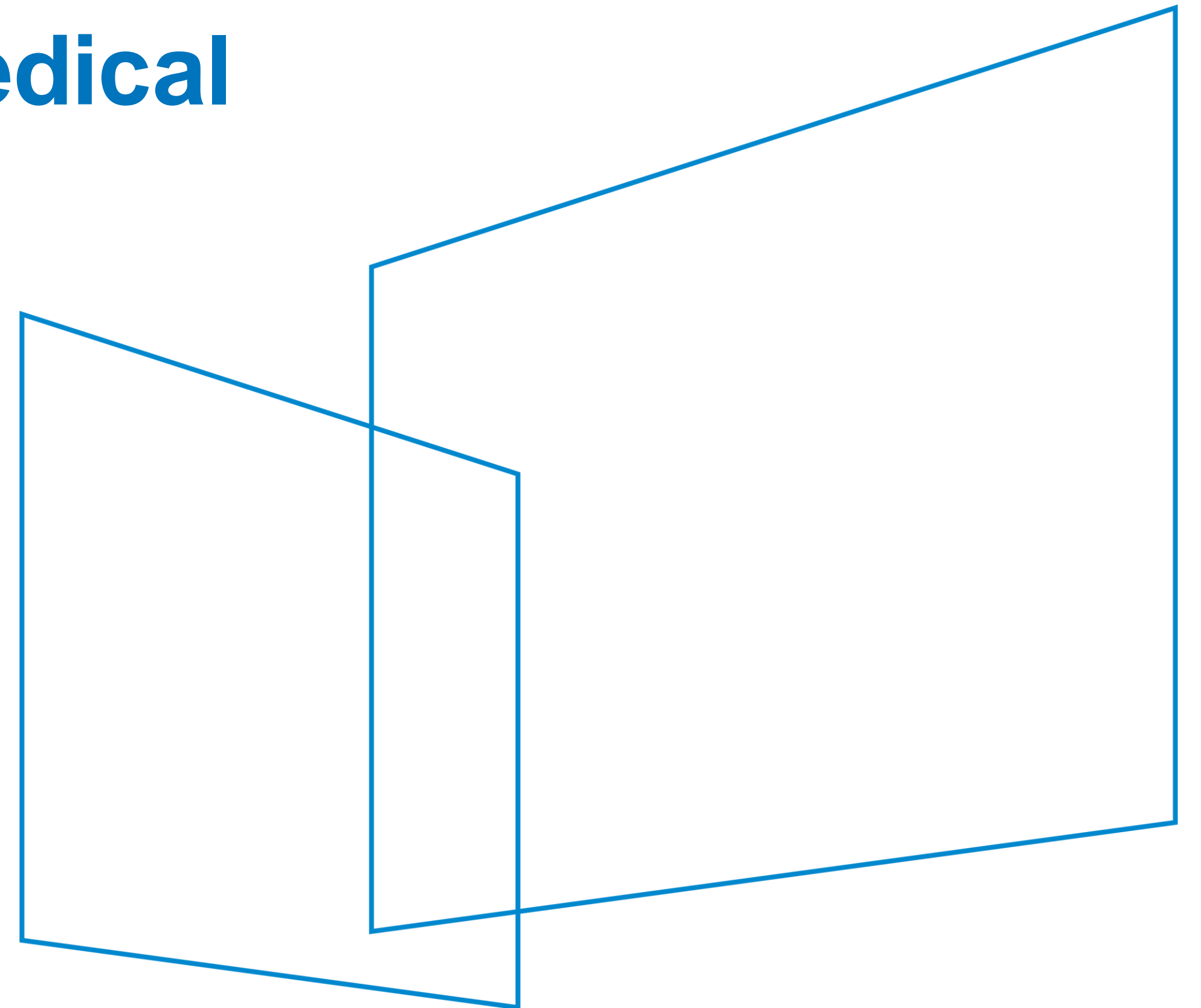
- Current PPE intervals:
 - High school – arbitrary and based on state or organization requirements
 - College – determined using NCAA, NAIA, and NJCAA recommendations and regulation
 - Start of college – comprehensive evaluation
 - Subsequent years – abbreviated annual evaluations that focus on injuries or medical problems that have since occurred

PPE 5 Consensus - Frequency of the PPE

- Comprehensive PPE should be performed every 2-3 years (grade, middle, and high school) and integrated into health supervision exams within the health care home
- Annual updates should include a history focused:
 - Heart
 - Head
 - Heat injury
 - Mental health issues
- Problem-focused examination, if needed



Determination of Clearance or Medical Eligibility



Determining Clearance or Medical Eligibility

1. Medically eligible for all sports without restriction
2. Medically eligible for all sports without restriction with recommendations for further evaluation of treatment
3. Medially eligible for certain sports
4. Not medically eligible pending further evaluation
5. Not medically eligible for any sports



Clearance Considerations for Specific Medical Issues

- Elevated BP/Hypertension
- Acute Illness (COVID-19)
- Cardiovascular Issues
- Neurological Issues
- Diabetes
- Gastrointestinal and Genitourinary Issues
- Single Organ
- Vision Abnormalities/Blindness
- Sickle Cell Trait and Disease

Clearance Considerations for Athletes with Cardiovascular Symptoms and Abnormalities

- No outcomes-based studies have demonstrated that the PPE is effective in preventing or detecting an athlete at risk for SCD, however many athlete abnormalities have been found during evaluations
- Require a thorough cardiovascular evaluation to exclude underlying heart disease
- Activity recommendations involving temporary or permanent sports disqualification or restrictions should be made in consultation with a cardiologist

Clearance Considerations - Concussion

- The absolute number of concussions has not been identified
 - Clinicians should be aware of the potential for long-term consequences from multiple sub-concussive impacts
- There are no evidence-based guidelines for disqualifying or retiring an athlete from his or her sport after concussion
- An athlete should be referred to a specialist with expertise in SRC when contemplating retiring from a specific sport

The Million Dollar Question: When Should an Athlete Retire after Concussion?

Leah G. Concannon, MD¹; Marla S. Kaufman, MD^{1,2}; and Stanley A. Herring, MD, FACSM^{1,2,3,4,5}

Medical Eligibility is Limited

- Consultation with a specialist is typically warranted
- Shared decision-making should occur
 - Discussion among the athlete, athlete's family, and an interdisciplinary health care team about the risks and benefits of participation
- Consider an alternative activity or role that the athlete can participate in
- Athletes should be monitored and provided with appropriate emotional support

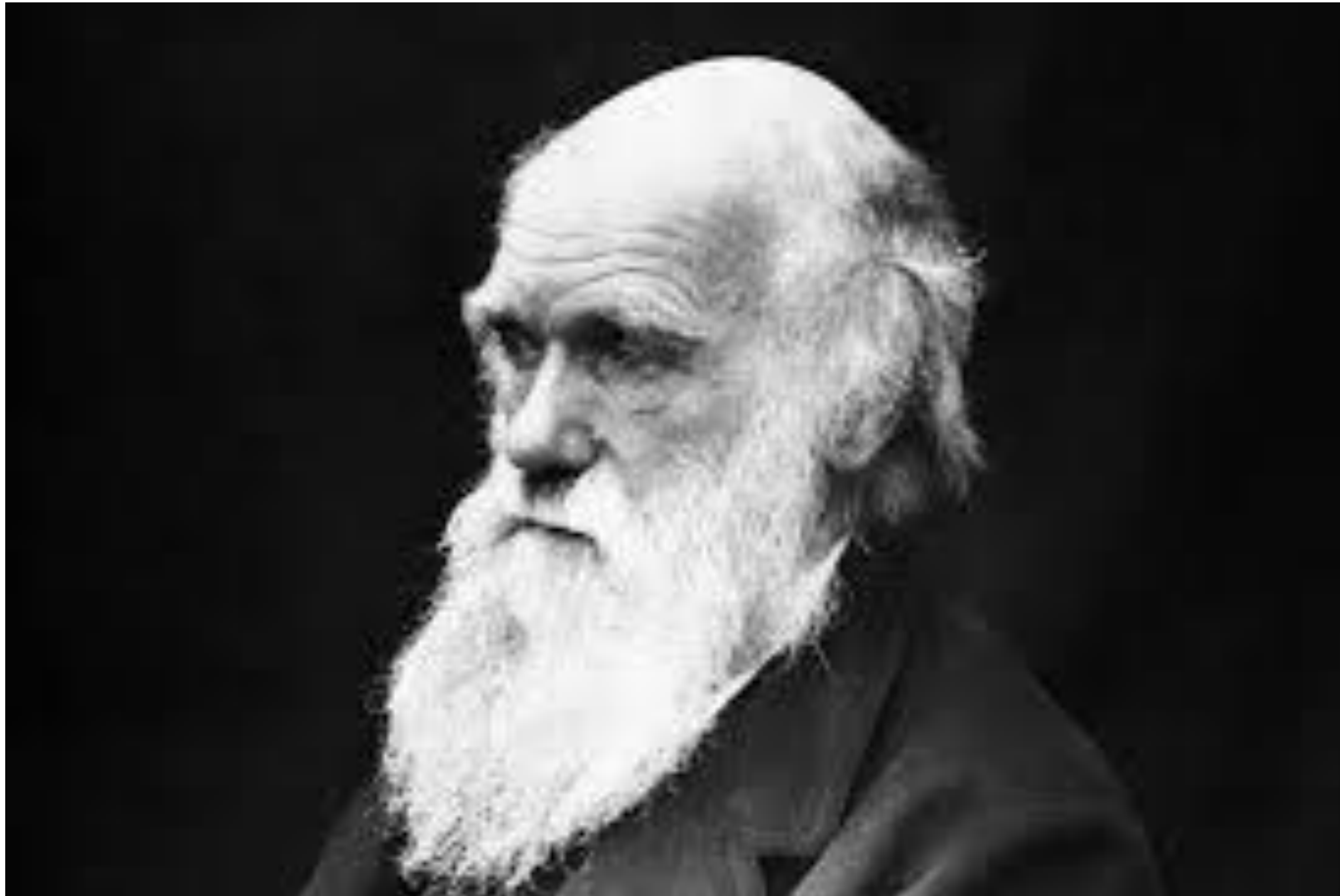




Now on to some cases....

Not All Athletes Are Created Equally

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The World We Live in: The Youth Sports Market

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- 23 million children 7-18 play sports outside of school
- 50.2** billion dollar/year industry
- GDP of Iceland in 2021 was 30 billion dollars



Kids and Teens: A Unique Athletic Population

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-Adolescent development is not linear

- Sexual
- Skeletal
- Psychological
- Physiologic



10 Year old Basketball Team

Does Sport Specialization Cause Injury?

-Prevalence of adolescent physical activity-related injuries in sports, leisure time, and school

Raisanen (2018)

- 8406 subjects, 11, 13 and 15 years old
- 2014/2016 data collection in Finland
- 49% boys, 51% girls

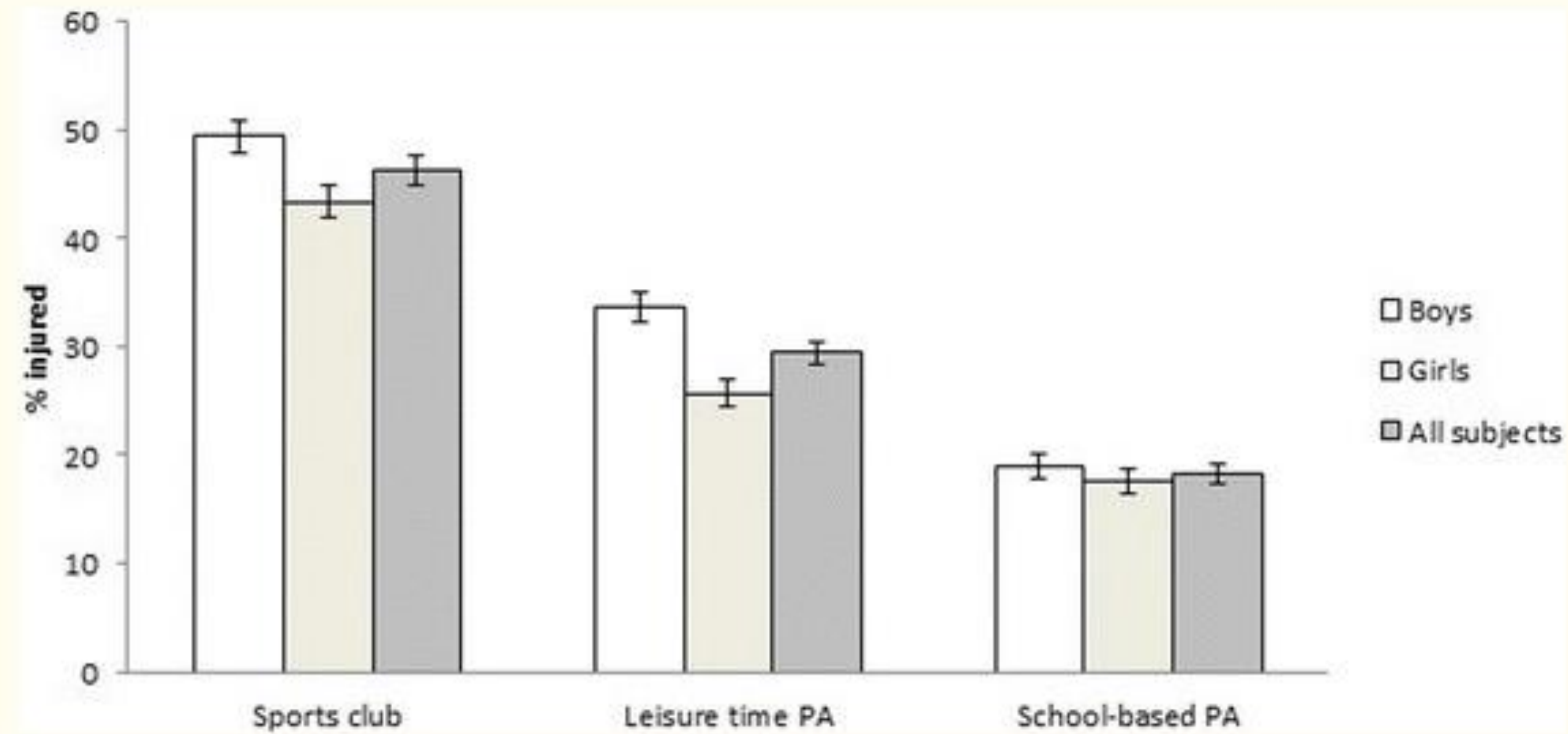


Fig. 1

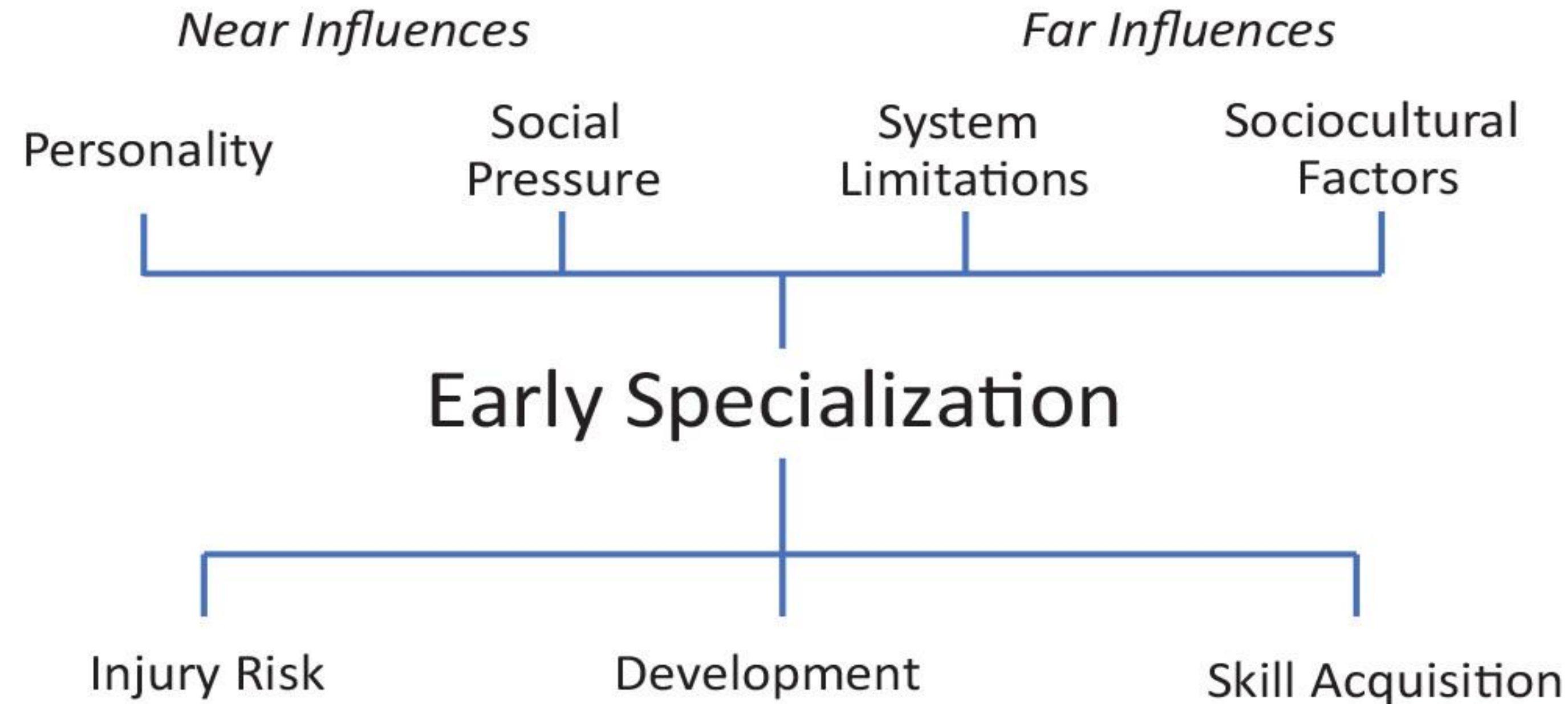
Injury prevalence (%) in the total data in sports club activities, leisure time PA and school-based PA for boys, girls and all subjects presented with 95% confidence interval

Sport Specialization and Injury

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Antecedent Conditions



Consequences

Possible Mechanisms

- | | | |
|----------------------------------|--|-----------------------|
| • Training imbalance | • Inappropriate breadth and depth of experiences | • Training imbalance |
| • Lack of generic movement skill | • Insufficient exposure | • Low time on task |
| | | • inappropriate focus |

Possible Solutions

- | | | |
|--|---|---|
| • Develop better load mgmt. strategies | • Build diversity into daily training environment | • Match developmental needs with skill acquisition principles |
| • Incorporate FMS training | | |



How About The Grey Area?

- Are there some cases where the ethos of sports medicine encourages us to “get them back on the field” but where we might be better suited in having a different discussion?

Questions to Consider

- Are we having these discussions?
- If so, when are we having these discussions?
- Do these discussions go against our mantra of “get back on the field?”
- Does the youth sports system play a role?
- What has been successful/unsuccessful in these discussions?



Patient #1 – I Really Want to Play High School Football

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15-year-old football player

2 sport-related concussions in past three years

One with prolonged symptom recovery (> 3 weeks)

“I really want to play football”

Comes to see you for pre-season football clearance



Audience Questions and Poll – What Do You Do?

SCAT 6 Normal/SCOAT6 Normal

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SCAT6TM

Sport Concussion Assessment Tool
For Adolescents (13 years +) & Adults



Eventually normal
post-injury

SCOAT6TM

Sport Concussion Office Assessment Tool
For Adults & Adolescents (13 years +)



Eventually normal post-
injury

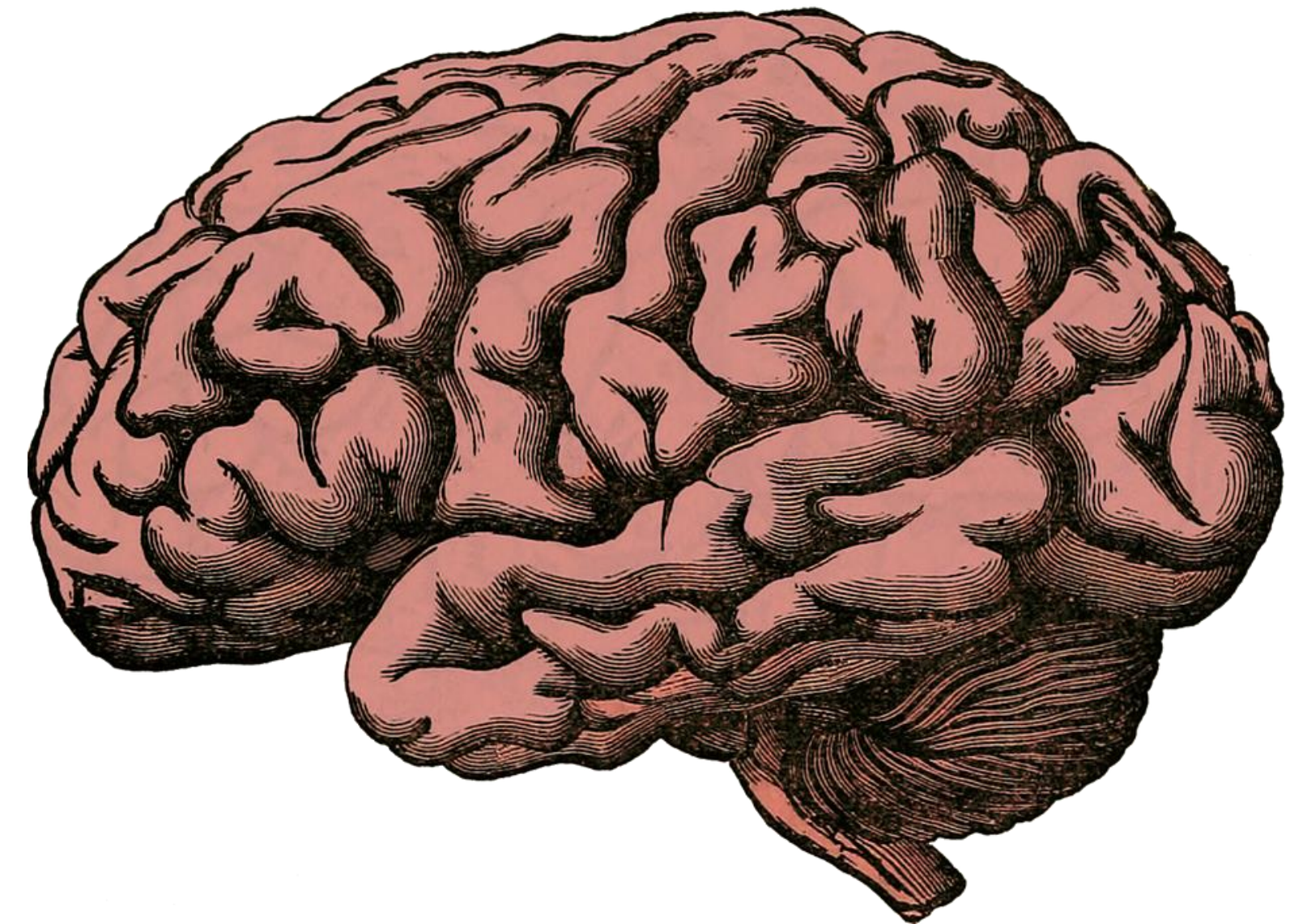
Neurocognitive Testing?

4 years of concussion testing data (NCAA)

1414 concussions, 8305 baseline control tests

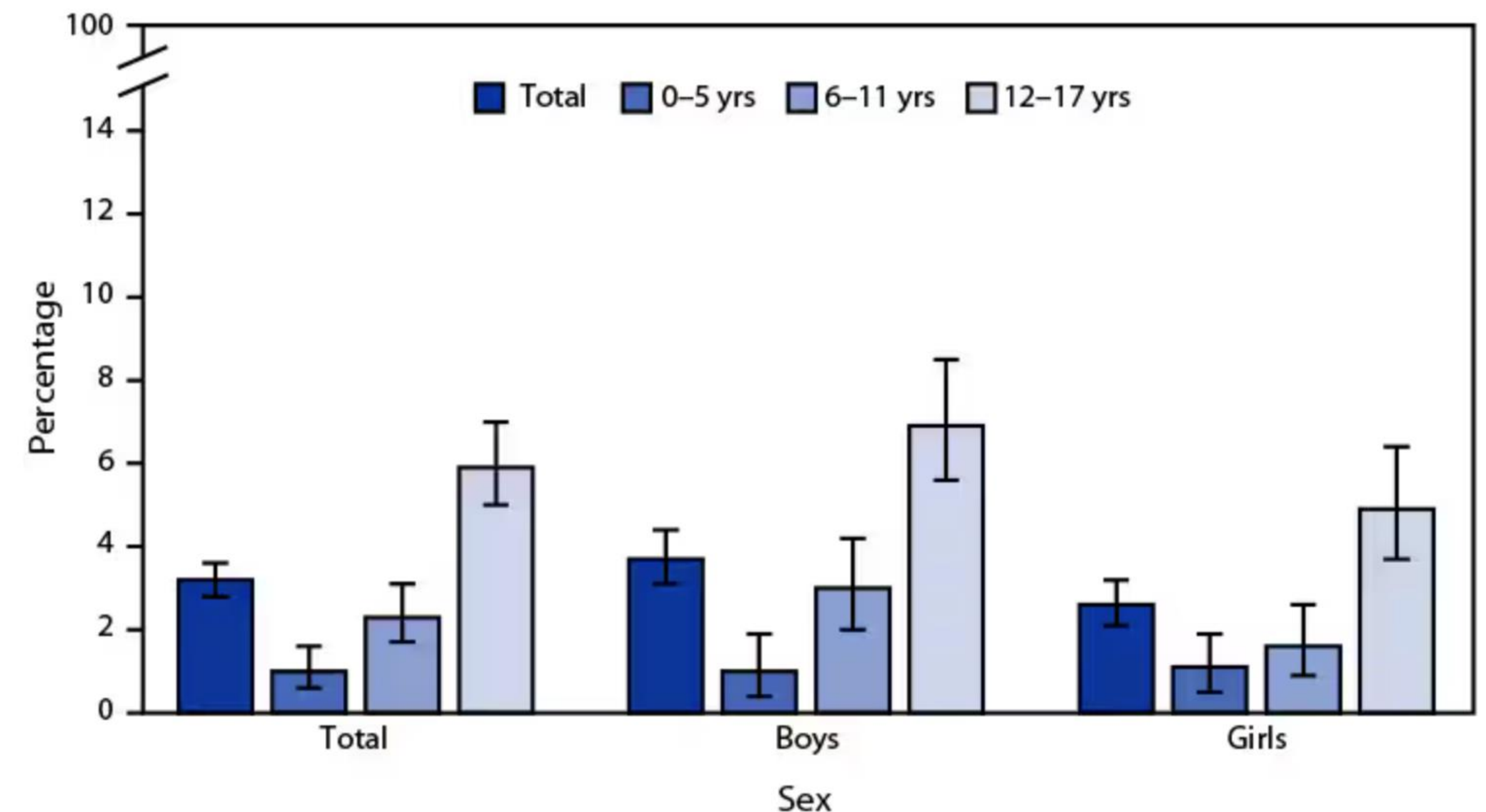
3 main computer-based testing programs

“The overall low sensitivity and specificity results provide additional evidence for the use of a multi-dimensional assessment for concussion diagnosis”



Sport-Related Concussion: Epidemiology

- In 2022, 2.3 million (3.2%) children and adolescents aged ≤ 17 years had ever received a diagnosis of a concussion (CDC 2023)
- Estimated 62,000 diagnosed concussions annually in HS sport (ANA 2022)
- A Person who has had one concussion is 1-2 times more likely to sustain another; this risk further escalates with each subsequent concussion (AANS 2022)
- The risk of concussion in football is three to six times higher in players who have had a previous concussion. (AANS 2022)



How Many Concussions Are Too Many?

15,764 subjects in the PROTECT study, a cohort assessing risk factors for cognitive decline (ages between 50 and 90 years)

Participants completed cognitive assessments annually for 4 years.

Concussion vs. non-concussed groups previously in life (avg 29 years previously)

Working memory, episodic memory, attention, processing speed, and executive function

Those who had suffered at least a single mild TBI demonstrated significantly poorer attention scores at baseline compared with the no head injury group (age-matched)

3 MTBI group manifested poorer baseline executive function and attention scores



Audience Questions and Poll – What Do You Do?

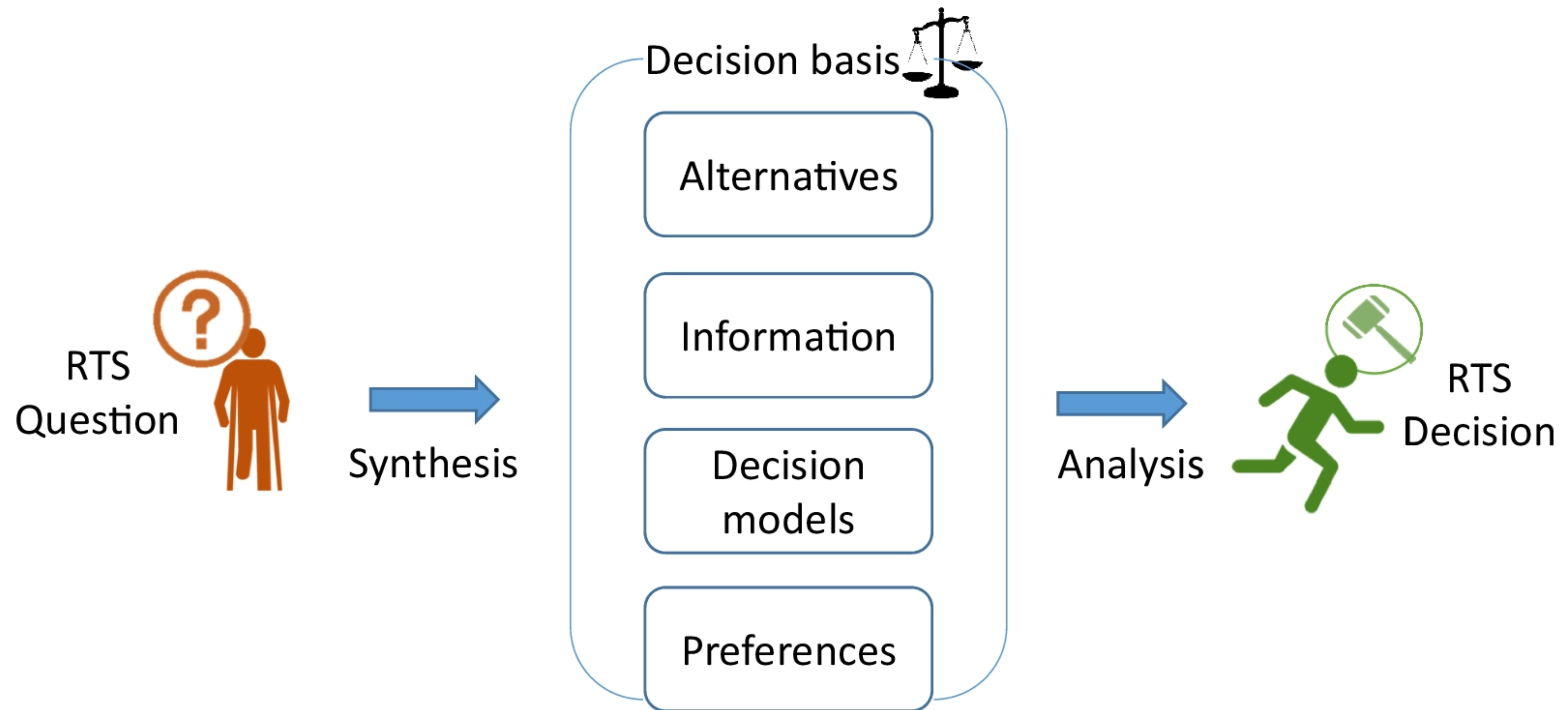
Helpful Concept: The Shared Decision Making Model

How Does the Concept of Shared Decision Making Apply?

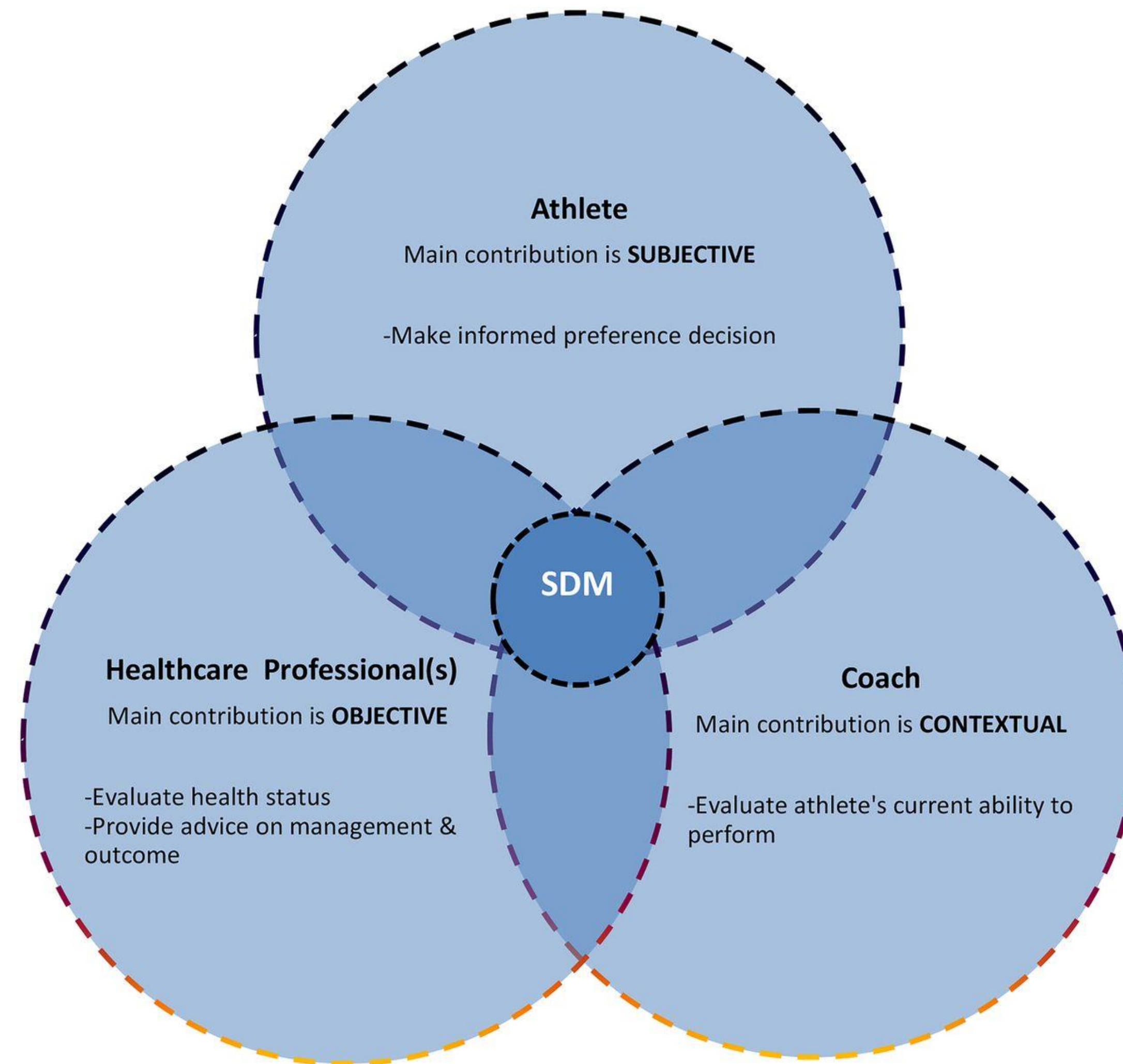
- Shared decision making (SDM) is a collaborative process where a patient and their healthcare provider work together to make the best health care decisions for the patient.



A Model for Shared Decision Making



The size of the contributing circles to the shared decision-making (SDM) processes are influenced by different factors, including health status, participation risk and other decision modifiers.



Patient #2 – I want to Play College Soccer

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17-year-old soccer player, Junior

Hoping to play college soccer

ACL tear x2 (same knee)

Determined to play college soccer

“Please get me to college soccer!”



Audience Questions and Poll – What Do You Do?

ACL Injury: Epidemiology



200,000 to 250,000 ACL injuries annually in USA

> 50% of surgical cases of knee injury

High financial (>\$13,000/injury, 2-3 billion/yr) + physical, and mental cost of injury

50-60% incidence of dropping out of sport after surgery (soccer) with 26% higher risk of retear in surgical knee

Lifetime consequences regardless of treatment (65-80% risk of OA development 15+ years)

ACL Injury: Gender and Age

90% of ACL injuries occur in sport (*Dunn WR et al., AJSM 2010*)

2-8x> incidence in females>males

Prospective 9-year study of collegiate ACL injury rates across 15 sports in NCAA, among sex-comparable sports including basketball, lacrosse, and soccer, females sustained significantly higher rates of ACL injury compared to males

Per 1,000 AE//(0.22 versus 0.08 in basketball, 0.23 versus 0.13 in lacrosse, and 0.10 versus 0.04 in soccer)

ACL injury in late adolescence mirrors adult data with 5-6x more common injury in females compared to males. 6.5/1,000 AE. (Mjannes et al. 2019)

Despite 20 years of ACL prevention, injuries still occur at high rate



Risk of further injury after tearing ACL?

MOON knee group – 19 surgeons, 9 institutions, predicting outcomes of ACL injury and reconstruction

AJSM 2020 - 3276 patients followed for 6 years after ACL reconstruction

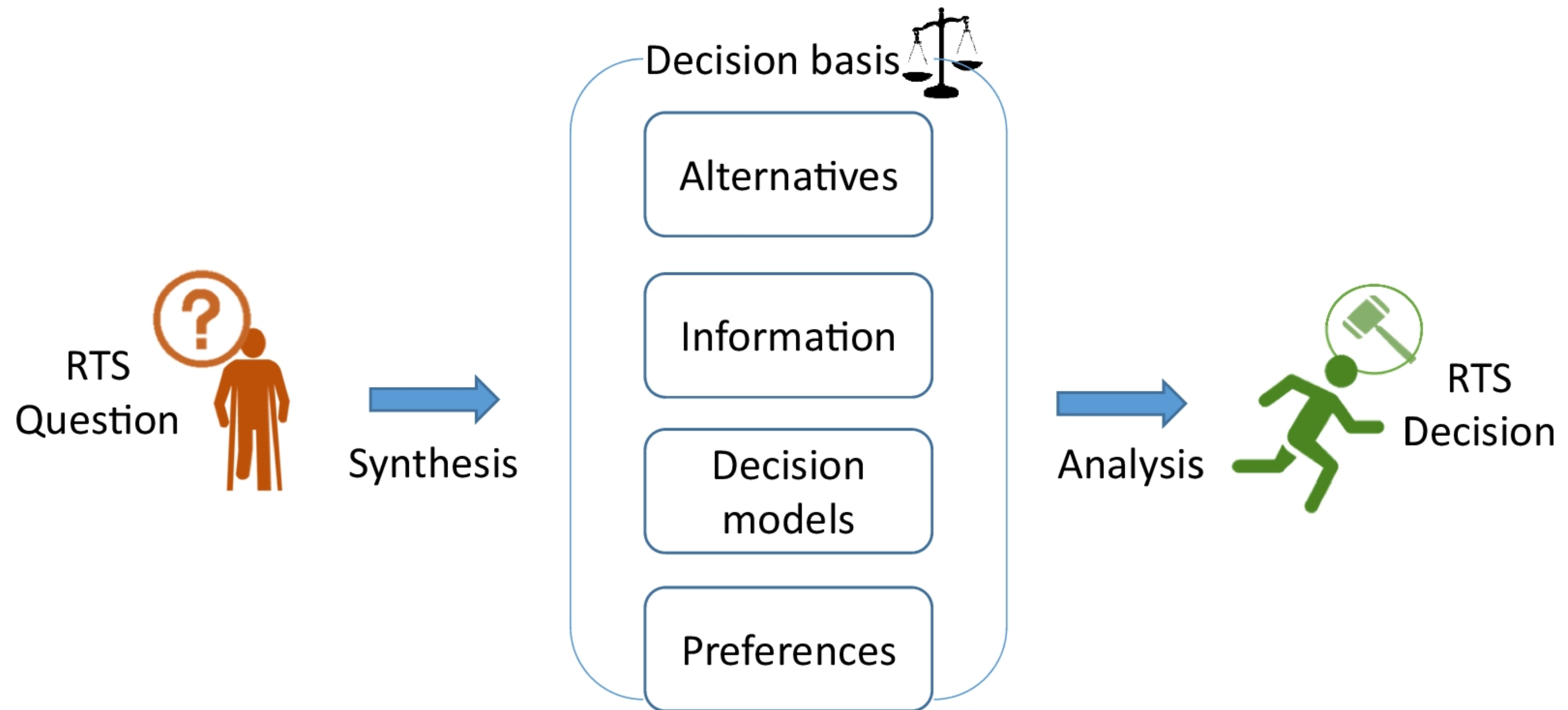
20.4% (612/2999) underwent at least one subsequent surgery within 6 years

Meniscus (11.9%), revision ACL reconstruction (7.5%), loss of motion (7.8%), and articular cartilage (6.7%)

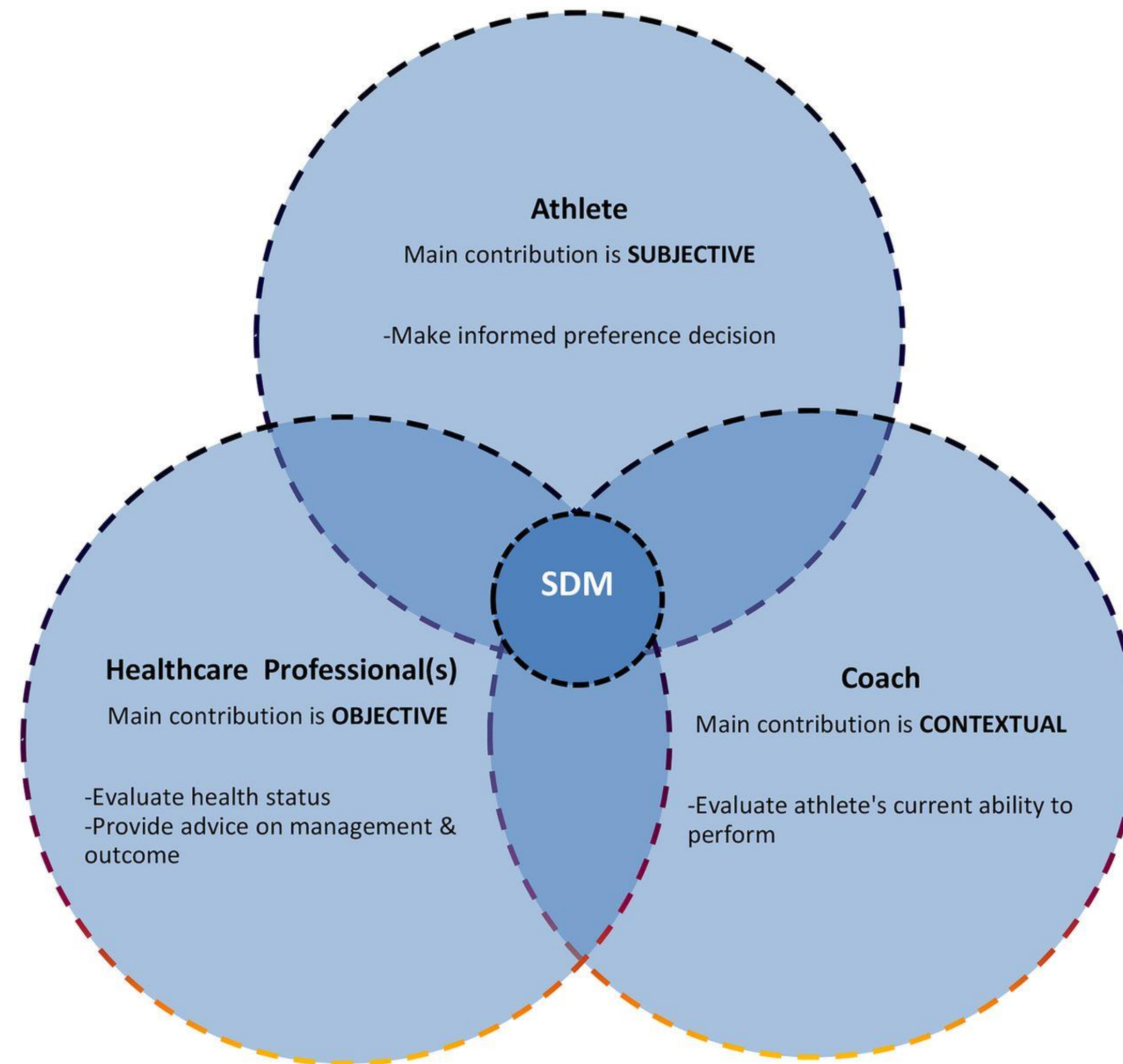


Audience Questions and Poll – What Do You Do?

A Model for Shared Decision Making



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Patient #3 – I want to play recreational softball

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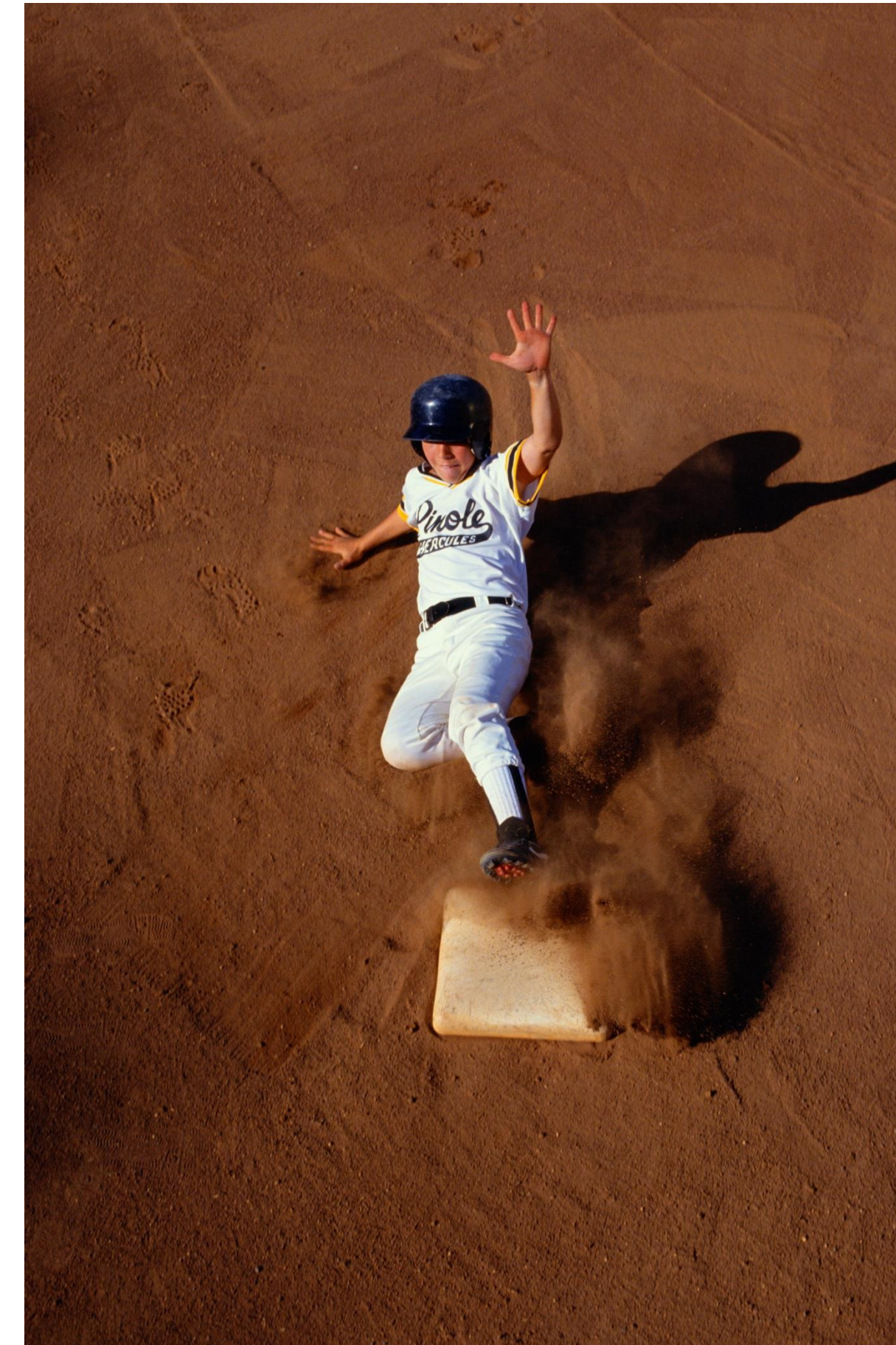
38 year old lawyer

Comes in with an achy knee

Saw another physician and had an MRI

Noted to have a meniscus tear

Wants to keep playing softball



Audience Questions and Poll – What Do You Do?

Vertical longitudinal



Vertical radial



Horizontal



Oblique

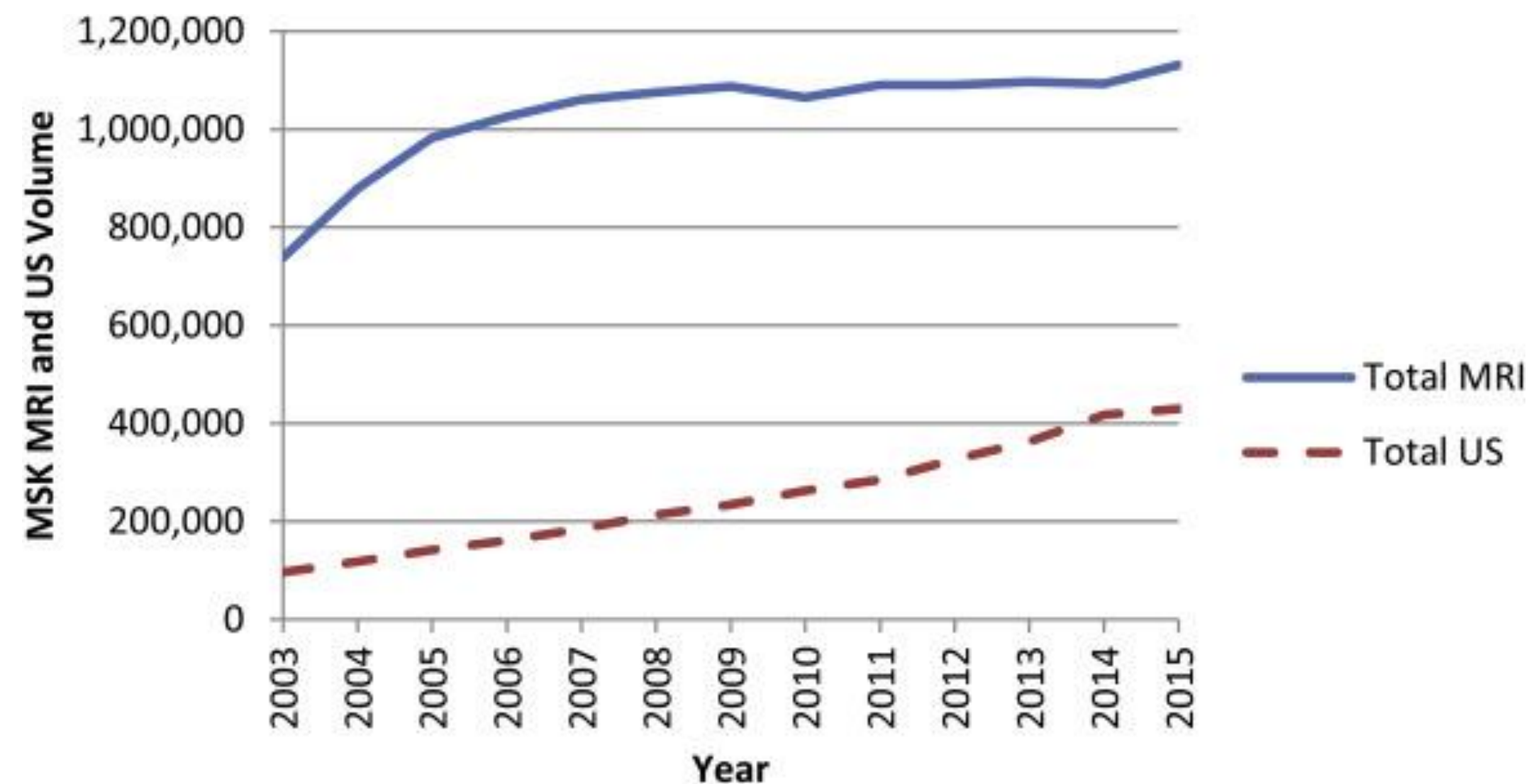


Complex/degenerative



We Are Seeing More Meniscus Tears and More Patients Are Having Meniscus Surgery

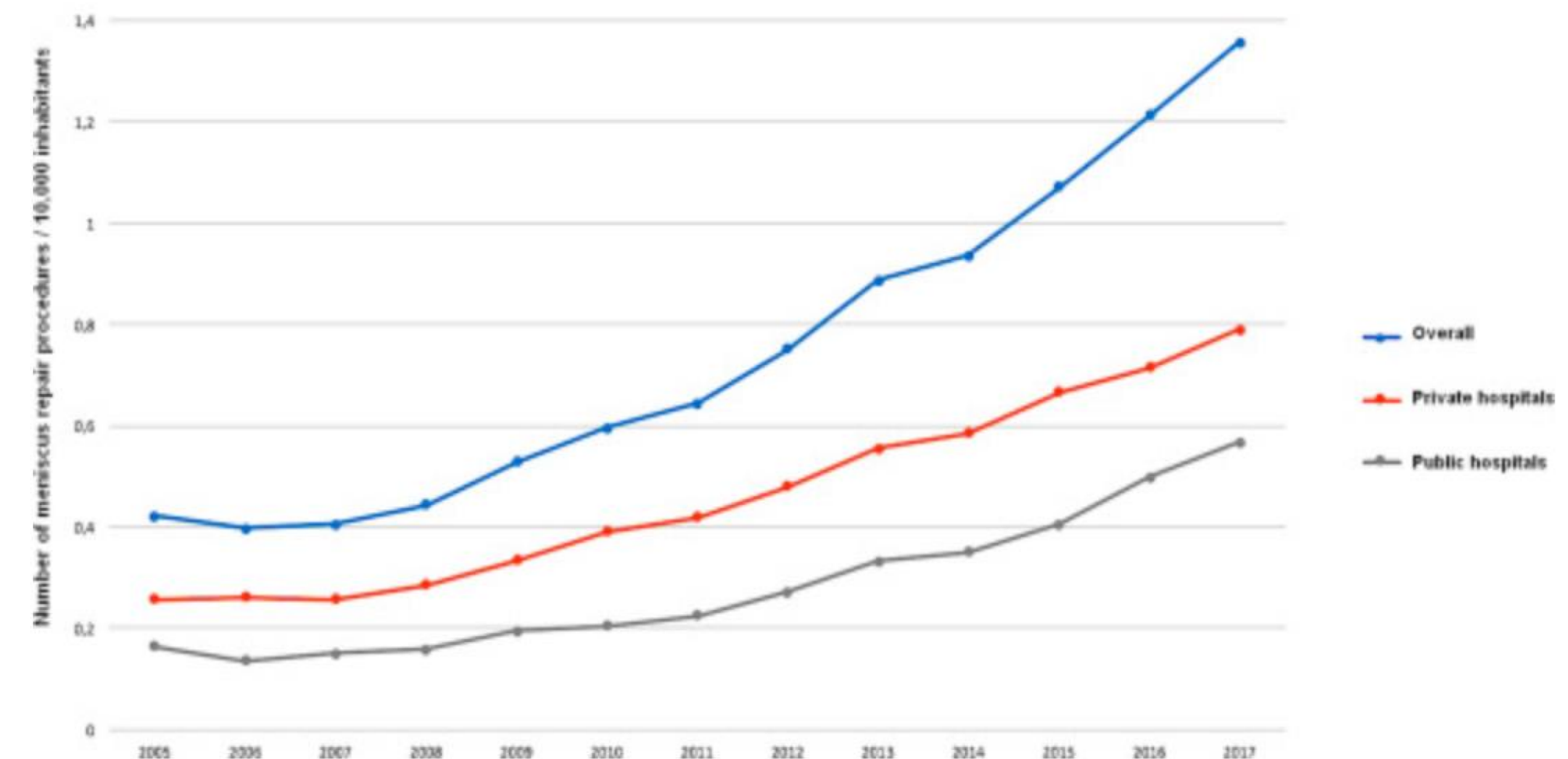
Musculoskeletal MRI in USA



347% growth 2003-2015

Jl of American College of Radiology, 2018
DOI:<https://doi.org/10.1016/j.jacr.2017.10.015>

Meniscus Surgery in France



Overall More Meniscus Surgery

Orthopedic and Traumatology Research,
2019

DOI: <https://doi.org/10.1016/j.otsr.2019.01.024>

Meniscal Tearing in Asymptomatic Knees

Zanetti et al, American Journal of Roentgenology. 2003

100 patients with knee pain, 18-73 y/o. Avg – 42.7

Patients with unilateral knee pain

Bilat knees MRI – meniscal tears in 57/100 (57%) symptomatic knees and 36/57 (63%) asymptomatic knees

Horizontal or oblique meniscal tears were more frequently encountered in both asymptomatic and symptomatic knees and were not always be related to symptoms

Conclusion – certain types of meniscus tears are common in asymptomatic patients

Meniscal Tearing in Older Asymptomatic Knees

Englund et al, New England JI Medicine, 2008.

991 random subjects, ages 50-90 in MA. MRI of right knee + knee questionnaire

Meniscus tears by age: 19% age 50-59, 56% age 70-90

With Moderate OA: OA>grade II, meniscal tears in 63% of patients with knee pain and 60% without symptoms

Conclusion – meniscus tears are common in asymptomatic patients and more common in the setting of increasing age and arthritic knees

Meniscus Injury and Treatment

Patients <40 with acute injuries
Patients with activity related pain
No OA
Mechanical symptoms (?)

Patients with advanced OA
Patients with fixed flexion deformity
Patients with night pain
Limited walking distance

GREY AREA

The NEW ENGLAND JOURNAL *of* MEDICINE

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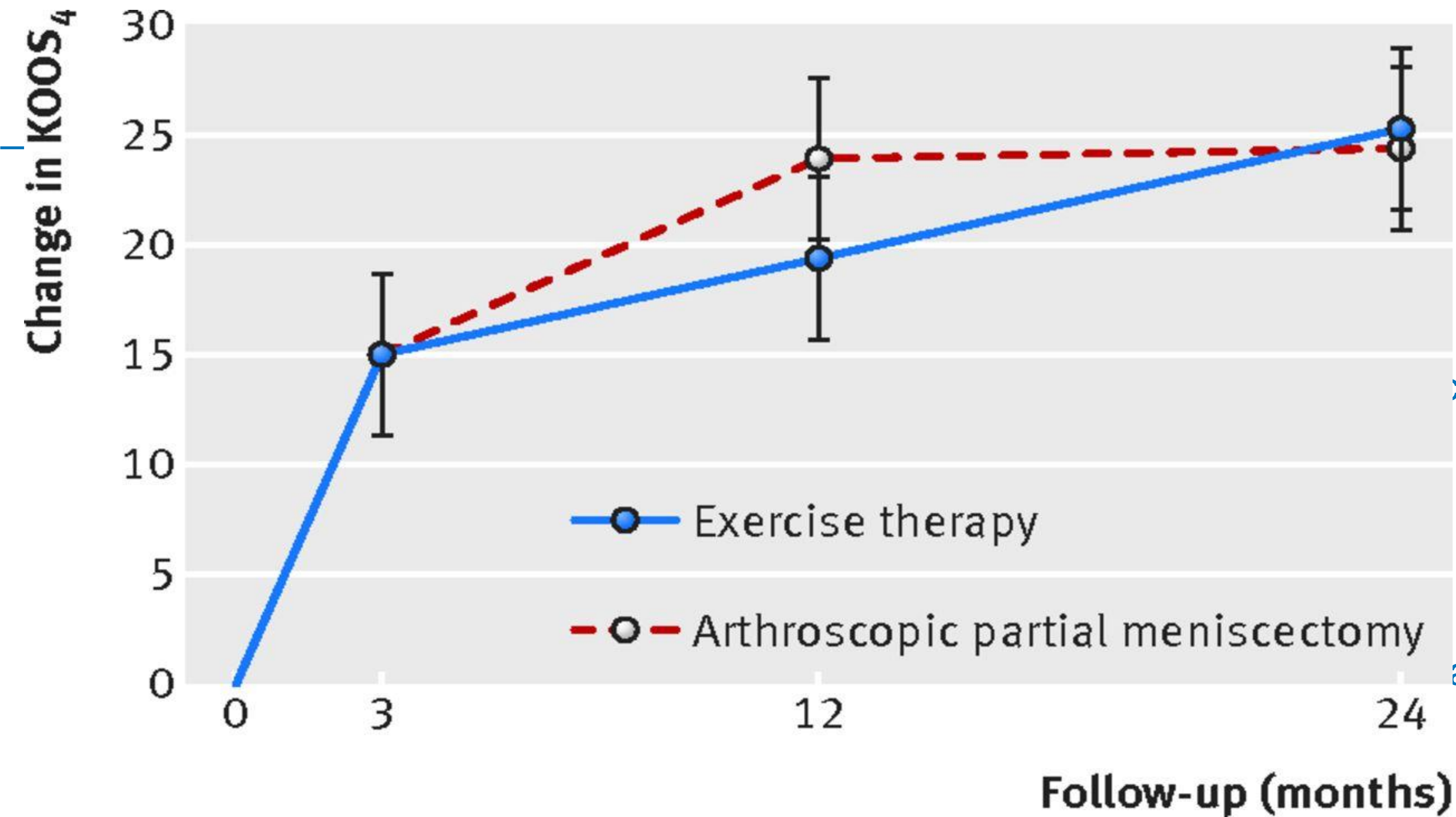
Surgery versus Physical Therapy for a Meniscal Tear and Osteoarthritis

RCT of 351 patients aged 45+ (average age 58), symptomatic,
knee OA (mild/moderate) + meniscal tear

Assigned to surgical and rehab groups (RCT)

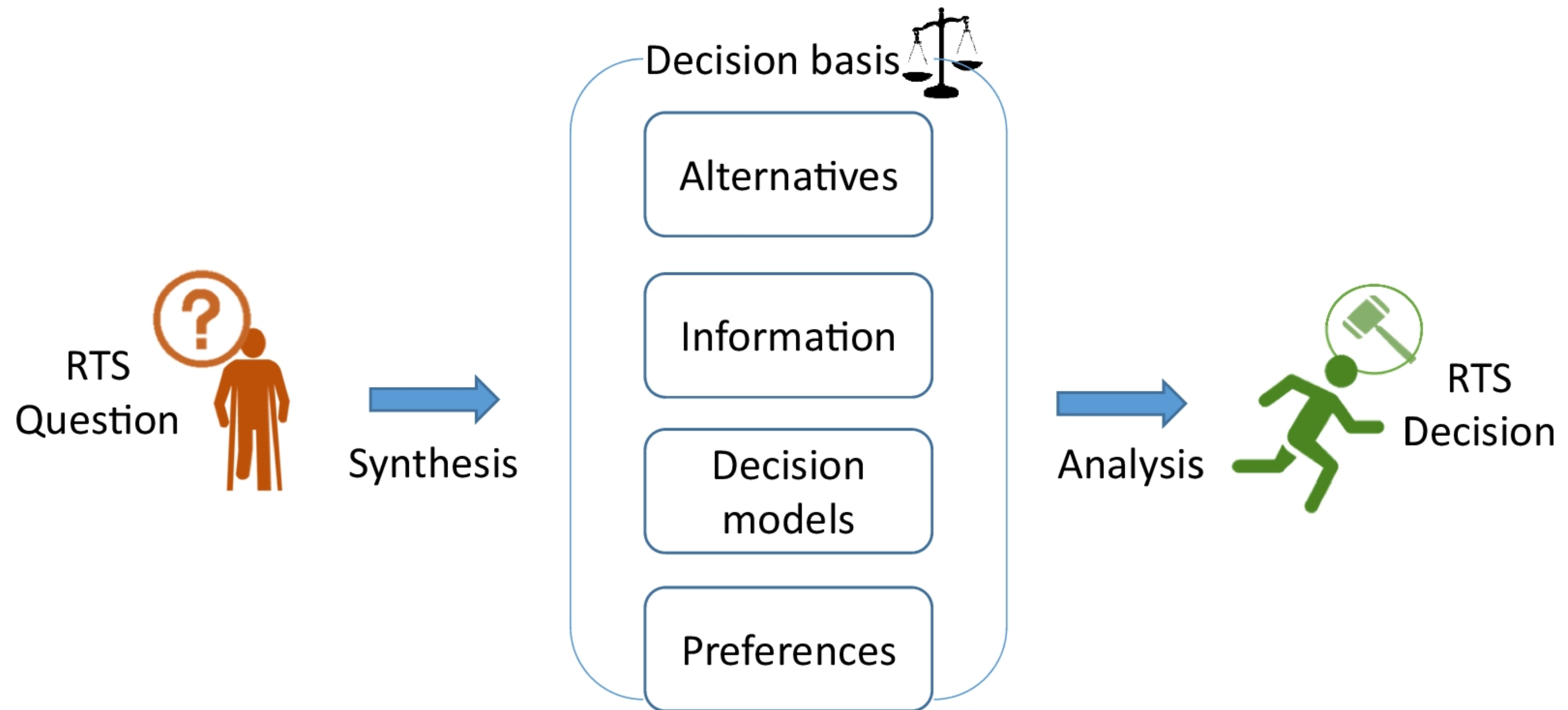
No significant differences in outcomes at 6 months (MeTeOR clinical trial)

However - 28% of the PT arm crossed to APM at 6 months

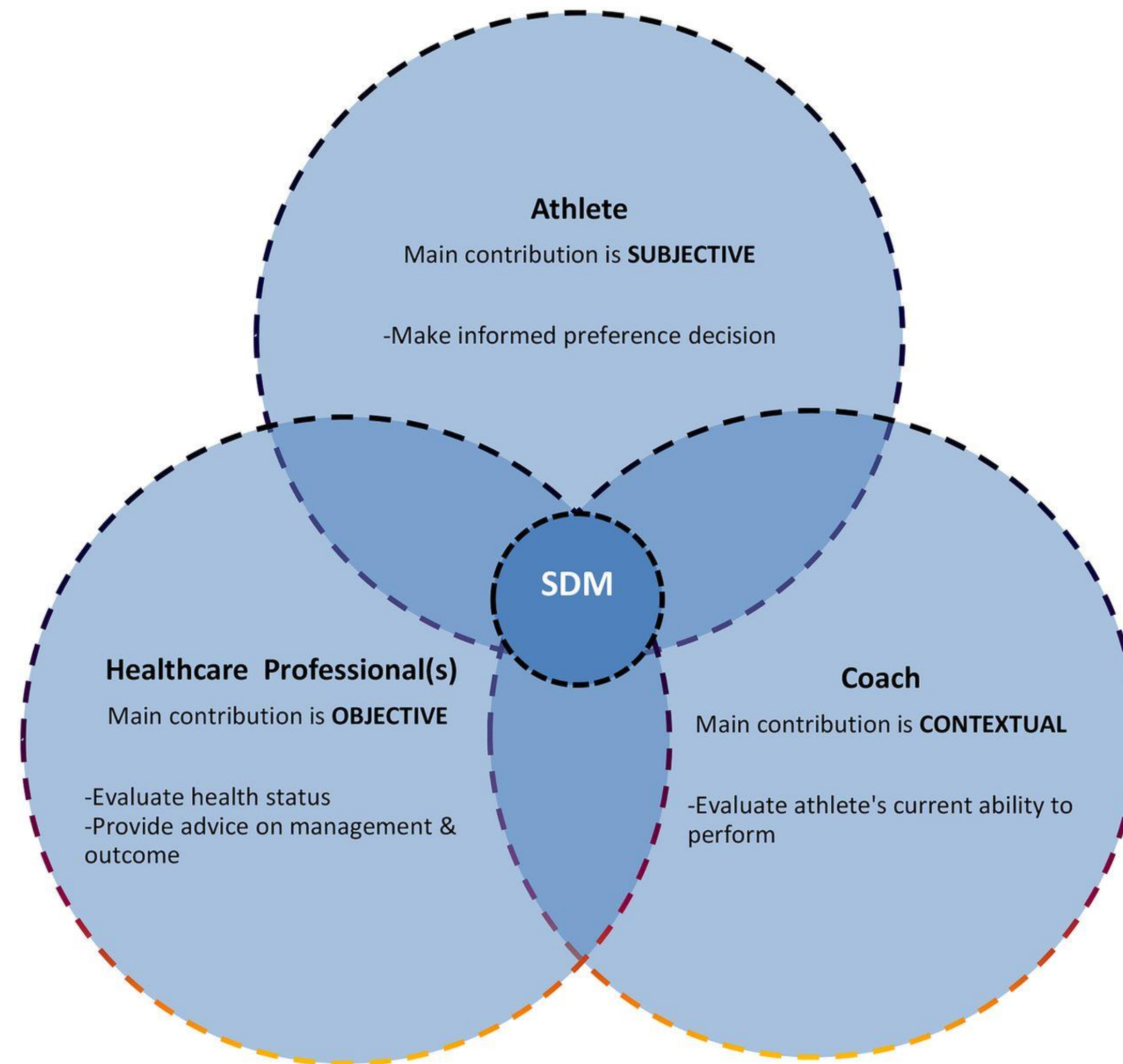


Audience Questions and Poll – What Do You Do?

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Thank You