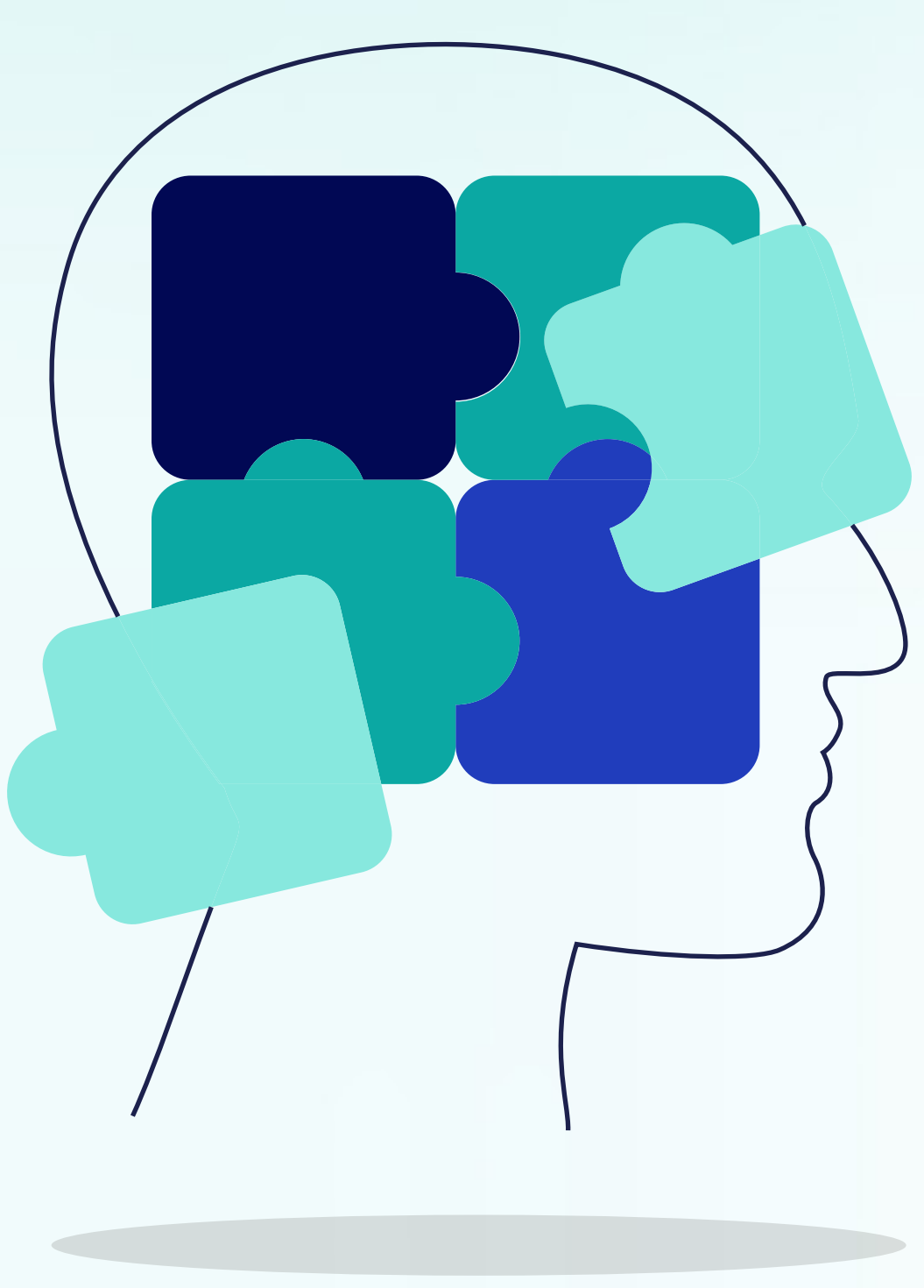
SPARTASCIENCE

Balance performance is independently associated with:

- Diabetes
- Cardiovascular Disease
- Respiratory Disease
- Depression/ Anxiety
- Physical Activity Level
- Knee Pain
- Socioeconomic status (childhood and adult)
- Body Mass Index (BMI)
- Cognitive Ability (childhood and adult)
- Smoking History

General Health



The American Heart Association classifies **balance** as one of the four types of exercise that should be completed by all.

Balance ability reflects the interplay between **multiple complex systems** and can be sensitive to a large array of vision, vestibular, somatosensory, neuromuscular, and central nervous system functions.

(2018, April 18). *Balance Exercise.* American Heart Association. https://www.heart.org/en/healthy-living/fitness/fitness-basics/balance-exercise

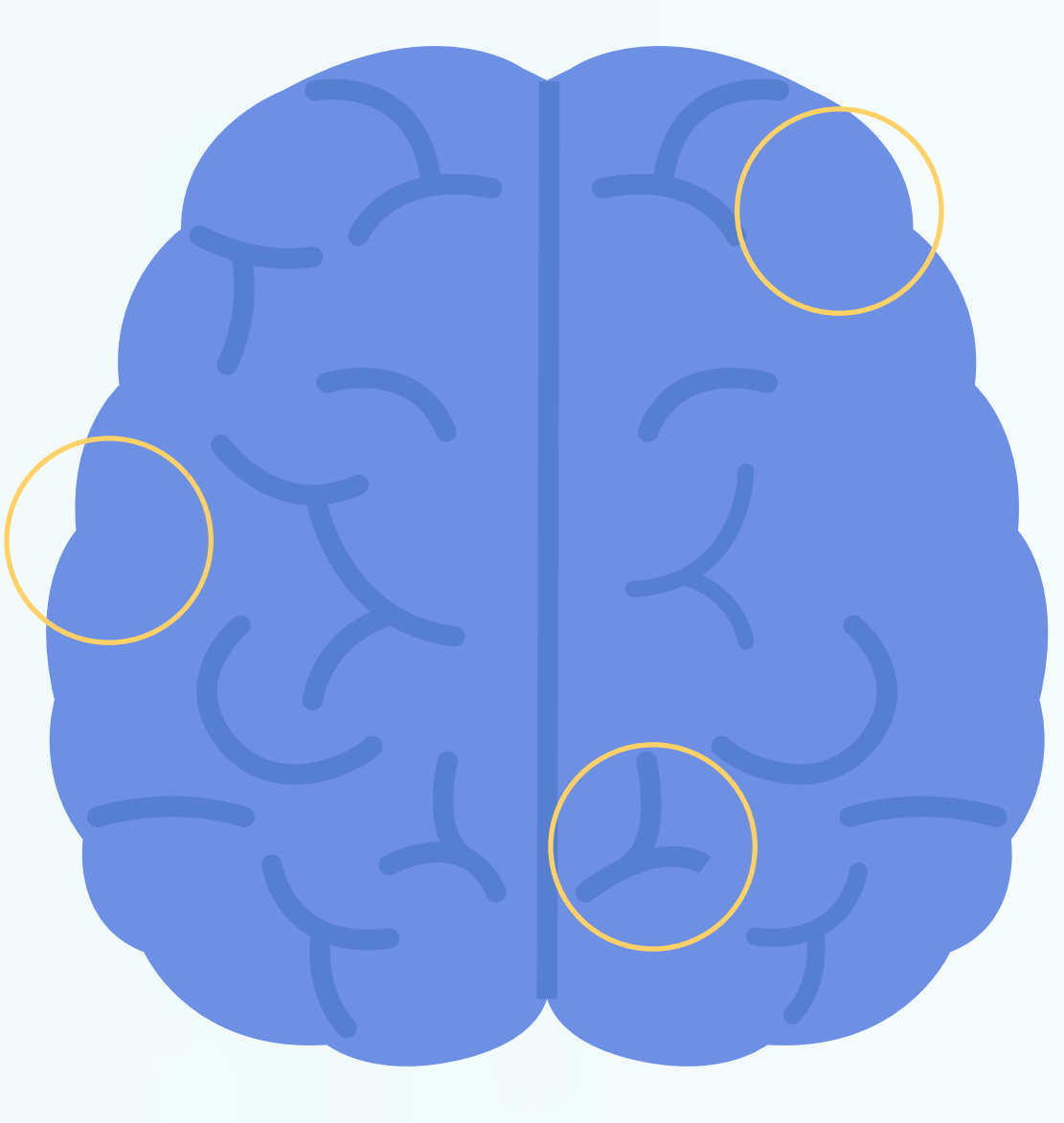
Fatigue/Stress

Balance performance has been shown to be sensitive to **fatigue and readiness**, and is impacted by everything from sleep to training load to mood and anxiety.

Bolmont, Benoıt, et al. "Mood states and anxiety influence abilities to maintain balance control in healthy human subjects." *Neuroscience Letters* 329.1 (2002): 96-100.

Furtado, Fabianne, et al. "Chronic low quality sleep impairs postural control in healthy adults." *PLoS One* 11.10 (2016): e0163310.

Neurological



Balance response complexity is able to differentiate between those with **multiple sclerosis** (MS) and **healthy control**, including those not yet limited by significant balance impairment.

Busa, Michael A., et al. "Multiscale entropy identifies differences in complexity in postural control in women with multiple sclerosis." *Gait & Posture* 45 (2016): 7-11.

https://www.sciencedirect.com/science/article/abs/pii/S0966636215009753

Athletes

Athletes tend to have better **dynamic** and **static capabilities** than non-athletes.

Bonis, M., and K. Tillery. "Do Collegiate Athletes Display Better Balance Skills than their Non-Athlete Counterparts?." *Biomedical Journal of Scientific & Technical Research* 34.4 (2021): 27023-27026.

https://biomedres.us/pdfs/BJSTR.MS.ID.005596.pdf

Aging, mortality/morbidity

The inability to stand on one leg for **10 seconds** in mid to later life is linked to a near doubling in the risk of death from any cause within the **next 10 years**

In patients over 75, **falls** are the #1 reason for a doctor's visit.

Araujo, Claudio Gil, et al. "Successful 10-second one-legged stance performance predicts survival in middle-aged and older individuals." *British Journal of Sports Medicine* 56.17 (2022): 975-980.

https://bjsm.bmj.com/content/56/17/975

Pediatrics

Balance capability in **children** seems to be impacted by changes due to **biological aging** and **maturity**.

Muehlbauer, Thomas, Albert Gollhofer, and Urs Granacher. "Associations between measures of balance and lower-extremity muscle strength/power in healthy individuals across the lifespan: a systematic review and meta-analysis." *Sports Medicine* 45 (2015): 1671-1692.

https://link.springer.com/article/10.1007/s40279-015-0390-z

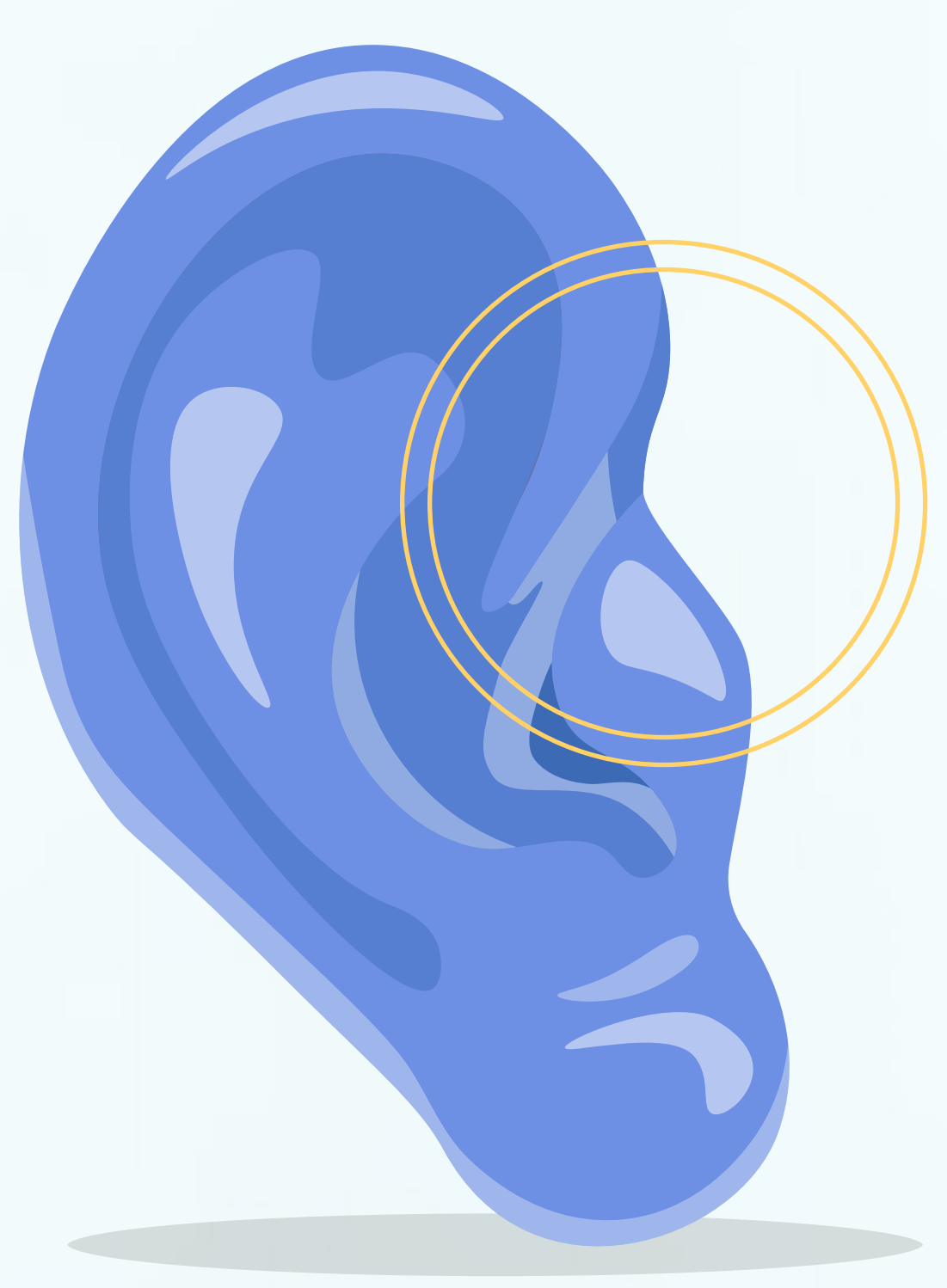
Youth Sports

Balance is related to many different **sport and fitness performances** such as soccer skills and maximal strength in youth athletes and muscular strength and endurance in football players.

Teunissen, Anthonius JW, et al. "Is balance performance associated with basic soccer tasks? An explorative Study." *Journal of Physical Education and Sport* 18.4 (2018): 2319-2323.

http://efsupit.ro/images/stories/decembrie2018/Art%20350.pdf

Vestibular



Balance testing is critical for the assessment of **vestibular health** and dysfunction.

National Institute of Health (n.d.). *Balance Tests.* MedlinePlus. https://medlineplus.gov/lab-tests/balance-tests/

Falls, falls risk

According to the Centers for Disease Control and Prevention (CDC), **falls** are the number 1 cause of **fatal and nonfatal injuries** among older adults in the United States.

(2021, August 6). *Facts About Falls.* Center for Disease Control. https://www.cdc.gov/falls/facts.html

Rehab and Injury Prevention

Balance training has shown to improve **injury rehabilitation outcomes** and help to reduce the risk of musculoskeletal injury.

Nessler, Trent, Linda Denney, and Justin Sampley. "ACL Injury Prevention: What Does Research Tell Us?." *Current Reviews in Musculoskeletal Medicine* 10 (2017): 281-288. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5577417/

Jahanjoo, Fatemeh, et al. "Efficacy Of Balance Training In Combination With Physical Therapy In Rehabilitation Of Knee Osteoarthritis: A Randomized Clinical Trial." *Crescent J Med Biol Sci* 6.3 (2019): 225-334. http://www.cjmb.org/uploads/pdf/pdf_CJMB_238.pdf

Cognitive Function/Decline

Patients over **65** with better balance show a slower rate of cognitive decline than those with worse balance scores.

Meunier, Claire C., et al. "Balance and cognitive decline in older adults in the cardiovascular health study." *Age and Ageing* 50.4 (2021): 1342-1348.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8522713/

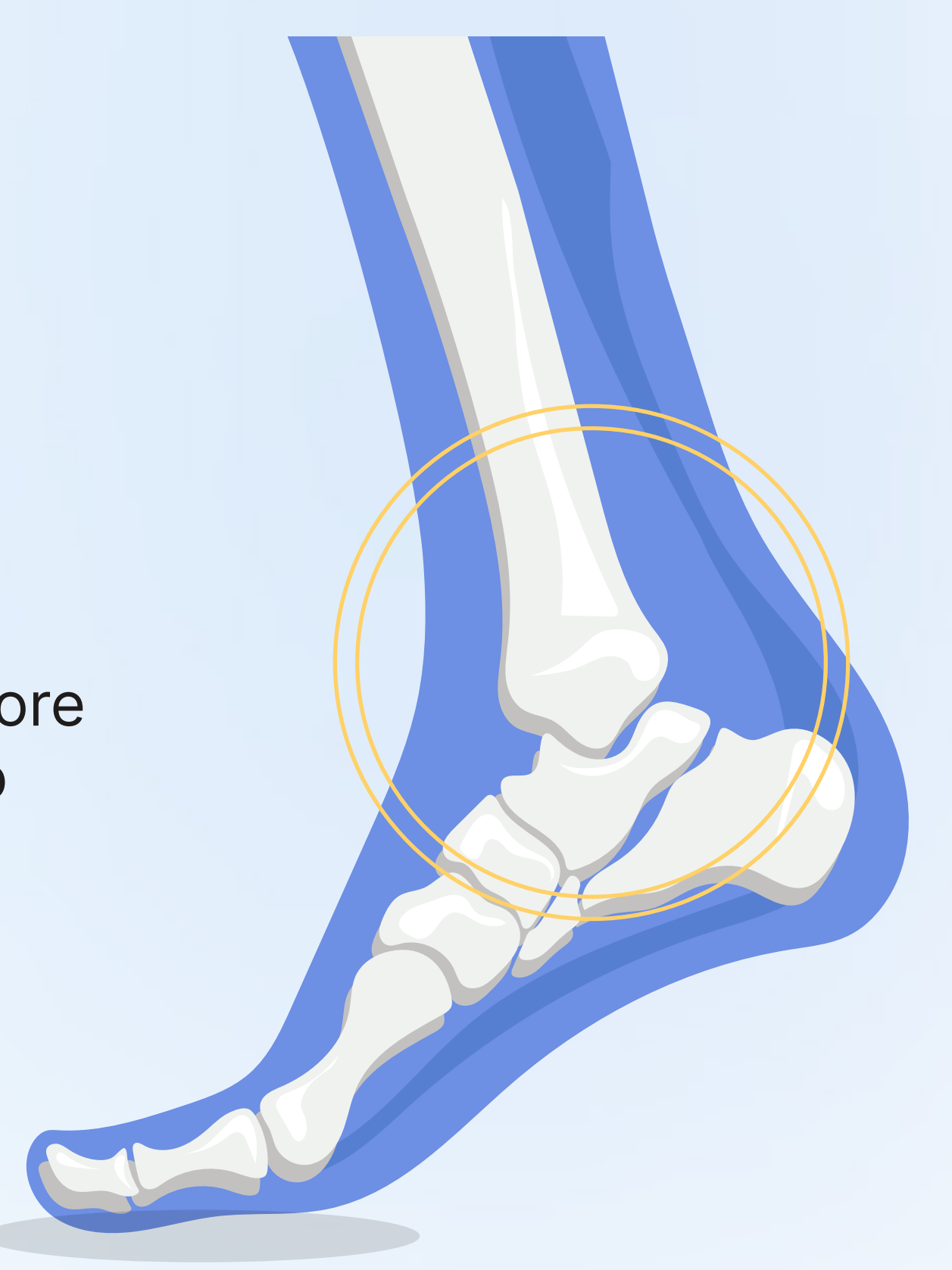
TBI/Concussion

Balance capabilities are worse in warfighters with a history of **repetitive mild TBIs** compared those with two or less mTBIs.

Walker, William C., et al. "Is balance performance reduced after mild traumatic brain injury?: Interim analysis from chronic effects of neurotrauma consortium (CENC) multi-centre study." *Brain Injury* 32.10 (2018): 1156-1168.

https://www.tandfonline.com/doi/full/10.1080/02699052.2018.1483529

MSK



Collegiate athletes with poor single leg balance capabilities may be **2.5 times** more likely to suffer an **ankle sprain** relative to those who score higher.

Trojian, Thomas H., and Douglas B. McKeag. "Single leg balance test to identify risk of ankle sprains." *British Journal of Sports Medicine* 40.7 (2006): 610-613.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2564306/