



FEMALE ATHLETE HEALTH INITIATIVE

Presented by Sportsmetrics™ and Cincinnati SportsMedicine Research and Education Foundation

Common Injuries in Female Athletes

What athletes need to know for their health and athletic performance

Muscle Imbalances

Knee Pain

– Knee cap pain, referred to as patellofemoral pain is a multifactorial injury involving malalignment of the knee bones (the patella, tibia, and femur). This malalignment can be caused by imbalances in muscle strength and tissue mobility that causes the knee cap to not track properly in the joint. Patellofemoral pain presents commonly in adolescent female athletes who are undergoing major physical transformations in their bones, muscles, and hormones due to puberty.

Shoulder injury

- Female athletes who participate in overhead sports such as volleyball and swimming are at an increased risk for developing injuries that damage the shoulder muscles, tendons, and ligaments that help control the stability of the shoulder. Common injuries include *rotator cuff impingement and/or tears, labral tears, and shoulder subluxations/dislocations*. The shoulder has a greater degree of movement than other joints in the body therefore it is necessary for overhead athletes to pay close attention to their shoulder health in order to ensure that they have proper shoulder posture and strength to tolerate the load of their sport.

Pelvic floor dysfunction

- Your pelvic floor refers to the muscles and other tissues that supports your bladder, uterus and bowels located deep in your pelvis. When these muscles are not working properly to support your organs, urinary incontinence or leaking can occur. This is especially prevalent in high impact sports such as ones that require running and jumping.



An estimated 47% of women who regularly engage in exercise report some degree of urinary incontinence.

Ligament Injuries

ACL injury - The anterior cruciate ligament (ACL) provides stability for the knee joint. This ligament is especially susceptible to injury in female athletes who perform jumping, cutting, turning, and twisting in their sport. One of the factors that leads to higher injury rates in females is related to strength and control of the body. factor, unlike our anatomy, can be influenced through training to decrease ACL injury risk.

ACL injury prevention is recommended for all female athletes at risk. To learn more about the Sportsmetrics™ ACL injury prevention program, scientifically proven to reduce noncontact ACL injuries visit [Sportsmetrics.org](https://www.sportsmetrics.org)



noncontact ACL injury rate is 2-6x higher in female athletes than in male athletes

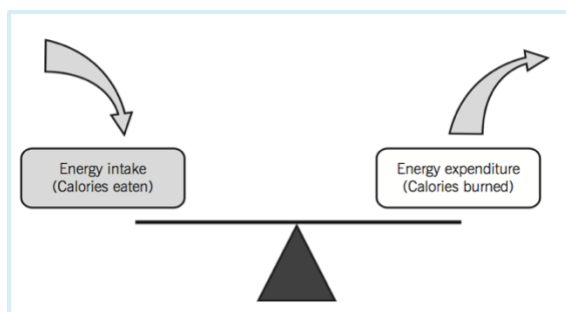
Over Use Injuries

Bone stress injuries- Bones are in a constant state of remodeling. Stress to your skeletal system is necessary for this remodeling to occur but when stress on your skeletal system becomes too much, your body is not able to rebuild fast enough and you end up breaking down bone more than you build it up. When this balance is disrupted, either due to too much loading from sports, inadequate nutrition, or hormonal imbalances, you're left with bone stress injuries. Bone stress injuries begin as stress reactions that if left untreated, can lead to stress fractures and even traumatic bone breaks.



Hormonal Imbalance

Low energy availability - Hormones are the body's signaling system allowing it to respond to



the environment to maintain homeostasis (a state of equilibrium). Hormonal and metabolic abnormalities caused by an inadequate diet can result in a reduction in sugar utilization, mobilization of fat stores, slowing of metabolic rate and a decreased production of growth hormone. In short, if your body doesn't take in enough carbohydrates (sugars), you begin breaking down the healthy parts of your body such as your bones in order to try and handle the stress that high level athletics has on your body.

Menstrual Dysfunction- Any menstrual cycle that does not occur every 28 days (+ or - 7 days) is dysfunctional. There are a few different dysfunctions that are important to distinguish between. **Primary amenorrhea** occurs when there is no menarche by age 15 years. **Secondary amenorrhea** is when there is an absence of three consecutive cycles post-menarche. **Oligomenorrhea** is a cycle length greater than 45 days. **Functional hypothalamic amenorrhea** is the absence of menses, commonly associated with exercise and stress.

When female athletes don't have enough energy left for their body's normal functions (as a result of over-training or lack of proper nutrition), it disrupts their hormones. This disruption causes a cascade of negative effects that lead to issues such as menstrual dysfunction, decreased bone density leading to stress fractures, and energy deficiencies due to inadequate dietary intake.



Hormonal contraceptives like those found in birth control pills can often mask the signs related to hormonal deficiencies. Estrogen, one of the main hormones in birth control plays a large role in signaling growth in your body. If your body is relying on your birth control for supplementation, you are not naturally producing the hormones you need, you are putting your body at increased risk for injury. Risk related to the female athlete triad and relative energy deficiency in sport should be analyzed if this is the case.

If you have ever had abnormalities in your menstrual cycle or if you are taking hormonal birth control, consult with your doctor to better understand your risks.

Concussion

Concussion is classified as a mild traumatic brain injury that occurs from forces applied directly or indirectly to the skull that results in the rapid acceleration and deceleration of the brain. Research has currently been finding that female athletes may be at higher risk for concussion. Here are a few theories on why this might be:

- *Physical differences:* Females have smaller heads and less neck strength than males leaving them at risk of greater head acceleration
- *More co-morbidities:* Migraines are 3x more common in females and since headaches are the most common symptom of concussion, this may be a factor in concussion diagnosis. Females that have gone through puberty are also at increased risk for depression and depressive symptoms that overlap with concussion symptoms
- *Social roles and expectations*
 - o Females are more likely than males to report concussion
 - o Medical providers are more likely to diagnose concussion in females

In high school soccer players, the odds of concussion diagnosis were 84% higher among female players compared with male players

Why should athletes be concerned about concussion?

- Brain injuries can lead to permeate changes and damages that effect your mental health, cognitive abilities, memory, sleep, and more
- If you've had a brain injury in the past you are more susceptible to repeat concussions that may also increase in symptom severity and healing time
- Sustaining a second concussion while you haven't healed from an initial one can lead to catastrophic brain injury and even death known as second impact syndrome



Talk with your doctor if...

- *If you experience pain in your muscles or joints with physical activity*
- *If you have a restrictive diet*
- *If you've had repetitive injuries to your bones*
- *You have or have had in the past, an abnormal menstrual cycle*
- *If you've sustained one or more head injuries in the past*
- *If you had a direct or indirect hit to your head followed by changes in your mental state*

Injuries need to be diagnosed and treated by a health care professional. Diagnosis and treatment will be different for every athlete depending on their risk factors. If you or an athlete you know is injured or at risk, talk with your doctor to find resources in your area.

Sources:

Albert PR, J Psych Neurosci 2015
Borglio, S.P., et al, JAT, 2014
Carter, C. W., et al, JAAOS, 2018
Chai, Curr Opin Neurol 2014
Chandran A et al, Res Sports Med 2019
Female Athlete Issues for the Team Physician: A Consensus Statement, Current Sports Medicine Reports, 2018
Greco, J Neurotrauma 2014
Joy, E., Van Hala, S., Cooper, L., AFP, 2009
Mihalik, AJSM 2013
Mihalik, J Sci Med Sport 2008
Wunderle, J Head Trauma Rehab 2014



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