

[Editorial]

Hoops News

Think philosophically for a moment: As sports medicine clinicians, what is our most important function? Some might say diagnosing illnesses. That's a hard one to argue, especially when it comes to cardiac conditions and the risk of sudden death. Others might focus on rehabilitation and training—no doubt major components of what we do. Many of us focus on injury prevention: keeping athletes on the field of play and trying to reduce the risks associated with joint injury such as posttraumatic osteoarthritis. Ligament trauma frequently alters joint kinematics and kinetics, injures articular cartilage, and often inhibits protective muscle function. Over the long term, these alterations in function can increase the risk of posttraumatic osteoarthritis at the shoulder, elbow, hip, knee, and ankle. So clearly, preventing joint injuries and providing the most appropriate care when they do occur are critical components of the total care of the athlete. In that light, honest, accurate assessments of our prevention and treatment efforts can help determine the most appropriate direction of future prevention programs and treatment protocols. Periodically, we are fortunate to get a report card on how well we are doing with properly designed studies.

The systematic review and meta-analysis by Taylor et al¹⁰ is the most current evaluation of injury prevention efforts in basketball. Basketball originated as a noncontact, finesse sport. However, it has evolved into a very physical contest emphasizing total body strength and leverage at the collegiate and professional ranks. Players often use their bodies to jostle for an advantageous position both on offense and defense. The girth and bulk of today's elite players hints at the demands of today's game. Contact mechanisms now account for the majority (69.2%) of acute injuries in basketball.³ It is a vertical and horizontal sport that combines jumping and rapid changes in direction. The axial rotation and lateral movement of the lower extremity is constant, along with the rapid momentum shifts. The vertical and horizontal movements of the game present many lower extremity opportunities for injury as torques and shear forces are applied to the ankle, knee, and hip. Those physical features and basketball's global popularity and participation generate many opportunities to study basketball injury epidemiology.

A European prospective cohort study of 164 players (mean age, 23.7 ± 7.0 years), both male and female, demonstrated an overall injury incidence of 9.8 (range, 8.5-11.1) per 1000 hours.³ The women's game has evolved to one similar to the men's, although it was not always like that. It used to be much less physical, slower, and focused on the half court in the past. To be competitive in today's game, women must train a lot harder, generating more overuse injuries than their male counterparts.⁸ Unfortunately, female players are now at a higher risk of injury (game-related injury rate, 24.9/1000 athlete exposures [AEs] vs 19.3/1000 AEs for men) at the elite level because of the physical evolution of the game and are even more in need of injury prevention efforts.⁴

For women, the rate of injury is almost twice as high at practice as in games, while preseason practice produces twice as many injuries as regular-season practice.¹ The highest rate of injury in basketball may actually be in adolescents, when the protective neuromuscular capacity is not fully developed. In a Nigerian prospective observational study of 141 adolescent players (75 boys and 66 girls; age range, 15-18 years), there were 1.1 injuries per game among boys and 0.9 injuries per game for girls.⁷ It looks like youngsters may need more training and conditioning before they get on the court.

In the development of the study featured in this editorial, Taylor et al¹⁰ reviewed 426 studies, selecting 10 for their meta-analysis. Details of the interventions were recorded for the randomized controlled or prospective cohort trials that were included. The interventions that were utilized were external supports, such as braces and high-top shoes, and neuromuscular training programs. This article is the most scientific evaluation of injury prevention efforts in basketball to date, and the results are quite interesting, both positive and negative.

In the general lower extremity injury category, which includes overuse and traumatic etiologies, injury prevention was successful. Looking more specifically at the ankle, these efforts were even better, clearly justifying the prevention efforts. Unfortunately for the knee, the 3 best studies, which focused on the prevention of anterior cruciate ligament (ACL) injuries, showed that these programs were not successful.

So, what insight and direction can we extract from these data? At the ankle it appears that static and dynamic balance training is the key, while external supports (braces) and high-top shoes are justifiable and should be implemented in basketball programs. Considering the vertical nature of basketball and the frequent 1-foot and off-balance jump landings, this is understandable. Most impressive, as the authors correctly pointed out, a numbers-needed-to-treat in 1 analysis showed that only 7 players were needed to participate in a 9-week balance training program to prevent an injury.⁶ That's pretty good odds! Those are the kind of numbers we would like to see for every prevention program. This is very worthwhile news for coaches, players, and parents, since a lateral ankle sprain is the most frequent orthopaedic injury in basketball, accounting for 53% of the games missed in the NBA.⁵

Injury prevention programs in the general lower extremity category were effective but not when looking specifically at the ACL. Very disappointing! In high school girls' basketball, the most common injury requiring surgery is a knee ligament sprain (47.9%).² With more than 25 years dedicated to ACL prevention work by many researchers, we're not there yet! So why haven't our efforts at the knee been more successful? Could it be that the numbers of participants in these trials are just too small and we need more involvement to see better results? Are the neuromuscular programs of today too general and are individualized programs based on risk assessment necessary with greater attention to structural and sex differences?⁹ Or, is there simply more work to be done on understanding the ACL injury mechanisms before we can design and implement more effective prevention programs? Well, I'm not sure where the

correct answer lies, but it certainly looks like we need to do a lot better in our prevention efforts to decrease the risk of ACL injuries in basketball, just like soccer and other high-risk sports.

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REFERENCES

1. Agel J, Olson DE, Dick R, Arendt EA, Marshall SW, Sikka RS. Descriptive epidemiology of collegiate women's basketball injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-1989 through 2003-2004. *J Athl Train.* 2007;42:202-210.
2. Borowski LA, Yard EE, Fields SK, Comstock RD. The epidemiology of US high school basketball injuries, 2005-2007. *Am J Sports Med.* 2008;36:2328-2335.
3. Cumps E, Verhagen E, Meeusen R. Prospective epidemiological study of basketball injuries during one competitive season: ankle sprains and overuse knee injuries. *J Sports Sci Med.* 2007;6:204-211.
4. Deitch JR, Starkey C, Walters SL, Moseley JB. Injury risk in professional basketball players: a comparison of Women's National Basketball Association and National Basketball Association athletes. *Am J Sports Med.* 2006;34:1077-1083.
5. Drakos MC, Domb B, Starkey C, Callahan L, Allen AA. Injury in the National Basketball Association. *Sports Health.* 2010;2:284-290.
6. Elis E, Schröter R, Schröder M, Gerss J, Rosenbaum D. Multistation proprioceptive exercise program prevents ankle injuries in basketball. *Med Sci Sports Exerc.* 2010;42:2098-2105.
7. Owoeye OBA, Akodu AK, Oladokun BM, Akinbo SRA. Incidence and pattern of injuries among adolescent basketball players in Nigeria. *Sports Med Arthrosc Rehabil Ther Tech.* 2012;4:15.
8. Roos KG, Marshall SW, Kerr ZY, et al. Epidemiology of overuse injuries in collegiate and high school athletics in the United States. *Am J Sports Med.* 2015;43:1790-1797.
9. Sturmeck DR, Vacek PM, DeSarno MJ, et al. Combined anatomic factors predicting risk of anterior cruciate ligament injury for males and females. *Am J Sports Med.* 2015;43:839-847.
10. Taylor JB, Ford KR, Nguyen A-D, Terry LN, Hegedus EJ. Prevention of lower extremity injuries in basketball: a systematic review and meta-analysis. *Sports Health.* 2015;7:392-398.