

Neuromuscular warm-up associated with reduced lower extremity injuries in adolescent female athletes

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Integrating a coach-led neuromuscular warm-up prior to sports practice appeared to reduce the risk of lower extremity injuries in female high school soccer and basketball athletes, according to a report in the November issue of *Archives of Pediatrics & Adolescent Medicine*.

"In girls' high school [sports](#), injury rates per 1,000 athlete exposures are highest in soccer (2.36) and [basketball](#) (2.01)," the authors write as background information in the study. "Knee injuries are the most common cause of permanent disability in female high school basketball players, accounting for up to 91 percent of season-ending injuries and 94 percent of injuries requiring surgery."

Cynthia R. LaBella, M.D., of the Feinberg School of Medicine, Northwestern University, Chicago, and colleagues, sought to examine if lower extremity injuries in adolescent female basketball and soccer [athletes](#) could be reduced by incorporating a neuromuscular warm-up prior to every practice and game. The authors invited 258 coaches from Chicago Public Schools to participate, and overall 90 coaches and 1,492 athletes participated. Coaches were randomly assigned to either the intervention group (those who instituted a neuromuscular warm-up) or a control group (those who maintained current warm-up procedures). The study focused on schools and coaches in a predominantly low-income, urban population.

Coaches in the intervention group attended a two-hour training session led by the principal investigator and head athletic trainer two weeks prior to the start of the 2006-2007 season. During the session, coaches were instructed on how to implement a 20-minute neuromuscular warm-up before every practice and an abbreviated version prior to each game. Neuromuscular training included progressive strengthening, balance, plyometric and agility exercises, as well as an educational component where coaches provided feedback to athletes to promote safe jumping and landing techniques designed to help avoid strain on the anterior cruciate ligament (ACL), which can cause knee injury.

Of 95 coaches randomized in the study, 90 (94.7 percent) participated, representing 36 of the 80 Chicago public high schools that offer girls' basketball or soccer programs. There were 755 athletes in the control group and 737 athletes in the intervention group. The control group had 96 lower extremity injuries, compared to 50 lower extremity injuries in the intervention group. Thirteen control athletes and two intervention athletes each sustained two lower extremity injuries. All athletes with noncontact lower extremity injuries that required surgery were in the control group. Teams using the warm-up more frequently had lower rates of acute-onset lower extremity injuries, but this difference was not significant.

Additionally, the authors estimated that the cost of training for a group of 15 to 20 coaches was roughly \$80 per [coach](#), suggesting that this program can feasibly be implemented in predominantly low-income, urban populations, such as the one studied. Intervention coaches reported using the prescribed warm-up before a mean (average) of 80 percent of practices, and only six of the 53 intervention coaches reported using the prescribed warm-up for less than 50 percent of practices. No control coaches were observed using any prescribed practices, and most omitted a warm-up or had athletes jog or warm-up by themselves.

"Coach-led neuromuscular warm-up reduces noncontact lower extremity injuries in female high school soccer and basketball athletes from a mixed-ethnicity, predominantly low-income, urban population," the authors conclude. "These findings suggest that neuromuscular training should be routine in girls' high school soccer and basketball."

In an accompanying editorial, M. Alison Brooks, M.D., M.P.H., and Timothy A. McGuine, Ph.D., A.T.C., both of the University of Wisconsin – Madison, write "each year, an estimated one in three female high school athletes sustains a soccer- or basketball-related injury. In addition to the economic impact of injury, these athletes may have long-term sequelae such as joint osteoarthritis, cessation of physical activity, higher rates of chronic medical conditions and worse self-reported quality of life."

"In this issue of the Archives, LaBella et al report their findings from a well-designed, large, cluster-randomized controlled trial in which they successfully implemented a coach-led neuromuscular warm-up in an underserved and at-risk population, specifically female athletes in low-income, mixed-ethnicity, urban communities," write Brooks and McGuine. "However, most coaches enrolled in the [control group](#) were observed not to include any type of warm-up routine in practice. When not part of a prescribed research intervention, coaches may not be motivated or knowledgeable to include a structured neuromuscular training program."

"LaBella and colleagues did not describe why nonparticipating coaches were unsatisfied with the warm-up program, why intervention coaches omitted certain exercises, or why control coaches included no warm-up routine at all," Brooks and McGuine continue. "This qualitative information may be key to identifying the beliefs and behaviors that are barriers to implementation of injury prevention strategies."

"In their concluding statement, LaBella and colleagues state that their 'findings suggest that NMT (neuromuscular training) should be routine in girls' high school soccer and basketball.' We could not agree more. But how do we get there from here?"

More information: *Arch Pediatr Adolesc Med.*
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