

# NEUROMUSCULAR WARM-UP REDUCES INJURY RATES AMONG FEMALE ATHLETES IN URBAN PUBLIC HIGH SCHOOLS: A CLUSTER-RANDOMIZED CONTROLLED TRIAL

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**Purpose:** To determine the effect of a structured neuromuscular warm-up on injury rates in female athletes in an urban public high school league.

**Methods and Study Design:** In 2006, we recruited 63 basketball and 31 soccer coaches and their athletes (837 and 655) from 46 Chicago public high schools, a school system where most students are non-white. After stratifying for team competitiveness and school population socio-economic status, we randomized teams by school to intervention (INT) or control group (CON). We trained INT coaches to implement a 20-minute structured neuromuscular warm-up before team practices, and told CON coaches to use their usual warm-up. Coaches in both groups submitted weekly reports of athlete exposures and all injuries resulting in a missed practice or game. Study personnel interviewed all injured athletes. We compared injury rates between INT and CON groups with Chi square and Fisher's exact tests.

**Results:** Total athlete exposures (AEs) were 28,023 (INT) and 22,925 (CON). INT coaches reported warm-up use in 1425 of 1773 practices (80.4%). Compared to CON athletes, INT athletes exposed to warm-up for  $\geq 50\%$  of practices had significantly lower rates of overuse lower extremity injuries (0.37 vs. 1.22 per AE;  $p < 0.001$ ), acute, non-contact, lower extremity injuries (0.69 vs. 1.61 per AE;  $p < 0.01$ ), non-contact ankle sprains (0.28 vs. 0.74 per AE;  $p < 0.05$ ), and non-contact knee sprains (0.12 vs. 0.48 per AE;  $p < 0.05$ ), and a lower rate of non-contact anterior cruciate ligament injuries that was marginally significant (0.04 vs. 0.26 per AE;  $p = 0.05$ ). Of the 1492 athletes, 1078 (55%) had parent consent to report their race: Hispanic (38%), Black/African American (37%), white (15%), mixed race (4%), other (6%).

**Conclusions:** This is the first study demonstrating a neuromuscular warm-up reduces lower extremity injuries in female soccer and basketball athletes in urban, public high schools.

**Significance of Findings:** Urban, public high school coaches can be trained to implement a neuromuscular warm-up as an injury prevention strategy for their female athletes. Female athletes from varied racial backgrounds can benefit from neuromuscular training.

**Acknowledgements:** Children's Memorial Research Center and Children's Memorial Office of Child Advocacy for funding this project. Northwestern University Biostatistics Collaboration Center for statistical support.



The Institute for Sports Medicine is comprised of a team of specialists with expertise in the treatment and prevention of the sports-related injuries and medical conditions unique to children and adolescents.