Physiological and Neuromuscular Risk Factors of Preventable Musculoskeletal Injuries in the Army 101st Airborne Division (Air Assault) Soldiers: A Prospective Study

BACKGROUND
- Musculoskeletal injuries have been a significant health problem among Soldiers and negatively impacted tactical readiness.
- The identification of prospective and modifiable risk factors of preventable musculoskeletal injuries can help Soldiers and health care providers to design specific injury prevention strategies.

PURPOSE
- To compare physiological and neuromuscular characteristics between Soldiers with and without prospective musculoskeletal injuries within 12 months following laboratory testing.

EXPERIMENTAL DESIGN / SUBJECTS
- All subjects went through an extensive 2-day laboratory testing.
- After 12 months following the testing, their medical charts were pulled using the Armed Forces Health Longitudinal Technology Application (ALTHA) injury data.
- Based on the medical-chart review from 491 Soldiers, a total of 179 Soldiers had no injuries (NOI) and 129 Soldiers had at least one preventable musculoskeletal injuries (INJ).
- The rest of Soldiers were excluded from the analysis due to their medical records of traumatic injuries, other medical conditions, or previous history of injuries.
- Preventable musculoskeletal injuries were those that, based on the injury classification itself, may be reduced through injury prevention programs (e.g., stress fractures) as well as injuries that potentially are preventable through injury prevention programs.
- Demographics (age, height, and weight) for each group are shown below (TABLE 1).

METHODS

PROCEDURES
- KNEE FLEXION/EXTENSION AND TRUNK ROTATION STRENGTH TEST
- Active knee extension (for hamstring flexibility) and active trunk rotation range of motion (ROM) was assessed with a digital inclinometer (FIGURE 2) and the Biodex with the trunk rotation attachment.

RESULTS
- There were 157 preventable musculoskeletal injuries identified among the INJ group: most commonly, ankle, low-back, knee, and shoulder.
- The INJ group demonstrated significantly less knee flexion/extension strength ratio, trunk rotation strength, anaerobic capacity, and eyes-closed balance (TABLE 2).

SUMMARY AND CONCLUSIONS
- The current investigation revealed several physiological and neuromuscular characteristics that are associated with the Soldiers who later sustain musculoskeletal injuries.
- Further analyses on those variables on specific injuries are warranted.