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The 1996 Gait Analysis in Rehabilitation Medicine priorities conference provided a road map for the development of gait analysis as a clinical decision making tool, and the extent of this tool into the medical community at large. Its focus was largely on lower extremity kinematics and kinetics in populations with neuromuscular dysfunction. With the present conference's extension of focus to biomechanics in general, there is an opportunity to also extend the benefits of the conference recommendations. The past 20 years have seen a dramatic increase in the number of children involved in formal sports and recreational activities, and a corresponding rise in injuries associated with these activities. While the analysis of gait in healthy children might not be clinically useful, the use of motion analysis methods in the study of athletic activities may provide clinically relevant information.

Recommendation #1: Identify biomechanical parameters which are activity-specific injury precursors, stratified by age and gender.

Formal participation in sports and other recreational activities begins at increasingly earlier ages. Examples include Little League eligibility beginning at age 5, or the talent search program maintained by USA Gymnastics with a minimum age of 7. While a number of reports have highlighted the risk of overuse injuries in skeletally immature bodies, the relationships between underlying parameters (e.g. cellular and musculoskeletal measures) and biomechanical outcomes are not well understood. Clarifying these relationships and understanding what puts particular individuals at risk will improve the long-term recreational health of individuals, which in turn contributes to overall physical, emotional, and social well-being.

Recommendation #2: Develop refined models which predict changes in biomechanical behaviors based on alterations in underlying musculoskeletal biology and neuromuscular control.

Most sports participation involves some combination of training, conditioning, and technique. Studies of training and conditioning methods and their effect on athletic performance generally focus on clearly relevant metrics. The outcome of a core strengthening regimen might be studied with changes in COP excursion during a balance test, or the result of a calf strengthening protocol studied with increases in vertical leap. Biomechanical modeling methods (whether inverse or forward) are infrequently employed for assessing such changes, but are well-suited for characterizing alterations in musculoskeletal behavior, including changes in joint torques and loading. Refined models which incorporate measures of musculoskeletal geometry (related to conditioning) and neuromuscular control (related to technique) would be beneficial on a number of levels, including injury prevention and education.

In summary, I suggest that while developing priorities for the future of biomechanics research, we include applications in sports and recreational activities. In reducing injury risk and prolonging recreational health, we can directly improve fitness and well-being in persons of all ages and abilities.