

Physical Contributors to Throwing Injury: A Prospective Study
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Baseball is one of the most popular sports in the United States with an estimated 20 million individuals participating as amateurs across the country. Accompanying this high popularity, is a high incidence of throwing related shoulder and elbow injuries in players ranging from the youth to the professional levels. Injuries in the throwing arm of pitchers make up a large portion of these reported injuries, with nearly 50% of all pitchers experiencing sufficient shoulder and/or elbow pain that prevents participation at some point in their career. Suggested contributors to throwing related injury include extrinsic participation factors such as lack of adequate rest and recovery, number and type of throws performed, and faulty throwing mechanics. In addition to these extrinsic participation factors, modifiable intrinsic physical characteristics such as scapular dysfunction, glenohumeral internal rotation deficit, tightness of the posterior capsule and musculature, and muscle imbalances and weakness are also suspected contributors to injury. These factors are considered modifiable, because they have the capacity to be improved through therapeutic exercise. Modifiable intrinsic factors are widely considered as causes of throwing related upper extremity injury, however the contribution of these factors to injury have not been demonstrated in a prospective study. The primary purpose of this study is to prospectively identify whether there are modifiable physical characteristics present in throwers who subsequently sustain a throwing related injury and whether injury potential can be predicted based on clinical screening of these physical characteristics. Fortunately for clinicians, these physical characteristics can be quickly screened for during pre-participation screenings. If these physical adaptations are present prior to injury and are predictive of whether someone will get injured, injury prevention programs can be implemented to modify these intrinsic characteristics in hopes of decreasing injury.

Specific Aim 1: The first aim of this study is to prospectively determine if the modifiable intrinsic physical characteristics thought to contribute to shoulder and/or elbow injuries are present in high school baseball players prior to sustaining a throwing related injury, and if they are predictive of injury. Specifically, glenohumeral rotation range of motion, posterior shoulder tightness, shoulder girdle muscle strength, and scapular motion will be assessed prospectively in a cohort of high school baseball players from 30 baseball teams (600 athletes per season) across central North Carolina.

Specific Aim 2: This second specific aim of this study is to determine the feasibility of obtaining injury surveillance data and data related to extrinsic factors associated with injury in a high school baseball population. The specific injury surveillance and variables related to extrinsic injury risk factors to be collected include number of exposures, injuries sustained, injury incidence, injury prevalence, time loss due to injury, years of participation in organized baseball, primary position of play, secondary positions of play, months out of the past two years participating in baseball competition, practice, and training, nature and number of leagues and teams played for in the past two years, current participation in other organized sports, and pitch counts and innings pitched for participants who pitch in games.

To date, the modifiable physical characteristics that we will test have been suggested as causes of throwing related shoulder/elbow injury. This is based on retrospective research studies that link them to injury through identification of abnormalities AFTER the injury has occurred. While these retrospective results regarding throwing related injury provide valuable information related to possible causes of shoulder/elbow injury, readers of this literature still question whether these characteristics resulted from the injury OR were present BEFORE the injury. The proposed study is the first to prospectively assess these modifiable physical characteristics and identify if these characteristics are present in throwers prior to sustaining the injury. The physical characteristics identified to predict injury from the current study, can be accurately screened by clinicians as part of pre-participation screenings, and appropriate prevention exercises can be initiated prior to injury occurrence. Ultimately, if a clinician can identify a potential for injury and intervene with an appropriate prevention program, the injury risk should be reduced. Therefore, the results of this study will have immediate and direct application for the clinicians who treat, rehabilitate, and prevent injury in the overhead athlete.