The Impact of Swing Biomechanics on Injury Risk Among Major League Baseball Players: Insights from Newly Released Data

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Disclosures: None

Introduction
Injuries in Major League Baseball (MLB) are detrimental to the success of players and teams and produce significant financial loss. Previous research has linked pitcher biomechanics and pitch metrics to injury risk, however, there is a paucity of research examining injuries among batters. Statcast data on MLB batter swings was made publicly available for the first time in May 2025. The purpose of this study was to determine whether swing metrics such as swing speed and swing tilt are independent predictors of injury burden among MLB batters.

Methods
Swing data–including swing speed, swing tilt, attack angle, and attack direction–were collected from all players with ≥ 100 swings recorded during the 2023 MLB season using publicly available Statcast data. Players who did not play in 2024 due to non-injury reasons were excluded. 389 players were included in the final analysis. Outcome measures of interest were total days spent on the IL and total number of individual IL stints during the 2024 season. Linear and logistic regression models were used to assess the impact of swing metrics on outcome measures after controlling for player demographic variables including age, weight, primary position, handedness, and previous season workload.

Results
Swing speed and tilt are independent predictors of total days spent on the IL. After controlling for player body composition, age, handedness, position, and prior workload, each 1 mph increase in average swing speed corresponded to a 5% increase in total IL days, while each 1° increase in average swing tilt was associated with a 1% increase. Switch hitters experienced 49% more IL days. Primary position is also strongly associated with both total IL days and number of individual IL stints.

Discussion
MLB player swing speed and swing tilt are independent, positive predictors of total days spent on the injured list. Understanding biomechanical risk factors for player injury can help surgeons, trainers, players, and coaches maximize performance while minimizing injury risk. Recent advancements in training have pushed for increased bat swing speed at all costs, though our data shows this is likely to lead to increased time spent on the injured list.

Significance/Clinical Relevance
Increasing swing speed is associated with increased risk of player injury. Players, coaches, and organizations should consider this risk when designing training and development plans for batters.

Images/Tables
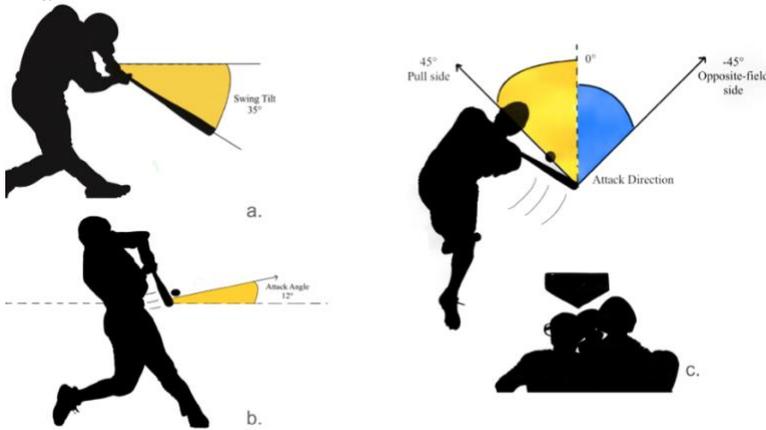
Variable	IRR	95% CI	p-value
Age	0.991	0.985-0.998	0.0136
Height	1.01	1.01-1.02	< 0.001
Weight	0.993	0.991-0.995	< 0.001
Swing Speed	1.05	1.04-1.06	< 0.001
Swing Tilt	1.01	1.00-1.02	0.0017
PA in 2023	0.999	0.999-1.00	0.413
Attack Angle	1.00	0.997-1.01	0.251
Attack Direction	1.00	0.993-1.01	0.911
Handedness			
Left (ref)	-	-	Reference
Switch	1.49	1.35-1.64	< 0.001
Right	0.973	0.923-1.03	0.311
Position			
1B (ref)	-	-	Reference
SS	1.85	1.66-2.06	< 0.001
3B	1.85	1.67-2.05	< 0.001
OF	1.26	1.15-1.38	< 0.001
DH	0.68	0.540-0.841	< 0.001
2B	1.05	0.933-1.18	0.416
C	1.05	0.938-1.17	0.425