

BILATERAL FORCE ASYMMETRIES IN NCAA D1 SOFTBALL STARTERS VS NON-STARTERS: A POTENTIAL METRIC FOR TALENT IDENTIFICATION

LeAnn L. Dromgoole¹, Benjamin P. Doyle^{1,2}, J. Bryan Mann^{1,2}

¹Performance and Fatigue Laboratory, Department of Kinesiology & Sport Management, Texas A&M University, College Station, Texas

²Sydney & J.L. Huffines Institute for Sports Medicine and Human Performance, Texas A&M University, College Station, Texas

BACKGROUND

- Historically, player selection has been based on fundamental performance metrics such as speed, strength, and batting and throwing mechanics, along with in-game performance (1).
- However, emerging evidence suggests that these measures alone may not be sufficient in distinguishing top performers from their peers (1).
- Bilateral asymmetries create an interesting outlook within softball because it is focusing on how repetitive, sport-specific movements create imbalances in muscle strength and function. In softball, this is of high interest because of how it impacts performance, injury risk, and training prescription (2).
- Bilateral asymmetry is inevitable due to the sport's repetitive, high-intensity movements, but rather than being inherently bad, it serves as a valuable measure to determine at what point the imbalance transitions from a natural performance adaptation to a potential risk for injury or decreased efficiency (2).

PURPOSE

- The aim of this study was to identify differences between starters (ST) and non-starters (NS) among collegiate softball players using body mass, jump height, peak force, and change of direction (COD).

RESULTS

Figure 1: Anthropometrics

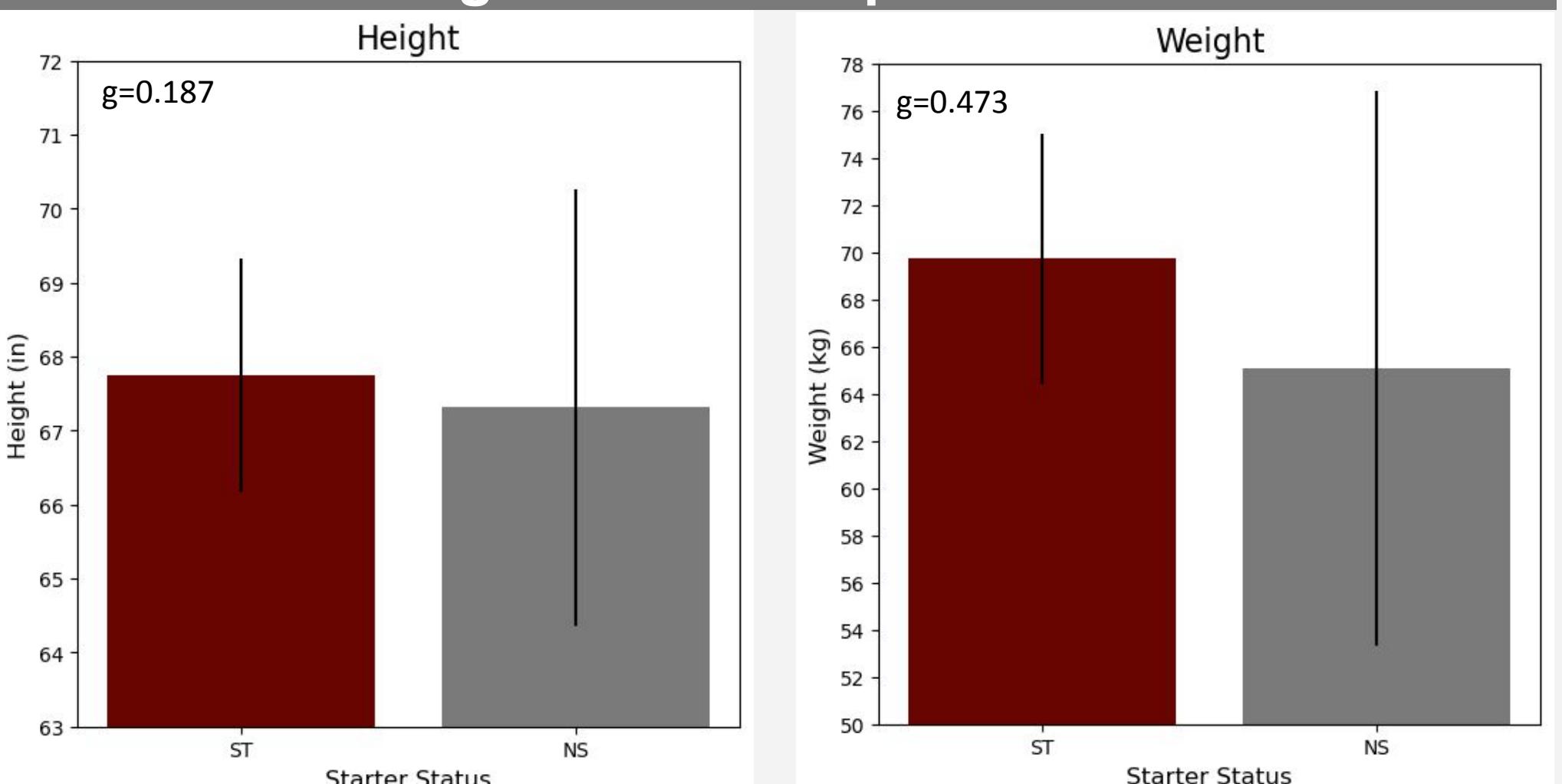


Figure 2: Countermovement Jumps

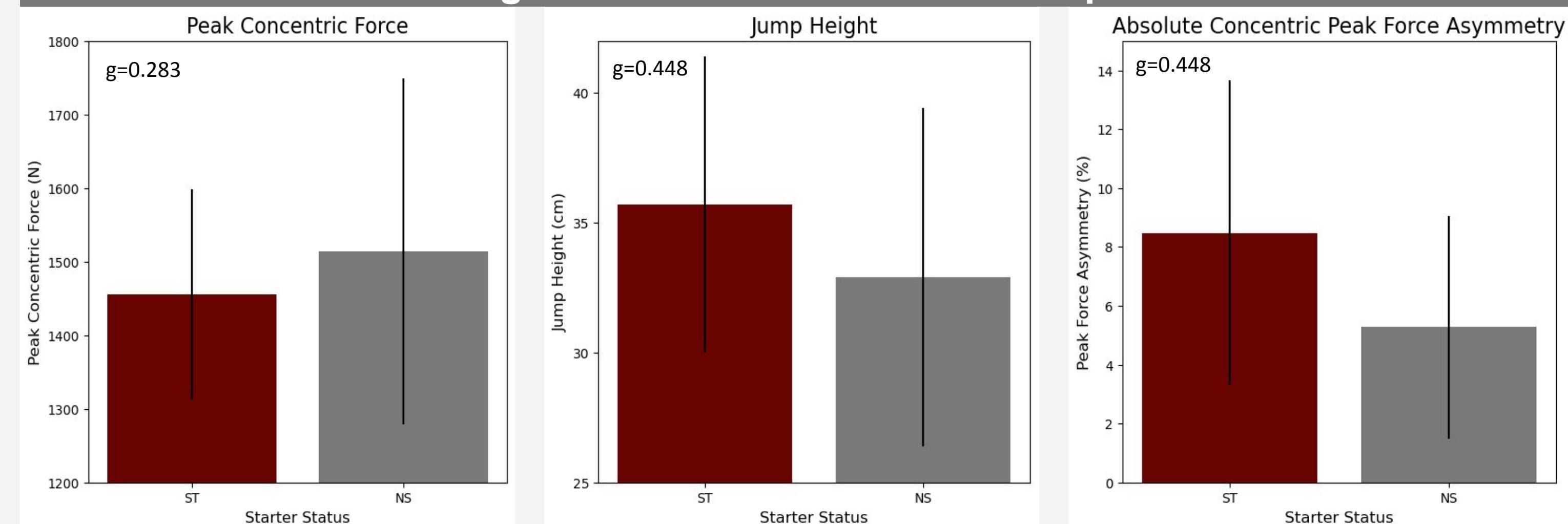


Figure 3: Linear Speed & Momentum

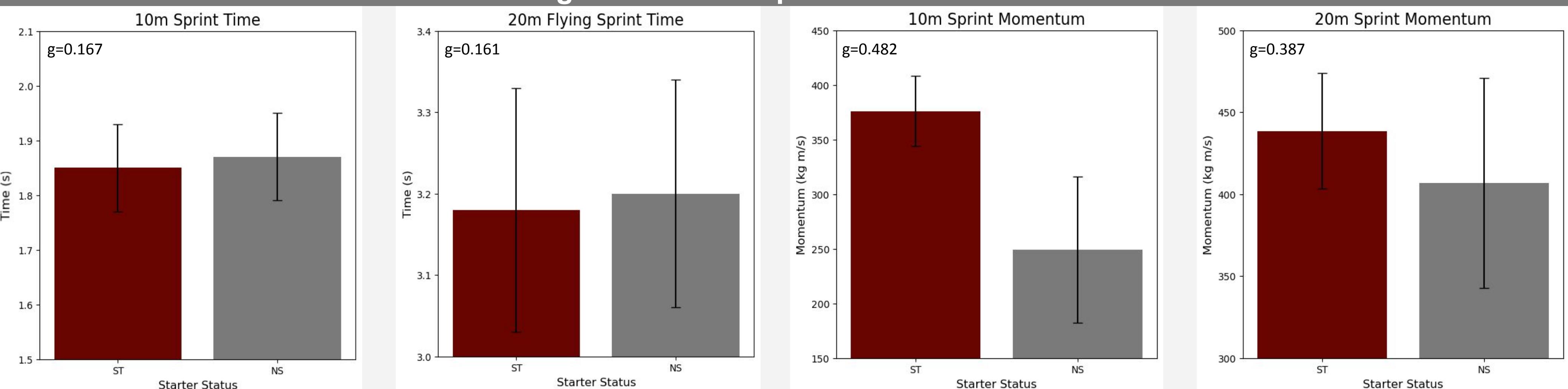


Figure 4: Change of Direction

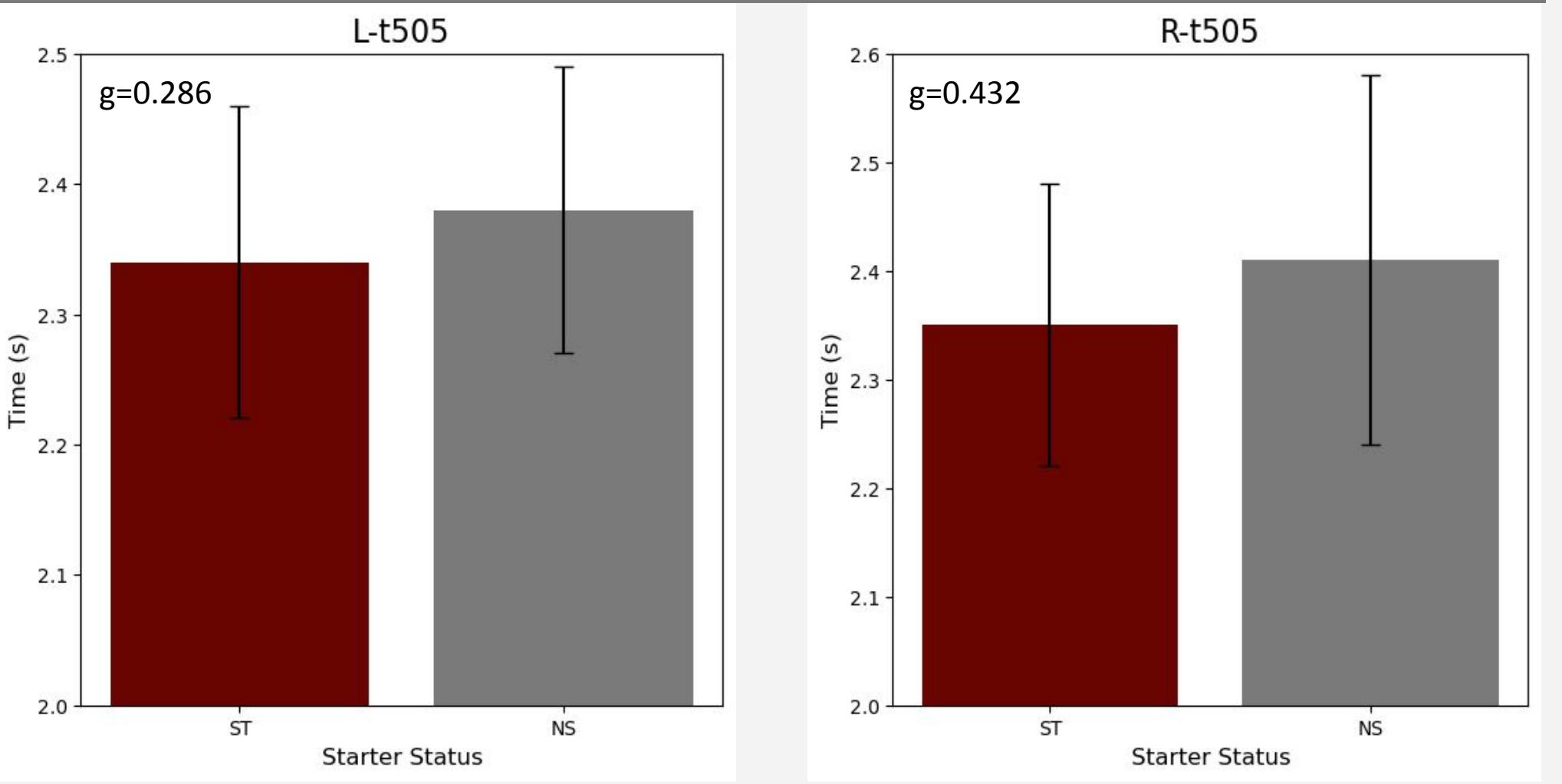
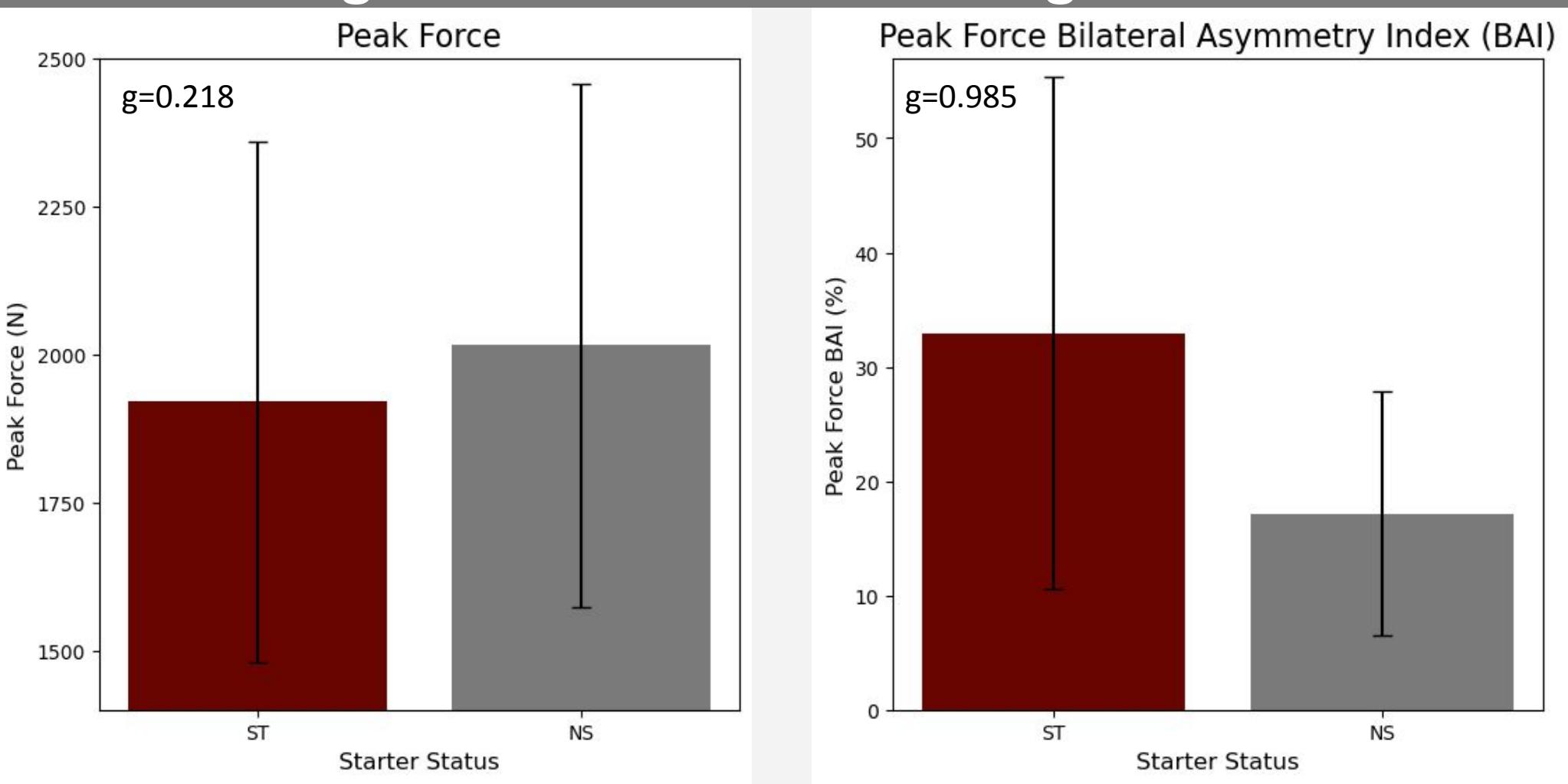


Figure 5: Isometric Mid-Thigh Pulls



METHODS

- This study evaluated the performance of 8 starters (ST) and 13 non-starters (NS) softball players at an NCAA Division I school (n=21).
- ST were defined as players who started at least 50% of games during the season.
- Countermovement jumps (CMJ) and isometric mid-thigh pulls (IMTP) were used to assess peak concentric force, jump height, and bilateral force asymmetries using force plates.
- Body weight was measured during CMJ testing. Height was measured using a stadiometer.
- Sprint speed was measured using 10m (t10) and 20m (t20) sprints timed with laser timing gates. Momentum (p) calculated for speed by multiplying average test velocity by body weight.
- Change of direction (COD) ability was measured using Left (L) and Right (R) 505 agility test times (t505).
- Statistical Methods:** ST and NS were compared using effect sizes (Hedge's g) and independent samples T-tests ($\alpha = 0.05$).

DISCUSSION

- While traditional metrics like speed, jump height, and momentum showed only small differences between ST and NS, CMJ peak concentric force asymmetry ($g=0.74$) and IMTP bilateral asymmetry index (BAI) ($g=0.99$) showed moderate-to-large effect sizes favoring ST.
 - This suggests that force asymmetry may be a distinguishing factor among players but further research is necessary.
- Though the differences were small, ST had greater body weight ($g=0.47$) and jump heights ($g=0.45$) than NS.
- Momentum ($g=0.48$) and sprints ($g=0.39$) were slightly faster for ST (Figure 3).
- No statistically significant differences were found, but the study's limitations, particularly the sample size, should be considered.

CONCLUSIONS

- While small differences may exist in weight, peak CMJ and IMTP force, COD, and momentum, these may not be optimal to distinguish performance between starters and nonstarters.
- CMJ concentric peak force asymmetry and IMTP peak force asymmetry revealed moderate-to-large effect differences between starters and nonstarters, demonstrating its potential advantage for elite softball players.
- These results suggest that starters may produce more force and power but in a less symmetrical manner. Future research should aim to explain how bilateral force asymmetries impact softball performance and thus can be used as a talent identification tool.

PRACTICAL APPLICATIONS

- When coaches are evaluating weight, COD, speed, and momentum, they may expect a small difference between the ST and NS, but should not rely heavily on these results.
- Coaches selecting starters should begin to consider using bilateral force asymmetries for evaluating player performance.
- This research may be impactful for beginning a paradigm shift in coaches and sports medicine professionals that asymmetries may not be strictly harmful in players.

REFERENCES

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CONTACT

LeAnn Dromgoole
Undergraduate Student at Texas A&M University
Email: ldromgoole2021@tamu.edu