

# COUNTERMOVEMENT JUMPS, DOES A COMPETITIVE GAME OF SOCCER IMPACT THEM?

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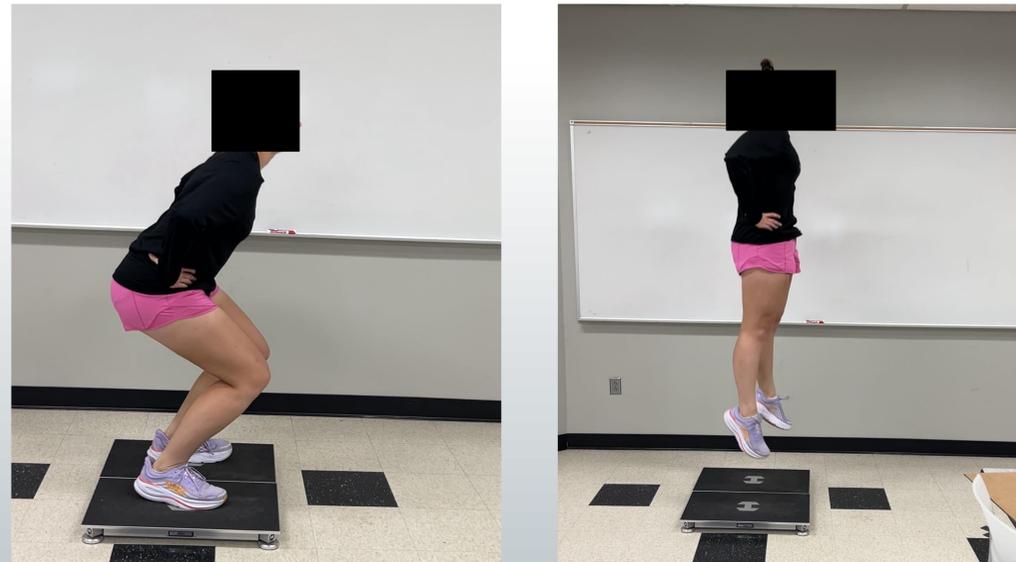


## INTRODUCTION

Human performance (aerobic and anaerobic) can be negatively impacted post-exercise. However, what specific variables is one assessing, and are they the appropriate variables to determine if the exercise caused positive or negative physiological changes? Regardless, assessing and understanding said testing can have immediate and long-term impacts on individual athletes and potential team performance.

## METHODS

Fifteen healthy female soccer players (age = 19.20 ± 1.01 years, height 166.77 cm ± 5.62 cm, mass 63.60 kg ± 6.90 kg) volunteered to participate in this study. Any lower extremity injuries resulted in exclusion from the study. Each participant performed three countermovement jumps before and after participating in a seventy-minute scrimmage. For each CMJ, fifteen-thirty seconds of rest were allowed in between attempts. All pre and post jumps per athlete were included for analysis. A wireless uniaxial dual force plate system sampling at 1,000 Hz was used to measure CMJ performance. Jumping performance measured the eccentric phase (braking phase duration, eccentric braking mean velocity, eccentric braking peak velocity, eccentric mean force, eccentric braking peak force) concentric phase (takeoff time, jump momentum, concentric phase duration, concentric propulsive mean velocity, concentric propulsive peak velocity, concentric propulsive mean force, concentric propulsive peak force, concentric propulsive mean power, concentric propulsive peak power) and other variables (vertical jump height, RSI-modified). A Paired Samples t-test was used to assess pre and post CMJ performance, and an alpha of 0.05 was used for level of significance.



**Figure 1.** Includes pictures of the countermovement jump (CMJ) during the lowering (braking) and jumping (propulsive) phases. Participants were instructed to keep hands on their hips the whole time and were asked to jump as high as they could.

Metric	Pre-Competition	Post-Competition	P value
<b>Eccentric</b>			
Braking Phase Duration (s)	0.19 (0.06)	0.19 (0.05)	0.021*
Braking Mean Velocity (m·s <sup>-1</sup> )	-0.64 (0.13)	-0.64 (0.09)	0.692
Braking Peak Velocity (m·s <sup>-1</sup> )	-0.96 (0.22)	-0.96 (0.16)	0.939
Braking Mean Force (N)	967.93 (157.51)	963.46 (144.31)	0.569
Braking Peak Force (N)	1299.91 (214.31)	1289.16 (210.82)	0.477
<b>Concentric</b>			
Takeoff Velocity (m·s <sup>-1</sup> )	2.29 (0.19)	2.26 (0.17)	0.045*
Jump Momentum (N·s <sup>-1</sup> )	145.56 (15.06)	141.72 (13.38)	<0.001*
Phase Duration (s)	0.27 (0.04)	0.26 (0.04)	0.036*
Propulsive Mean Velocity (m·s <sup>-1</sup> )	1.37 (0.12)	1.36 (0.12)	0.094
Propulsive Peak Velocity (m·s <sup>-1</sup> )	2.42 (0.18)	2.39 (0.16)	0.028*
Propulsive Mean Force (N)	1178.03 (144.41)	1180.26 (140.27)	0.792
Propulsive Peak Force (N)	1418.73 (178.16)	1437.27 (178.51)	0.192
Propulsive Mean Power (W)	1491.93 (214.17)	1473.84 (198.99)	0.236
Propulsive Peak Power (W)	2761.92 (304.48)	2741.74 (281.29)	0.331
<b>Other</b>			
Vertical Jump Height (cm)	26.93 (4.45)	26.22 (3.88)	0.041*
RSI Modified	0.34 (0.08)	0.35 (0.07)	0.091

\* Significant difference <0.05

**Table 1.** Average (SD) values for countermovement jump metrics

## RESULTS

For the eccentric phase, only the braking phase duration was significant (p=0.021), all other variables were non-significant (p=0.477 – 0.939). For the concentric phase, significant differences were seen for jump momentum, peak velocity, takeoff velocity, and propulsive phase (p= 0.001 – 0.045). No differences were observed for any other concentric variables (p= 0.094 – 0.792). A significant difference was observed for vertical jump height (p = 0.041); no differences were seen for RSI-modified (p = 0.091 ).

## CONCLUSIONS

The present findings observed a significant difference for the braking phase duration post-match, while jump momentum and propulsive phase duration, peak velocity, and takeoff were all significantly decreased post-match. Lastly, the vertical jump height was significantly lower post-match compared to pre.

## PRACTICAL APPLICATIONS

Assessment of sport performance before and after a competitive game (scrimmage, full-game) can provide coaches and health care staff vital information, allowing for the potential modification of programming or rest protocols if needed. While strength and conditioning workouts, coupled with specific sport practice, can provide positive physiological adaptations, increased fatigue and decreased recovery capabilities may result from the overall volume athletes experience. Future research may benefit from using portable force plates to track fatigue and recovery across competitive seasons.

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