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EFFECTS OF AN ARM SWING ON DROP AND SQUAT JUMP PERFORMANCE IN RECREATIONALLY TRAINED ADULTS

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ABSTRACT

Drop jumps (DJ) and squat jumps (SJ) are common assessments of vertical jump capabilities and overall athletic performance. In research studies and in clinical settings, the DJ and SJ are commonly performed without the use of an arm swing (hands placed on hips) to control for the effects of upper-body movement on vertical jump performance. However, in field-based settings, such as during an exercise routine, an arm swing is commonly employed during the DJ and SJ, which may augment overall performance. While jumping with no arm swing may allow for more precise, controlled assessments of lower-body performance, integrating the use of an arm swing may yield more sport-specific results. **PURPOSE:** The purpose of this study was to compare the effects of arm swing (AS) and no arm swing (NAS) on DJ and SJ performance. **METHODS:** Eleven recreationally trained males and females (age=23±2 yrs, height=171±7 cm, body mass=72±12 kg) participated. Participants completed six DJs, from a drop height of 30 cm, and six SJs, three with AS and three with NAS for each jump type, in random order. Ground reaction forces were collected using force plates for the right and left foot during all DJs and SJs to quantify vertical jump metrics. For the DJ, the following metrics were calculated: eccentric phase duration, countermovement depth, eccentric impulse, force at the low position, eccentric rate of force development (RFD), mean eccentric force, eccentric stiffness, concentric phase duration, concentric impulse, peak concentric power, mean concentric force, jump height, and reactive strength index (RSI). For the SJ, the following metrics were calculated: concentric phase duration, peak concentric power, mean concentric force, jump height, and RSI. Dependent samples *t*-tests were used to examine differences for all DJ and SJ metrics. An alpha level of 0.05 was considered statistically significant for all tests. **RESULTS:** For the DJ, the AS condition resulted in greater concentric phase duration, concentric impulse, peak concentric power, and jump height ($p \leq 0.010$), and lower force at the low position ($p = 0.010$). For the SJ, the AS condition resulted in greater concentric impulse, jump height, and concentric peak power ($p \leq 0.004$). **CONCLUSIONS:** The present study demonstrates that using an arm swing for DJs and SJs may result in superior jump metrics. These results suggest that the mechanical influence of an arm swing on vertical jump performance is worth consideration. **PRACTICAL APPLICATIONS:** Although prohibiting an arm swing during the DJ and SJ may permit a better understanding lower-body-specific performance, which may be beneficial in research and/or clinical settings when experimental control is a priority, permitting the use of an arm swing may allow a more holistic examination of overall athletic performance and sport-specific capabilities during jumping movements. This may prove beneficial when the priority is sport-specific testing, particularly in field-based settings.

PURPOSE

The countermovement jump (CMJ) is a common assessment of vertical jump capabilities and overall athletic performance. In research studies and in clinical settings, the CMJ is commonly performed without the use of an arm swing (hands placed on hips) to control for the effects of upper-body movement on vertical jump performance. However, in field-based settings, such as during an exercise routine, an arm swing is commonly employed during the CMJ, which may augment overall performance. While jumping with no arm swing may allow for more precise, controlled assessments of lower-body performance, integrating the use of arm swing may yield more sport-specific results. The purpose of this study was to compare the effects of arm swing (AS) and no arm swing (NAS) on CMJ performance.

- Utilizing an arm swing during SJ and DJ leads to greater performance
- Arms akimbo may be useful in monitoring acute changes in fatigue and neuromuscular status
- Arm swing may be useful for monitoring performance changes between training phases
- Force at low position relative to body weight may offer insight into the efficiency of jump mechanics

METHODS

Eleven recreationally trained males and females (age=23±2 yrs, height=171±7 cm, body mass=72±12 kg) participated. Participants completed six DJs, from a drop height of 30 cm, and six SJs, three with AS and three with NAS for each jump type, in random order. Ground reaction forces were collected using force plates for the right and left foot during all DJs and SJs to quantify vertical jump metrics. For the DJ, the following metrics were calculated: eccentric phase duration, countermovement depth, eccentric impulse, force at the low position, eccentric rate of force development (RFD), mean eccentric force, eccentric stiffness, concentric phase duration, concentric impulse, peak concentric power, mean concentric force, jump height, and reactive strength index (RSI). For the SJ, the following metrics were calculated: concentric phase duration, peak concentric power, mean concentric force, jump height, and RSI. Dependent samples *t*-tests were used to examine differences for all DJ and SJ metrics. An alpha level of 0.05 was considered statistically significant for all tests.

Results

For the DJ, the AS condition resulted in greater concentric phase duration, concentric impulse, peak concentric power, and jump height ($p \leq 0.010$), and lower force at the low position ($p = 0.010$). For the SJ, the AS condition resulted in greater concentric impulse, jump height, and concentric peak power ($p \leq 0.004$).

Conclusion

The present study demonstrates that using an arm swing for DJs and SJs may result in superior jump metrics. These results suggest that the mechanical influence of an arm swing on vertical jump performance is worth consideration. PRACTICAL **APPLICATION**: Although prohibiting an arm swing during the DJ and SJ may permit a better understanding lower-body-specific performance, which may be beneficial in research and/or clinical settings when experimental control is a priority, permitting the use of an arm swing may allow a more holistic examination of overall athletic performance and sport-specific capabilities during jumping movements. This may prove beneficial when the priority is sport-specific testing, particularly in field-based settings.