

# TRUNK KINEMATICS DURING THE TEE-SHOT OF MALE AND FEMALE GOLFERS

Michael H. Cole<sup>1</sup> and Paul N. Grimshaw<sup>2</sup>

University of South Australia, Australia<sup>1</sup>

University of Adelaide, Australia<sup>2</sup>

**KEY WORDS:** Golf; Shoulder Movement; Pelvic Movement; Hip to Shoulder Differential.

**INTRODUCTION:** While females comprise 20% of the golfing population in some Western countries (e.g. Australian Bureau of Statistics, 2007), previous research has typically assessed populations that are exclusively comprised of male golfers (e.g. Cheetham et al., 2008). However, the overall prevalence of golf-related injuries is reported to be similar for males and females (McHardy et al., 2006) and thus, it is of interest to assess whether the kinematics of the female golf swing are similar to those demonstrated by male players. This is important, as this knowledge will ensure that any changes that are made by coaches to improve performance and/or reduce the risk of injury in these golfers are appropriate.

**METHOD:** Hip, shoulder and trunk kinematics of a group of male (n = 5) and female (n = 5) golfers were compared during the performance of the tee-shot. Whilst performing 20 tee-shots, participants were filmed by three genlocked video cameras (50 Hz) and 3D kinematics were derived using Peak Motus 2000. The 3D kinematics were used to calculate; 1) *Hip angle*: the angle formed between the inter-trochanter vector and a theoretical line parallel to the y-axis between the tee and the target (Transverse plane); 2) *Shoulder angle*: the angle formed between the inter-acromion vector and the same theoretical line used to calculate hip angle (Transverse plane); 3) *X-Factor*: the differential angle between the inter-trochanter and the inter-acromion vectors (Transverse plane). To examine for statistically significant differences between the groups, the Mann-Whitney *U* test was used.

**RESULTS:** Female golfers showed an increased hip rotation range of motion (ROM) during the backswing (BS) and increased hip and shoulder rotation ROM during the downswing (DS). Given the concomitant differences in hip and shoulder rotation, it is not surprising that the groups did not differ with respect to X-Factor values throughout the swing (Table 1).

**Table 1: Hip and shoulder ROM during the BS and DS and the peak X-Factor. \*  $p < 0.05$ ; \*  $p < 0.1$**

		Male (n = 5)		Female (n = 5)	
		Mean	SD	Mean	SD
<b>Hip Angle ROM (deg)</b>	BS	37.8*	10.2	49.9*	4.4
	DS	62.4*	10.2	82.3*	11.3
<b>Shoulder Angle ROM (deg)</b>	BS	97.7*	6.1	109.7*	11.4
	DS	97.6*	8.0	124.5*	22.3
<b>Peak X-Factor (deg)</b>		56.6	9.1	55.9	12.6

**DISCUSSION:** The findings of this research are important, as coaches have often believed the female golf swing to be a slower version of the male golf swing. This research demonstrates that the golf swings of male and female golfers differ significantly with respect to the patterns of hip and shoulder rotation, which may suggest that female golfers could benefit from different coaching strategies to aid improved performance and reduce injury risk.

## REFERENCES:

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