Relationship between Upper Torso and Pelvis Rotation and Driving Performance in the Golf Swing

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While the role that the upper torso and pelvis play in increasing driving performance is anecdotally appreciated by golf instructors, the actual biomechanical relationship between upper torso and pelvis rotation and resulting driving performance is not known. **PURPOSE**: To biomechanically describe upper torso and pelvis rotation and velocity during the golf swing and determine the relationship between these variables and driving performance. **METHODS**: One hundred male golfers (Handicap = 7.5 ± 6.4) underwent a biomechanical golf swing analysis using their driver. Upper torso rotation and velocity, pelvic rotation and velocity, and x-factor (absolute difference between upper torso and pelvic angles) and x-factor velocity were measured for each swing. Driving performance (represented by ball velocity) was assessed with a golf launch monitor. Relationships between ball velocity and all biomechanical variables were analyzed using product moment correlations. **RESULTS**: A significant relationship ($p<.001$) existed between increased ball velocity and the following variables: increased xfactor at the top of the swing ($r = .55$), maximum x-factor ($r = .54$), maximum upper torso rotation velocity ($r = .59$), upper torso rotational velocity at lead arm parallel ($r = .61$) and last 40 milliseconds prior to impact ($r = .50$), maximum x-factor velocity ($r=.50$) and x-factor velocity at both lead arm parallel ($r = .55$) and at the last 40 milliseconds prior to impact ($r = .53$). Additionally, both maximum xfactor and x-factor at the top of the swing were moderately correlated with maximum upper torso rotational velocity ($r = .71$) and upper torso rotational velocity at lead arm parallel ($r = .70$), maximum x-factor velocity ($r = .63$), x-factor velocity at lead arm parallel ($r = .57$), and x-factor velocity at the last 40 milliseconds prior to impact ($r = .50$). **CONCLUSIONS**: It appears that x-factor contributes to increased upper torso rotation velocity and x-factor velocity during the downswing, ultimately contributing to increased ball velocity. These results provide golf instructors with biomechanical evidence to support increasing ball velocity by maximizing separation between the upper torso and pelvis.