INFLUENCE OF COUNTERWEIGTING A TRAINING CLUB ON SWING SPEED AND GRIP KINETICS

Sasho J. MacKenzie[1*], Josh Hebert-Chesley[1] and Josephine G. Chisholm[1]
[1]Department of Human Kinetics, St. Francis Xavier University
email: smackenz@stfx.ca

Introduction

Variable inertia speed training has become a common method for golfers to increase clubhead speed. Variable inertia speed training involves swinging a golf club-like implement that either increases the loads applied to the grip by the golfer (overload training), or the speed with which the club is swung (overspeed training). TheStack™ is a golf club-like implement, with an adjustable weight system at the clubhead end, which allows for the implementation of both overload and overspeed conditions. Counterweighting – adding weight to the grip end of the club – may offer a unique training stimulus for the golfer. The purpose of this study was to investigate the influence of counterweighting TheStack™ on golfer applied loads and swing speed.

Methods

Following a thorough warm-up, 25 golfers executed three near-maximum effort swings with each of 6 conditions: Driver, 195g Stack with no counterweight, 195g Stack with 100g counterweight, 95g Stack with no counterweight, 95g Stack with 100g counterweight, and 280g Stack with no counterweight. An 11-camera motion capture system operating at 500 fps was used track the position of reflective markers attached to the club. A biomechanical analysis was performed to determine the club kinematics and golfer applied kinetics[1]. Repeated measures ANOVAs with follow-up adjusted Tukey tests were used to determine significant differences across conditions for select dependent variables ($\alpha = .05$). Research ethics approval was obtained, and participants gave their informed consent.

Results and Discussion

Adding 100g of counterweight to either the 95g or 195g condition had no statistically significant influence on clubhead speed, max force applied to the grip by the golfer, or the max torque applied to the grip by the golfer. The 195g conditions yielded clubhead speeds within ~1% of the Driver, which would not result in a meaningful overspeed stimulus. However, the 195g conditions yielded max grip forces that were ~19% greater than the Driver ($p < .001$), which would represent a meaningful overload stimulus. Similarly, the 280 g condition yielded torques that were ~23% greater than the Driver ($p < .001$), which would represent a meaningful overload stimulus.

Significance

These findings suggest that counterweighting may not provide a novel training stimulus over that which can be achieved by manipulating the weight added to the end of a training club. There are three inertial properties of a club that can influence how it is swung by a golfer: mass, center of mass location, and moment of inertia. Adding a counterweight increases the mass, which would tend to create an overload condition. However, adding a counterweight also moves the center of mass location closer to the hands, which would tend to create an overspeed condition.

References

1. MacKenzie, S., McCourt, M., & Champoux, L. (2020). How amateur golfers deliver energy to the driver. *International Journal of Golf Science*, 8(1), 1-21.

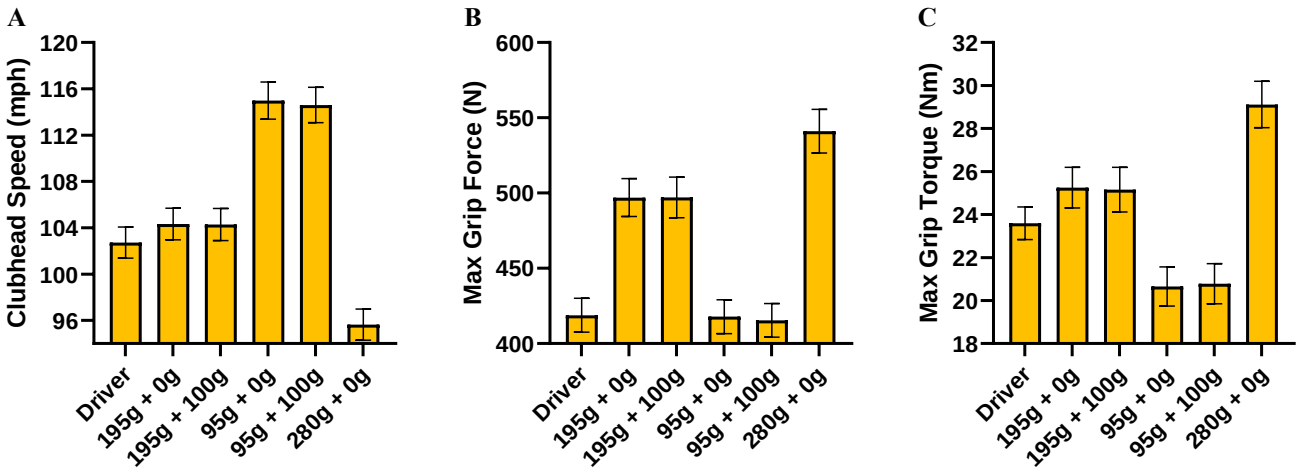

Figure 1. (A) Max speed during the downswing of a virtual point representing the center of the face on a 45" long driver. **(B)** Max value of the force applied by the golfer to grip during the downswing. **(C)** Max value of the couple applied by the golfer to the grip during the downswing. Each bar is the average of all participants and error bars are standard error of the mean.