

## **Symposium: Optimizing Ground Reaction Force (GRF) and Pressure Data in the Golf Swing: Future Directions for Golf Instructors and Researchers**

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Golf instruction has traditionally relied on kinematics for the analysis of the efficiency of swing mechanics and in providing feedback and cues to golfer. However, new technology now allows the golf instructor to measure the external pressures, forces, and torques that the golfer is putting into the ground. The kinetics occurring between the golfer's feet and the ground can be thought of as being used to create the motions of the swing, or as a reaction to the motions the golfer is creating. Either way, optimizing these forces for each golfer has great potential in helping to produce more efficient motions of the body and club in order to produce the desired ball flight. The technology that can measure the kinetics between the golfer's feet and the ground has been available to biomechanics researchers for many years, but the research examining the external connection between the golfer and the ground is limited. Ball and Best (Ball and Best, 2007a, b; Ball and Best, 2011; Ball and Best, 2012) have done the majority of the work examining the pressures between the golfer's feet and the ground and how these pressure shift throughout the swing. There are also very few studies examining the three dimensional Ground Reaction Forces (GRFs) in the golf swing. Barrentine et al. (1994) and Lynn et al. (2012) have both examined the differences in GRFs between golfers of different skill levels. All of these studies have provided some interesting insights and this symposium will review the results of the most current research examining the connection between the golfer and the ground. However, the golf instructor must understand that the results presented in these studies are group data and must be interpreted with caution when working with individual golfers. There are great variations in the mechanics of any group of golfers and the golf instructor must understand how to optimize these mechanics for each individual. Therefore, this symposium will also present several hypotheses regarding how to optimize GRFs in each golfer. These hypotheses are based around movement and anthropometric screens or tests that can be used to assess the structure and function of each individual golfer. It has been hypothesized that these screens can help determine how each individual golfer needs to use the ground to create optimal impact conditions. This symposium will also provide some examples of set-up modifications and drills/cues that can be used to alter how your golfers use the ground in order to better optimize their mechanics. This information will be useful to golf instructors as it can easily be implemented to help better individualize your instruction. These hypotheses also require further testing and scrutiny by researchers so that they can be refined and improved upon. This symposium will also discuss the future research that will help us better understand how to use the kinetic information between the golfer's feet and the ground in order to optimize the swing mechanics of every single golfer.

### **References**

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