The Effect of a Seven Week Exercise Program on Golf Swing Performance and Musculoskeletal Screening Scores

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Abstract
Golf has traditionally been a sport where the focus of coaching and development programs has been on perfecting the technical aspects of the golf swing. Recent systematic reviews have given coaches and players the opportunity to see the physical and on-course performance benefits of performing exercise programs as part of their development programs [1, 2]. Typically, golf exercise studies have implemented programs of 6 – 18 weeks, 2 – 3 sessions per week and involved a variety of forms of exercise focusing on improving muscular strength, power and endurance, as well as range of motion and stability [1, 2]. Despite these studies reporting positive outcomes in golf swing performance and musculoskeletal measures (e.g. muscular strength, power and endurance and joint flexibility) as a result of these exercise programs, many golfers may be unwilling or unable to complete such a frequent amount of sessions per week due to work, family and/or study commitments. Subsequently, the question then remains, what is the minimum dosage of exercise required to elicit positive changes in golf swing performance and musculoskeletal measures?

The aim of Study one was to investigate the effects of a once per week strength and conditioning program conducted over a seven week period on golf swing performance and musculoskeletal screening measures. Forty three participants (37 males and 6 females), enrolled in a Diploma of Golf Management at the Professional Golfers Association International Golf Institute volunteered to take part in the study. Golf swing performance measurement such as Club Head Speed (CHS), driving distance, ball speed, smash factor (ratio of ball speed and club speed), carry side (lateral deviation from target line), as measured with the TrackMan system, and the Ten Test-On Range Protocol involving 10 musculoskeletal screening tests that examined abdominal muscular endurance, movement competency and range of motion, were performed on separate days before and after the 7-week exercise program. Several significant improvements were found for the musculoskeletal screening measures, namely left leg bridging, thoracic extension, right thoracic rotation, and right and left single leg squat. In contrast, no significant changes were found for any golf swing performance measures. These results add to the current golf science literature in that they indicate that once a week training for seven weeks is sufficient to produce a number of significant improvements in musculoskeletal screening performance but insufficient to elicit changes in golf swing performance.

Study two focused on the quantifying the relationship between changes in musculoskeletal screening measures and golf swing performance that occurred after the seven week exercise program described in Study one. Pearson correlational analysis was performed on the change scores (difference between pre-and post-test)
between the musculoskeletal measures and TrackMan golf swing variables with statistical significance set at p < 0.05. Although the majority of correlations were non-significant, there were a number of exceptions. Moderate negative correlations between right bridging leg lift and driving distance (r = -0.354, p = 0.040), left thoracic rotation and ball speed (r = -0.358, p = 0.037), driving distance (r = -0.393, p = 0.021), side (r = -0.381, p = 0.026) right thoracic rotation and smash factor (r = -0.340, p = 0.049), right single leg squat and ball speed (r = -0.407, p = 0.017) and left single leg squat and ball speed (r = -0.411, p = 0.016). The only significant positive correlation was found between right side bridge and Combine test score (r = 0.356, p = 0.039).

Overall, these results suggest that changes in individual musculoskeletal measures may only predict a relatively small proportion of the improvement in golf swing performance with short term exercise programs.

The current thesis adds to the current literature on the effectiveness of exercise programs in golf in several ways. It demonstrates that a once a week, seven week exercise program can be successful in improving a number of musculoskeletal screening measures, although no significant changes were detected for any golf swing performance measure. However, results of this thesis also provide some insight into what aspects of the exercise prescription may most contribute to improved golf swing performance. Results supported the importance of the trunk with improved trunk rotation range of motion and lateral trunk flexion endurance significantly related to accuracy and overall Combine test score, respectively. Collectively, these results suggest that golfers can obtain benefits with reduced strength and conditioning frequency and duration and that increases in trunk range of motion and muscular endurance may contribute to improved golf swing performance.
Declaration

This thesis is submitted to Bond University in fulfilment of the requirements of the degree of Masters by Research. This thesis represents my own original work towards this research degree and contains no material which has been previously submitted for a degree or diploma at this University or any other institution, except where due acknowledgement is made.

Mico Hannes Olivier

Sign: [Signature]
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<td>Clubhead Speed</td>
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<td>3 – Dimensional</td>
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<td>FMS</td>
<td>Functional Movement Screen</td>
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<td>IMTP</td>
<td>Isometric Mid-Thigh Pull</td>
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<td>LBP</td>
<td>Low Back Pain</td>
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<td>ROM</td>
<td>Range of Motion</td>
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