A Critique of: “Dynamic Electromyograhpic Analysis of Trunk Musculature in Professional Golfers”

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# Summary

Please note this article critique is longer than the max 2 pages for the assignment. This is to provide students with more example ideas.

# Watkins, Uppal, Perry, Pink, and Dinsay (1996) conducted a study with the objective of identifying a reproducible pattern of trunk muscle activity during the golf swing. Thirteen right-handed male professional golfers participated in the experiment. Telemetric dynamic surface electromyography (EMG) was obtained from the upper abdominals, lower abdominals, left and right gluteus maximus, left and right erector spinae, and left and right abdominal obliques. Watkins et al. (1990) claim that professional golfers have reproducible patterns of trunk muscle activity. They concluded that the golf swing produces tremendous stresses on the spine and that trunk muscle strength and coordination are vital to all levels of golfers. They also state the need for trunk strengthening exercises for injured golfers oriented toward balance and coordination.

# Critique

This paper confirms previous assumptions from anatomical motion analyses about muscle activity throughout a golf swing. Specifically, it provides information on the relative contributions by the trunk muscles to the overall movement. However, the study does appear to make claims that are unsubstantiated by the results.

The authors have limited expectations regarding the results of the study. Their stated purpose is to evaluate trunk muscle activity with hopes of identifying reproducible patterns. This statement implies that the researchers are taking an observational approach. There is reference to only one study in the introduction. This could mean that no previous literature existed at the time or a weak review was performed.

The explanation of the methodology is vague in key areas. The authors state that MMT values were used in determining percentage of muscle activation. There is no mention as to how these maximal contractions were performed. This is of particular concern in this study because of the difficulty in isolating the trunk muscles to produce a maximum force. In explaining where the separate phases of the swing start, the definitions are circular. For example, they define the beginning of the *forward swing* as the point where the *take away* ends. This should instead be defined by a visual cue, such as a change in direction of the clubhead or the hands. As well, there is no explanation of how the EMG signal and video were synchronized.

The equipment seems sufficient. Generally, two cameras are needed to film a golf swing because of the extent of the motion in three dimensions. The use of telemetry EMG is an advantage because there is less chance of equipment interfering with the swing. The analog-to-digital sampling rate (2500 Hz) and filter process appear adequate. The authors state that the cameras were operating at a sampling rate of 45 frames per second. It is highly doubtful that this sampling rate would be great enough to definitively separate the phases of the swing that the authors claim to have analyzed.

There is also a concern regarding two of the muscles that were evaluated. The left and right abdominal obliques are each actually comprised of two distinct muscles. There are internal and external obliques on both sides of the body. For any given trunk rotation, the abdominal obliques are active on both sides of the body. The internal obliques on one side and the external obliques on the other side work in synergy to aid in trunk rotation in a given direction. This leaves the question as to which muscle the EMG was actually being measured from?

The results are initially presented in a way that appears to generalize muscle activity patterns across all subjects, yet actual values are stated later in the results. There is no indication if these values were averaged across subjects or if they represent the muscle activity from a single subject for a single trial. There is also no measure of variance given in the results. This implies that each swing by each golfer was identical. In addition there was not a single table or figure included in the results section.

There is relatively no reference to the results in the discussion. The authors claim that they have found that the golf swing produces tremendous stresses on the spine. This is not something they were investigating and there is very little justification for this based on their EMG results. The authors concluded that their testing demonstrated a relatively consistent pattern of muscle activity. If this was the case, then they failed to convey this in the results. The term “relatively consistent” implies little variation, yet there was no mention of variance between trials or between golfers. Based on the fact that trunk muscles were found to be active during the golf swing, the authors believe that there is a need for trunk strengthening exercises for golfers. The observed activity of a muscle during a skill does not mean that strengthening that muscle will enhance performance. Further knowledge regarding how that muscle is used in the overall movement is required before such claims can be stated.

This study provides information on the level and pattern of activation of certain trunk muscles. However, due to the vague explanation of the EMG values and the low camera sampling rate, the level and patterns of activation presented are in question. The only certain information that can be taken from this study is that certain trunk muscles are active during the golf swing.

## References

Watkins, R. G., Uppal, G. S., Perry, J., Pink, M., & Dinsay, J. M. (1996). Dynamic electromyographic analysis of trunk musculature in professional golfers. The American Journal of Sports Medicine, 24, 535-538.