

Randomized Warm-up Improves Performance in Skilled Golfers

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- Instruction and coaching, or;
- Motor control and learning

Purpose

While the beneficial impact of physical/physiological warm-up has been carefully studied and well documented in the literature, the effects of adding variability to the driving range portion of a golf warm-up, and its physical and/or psychological impact on subsequent performance, has not been considered to date. Furthermore, while randomized practice is known to have positive effects on learning in skilled performers, the contextual interference approach has never been applied to the warm-up setting. The current study compared the effects of a group of skilled golfers who warmed-up using traditional 'blocked' methods on the range to a group of golfers who employed a novel 'randomized' warm-up protocol. Previously, we reported the effects of a pilot project that revealed a positive effect of a randomized warm-up (Bertram et al., 2016). The data presented herein (n=24) confirm an even more robust conclusion, further supporting the notion that incorporating variability (i.e., randomness) during warm-up better prepares skilled players for a competitive round of golf.

Methods

Participants were 24 highly skilled golfers (handicap of 2 or better). Each participant was first led through a 15-minute dynamic stretching routine and was then randomly assigned to either the control (Blocked) or experimental (Random) warm-up group. Participants in the control (Blocked) group were asked to hit 36 shots according to a pre-determined order of club-selection (i.e., 9 shots in a row taken with each of 4 different golf clubs). Participants in the experimental (Random) group also hit 36 golf shots, but instead of hitting 9 shots in a row with each of the 4 clubs, the shot sequence was randomized (e.g., one driver, one 5-iron, one pitching wedge, one 8-iron, and so on). After a 10-minute rest period, each participant hit a

predetermined series of 9 'test' shots, in an order that they might occur in a typical round of golf (Driver, 7-iron; wedge, etc). In addition to FlightScope data that was collected on all shots throughout the experiment, participants were asked to rate the quality of each of the 9 test shots on a scale from 1-10 (1 being a very poor shot, 10 being a perfect shot in terms of contact and desired trajectory).

Analysis/Results

The qualitative rating data revealed a clear advantage in the Random warm-up group. A good indicator of how prepared participants were after their warm-up was the quality of the first ball hit (a Driver, in all cases) during the test. The Random warm-up group rated their first shots at an average of 8.18/10, while the blocked group average was just 4.23/10. Independent t-tests suggested that a more variable warm-up routine better prepares a player to get off to a strong start. The quantitative data gathered via FlightScope corroborated these higher ratings in that the first test shots hit by the Random group were struck more solidly in terms of smash factor and were much closer on average to the intended target line than were the shots hit by the Blocked warm-up group.

Looking beyond the first test shots, the performance advantage of being in the Random warm-up group persisted. Breaking the results down into sets of three shots (Driver, 7-iron, PW), repeated measures ANOVA revealed that the Random warm-up group rated their shots higher than the Blocked warm-up group in set 1 (7.60 vs. 5.68) and set 2 (7.67 vs. 5.83), as well as in the overall average rating of the 9 test-shots (7.56 vs. 6.18). Only in the third and final set of test shots did the Blocked warm-up group narrowly rate higher than the Random group. These findings were again corroborated by the FlightScope data in terms how close balls were hit to the intended target line, as well as such indicators as club head speed and smash factor.

Discussion/Practical Relevance

While the beneficial effects of a good *physical* warm-up (i.e., static or dynamic stretching) for athletes have been documented, the benefits of a well-designed driving range warm-up routine - in terms of its overall structure - are not well understood. The results of the current study are unique in that for the first time, we present compelling data to suggest that adding variability (i.e., randomness) to a warm-up

routine increases the likelihood of success in a subsequent round of golf. Furthermore, we postulate that the observed performance advantages in the experimental group were brought about by the added challenge, and subsequent psychological readiness, resulting from a more variable, randomized warm-up.

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