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The Effect of Pre-Shot Routines on Golf Wedge Shot Performance

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The objective of this study was to examine the effect of pre-performance routines among golfers of low skill and non-golfers on wedge golf shot performance. The intervention strategies involved a physical skill and cognitive-behavioral routine program, as well as a physical skills-only program. Performance was measured on a pre-intervention test, post-intervention test, and following a period of time without treatment, and involved wedge shots being played from distances of 40, 50, and 60 m from a target. Participants in this study (*N* = 68) were assigned to either a golfer or non-golfer group. Participants in the treatment groups attended 2 practice sessions per week during the acquisition phase. A variable practice design was incorporated during the intervention phase. Non-golfers in both intervention groups improved performance following the acquisition phase and maintained these levels of performance in the retention test. Greater improvements in performance were found in the non-golfer physical skills and cognitive-behavioral routine group. The non-golfer physical skills and cognitive-behavioral routine group was the only group to realize significant improvements in performance when comparing initial test performance measures to post-intervention and retention test performance measures across all test distances. Although the golfer treatment groups had consistent improvement in performance measures following the intervention phase, these improvements did not reach statistical significance in the majority of cases.

Key Words: task performance, psychology, golf

Key Points:
- Novice golfers who undertook a physical skills and cognitive-behavioral routine intervention significantly improved performance and learning in the execution of golf wedge shots.
- Novice golfers who undertook a physical skills intervention significantly improved performance and learning in the execution of golf wedge shots.
- Low skill level golfers enhanced their performance following the acquisition phase compared to their respective initial test scores, but these improvements did not achieve levels of statistical significance.

Introduction

Golf presents participants with both cognitive and behavioral challenges (17). The social aspects of the game allow potentially evaluative observers and/or fellow competitors to influence the performer, possibly in an adverse manner (7). Golf also involves a wide variety of shots to master (e.g., driving, chipping, putting), extended periods of time between shots, and competitive situations that could be distracting and destructive in terms of performance decrement (5). Successful golfers have been identified as having the ability to develop plans for refocusing after distractions, have control over their thoughts and emotions, and employ cognitive techniques in imagining intended performance actions (14, 19, 20, 21). Coupled with these characteristics, it has been observed that highly skilled performers also often utilize consistent cognitive-behavioral patterns that are maintained during competitions (5, 9, 11).

One specific cognitive-behavioral strategy used in golf is the performance routine. The use of performance routines has been shown to be effective in improving the performance of skilled participants across a number of sports (3, 6, 8, 11). Some evidence also suggests that such routines may benefit novice and low-skill level performers in the performance of specific motor skills (2, 4, 6, 10).

The aim of this study was to evaluate the effect of performance routines on the performance of a predominantly self-paced and closed, complex perceptual motor skill, with novice and low skill level performers. Wedge golf shot performance over a range of distances was chosen for this study because, like most golf shots, it is a complex motor skill requiring fine spatio-temporal movement patterns (16). The wedge shot also lends itself to ecologically-valid assessment over a variety of distances (i.e., real life environmental conditions and distances), and enables test performance distances to be manageable and potentially less formidable than performing other golf shots (e.g., a 200-yard drive). Lastly, the capability to perform wedge shots is considered by some experts to be of paramount importance to successful golf (15).

Methods

Participants

Participants in this study included 68 males who were an average of 35.6 years of age (*SD* = 6.0). All participants were assigned to either a golfer (*n* = 28) or non-golfer (*n* = 38) group. The criteria for assignment to the golfer group included the individual possessing an official golf club handicap at the time of the study, having never possessed a handicap lower than 18, having played a minimum of 12 rounds of golf in the 6 months prior to the start of the study, having been an active golfer for more than 2 years prior to the start of the study, and having a history of practice no greater than once a week. Overall, the golfers' handicaps ranged from 18.0 to 24.4 (*M* = 21.4, *SD* = 1.56). Criteria for assignment to the non-golfer group included having played less than three rounds of golf in one's lifetime and having no history of golf practice.

Within each category, participants were randomly assigned to one of the following six experimental groups:

1. Non-golfer control with no practice group (NGCG; *n* = 10)
2. Non-golfer physical skills practice only group (NGG; *n* =15)
3. Non-golfer physical skills practice and cognitive-behavioral performance routine group (NGRG; *n* = 13)
4. Golfer control with no practice group (GCG; *n* = 10)
5. Golfer physical skills practice only group (GG; *n* = 9)
6. Golfer physical skills practice and cognitive-behavioral performance routine group (GRG; *n* = 9)

Procedure

The program sequence involved participants being tested during Week 1 of the study, practice groups attending two sessions per week for a period of 3 weeks, participants completing a test during Week 5 of the study, and a final test during Week 7 of the study following 1 week without practice. The practice sessions were of a variable distance design, with all participants following the same protocol.

The performance area for both test and practice occasions was a well-maintained hockey pitch. In this respect, the ball striking area was level and well-grassed, and the landing area receptive to golf balls. Participants performed in loose fitting clothing, sports shoes, and used the same wedge golf club on all occasions. Golf balls used in the study were of a high quality and maintained in a clean condition throughout.

A circle with a 10-m radius was created as the target area, with a flag stick positioned in the center of the circle as the target. The test distances were the distances from the flag stick target that golf balls were played from, and included 40, 50, and 60 m. The distance (in meters) and angle (in degrees and minutes) of each golf ball played during a test occasion were determined in relation to the target and performance position using a surveying sighting rod and a SOKKIA Digital T6 Model theodolite (accurate to within .001 m for distance and to within 20 s for angles).

All initial test performances were conducted in Week 1 of the study. Participants performed 30 wedge shots on the test occasion. The golf balls were numbered 1–30 and color coordinated. The golf balls were played in numerical sequence, with golf balls numbered 1–5 played first from 40 m, numbers 6–10 from 50 m, numbers 11–15 from 60 m, numbers 16–20 from 40 m, numbers 21–25 from 50 m and, finally, numbers 26–30 from 60 m. The golf balls were played from a level ground position that would not hinder performance. Only one attempt to play a particular golf ball was permitted, and no shots were played until it was safe to do so.

On completion of a set of tests, the target was removed and the theodolite erected in exactly the same position. In order to score each golf ball (according to its color and number), a sighting pole was held at each golf ball's location and the distance and angle of each golf ball recorded in relation to the performance position and the theodolite (i.e., target).

On completion of the initial test, participants were assigned to the NGRG and GRG groups, issued with a handout of a performance routine, and given two practical demonstrations (with verbal commentary) highlighting sequential and procedural elements of the routine. The performance routine was an adaptation of a performance routine designed by Crews and Boutcher (8) for golf, and included the following elements:

1. Address imaginary ball next to the ball to be hit
2. Visualize an imaginary line from the target to the club face
3. Waggle club
4. Visualize an imaginary line from the target to the club face
5. Take a deep breath

6. Perform the swing recalling the word “smooth” on the backswing and the word “swing” on the downswing
7. Visualize the ball flying from the club face with the correct trajectory and landing at the target
8. Address ball to be hit
9. Visualize an imaginary line from the target to the club face
10. Waggle club
11. Visualize an imaginary line from the target to the club face
12. Take a deep breath
13. Perform the swing recalling the word “smooth” on the backswing and the word “swing” on the downswing

The acquisition phase (Weeks 2, 3, and 4 of the study) involved participants in the NGG, NGRG, GG, and GRG groups attending two practice sessions per week. There was a minimum of 1 day and maximum of 4 days between practice sessions. The practice area setting was similar to that of the test area (i.e., performance distances, a target area, and centrally positioned target). A minimum of 2 and maximum of 6 participants were active during a practice session.

During the practice sessions, participants played five golf balls from three different distances from the target. This procedure was repeated with a total of 30 shots being played and distances changed each week. The variable practice distances were 35, 45, and 55 m for Week 2; 45, 55, and 65 m for Week 3; and 30, 50, and 70 m for Week 4. Practice sessions were scheduled to ensure that NGRG and GRG participants were not active at the same time as NGG and GG participants in an attempt to minimize the exposure of the NGG and GG groups to the performance routine treatment. Participants in the NGRG and GRG groups were provided with a large, laminated performance routine prompt card. The cards were transportable and accompanied the performer at each test distance and practice distance. The function of the cards was to assist the performer to follow the correct sequence of events in the performance routine. The cards were pinned to the ground above the position where the golf balls were being played.

Participants repeated the initial test procedure during Week 5 of the study with a minimum of 4 days and a maximum of 7 days between the last practice session and performance of this test (M = 4.3 days, SD = 1.1 days). This performance was designated as the post-intervention test. Participants repeated the initial test procedure again during Week 7, after a week without treatment. A minimum of 4 and maximum of 8 days elapsed between the post-intervention test and the performance of this test (M = 5.1 days, SD = 1.4 days). This performance was designated as the retention test.

The weather did not pose a problem on any test occasion and prevented practice on two occasions for a period of 15 min only. The ability to predict such stable naturally occurring conditions is unlikely and would clearly be a factor in the reproduction of such a design. Participants were aware of the importance of attendance, and all 68 completed every test and practice session where appropriate.

Participants following the performance routine were asked not to discuss this with other participants.

Results

Mean distances in meters from the target were calculated for the 10 shots played from each of the test distances (i.e., 40, 50, and 60 m), and mean values were used as the participants' performance measures. Group mean test results were determined from these measures. Table 1 provides group mean performance measures and standard deviation scores in meters from the

Table 1 Group Performance Measures in Meters From Target Across Test Distance and Occasion

Group	40 m			50 m			60 m		
	IT	PIT	RT	IT	PIT	RT	IT	PIT	RT
NGCG (*n* = 10)	20.25	19.06	19.1	24.55	20.85	22.02	28.84	28.29	28.07
	(5.01)	(3.74)	(4.49)	(7.36)	(5.43)	(4.89)	(9.36)	(8.57)	(5.7)
NGG (*n* = 15)	16.16	12.51	12.5	18.4	15.46	14.77	23.07	16.87	17.55
	(6.22)	(3.64)	(2.98)	(6.77)	(4.29)	(4.5)	(8.56)	(4.87)	(5.97)
NGRG (*n* = 13)	17.09	10.34	11.23	19.94	13.9	11.78	22.95	15.92	15.81
	(6.02)	(3.19)	(3.18)	(7.51)	(5.47)	(4.11)	(9.32)	(6.72)	(6.21)
GCG (*n* = 10)	9.83	9.51	9.31	12.85	12.1	9.84	12.85	12.83	15.36
	(2.65)	(2.74)	(.99)	(2.29)	(3.19)	(2.31)	(4.07)	(4.11	(3.2)
GG (*n* = 9)	8.22	7.97	7.28	10.56	8.16	7.45	12.35	8.9	9.69
	(1.96)	2.27)	(1.57)	(5.86)	(2.01)	(1.39)	(6.12)	(1.94)	(2.05)
GRG (*n* = 9)	8.45	4.91	5.62	9.24	6.21	6.5	10.27	8.26	7.59
	(3.77)	(1.18)	(1.35)	(4.03)	(1.39)	(1.92)	(4.83)	(2.18)	(1.57)

Note. Standard deviation scores in parentheses. IT = initial test; PIT = post intervention test; RT = retention test. NGCG = non-golfer control group; NGG = non-golfer group; NGRG = non-golfer routine group; GCG = golfer control group; GG = golfer group; GRG = golfer routine group.

Table 2 Group Mean Performance Differences in Meters Across Test Distance and Occasion

Group	Test occasion	Test distance 40 m			Test distance 50 m			Test distance 60 m		
		IT	PIT	RT	IT	PIT	RT	IT	PIT	RT
NGCG	IT		nsd	nsd		nsd	nsd		nsd	nsd
	PIT	1.19		nsd	3.7		nsd	0.55		nsd
	RT	1.15	0.04		2.53	1.17		0.77	0.22	
NGG	IT		**	**		nsd	nsd		**	**
	PIT	3.65		nsd	2.94		nsd	6.2		nsd
	RT	3.66	0.01		3.63	0.69		5.52	0.68	
NGRG	IT		**	**		**	**		**	**
	PIT	6.75		nsd	6.04		nsd	7.03		nsd
	RT	5.86	0.89		8.16	2.12		7.14	0.11	
GCG	IT		nsd	nsd		nsd	nsd		nsd	nsd
	PIT	0.32		nsd	0.75		nsd	0.25		nsd
	RT	0.52	0.2		3.01	2.26		2.78	2.53	
GG	IT		nsd	nsd		nsd	nsd		*	nsd
	PIT	0.25		nsd	2.4		nsd	3.45		nsd
	RT	0.94	0.69		3.11	0.71		2.66	0.79	
GRG	IT		nsd	nsd		nsd	nsd		nsd	nsd
	PIT	3.54		nsd	3.03		nsd	2.01		nsd
	RT	2.83	0.71		2.74	0.29		2.68	0.67	

Note. nsd = not significantly different. IT = initial test; PIT = post intervention test; RT = retention test. NGCG = non-golfer control group; NGG = non-golfer group; NGRG = non-golfer routine group; GCG = golfer control group; GG = golfer group; GRG = golfer routine group. *$p < .05$; **$p < .01$.

target across test distance and test occasion. Table 2 provides group mean performance measures differences in meters and *F*-ratio values for within-group effect measures.

Group mean performance from 40 m across test occasions revealed a significant overall within-group effect ($F_{5,40} = 24.03$, $p < .0001$). The performance of the NGCG did not differ significantly across the three test occasions. The performance of NGG and NGRG was significantly more accurate on the post-intervention test than on the initial test ($p < .01$). The performance of the NGG and NGRG groups remained significantly more accurate on the retention test in comparison with their respective initial test performances ($p < .01$). The performance of the NGG and NGRG on the retention test did not differ significantly from 40 m across the three test occasions among the golfer groups.

Group mean performance from 50 m across test occasions revealed a significant overall within-group effect ($F_{5,40} = 22.08$, $p < .0001$). The performance of the NGCG and NGG groups on the post-intervention test and retention test occasions were not significantly different from their respective initial test performances. The performance of the NGRG on the post-intervention test and retention test occasions were significantly more accurate than this groups' initial test performance ($p < .01$). The performance of the non-golfer groups on the retention test did not differ significantly from their respective post-intervention test performances. Within-group performance among the golfer groups did not differ significantly from 50 m across the three test occasions.

Group mean performance from 60 m across test occasions revealed a significant overall within-group across effect ($F_{5,40} = 21.18$, $p < .0001$). The performance of the NGCG did not differ significantly across the three test occasions. The performances of the NGG and NGRG groups were significantly more accurate on the post-intervention test occasion than on their respective initial test performances ($p < .01$). Similarly, the performances of the NGG and NGRG groups were significantly more accurate on the retention test occasion than on their respective initial test performances ($p < .01$). The performances of the NGG and NGRG groups on the post-intervention test did not differ significantly from their respective retention test performances.

The performance of the GG from 60 m was significantly more accurate on the post-intervention test than on the groups' initial test performance ($p < .05$). This improvement relative to the initial test performance was not maintained into the retention test despite there being no significant difference between the groups' performances on the post-intervention test and retention test occasions. There were no further statistical differences found within the golfer groups across test occasions from 60 m.

Discussion

This study compared the effect of a physical skills and cognitive-behavioral intervention, a physical skills only intervention, and a control group on the performance of wedge shots with non-golfers and high handicap (i.e., low skill level) golfers. Results revealed that wedge shot performance for the non-golfer intervention groups was significantly improved following a 3-week acquisition phase. The results from the golfer intervention groups found some significant changes in performance and motor skill learning, but not of the same magnitude, breadth, nor consistency as found in the non-golfer intervention groups. Also, the performances of the NGRG were found to be significantly more accurate than the performances of the NGG when considered in relation to the performances of the NGCG. These results support the suggestion made by Beauchamp et al. (2), who proposed that the effectiveness of such interventions is not limited to elite athletes but can be extended to novices.

This research sought to monitor the impact of different interventions across varying degrees of the same motor skill from different distances to a target. This followed suggestions made by Beauchamp et al. (2) and offered the potential to compare control, physical skills only, and physical skills and cognitive-behavioral performance routine intervention effects following an acquisition phase as well as a period of no treatment. The study design also offered an opportunity to explore differences between non-golfers and low skill level golfers on a particular aspect of skill in the game of golf.

Although the performance of the golfer intervention groups generally improved following the acquisition phase in this study, these improvements did not reach statistical significance. Cohn et al. (6) reported that a 14-week cognitive-behavioral intervention program did not immediately improve performance in elite collegiate golfers. Improvements in performance were reported in this particular study; however, in a 4-month follow-up, the researchers acknowledged that intervening variables may have confounded these improvements. It has been suggested that extended periods of time may be required for the internalization of cognitive-behavioral performance strategies (2, 6). This may explain the findings in the present study, in that more time may be required to relegate well-established strategies, and learn and adjust to new ones (6). As Singer, Lidor, and Cauraugh (18) suggest, novices may be receptive immediately to new performance strategies that are employed by elite level performers.

This study was similar in some respects to that carried out by Crews and Boutcher (8) in that both studies examined the effects of structured performance routines on novice golf performers utilizing performance-based measures of golf shots played into target areas. The results of these researchers showed that male performers, with a more advanced initial skill level, significantly improved performance following an acquisition phase utilizing a cognitive-behavioral intervention. Women in a similar treatment group also improved performance, as did male performers in a practice-only treatment group. These findings are similar to those in the present study. However, Crews and Boutcher (8) suggest that, due to the differential in effect sizes between the experimental groups following the acquisition phase, and the fact that the skill level of the male performance routine treatment group was greater than the other groups in the pre-acquisition phase, perhaps a certain level of skill must be established before the pre-shot routine is effective.

Previous research (2, 10, 17, 18) has supported the notion that novices may benefit from cognitive-behavioral interventions, which have typically been associated with elite performers (9). Beauchamp et al. (2) reported significant improvements in putting performance among novice golfers, utilizing a cognitive-behavioral intervention in the later stages of a 14-week study. These improvements were maintained over a period of time, with a change in behavior indicative of motor skill learning (1, 16). Despite the differences in time course and nature of the motor skill (i.e., wedge shot performance vs. putting performance), the results of the present study support these and earlier findings.

A suggestion for the limited improvement in the golf treatment groups may be explained by the notion that, over time, ineffective movement awareness strategies were developed by the low skill level golfers. Crews and Boutcher (9), in their observational analysis of 12 tour players of the Ladies Professional Golf Association during competition, noted that lower ranked golfers appeared to show less neutral and more positive reactions to shots than higher ranked players. It has been suggested that peak levels of performance are associated with a neutral emotional state (22). It is possible that, as Moore and Stevenson (13) suggest, some traditional learning strategies promoted the need for conscious control of movement, opposing the development of skills needed to facilitate free-flowing automatic control, which is characteristic of peak performance states.

Conclusion

The findings of the present study showed that non-golfers were able to demonstrate significant levels of motor skill learning following a 3-week acquisition phase utilizing either a physical skills-only or a physical skills and cognitive-behavioral intervention program. These improvements were most evident in the non-golfer physical skills and cognitive-behavioral intervention group. Statistically significant improvements in performance were not found in low skill level golfers in similar experimental groups. The golfer treatment groups' mean performance measures improved across all test distances following the acquisition phase compared to their respective initial test scores. However the improvement differences, with one exception, did not achieve a level of statistical significance.

Further research may incorporate additional measures of psychological and physiological variables which underlie and support performance measures. Such multivariate research designs may provide a more global picture of the effects of cognitive-behavioral routines. Researchers may wish to incorporate control for the many influences on performance in order to determine the effects of performance routines in such variable situations. Research designs should specifically control the various aspects of the performance routine in order to explore the relative impact of these component parts on performance and the process of motor skill development. As a clearer understanding of the mechanisms underlying the learning of motor skill and factors affecting the performance of such skill is reached, a greater appreciation of the role of cognitive-behavioral performance routines will become apparent.

References

1. Bakker FC, Whiting HTA, Van Der Brug H. 1995. Sport psychology: concepts and applications. London: John Wiley.

2. Beauchamp PH, Halliwell WR., Fournier JF, Koestner R. 1996. Effects of cognitive-behavioral psychological skills training on the motivation, preparation, and putting performance of novice golfers. The Sport Psychologist 10:157-70.

3. Boutcher SH, Crews DJ. 1987. The effect of a preshot attentional routine on a well-learned skill. Int J Sport Psychol 18:30-39.

4. Boutcher SH, Rotella RJ. 1987. A psychological skills education program for closed skill performance enhancement. The Sport Psychologist 1:127-37.

5. Cohn PJ. 1990. Performance routines in sport: theoretical support and practical applications. The Sport Psychologist 4:301-312.

6. Cohn PJ, Rotella RJ, Lloyd JW. 1990. Effects of a cognitive-behavioral intervention on the pre-shot routine and performance in golf. The Sport Psychologist 4:33-47.

7. Cottrell NB. 1968. Performance in the presence of other human beings: mere presence audience and affiliation effects. In: Simmel EC, Hoppe RA, Milton GA, editors. Social facilitation and imitative behavior. Boston: Allyn & Bacon.

8. Crews DJ, Boutcher SH. 1986. Effects of structured preshot behaviors on beginning golf performance. Percept Mot Skills 62:291-94.

9. Crews DJ, Boutcher SH. 1987. An observational analysis of professional female golfers during tournament play. Journal of Sport Behavior 9:51-58.

10. Lidor R, Tennant KL, Singer RN. 1996. The generalizability effect of three learning strategies across motor task performances. Int J Sport Psychol 27:23-36.

11. Lobmeyer DL, Wasserman EA. 1986. Preliminaries to free throw shooting: superstitious behavior? Journal of Sport Behavior 9:70-78.

12. McCaffrey N, Orlick T. 1989. Mental factors related to excellence among top professional golfers. Int J Sport Psychol 20:256-78.

13. Moore WE, Stevenson JR. 1991. Understanding trust in the performance of complex automatic sport skills. The Sport Psychologist 5:281-89.

14. Orlick T, Partington J. 1988. Mental links to excellence. The Sport Psychologist 2:105-130.

15. Rotella R. 1995. Golf is not a game of perfect. New York: Simon & Schuster.

16. Schmidt RA, Lee TD. 1988. Motor control and learning: a behavioral emphasis (3rd ed.). Champaign, IL: Human Kinetics.

17. Singer RN. 1988. Strategies and metastrategies in learning and performing self paced athletic skills. The Sport Psychologist 2:49-68.

18. Singer RN, Lidor R, Cauraugh JH. 1993. To be aware or not aware? What to think about while learning and performing a motor skill. The Sport Psychologist 7:19-30.

19. Thomas PR, Fogarty GJ. 1997. Psychological skills training in golf: the role of individual differences in cognitive preferences. The Sport Psychologist 11:86-106.

20. Thomas PR, Over R. 1994. Psychological and psychomotor skills associated with performance in golf. The Sport Psychologist 8:73-86.

21. Whelan J, Myers A, Berman J, Bryant V, Mellon M. 1988, October. Meta-analysis of cognitive-behavioral interventions for performance enhancement in sports. Paper presented at the 1st Annual Conference of the Association for the Advancement of Applied Sport Psychology, Nashua, NH.

22. Wiren G, Coop R. 1978. The new golf mind. New York: Simon & Schuster.

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