

‘PIM’ Training with e-Putting Imagery Script Helps to Improve Putting Scores and Moods of the Golfers, Is This Really True?

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Abstract The aim of the study was to investigate the effectiveness of using e-putting imagery script in PIM training to evaluate putting scores and moods of the golfers. Sixty-three male golfers aged 18–25 years with 1- to 3-year experience ($M = 1.40$, $SD = 0.58$) participated in this study. Three groups were randomly assigned (i.e., PIM group, traditional imagery group, and control group), and three assessments were conducted. The findings demonstrate that the PIM group improved putting performance and positive mood and were able to control negative mood better compared to the traditional imagery group and control group. Coaches also recommended using e-putting imagery script during the PIM training program. Future studies should focus on female, elite and golfers of different age groups.

Keywords e-putting imagery script • PIM training • Putting distance • Moods

1 Introduction

Previous studies clearly suggest that Practice in Mind (PIM) training program which emphasized the seven PETTLEP components helps to improve skills of athletes [1, 2]. All the PETTLEP components are also beneficial in sports performances particularly in golf [1, 3–8]. For instance, previous researcher found that bunker shot of the golfers was improved for PETTLEP imagery group [6]. Furthermore, the post-test results also showed that all groups improved including physical practice when combined with PETTLEP imagery. But, no improvement showed for both groups using PETTLEP imagery alone or only physical practice. According to [1],

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PIM training program that consists of three times per week combination of mental and physical practice within six weeks span will also help in improving golf putting performance. In fact, the stimulus and responsive emotions, as well as facilitative direction imagery, help golfers in the PETTLEP group [1].

Imagery is unpredictable and associated with the mood of athletes [9]. In golf, health could be improved by walking, but performance is reduced if unpleasant mood exist [10].

Previous researchers have suggested that technical training aids such as video, audio, and written script can be used by the athletes during imagery practice [1, 8]. For instance, previous study tried to examine 40 male amateur golfers with different training aids such as written script, video, and audio [8]. Also clear evidence found [1] that audible device helps golfers when practicing imagery at the putting green. Furthermore, mobile device for PDA or smartphones seems to be useful for golfers to use during imagery practice, also need further research. Hence, the aim of this study was to investigate the effectiveness of using e-putting imagery script in PIM training particularly to evaluate putting performance and moods of the golfers.

2 Methodology

2.1 Participants

Sixty-three male golfers aged between 18 and 25 years ($M = 20.83$, $SD = 1.94$) participated in this study. All golfers were considered beginners who had between 1 and 3 years of playing experiences ($M = 1.40$, $SD = 0.58$) [5, 12]. For the selection of participants, MIQ-R was used to identify the imagery ability of the golfers before they engage with the intervention program [13, 14]. A one-way ANOVA results indicated that all participants had equal imagery ability before the intervention program. Next, all participants were randomly assigned into three groups: Practice in Mind group, PIM; traditional imagery group, TI; and control group.

2.2 Instrumentation

PIM intervention guides. For the purpose of the study, the researcher developed e-putting imagery script for android electronic device that will help the participants practice their imagery (see Fig. 1). The PIM training program was based on seven PETTLEP components [1, 2]. For instance, *physical component* such as golf clothing, *emotion component* such as feel like a real putting task, and *timing component* such as imagine from walking to the green until to get a birdie. The *environment component* such as participants performed putting on the standard indoor putting mat in a standing position by holding the putter 10 m from the

Fig. 1 e-Putting imagery script

PRACTICE IN MIND

e-Putting Imagery

Name: Gender: **Male** Age:

Contact No: Handicap:

Years of experience in golf:

Putting Steps

Stance Position

Standing Position: **parallel**

Feet Position: **little less apart and shoulder slightly apart**

Grip Comfort

Grip: **Light Grip**

Generate Script

putting green. *Task component* such as they were asked to perform consistent with an actual task and *perspective component* such as to read their own imagery scripts. Lastly, for *learning component*, participants were asked to modify their own script after each and every imagery session they partake.

Putting task performance and scoring

Golfers were provided five standard golf balls. They were advised to use their own putter to perform the task. The golfers were performed 10 putting strokes at the standard indoor putting mat. They were scored based on scoring suggested by the previous study [8] (see Fig. 2).

Brunel Mood Scale

BRUMS [15] was used to assess mood of the participants prior to putting performance. This questionnaire considers a 24-item mood adjective checklist, with four items relating to each of six transitory mood states: anger, confusion, depression, fatigue, tension, and vigor. Each subscale contains four items; for example, the Anger Scale includes items such as *annoyed*, *bitter*, *angry*, and *bad tempered*, i.e., items no: 7, 11, 19, and 22 and the Vigor Scale includes items such as *lively*, *energetic*, *active*, and *alert*, i.e., items no: 2, 15, 20, and 23. Respondents indicate whether they have experienced such feelings on a 5-point scale, i.e., 0 = not at all, 1 = a little, 2 = moderately, 3 = quite a bit, and 4 = extremely. When responses from the four items in each subscale are summed, a subscale score in the range 0–16 is obtained. In this study, the Cronbach alpha coefficient for the scale was 0.86.

2.3 Procedure

During the initial meeting, all golfers completed the BRUMS questionnaire. Next, they were asked to perform the 10 putting strokes from a 6-ft distance [11]. For the

Fig. 2 The shape and position of the scoring system



purpose of the study, golfers have to complete three training sessions per week for six-week training program. As suggested by [1, 6], such combination of imagery and physical practice improved athletes' performance. Also similar amount of imagery and physical practices should be performed in a week [1, 5]. Hence, golfers in PIM group performed 10 physical practices right after 10 imagery practices which are in-line with the previous putting study [1]. The practice sessions in the test were performed 10 meter away from the putting green. It should be similar session as per test, beside to avoid any disruption to the club members to practice [1, 16].

In the PIM group, e-putting imagery script was provided to each golfer. All golfers were also advised to do some modification on the script based on their own personal putting skill right after each of the sessions. Next, golfers read and mentally perform 10 successful putting strokes, followed by 10 physical practices at the putting mat 10 m away from the putting green [1]. Overall, 20 min was taken to practice imagery including physical practices.

The golfers in traditional imagery group also completed 10 imagery practices and 10 physical practices at the indoor putting mat inside the club building. The imagery script used is considered as a standard procedure for conventional imagery method [4, 5]. This written script was printed for each of the golfer, compiled together in their individual file. They were also instructed to record all the activities regarding the program and practices in a diary including the total number of sessions and places where imagery was being practiced. Meanwhile, only 10 physical

practices were performed by the golfers in the control group, also for 3 times per week in 6 weeks of training program. Golfers in this group were also advised to write everything regarding the training in a diary given by the researcher. The second assessment was conducted after 4 weeks followed by a third assessment after 6 weeks of intervention program.

3 Results

Preliminary assumption testing was conducted and the scores are normally distributed. The results of one-way repeated measures ANOVA were performed for putting performance and moods across three assessments, namely pretest, second test, and post-test in the PIM group, traditional group, and control group, respectively. Table 1 shows the descriptive statistics followed by pairwise score in Tables 2, 3, and 4

PIM group: There was a significant effect on the three assessments (Wilks' Lambda = 0.35, $F(2, 19) = 17.33$, $p = 0.000$, multivariate partial eta-squared = 0.65). Table 2 shows that the pairwise for putting scores increase from the pretest to the second test ($M = 28.86$, $SD = 3.25$ vs. $M = 31.48$, $SD = 3.63$, respectively) was statistically significant ($p = 0.001$). There was a statistically significant increase from the second test to the post-test ($M = 34.52$, $SD = 0.97$, $p = 0.002$). Finally, there was a statistically significant increase from the pretest to the post-test ($p = 0.000$).

For positive mood, the result shows that there was a statistically significant effect in the three assessments (Wilks' Lambda = 0.678, $F(2, 19) = 4.52$, $p = 0.03$, multivariate partial eta-squared = 0.32). The pairwise for positive mood in Table 3 indicates that the PIM group increase from the pretest to the post-test ($M = 11.90$, $SD = 2.28$ vs. $M = 13.52$, $SD = 1.57$, respectively) was statistically significant

Table 1 Descriptive statistics for putting performance, positive mood, and negative mood in pretest, second test, and post-test in PIM group, TI group, and control group

IV	Pretest		Second test		Post-test		DV
	Mean	SD	Mean	SD	Mean	SD	
PIM	28.86	3.25	31.48	3.63	34.52	4.42	PT
TI	27.14	4.51	27.19	2.25	27.00	3.15	
CG	27.38	4.31	24.71	3.96	24.95	2.85	
PIM	11.90	2.28	12.38	2.04	13.52	1.57	PM
TI	10.90	1.90	11.71	1.74	12.43	2.11	
CG	12.57	3.40	12.62	2.78	12.19	2.16	
PIM	8.74	2.21	7.87	1.31	7.91	1.42	NM
TI	9.51	1.77	8.32	1.22	8.92	1.61	
CG	7.80	2.22	7.73	2.37	6.96	2.56	

Note: *PIM* practice in mind group, *TI* traditional imagery group, *CG* control group, *P* putting, *PM* positive mood, *NM* negative mood

Table 2 Pairwise for putting scores in PIM group and control group

(I)	(J)	Mean dif (I-J)	Std. error	Sig. ^a	95 % confidence interval for difference	
					Lower bound	Upper bound
PIM group						
1	2	-2.62*	0.60	0.001	-4.185	-1.053
	3	-5.67*	0.95	0.000	-8.141	-3.193
2	1	2.62*	0.60	0.001	1.053	4.185
	3	-3.05*	0.74	0.002	-4.985	-1.110
3	1	5.67*	0.95	0.000	3.193	8.141
	2	3.05*	0.74	0.002	1.110	4.985
Control group						
1	2	2.67*	0.75	0.006	0.706	4.628
	3	2.43	1.07	0.102	-0.362	5.219
2	1	-2.67*	0.75	0.006	-4.628	-0.706
	3	-0.24	0.86	1.000	-2.489	2.013
3	1	-2.43	1.07	0.102	-5.219	0.362
	2	0.24	0.86	1.000	-2.013	2.489

*The mean difference is significant at the 0.05 level

^aAdjustment for multiple comparisons: Bonferani

Table 3 Pairwise for positive mood scores in PIM group

(I)	(J)	Mean dif (I–J)	Std. error	Sig. ^a	95 % confidence interval for difference	
					Lower bound	Upper bound
PIM group						
1	2	–0.48	0.51	1.000	–1.821	0.868
	3	–1.62*	0.55	0.024	–3.055	–0.183
2	1	0.48	0.52	1.000	–0.868	1.821
	3	–1.14	0.49	0.095	–2.434	0.148
3	1	1.62*	0.55	0.024	0.183	3.055
	2	1.14	0.49	0.095	–0.148	2.434

*The mean difference is significant at the 0.05 level

^aAdjustment for multiple comparisons: Bonferani

($p = 0.024$). Meanwhile, there was no statistically significant difference from the pretest to the second test ($M = 12.38$, $SD = 2.03$) and from the second test to the post-test, respectively. Finally, the results revealed that there was no statistically significant difference in the three assessments for negative mood (Wilks' Lambda = 0.864, $F(2, 19) = 1.49$, $p = .25$, multivariate partial eta-squared = 0.14).

Traditional group: There was no statistically significant effect in the three assessments for putting performance (Wilks' Lambda = 0.176, $F(2, 19) = 2.024$, $p = 0.16$, multivariate partial eta-squared = 0.18). Additionally, there was no

Table 4 Pairwise for negative mood scores in TI group

(I)	(J)	Mean dif (I–J)	Std. error	Sig. ^a	95 % confidence interval for difference	
					Lower bound	Upper bound
TI group						
1	2	1.19	0.46	0.055	–0.022	2.403
	3	0.59	0.54	0.860	–0.819	2.000
2	1	–1.19	0.46	0.055	–2.403	0.022
	3	–0.60	0.35	0.310	–1.519	0.319
3	1	–0.59	0.54	0.860	–2.000	0.819
	2	0.60	0.35	0.310	–0.319	1.519

*The mean difference is significant at the 0.05 level

^aAdjustment for multiple comparisons: Bonferani

statistically significant effect for positive mood in the three assessments (Wilks' Lambda = 0.176, $F(2, 19) = 2.024$, $p = 0.16$, multivariate partial eta-squared = 0.18). For negative mood, the result shows that there was a statistically significant effect in the three assessments (Wilks' Lambda = 0.705, $F(2, 19) = 3.984$, $p = 0.03$, multivariate partial eta-squared = 0.29). The pairwise for negative mood is shown in Table 4 indicates that the TI group decrease from the pretest to the second test ($M = 9.51$, $SD = 1.77$ vs. $M = 8.32$, $SD = 1.22$, respectively) was statistically significant ($p = 0.05$).

Control group: There was a statistically significant effect in the three assessments for putting performance (Wilks' Lambda = 0.61, $F(2, 19) = 6.01$, $p = 0.009$, multivariate partial eta-squared = 0.39). Table 2 shows that the pairwise for putting performance decrease from the pretest to the second test ($M = 27.38$, $SD = 4.30$ vs. $M = 24.71$, $SD = 3.96$, respectively) was statistically significant ($p = 0.006$). There was no statistically significant difference in putting performance in the post-test ($M = 24.95$, $SD = 2.85$) from the pretest ($p = 0.102$) and the second test ($p = 1.000$). Meanwhile, there was no statistically significant effect for positive mood in the three assessments (Wilks' Lambda = 0.979, $F(2, 19) = 0.205$, $p = 0.82$, multivariate partial eta-squared = 0.02). Finally, there was no statistically significant effect for negative mood in the three assessments (Wilks' Lambda = 0.853, $F(2, 19) = 1.63$, $p = 0.22$, multivariate partial eta-squared = 0.15).

4 Discussion

Results of the present study indicated that the improvement in putting performance by the PIM group is consistent across the three assessments compared to traditional imagery group. Indirectly, PIM training program was more functionally equivalent to physical performance than traditional imagery practice method. Similarly, as discussed by [16], the physiological responses experienced during physical

performance were simulated during the imagery. The present study also highlights that there was no significant difference for putting performance across the three assessments in the traditional imagery group. However, the performance in traditional imagery group was better than the control group (Only physical practice).

The present study also confirmed that the mood of the golfers is unpredictable while performing the task [17, 18]. For instance, the effectiveness of PIM training with PETTLEP imagery components helped to control the negative mood and increased the positive mood of the golfers. The present study has shown that the negative mood is significantly observed in traditional imagery group and there was no improvement in the positive mood.

Clear evidence was provided in the study that practicing 10 m away from actual environment or putting green is also an effective way to improve golf putting performance [1]. The study also suggested that the e-putting imagery script was also considered as one of the technical training aid that is easy to use by the coaches or golfers during imagery practice at the putting green. The findings revealed from this study cannot be taken to represent low handicap golfers. Future studies should also compare between e-putting imagery script and video or audio training aids.

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