Visuo-motor behavior rehearsal training (VMBR) approach in enhancing novice archer shooting accuracy performance

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Abstract: Imagery has been shown as an effective psychological tool in enhancing sports performance. While most studies focusing on expert archers as subject, limited findings were discovered using novice athlete to measure the imagery training effect on shooting accuracy. This study aims to identify the effect of mental imagery training on novice archery athlete performance; and to compare the differences in shooting accuracy between novice and expert archers. The intervention cross-sectional research design was used in this study, which involved pre and post-test with Visuo-Motor Behavior Rehearsal Training (VMBR) as treatment intervention. Subjects were 12 archery athlete employed from Majlis Sukan Negara (Pahang) age 15.8(1.03) years old. Subjects were purposely assigned into experiment and control group base on the team their represented. Shooting accuracy data were recorded for both novice and expert groups and paired sample t-test were used to analyze the mean differences in shooting score with pearson correlation to analyse the correlation between score. As for the findings, novice archers shooting score have improved in comparing pre-test score 73.83 (9.806) and post-test score 81.83(7.80) with $t(5) = 4.619$, $p = .0057 < .05$. The novice archers also showed positive correlation in shooting test with $r = .9085$, $p = .00$, $R^2 = .8101$. This study had concluded imagery training approach indeed has proven a beneficial training method for increasing the novice archers shooting accuracy. However, further investigation needs to be done to test the shooting accuracy on real game situation to analyse athlete performance when under competition environment.

Keywords: mental imagery, novice archers, shooting accuracy

1. Introduction

Imagery training was one of the most popular methods in trained high performance athlete using psychological modalities in improving their sport performance by recreating the scenes in mind from the experience gained (Schack, Essig, Frank & Koester, 2014). From past research, imagery training able to enhance athelete in skill acquisition (Hall, Mack, Paivio & Hausenblas, 1998), training and competition performance (MacIntyre & Moran, 2009), intrinsic and extrinsic motivation (Munroe et al., 2000) and self-confidence (Hall, Rodgers & Barr, 1990) as well as able to reduce arousal and anxiety (Weinburg, Butt, Knight, Burke & Jackson, 2003). Imagery training has also proven to boost sport performance including golf (Swainston et al., 2012; Quinton, Cumming, Allsop, Gray, & Williams, 2016), swimming (Post, Muncie, & Simpson, 2012), tennis (Robin et al., 2007) , badminton (Wang et al., 2014) and shooting (Baeck et al., 2012). Interestingly, most of imagery training skills have been employed by target sports to increase their accuracy in respective sport event (Baeck et al., 2012).Past research has exhibited clear evidence that mental imagery training is beneficial on performance in sports and competition by improving cognitive specific (CS) and cognitive general (CG) (Munroe-Chandler & Guerrero, 2017). Yet still, mental imagery training is not a common method implemented in everyday training among the athletes and coaches especially in local setting. In addition, novices performers still implement the same method which is need to put more effort in repetitive practice hours by increasing the capacity of the training without applications of imagery training (Tracy, 2015).Therefore, this study aims to conduct effectiveness of mental imagery training on novice arhcers in enhancing the shooting accuracy.

2. Method

An intervention cross-sectional research design to represent the research evidence in regard to the Visuo-Motor Behavior Rehearsal Training (VMBR) on novice archery athlete performance were implemented in this study. A total number of N=12 male subjects age between 14 to 17(M=15.83, sd=1.03) years old were selected from the Pahang state backup archery team and school level archers through purposive sampling technique. All subjects were tested with one round of arrow shooting (10 arrows) adapted from Quinton et al., (2016) *figure 1* as pre-test before random assignment were implemented. The experimental group were underwent four weeks of mental imagery intervention adopted from Koehn, Morris and Watt (2014) consist of three sessions per week with 15 minutes of VMBR on each session. Each VMBR session was conducted using three phases of relaxation phases, imaging phase and reaction phase with a guided imagery script provided to the samples. The non-experiment group were not been induced with any treatments but still undergo the same training regime as the treatment group. A post test were executed after four weeks with the same testing protocol of one round of shooting (10 arrows). Paired sample t-test were used to analyze the comparison between pre and post of mental imagery treatment to determine the mean differences wthin the experimental and non-experiment groups.

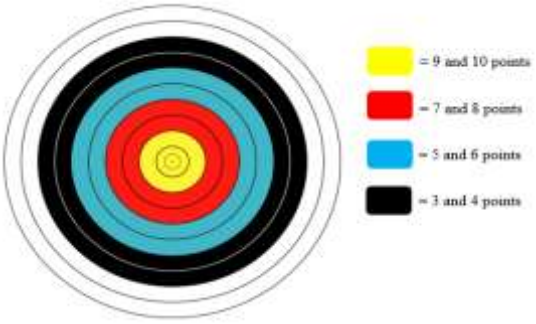


Figure 1- Archery target scoring

3. Findings

Visuo-Motor Behavior Rehearsal Training (VMBR)

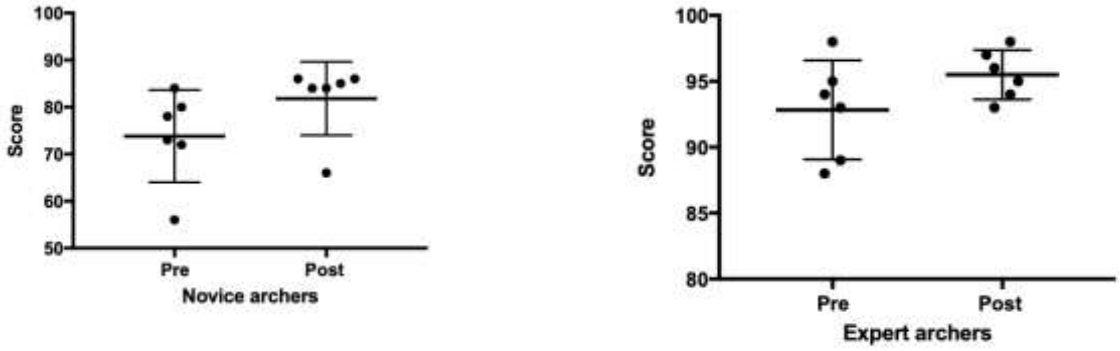
To test this study hypothesis, paired sample t-test were employed to find the mean score for novice and expert groups before and after VMBR treatment. It is showed in the table 1, the mean score for novice archers in pre-test before VMBR is 73.83 (9.806) while the post test showed increase in score 79.83 (7.808). This research has found out, there is a significant increase in shooting performance after VMBR treatment on novice archers with $t(5) = 4.619$, $p = .0057 < .05$. However, the expert archers has showed slightly increase in shooting accuracy from 92.83 (3.763) in pre test, to 95.5 (1.870) in post test with $t(5) = 3.024$, $p = .0293 < .05$. Table 1 presented the result for both novice and expert archers with illustrated graph in figure 2.

Table 1 Analysis of mean score for novice archers (experiment) and expert archers (non-experiment) in shooting score.

Group	N	Mean	*sd*	*t*	df	Sig.
Experiment	6					
Pre test		73.83	9.806	4.619	5	.0057**
Post test		81.83	7.808			
Non-experiment	6					
Pre test		92.83	3.7638	3.024	5	.0293*
Post test		95.50	1.8708			

Sig. * p = <.05 (two-tailed)
** p = <.05 (two-tailed)

Figure 2- Novice and expert archer shooting score



This study also intend to test the differences and correlation of the mean score between the expert and novice group. Therefore, the paired sample t-test and correlation analysis were employed to test the mean score. As showed in table 2, the there were high differences in pre and post score in novice archers with 8 (1.732) while in expert archers, small differences were found with 2.667 (.8819). However, both group has showed positive correlation in pre-post mean score with novice archers score r = .9085, p = .00, R^2 = .8101 and expert archers score r =.9231, p=.00, R^2 = .6465. Table 2 presented the result for both novice and expert archers with illustrated graph in figure 3.

Table 2 Analysis of mean differences and correlation between novice archers (experiment) and expert archers(non-experiment) in shooting score pre versus post.

	Mean diff	*SE*	R^2	*r*	Sig.
Experiment	8	1.732	.8101	.9085	.00**
Non-experiment	2.667	.8819	.6465	.9231	.00**

Sig. * p = <.05 (two-tailed)
** p = <.05 (two-tailed)

Figure 3- Novice and expert archer mean differences in shooting score

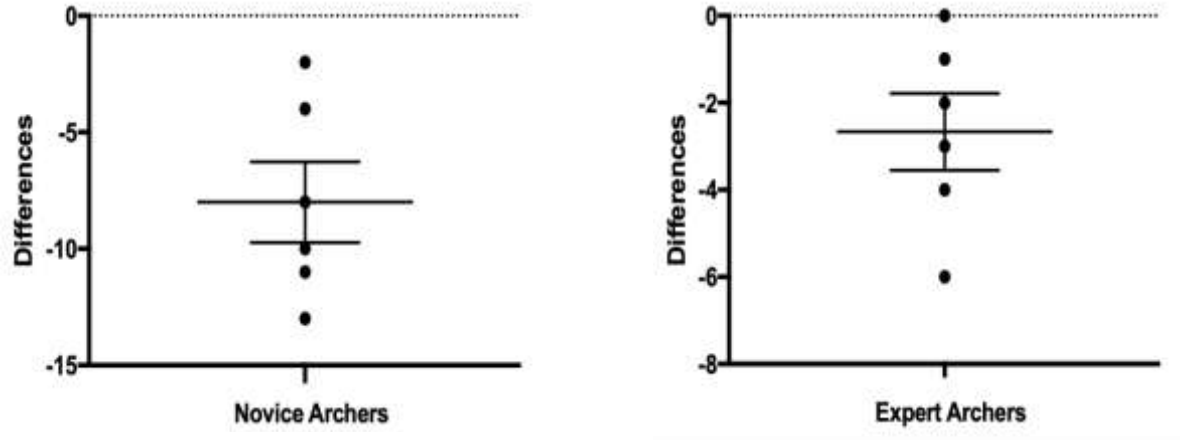
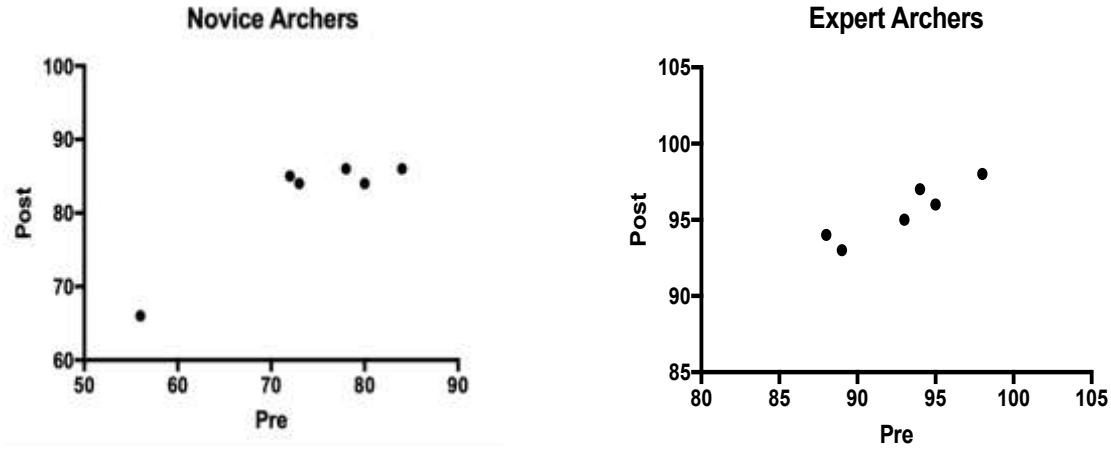


Figure 4- Novice and expert archer mean correlation in shooting score



4. Discussion

This research objective is to identify VMBR training on novice archery shooting accuracy. Through this research findings, it was shown VMBR training intervention has enhanced novice archers shooting performance. This result is consistent with numbers of previous literatures (Simonsmeier et al., 2017; Koehn et al., 2014; Swainston et al., 2011; Post et al., 2012; Hammond et al., 2012) which show an improvement on athlete performance after intervention sessions of mental imagery training. Simonsmeier et al., (2017) has stated that VMBR training was able to help novice athletes in the learning process which boost their performance with additionally,lessened the time required by novice athlete to transfer from cognitive stage to autonomous stage. Ericsson (1993) developed an idea that for someone to be an expert, it's required at least 10,000 hours of training. However, Munroe-Chandler et al., (2017) has suggested that combination of VMBR training with physical practices and technology may boost an athlete to become proficiency in short amount of time compare to traditional duration of training.

5. Conclusion and recommendation

From this research, the findings had concluded VMBR training intervention provides a significant effect on novice athlete performance. The results between pre-test and post-test suggest that VMBR training is one of the training methods that can enhance the performance of the athlete. It is also been found the expert athlete have better skill performance even not provided with VMBR training. The findings show that the accuracy of expert archers are

better than novice archers in post-test eventhough the novice archers receive VMBR training.The findings from this study was supported by numerous literature (Ekeocha, 2015; Simonsmeier, 2016; Wang et al., 2014; Hammond 2012, Koehn et al., 2014; Quinton,2016;). Based on the findings from this study, it suggests that novice athlete should practice mental imagery training in enhancing their learning process. VMBR is proven as one of the methods that can help novice learning process became faster and more accurate. Combining VMBR training with physical practice help in skill performance enhancement become more efficient (Munroe-Chandler et al., 2017). However, in future research it is suggested to extend the duration of the intervention session to improve the effect of novice performance. Besides that, Perhaps future studies should consider to test the shooting accuracy test on real game situation to analyse athlete performance when under competition environment.

6. References

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