

## THE EFFECTIVENESS OF PSYCHOLOGICAL SKILLS TRAINING PROGRAM ON NETBALL SHOOTING PERFORMANCE

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**Abstract:** The study was aimed to investigate the effect of Psychological Skills Training Program on netball shooting performance. The experimental method was used on three groups of an 8-week intervention: combination of diaphragmatic breathing and imagery, plus physical practice (G1); combination of DB and self-talk, plus physical practice (G2); and control group which have physical practice only (G3). A SPANOVA was conducted to assess the impact of all groups on shooting performance across the two time periods. The main effect comparing the two treatments and a control group was significant,  $p < .001$ . Post hoc Tukey test differ significantly at  $p < .05$ . However, the G2 was not significantly different from the G3. The results indicated that netballers of different skill used of PST, either G1 or G2 were found to improve the netball shooting performance. It was also showed that G1 has better netball shooting performance rather than G2 and G3. As to highlighting, that the principles and practical applications of these most basic psychological skills can be taught in easier ways and probably in a relative short period of time among youth athletes.

**Keywords:** *psychological skills training, imagery, self-talk, diaphragmatic breathing, netball shooting*

## EFEKTIVITAS PROGRAM PSYCHOLOGICAL SKILL TRAINING PADA KETERAMPILAN TEMBAKAN NETBALL

**Abstrak:** Penelitian ini bertujuan untuk mengetahui pengaruh Program *Psychological Skills Training* (PST) terhadap keterampilan tembakan *netball*. Metode eksperimental digunakan pada tiga kelompok intervensi 8 minggu: kombinasi pernapasan diafragma dan imageri ditambah latihan fisik (G1); kombinasi pernapasan diafragma dan self-talk ditambah latihan fisik (G2); dan kelompok kawalan yang hanya menjalani latihan fisik (G3). SPANOVA dilakukan untuk menilai dampak dari semua kelompok terhadap keterampilan tembakan selama dua kali. Efek utama membandingkan dua perlakuan dan kelompok kontrol adalah signifikan,  $p < .001$ . *Post hoc Tukey* test juga mengalami perbedaan yang signifikan pada  $p < .05$ . Namun, G2 tidak jauh berbeda dari G3. Hasil menunjukkan bahwa terdapat perbedaan keterampilan dari pemain *netball* dengan latihan PST, baik G1 atau G2 ditemukan meningkatkan keterampilan tembakan *netball*. Selain hal tersebut, hasil menunjukkan bahwa G1 lebih baik kemampuan tembakan *netball* dari pada G2 dan G3. Sebagai hasil yang paling disoroti adalah bahwa prinsip-prinsip dan aplikasi praktis dari keterampilan psikologis tersebut dapat diajarkan dengan cara yang lebih mudah dan mungkin dalam waktu yang relatif singkat kepada para atlet remaja.

**Kata Kunci:** *psychological skills training, imagery, self-talk, pernapasan diafragma, tembakan netball*

## INTRODUCTION

As all other ball games, scoring is the most important characteristic for the competitive success of a netball team (Navin, 2012). A netball team consists of seven players on the court at one time. Each position has different court restrictions and roles within match play, which is demanding the shooting performance of the two players called Goal Shooter and Goal Attack in defining the goal (Davidson & Trewartha, 2008). Open skill such as netball shooting occur in a changing, and predictable environment such need to regularly move and adapt with different shooting distance aiming to the basket (Stoker et al., 2017). As a player, she tended to demonstrate few repetitions of movement activities and demonstrated least time walking, jogging and running, and greatest percentage of time standing (Davidson & Trewartha, 2008). Therefore, training should be tailored to suit the needs and capabilities of particular players (Fox, Spittle, Otago, & Saunders, 2013). Various performance indicators have been used to try to understand the psychological demand of training (Hegazy, Sherif, & Houta, 2015).

Psychological aspects may influence the results, for example anxiety prior to competition (Fernández-Fernández, Boullosa, Sanz-Rivas, Abreu, Filaire, & Mendez-Villanueva, 2015) or during daily event (Garza & Ford, 2009) could cause rise in heart rate; or the visualization and concentration-attention control during the task completion could cause the performance of motor skills (Hegazy et al., 2015); or the relaxation exercise was used to gain a relaxed state so that the affirmation statements could be used in conjunction with relaxation during the preparation phase of a physical activity (Rogerson & Hrycaiko, 2002); or could be used during the activity itself (Fraser, Steffen, & Elfessi, 2001). Thus, it is very common that the main emphasize is to develop one's performance through mental

training (Weinberg & Gould, 2014). The argument is whether those mental preparation strategies could be effectively works, either single or a combination of techniques (Weinberg, Chan, & Jackson, 1983).

One general definition describes the mental preparation strategy known also as psychological skills training (PST), as the "systematic and consistent practice of mental or psychological skills for the purpose of enhancing performance, increasing enjoyment, or achieving greater sport and physical activity self-satisfaction" (Weinberg & Gould, 2014). In other words, psychological skills are developmental targets that are addressed through training of psychological techniques (Vealey, 1988). Gardner (2009) added that PST is used to ensure that individuals attain high-level performance in sports through honing and applying necessary psychological skills. A calm mental state, the rhythm of preparation, training, and lack of pressure were the major factors contributing to the ability to maintain control or successful self-regulation (Sun & Wu, 2011).

Weinberg and Gould (2014) responded that the PST program was effective to improve athletic performance and success. It was either with one single skills like self-talk training program such soccer skills (Johnson, Hrycaiko, Johnson, & Halas, 2004), swimming backstroke (Zetou, Nikolaos, & Evaggelos, 2014), cycling time trial (Barwood, Corbett, Wagstaff, McVeigh, & Thelwell, 2015), or imagery training program such netball shooting (Fowler, 2010; Halim & Ismail, 2016; Wakefield & Smith, 2009), soccer passing (Seif-Barghi, Kordi, Memari, Mansournia, & Jalali-Ghomi, 2012), soccer free kick accuracy (Hallsson, 2013), volleyball serve (Velentzas, Heinen, & Schack, 2011), basketball free throw shooting (Samis-Smith, 2015) proven interesting significant results towards athletes performance, or the use of

package approach - imagery, goal setting, and variations of self-talk used in Blakeslee & Goff (2007), Wolframm & Micklewright (2011), Kerkez, Kulak, & Aktas (2012) and Montgomery, Ross, Perry, & Hansen (2017). Interestingly, even with large numbers of interventions provide by the researchers, there is still lack of information on the comparison study between different combinations of mental strategy based on the assessment on the same task-performance.

When athletes have too much energy or anxiety, relaxation strategies are often helpful (Pineschi & Di Pietro, 2013) and one of key skill and happens quickly is diaphragmatic breathing (Fraser et al., 2001). When athletes are too low in energy, they often feel tired and flat and may suffer a “let down” (Loehr, 1994). Therefore, it enables increase the ability to concentrate largely in combination with concentration, imagery or self-talk prior to practice (Harris & Harris, 1984). Vealey and Forlenza (2015) describe imagery as “using one’s sense to create or re-create an experience in the mind”. This technique can be used by athlete with any cognitive strategy such as to use it effectively. Few of the literature is on using imagery in mental skill training with few controlled studies that get at how imagery works (Glynn, Gilbert, & Lewis, 2013; Smith, Wright, Allsopp, & Westhead, 2007) and what might make imagery more effective (Hallsson, 2013).

The relaxation techniques are skills that can be learned while some of these techniques work better for one athlete than another. The most important contribution that relaxation presents is how to regulate arousal such that the athlete does not over-charge his or her system. For example, sometimes during practice, instead of trying harder, the athlete need only relax and just let the situation naturally unfold. Putting too much effort into skill execution is almost always counterproductive. Frequently, when a player is having

trouble learning a new skill, taking a few minutes out to relax such practicing the diaphragmatic breathing in combination with imagery – will be more productive than repeating the skill over and over when one is tense, fatigued, or not concentrating (Harris & Harris, 1984).

As one of the cognitive strategy that been combine with imagery by several researchers is self-talk as self-give instructions; reinforce or interpret thoughts, feeling or actions; or carry on an internal dialogue within oneself. Whilst there is evidence in the use of imagery and self-talk independently of one another, it might be possible that they also cause preferences for the use of one strategy rather than the other to be formed. For example, previous research has revealed that athletes tend to place more emphasis on the use of imagery as a pre-competitive strategy (Munroe, Giacobbi, Hall, & Weinberg, 2000; Weinberg, 2003) and self-talk as a strategy to be used during competition (Gammage, Hardy, & Hall, 2001; Hardy, Hall, & Hardy, 2005). Moreover, it has been suggested that self-talk may lend itself better to use during competition than imagery, as it is a quicker and easier strategy to employ (Hardy et al., 2005).

However, as to make a comparison there were findings suggested the combination of imagery with relaxation and/or self-talk could also produce the positive result in enhancing performance (Cumming, Nordin, Horton, & Reynolds, 2006; Vealey, 1986). In addition, a number of research studies have demonstrated that imagery combined with relaxation is more effective than imagery alone (Hallsson, 2013; Weinberg, Seabourne, & Jackson, 1981). It make a great sense since it is usually suggested that relaxation enhances the clarity of the athlete’s imaging (Harris & Harris, 1984). Accordingly, self-talk was hypothesized can help the athlete increase the self-confidence when combining with imagery. However,

Cumming et al. (2006) revealed that combination of these two had no effect on self-confident but the self-talk may helping on cues while imagine. While, past research has demonstrated the positive effects of single used of focus self-talk for improving performance such in basketball (Chroni, Perkos, & Theodorakis, 2007), tennis (Van Raalte, Cornelius, Brewer, & Petitpas, 2006) and throwing-and-jumping events (Goudas, 2006) performance.

For some reason the literature indicates that many coaches exclude psychological skills training (PST) from the training and preparation of their athletes (Freitas, Dias, & Fonseca, 2013a; Grobbelaar, 2007) and a lack of knowledge about PST (Freitas, Dias, & Fonseca, 2013b; Grobbelaar, 2007). However, there have been possible explanations from athletes' point of view for the need of development and implementation of PST including the awareness to improve poor psychological preparation for competitions (van Den Heever, Grobbelaar, & Potgieter, 2007). Another possible explanation reported that more than 50% of the youth athletes claimed that they "never heard or do not know" about meditation, autogenic training, progressive muscular relaxation, concentration training and imagery (Ong, 2004). All of these feedbacks illustrate the importance of mental strategies in helping athletes improve their performance in their respective sports. To date, countless studies have proven the effectiveness of psychological strategies to improve athletes' performance and yet the number of research involved in netball and Malaysia contexts is still small. Such a trend has created a general concern of whether the huge number of PST programs been designed has any way could be applied to assess shooting-task performance among netball shooters. Thus, the aim of this study was to determine the effectiveness of PST

program in shooting-task performance on netball shooters.

## **METHODS**

### **Participants**

Forty-six netball athletes' age between 13 to 16 years old from Kuala Lumpur Sports School participated in the present study. The subjects were recruited as not to be involved in official competitions such as Malaysia Sport (SUKMA) or Malaysia School Sports Council Sport (MSSM) during the intervention period. The athletes not an elite standard and none of them reported having any experience of formal PST program. The study was performed after approvals of the University's Research Ethics Committee was obtained, and followed by having the sanctions from Ministry of Education Malaysia (MOE) and Kuala Lumpur Federal Territory Education Department. As the subjects were under 18 years of age, subjects along with their parents and coaches were provided information about the study.

### **Procedures**

The subjects were recruited to three groups: Group 1 – combination of diaphragmatic breathing and imagery, plus physical practice (DB and IM, + PP) with  $n = 16$ ; Group 2 – combination of diaphragmatic breathing and self-talk, plus physical practice (DB and ST, + PP) with  $n = 15$ ; Group 3 – physical practice (PP) with  $n = 15$ . The subjects who achieved a criterion of equal to or less than 36 of the Vividness of Movement Imagery Questionnaire-2 (VMIQ-2) subscales were recruited as Group 1 members. The first 16 out of 46 subjects were therefore recruited into the Group 1, while, the remaining 30 subjects were equally divided randomly into the Group 2 and Group 3. The intervention groups – Group 1 and Group 2 performed three times per week with 30 minutes of PST and followed by 30 minutes of PP per session at different days

for eight weeks that in total was 24 sessions for each group. Except, the control group – Group 3 which only did for 30 minutes of PP in a session. No information about the purpose of the study was given to the subjects until they completed the experiment.

### **The Intervention Schedule**

In familiarization phase, the subjects in Group 1 and Group 2 had a session in which they received instruction and training on how to perform the PST interventions, respectively. The subjects were familiarized with what will be done, and what is expected from them could become grateful assistance to subject who has never practiced shooting even though they are netball players. The protocol of physical practice (PP) session also was explained and the subjects received instruction on how to perform shooting during the sessions scheduled for them. Due to varying levels of shooting experience and their ability, the subjects performance considering only after they were familiarize with the expected tasks to maintain consistency in the following 8 weeks intervention period. The duration of each session for both intervention groups was lasted for 30 minutes session – 10 minutes with DB training and 20 minutes with either IM training or ST training. As the subjects are considered new to psychological skills techniques, training is carried out as they lie down because it will be very relaxing and can help them more fully focus on their breathing, images or phrases that are required. After completing the 30 minutes PST session, the subjects were continued with 30 minutes of PP.

### ***DB and IM training***

The subjects participated in the DB while lying in a quiet and comfortable room. The researcher lead the session and read the relaxation script in about 10 minutes, while the research assistance was utilized to monitored the subjects. The

subjects were reminded that they should enable to fell the relaxation after they finished with the breathing exercise. The subjects were then asked to continue lay-down and continue with the instructional imagery script that was read out to them for another 20 minutes. As short as possible, remind the subjects how exactly the technique can incorporated into their PP later.

### ***DB and ST training***

The purpose of performing DB before conducting ST training is the same as in conducting for Group 1. The subjects participated in the DB while lying in a quiet and comfortable room and lasted approximately 10 minutes. While the researcher led the session and read the script of relaxation the research assistance was utilized to monitored the subjects. The subjects were then asked to continue lay-down and continue with the self-talk script that was read out to them for another 20 minutes. The steps are simplify by address each or more than one steps in making a successful shooting to four components which can gives a single cue word – ‘check’, ‘aim’, ‘flick’ and ‘follow-through’ to instruct where they had to focus their attention for shooting. The self-talk phrases and self-talk instruction cues that need to be self-generated by the subject should be recite just before they continue with their PP afterwards.

### ***Physical Practice (PP)***

The basic part of this shooting task in allowing a subject to perform a shooting was refer to the technical parts recommended by Navin (2012). The subject had performed 20 trials in the first round at a distance of 1.5 meters and 3.0 meters from the post and be given a break for 3 minutes before continuing 20 trials in the second round for the other distance. The subjects must perform according to the rules of the game, in which they are allowed to hold the ball for only 3 seconds

(before shooting) and shall obey the Footwork Rule. After each attempt made by the subject whether it is successful or unsuccessful, the rebound ball is taken by the feeder (research assistant). Right after that, the feeder is within a distance of 0.9 meters acting as a defender by raising both hands.

### Measures

This study was an experimental design involved three phases:

Phase 1: A baseline phase that the researcher needs to indicate the imagery ability of the subjects. Then, the subjects were divided into three groups. The data was collected during pretest activity.

Phase 2: The intervention phase, lasting for eight weeks for the intervention groups – Group 1 and Group 2, and no intervention was provided to the control group – Group 3.

Phase 3: The post-intervention phase, the data was collected on the last session.

### *Vividness of Movement Imagery Questionnaire-2 (VMIQ-2)*

The athletes were asked to answer VMIQ-2 to indicate their imagery ability (Roberts, Callow, Hardy, Markland, & Bringer, 2008). The subjects who achieved a criterion of equal to or less than 36 of the VMIQ-2 subscales were recruited as Group 1 members (i.e. DB and IM, + PP). The criterion indicated that their imagery ability was at least moderately clear and vivid (Lawrence, Callow, & Roberts, 2013; Roberts et al., 2008). Whereas, the remaining thirty subjects were equally divided randomly into the experimental Group 2 (i.e. DB and ST, + PP) and Group 3 (i.e. PP only).

### *Netball Shooting Task*

Even though there was several shooting style across the world, but the preferred technique has changes from a two-handed shot to the one-handed high release shot known as Australian shooting

style was selected for this study (Lim, Choo, Safee, & Tan, 2011; Shakespear & Caldwell, 2009). Two assessors recorded each attempt using the scoring scale which 1 point if the ball goes directly into net and 0 point if the ball do not goes into net. Shooting task performance was measured by summing the scores for 40 attempts. The summation scores range from 0 to 40 points.

## RESULTS AND DISCUSSION

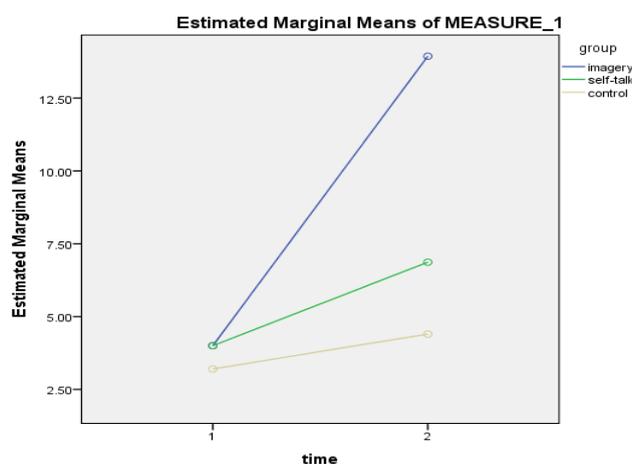
### Results

Kolmogorov-Smirnov and the Levene's test showed that the assumption of normality was met within each group. The Levene's test and Box's Test of Equality of covariance matrices were not significant value ( $p > .05$ ) and thus, parametric tests can be applied. During pretest, Group 1 (i.e. DB and IM, + PP) had the same mean score with Group 2 (i.e. DB and ST, + PP) (mean = 4.00). Group 3 as control group (mean = 3.20) has the lowest mean score. However, for the post-test, the mean score for Group 1 (mean = 13.94) was higher than Group 2 (mean = 6.87). The mean score for control group was remain the lowest (mean = 4.40). The graph of the profile plot illustrated in Figure 1 clearly indicated that the shooting performance for the treatment groups increase over time. However, the mean value of Group 1 outperformed the Group 2 during the posttest. Group 2 showed marginal increase of mean value during the posttest. For the control group, the mean value was increase over time; however, the increasing of the mean value of treatment groups was much better than the control group.

A split-plot analysis of variance (SPANOVA) was conducted to assess the impact of two different treatments and a control group on athletes' shooting performance score, across the two time periods of pre-post intervention. There was a significant interaction between groups and time (Wilks Lambda = .612,  $F(2,43) =$

13.61,  $p < .001$ ). There was also a substantial main effect for time, (Wilks Lambda = .515,  $F(1,43) = 40.507$ ,  $p < .001$ , partial eta squared = .485) with all

groups showing an increment in shooting performance score across the two time periods (Table 1).



**Figure 1. Profile Plots to Indicate the Pre-Test and Post-Test for Shooting Performance Means of the Three Groups Based on the Time**

**Table 1. Multivariate Tests**

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
time	Pillai's Trace	.485	40.507	1.000	43.000	.000	.485
	Wilks' Lambda	.515	40.507	1.000	43.000	.000	.485
	Hotelling's Trace	.942	40.507	1.000	43.000	.000	.485
	Roy's Largest Root	.942	40.507	1.000	43.000	.000	.485
time *	Pillai's Trace	.388	13.606	2.000	43.000	.000	.388
	Wilks' Lambda	.612	13.606	2.000	43.000	.000	.388
group	Hotelling's Trace	.633	13.606	2.000	43.000	.000	.388
	Roy's Largest Root	.633	13.606	2.000	43.000	.000	.388

**Table 2. Table of Tests of Between-Subjects Contrasts**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	3383.651	1	3383.651	183.445	.000	.810
group	435.299	2	217.650	11.800	.000	.354
Error	793.135	43	18.445			

**Table 3. Post Hoc Tests: Multiple Comparisons**

Group	Mean Difference	Sig.	95% Confidence Level	
			Lower bound	Upper bound
G1 (DB & IM, + PP) and G2 (DB & ST, + PP)	3.5354	.002	1.3343	5.7365
G1 (DB & IM + PP) and G3 (PP only)	5.1688	.000	2.9677	7.3698
G2 (DB & ST, + PP) and G3 (PP only)	1.6333	.148	-.6030	3.8697

and a control groups was significant,  $F(1,43) = 11.800, p < .001$ , with partial eta squared = .354. Post hoc Tukey test indicated that the Group 1 and Group 2 differ significantly at  $p < .05$  and the Group 1 and Group 3 differ significantly at  $p < .05$ . However, the Group 2 was not significantly different from the Group 3. The summarization of mean difference showed that the subjects of different treatment from Group 1 and Group 2 were found effectively in increasing shooting performance. It was also showed that the Group 1 has better shooting performance rather than Group 2 and the Group 3 (Table 3).

### Discussion

The purpose of this study was to investigate the influence of Group 1, Group 2 and Group 3, specifically expecting result from the intervention groups on the improvement of the netball shooting-task performance. The athletes of different treatment from Group 1 and Group 2 were found effectively in increasing shooting performance. It was also showed that the Group 1 has better shooting performance rather than Group 2 and the Group 3. Given the goal as to increase the performance, some findings claimed that without the use of other mental strategy and follow by PP, IM or ST alone could also fulfill the goal (Boubouki & Perkos, 2014; Fowler, 2010; Kolovelonis, Goudas, & Dermitzaki, 2011; Wakefield & Smith, 2009). Fortunately, this study, Aghdasi and Touba (2012), and Hemayattalab and Movahedi (2010) revealed that the combination of PP leads to better result than separate practice. This may explained by the fact that young athlete may feel that their body well by having the PP and they understand the importance of focusing on the PST techniques that they been taught. Probably, they may felt the improvement on the relaxation mode that can gain in shorter period of time, or able to lessen the

pressure which accompanying them during the practices by having either, IM or ST.

Some findings revealed on the effectiveness of PST program among adult athletes which contain almost similar program with these studies (Fowler, 2010; Peluso, Ross, Gfeller, & LaVoie, 2005; Thelwell, Weston, & Greenlees, 2010). Nevertheless, Capranica and Millard-Stafford (2011) had investigate the effect of PST with young athletes, which found positive results for its effects on performance. Interestingly, most of them started training and participating in competitions early in their childhood. For example, this perspective was supported by Frick, Daum, Wilson and Wilkening (2009) which the finding proved that the effectiveness of IM training in adult athletes cannot be transferred one-to-one to young athletes because there is a difference with respect to motor skills. Some more, this is reinforced with insight that the association between motor imagery ability and motor performance may get stronger with age (Caeyenberghs, Tsoupas, Wilson, & Smits-Engelsman, 2009). This study may promote comprehensive PST program on future study promoting motor learning in young athletes from different kind of sports and may consider on under some conditions such as kinesthetic experiences to the judgement task.

The practical part in this study was provided basic knowledge from the practices of IM and ST (cognitive strategy) in separate intervention with each of them was used just after DB (somatic strategy). Subjects were thought three easier PST techniques to use during their practices. Reason for that might be that these are more interesting PST techniques for younger athletes. In this study, it was expected that athletes may had some difficulties to find out right state of mind and make it work but after few repetitions, they were able to use ST than the IM. Similarly, as the subjects considered as a

“beginner” in practicing the self-talk, they are prompted to think and memorize the self-talk instruction cues to get a sense of how to perform the shooting task. Hence, the subjects were asked to consolidate the acquired skill from the trigger cue words into their physical practices along the intervention phase with a steady, spontaneous and deliberate pace. Even though, imagery was easier too but it may needs more time to feel comfortable for practices than self-talk. This was supported by Peluso et al. (2005) that who engaged in less than ten hours of athletic activities per week preferred self-talk strategy.

However, this study reported that the DB and IM group was better than DB and ST group though the subjects were engaged in three hours-per-week programs, equally for both techniques. It was probably because of the recruitment basic on DB and IM group was based on the average criteria on their imagery ability (Lawrence et al., 2013; Roberts et al., 2008). Specifically, It could be claim that the Group 1 intervention can be potentially use and should be replicate by other researcher since the result of this study proven was not interfere by the imagery ability of the athletes.

## CONCLUSION

Key findings included that either the athletes may use both type of intervention the combination of DB and IM, or DB and ST probably with the reason of using breathing technique as a strategy to overcome stress and getting calmer and gaining focus before continue with either IM or ST technique. Therefore, the athletes are able to focus more in their way to perform the shooting task. Interestingly, probably the function of IM and ST were found to serve for different purpose. The IM use to plan for making a successful shot, while, the ST use to create and maintain the psychological state while making a successful shot. An attempt was

made to conclude in a clear and concise fashion the efficacy of a practical PST program that might provide readily useable information for coaches, athletes and researchers.

The program could be tested with athletes of different levels including college athletes. It is also important to note that the age of the athlete could impact his or her understanding of the intervention techniques, as he or she may have different levels of mental capacity. Hence, future work should assess the effect of age in intervention implementation. As to highlighting, that the principles and practical applications of the most basic psychological skills can be taught in easier ways and probably in a relative short period of time among youth athletes. In summary, athletes should work with the strategy that they are most comfortable with. This is to ensure that their experience in applying the strategy will be as pleasant as possible. Therefore, coaches should be extra careful when administering the PST program on their athletes, as the athletes might not be using the combination of strategies as effectively as other strategy combinations.

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