



ISSN Print: 2394-7500  
 ISSN Online: 2394-5869  
 Impact Factor (RJIF): 8.4  
 IJAR 2024; 10(4): 94-101  
[www.allresearchjournal.com](http://www.allresearchjournal.com)  
 Received: 09-01-2024  
 Accepted: 16-02-2024

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## Effect of five sessions of imagery intervention on learning a gymnastics skill

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**DOI:** <https://doi.org/10.22271/allresearch.2024.v10.i4b.11662>

### Abstract

Mental toughness and mental power can improve the performance of an athlete. The aim of the study was to see the effect of imagery intervention on learning a skill in Gymnastics. Nine (9) female and three (3) male gymnasts ranging in age from 10 to 14 (M-12.5) years were the participant in the current study. The level of the participants was beginner to intermediate with training age between 0-3 years and 4-6 years. and was participating on District, State and National level in competitions. The Sports Imagery Questionnaire developed by Martens (1982) was used for the present study. The Gymnasts needed to sit focused on a quiet place with the closed eye and try to visualize the skill with full concentration. The questionnaire was filled after the imagery intervention. The scores were recoded and calculated after the 5<sup>th</sup> session on imagery intervention. For the statistical analysis of the questionnaire after last session, ANOVA was used  $\alpha$  0.05 significant level in SPSS. Researcher found that there were significant differences in gymnasts' visual imagery, it is possible that intermediate gymnasts had more visual imagery than beginners due to their greater training age. There were significant differences in gymnast audio imagery. Gymnast has improved as evidenced by an increase in mean score after each session. There were significant differences in the Gymnast's Kinaesthetic imagery because they were able to feel their multiple limbs at the same time, which improved their physical skills. There were significant differences in gymnasts' mood imagery. It has also been observed that the mood of the beginners is better than that of the intermediate gymnasts. The immediate score of session 1 in all skills shows a rise in the mean score, demonstrating its significance and necessity for the athlete. The researcher concluded that there is a significant effect of five session imagery intervention on learning a gymnastic skill.

**Keywords:** PST training, imagery intervention, gymnastics skills, mental imagery, gymnastics training, imagery

### Introduction

For guiding and managing athletic performance it has been acknowledged that mental imagery is a form of Psychological Skill Training (PST) (Murphy, 1994) <sup>[45]</sup>. For thousands of years, discussions of mental function have focused heavily on mental imagery. It has been asserted by many that it is one of the fundamental mental processes that underlies human memory, future planning, navigation, and decision-making. One's inner eye or the visualization of their feelings are both examples of mental imagery. Athletes can perform to the best of their abilities by maintaining a positive attitude and a focused mind. Athletes should practice imagery in a way that makes it simple for them to concentrate. Practice with imagery should be progressive in order to promote quick and effective adaptation.

It has long been acknowledged that mental imagery is a form of PST for guiding and managing athletic performance (Murphy, 1994) <sup>[45]</sup>. However, imagery training is a versatile technique and therefore should follow a systematic approach and target the athlete's area of concern (Martin, Moritz & Hall, 1999) <sup>[39]</sup>. The applied model of imagery training (Martin, Moritz & Hall, 1999) <sup>[39]</sup> was specifically formulated to direct mental practice for athletes and suggests variables which may influence the outcome of the training. The model consists of four main constructs; 1) the sport situation, 2) the imagery type, 3) the outcome and 4) imagery ability of the athlete.

Gymnastics and other fast-paced sports call for precise body movements. Gymnasts should have perfect kinaesthetic senses to perform challenging skills. They have trouble with rotatory movements, and their kinaesthetic awareness is severely diminished. The gymnast's

kinaesthetic sense can be improved through mental imagery training to help them perform better. Many researchers Singh, V. *et al.* (2018) [57], Keogh, R., (2011) [34], Raichur, H., *et al.* (2017) [54] Amasiatu, A. N. (2013) have proven the positive effect of imagery intervention in an athlete's performance.

We use the term "mental imagery" to describe the experience of sensory information combined with representations without a distinct external stimulus. These memories are retrieved images that make the person experience the initial stimulus again or a different combination of stimuli. It should be noted that not all mental imagery must be voluntarily experienced; other people's actions or internal connections can also trigger a mental image, even if the person does not intend for it to. Despite the fact that it is obvious that mental imagery can involve all five senses, in this study we will specifically talk about visual mental imagery because the majority of empirical research has concentrated on this sensory area. The sport situation is specific to the athlete, whether the mental imagery takes place in training, competition or for rehabilitation purposes. Imagery type is based on research developed by Paivio (1985) [50] who conceptualized imagery into five independent types oriented to either motivational or cognitive functions. Cognitive specific (CS) is related to the athlete using visualizations to correctly execute a particular skill. For example, a diver visualizing their arm movements entering the rotation and the image they have when they hit the water correctly.

In the past, mental imagery research has been hampered for theoretical and practical reasons. Due to methodological restrictions brought on by imagery's inherently private nature, there were practical limitations on the types of mechanistic investigation that could be conducted. In the second half of the 20<sup>th</sup> century, behaviorism in psychology also began to take shape. This theoretical viewpoint was against looking into internal representations, including mental imagery. The relative lack of research on mental imagery compared to related fields like visual attention and visual working memory is largely due to the combination of these two challenges.

As a result of numerous recent discoveries about imagery being made using increasingly sophisticated research techniques, these restrictions are now easing. Thanks to new impartial research methodologies, there have been more in-depth investigations into the neural bases and mechanisms of mental imagery in recent years. Martin, Moritz, and Hall (1999) [39] portray imagery ability as a mediating variable between imagery function and the outcome related to performance. The outcomes of these techniques shed light on the function of mental imagery in perception, cognition, and mental health. Findings that have solidified our understanding of visual mental imagery as a depictive internal representation with strong and unexpected connections to visual perception have effectively put an end to the so-called "imagery debate." Research also demonstrates the importance of mental imagery in clinical practice as suggested by Simon E Blackwell (2018) [7]. This surge in basic and clinical research into mental imagery is highlighting the crucial part that it plays in both healthy and dysfunctional aspects of daily behaviours. successful performance in any sports requires athletes to be in an optimal condition, not only physically but as well mentally. To be mentally fit helps an athlete to cope with the variety

of different situations and the corresponding challenges that occur while participating in a specific sport, particularly in a competitive setting.

**Methodology**

**Participants:** 12 Beginner to intermediate level Gymnast (9 female and 3 male) participating on different levels in the competition ranging in age from 10 to 14 (M-12.5) years with training age between 0-3 years and 4-6 years participated in the study. Each gymnast trained three hours per day and six days per week under the supervision of two coaches. This program was the first exposure to psychological skill training for all 12 athletes. To avoid disturbance of regular training program researcher delimited the study for five sessions only.

**Procedure of Data Collection:** The subjects were given the Imagery intervention to learn a skill in Gymnastics. They were instructed to choose a Gymnastics skill which they found difficult to perform or they are eager to learn to increase the difficulty (D- score) of their Gymnastics routine with the condition to choose only the listed skills from current Gymnastics Code of Points (2017-2022).

In the beginning of the training the Gymnasts were briefly introduced about the imagery training which is rarely used in India before to learn the skills. The session was for 20 minutes in total. The Sports Imagery Questionnaire developed by Martens (1982) [38] was used for the present study. Gymnasts need to sit and fill-up the questionnaire after the imagery practice.

Gymnasts completed the questionnaire related to visual Imagery.

1. How vividly did you see yourself doing the activity?
2. How clearly did you hear the sound of the activity?
3. How well did you feel yourself making the movement?
4. How clearly were you aware of your mood?

**Scoring of the questionnaire-** They had to assess their self and give mark 1 if No Image present, 2 if not clear or vivid but a recognizable Image, 3 if moderately clear and vivid Image, 4 if clearly and vivid image and 5 if extremely clear and vivid Image were visualized.

**Data Analysis:** For the purpose of analysing the data, Descriptive Statistics was computed and ANOVA was used to find the difference between the mean and linear trend. Further the level of significance was set at an alpha level of 0.05. The statistical analysis was performed with the help of SPSS. The scores of the questionnaire were analysed to determine any significant difference. The result is presented in the following tables.

**Results**

**Table 1:** Descriptive Statistics of Imagery (Visual) on skill learning in Gymnastics

Session	Mean	Std. Deviation	N
pre session	2.8333	.57735	12
post 1	3.8333	.57735	12
post 2	3.5000	.79772	12
post 3	3.6667	.77850	12
post 4	3.8333	.57735	12
post 5	4.1667	.71774	12

The table No.1 reveals the descriptive analysis of mean value of the imagery (Visual) during different sessions of training. The mean scores of the Gymnast in pre was 2.83 with SD.57, after post 1 3.83 SD.57, post 2 3.50 SD.79, post 3 3.66 SD.77, post 4 3.83 SD.57 and post 5 was 4.16 SD.71.

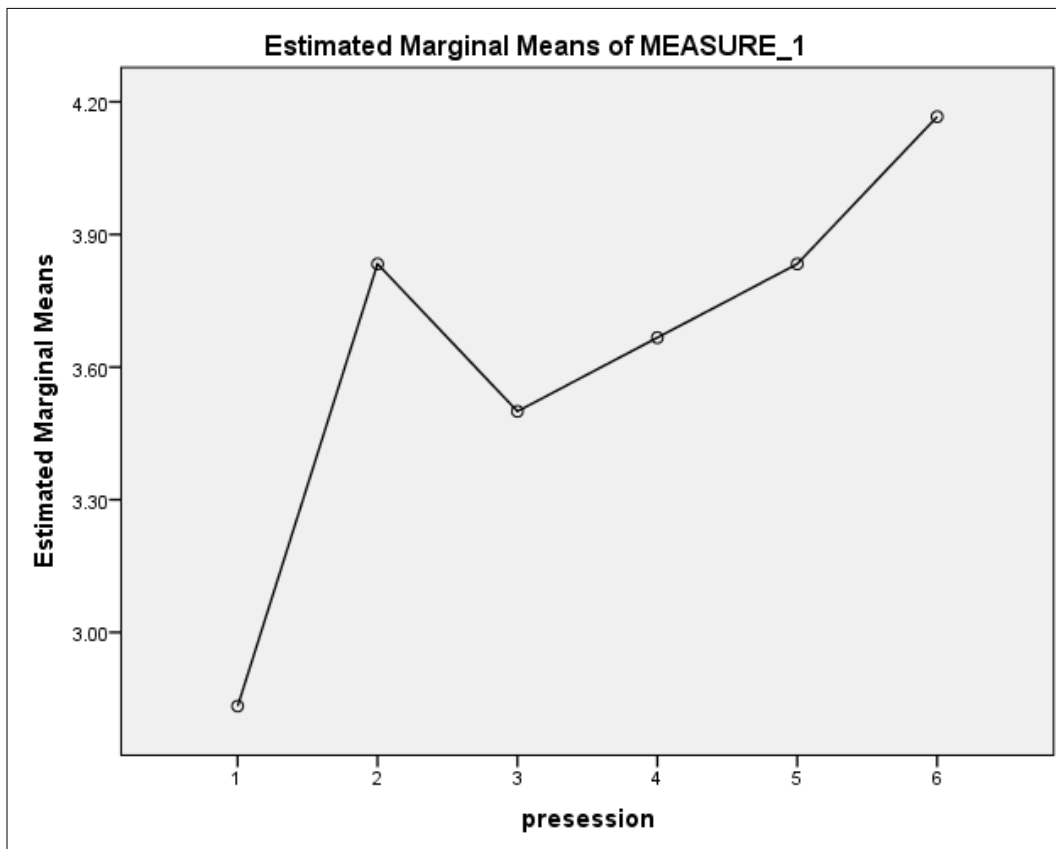
On the basis of Table No.1 Descriptive statistics of Imagery (Visual) the researcher found the change in Visual skill after every session. The imagery power of the gymnast increased with the progression in the training sessions.

**Table 2:** Trend analysis on Imagery (Visual) on skill learning in Gymnastics

Source	Preession	Type III Sum of Squares	DF	Mean Square	F	Sig.	Partial Eta Squared
Preession	Linear	8.005	1	8.005	27.806	.000	.717
	Quadratic	.254	1	.254	.662	.433	.057
	Cubic	2.400	1	2.400	6.253	.029	.362
	Order 4	1.190	1	1.190	2.806	.122	.203
	Order 5	.429	1	.429	1.248	.288	.102

Table 2 reveals the trend in the data. There was a linear change in the Imagery (Visual) scores due to the

psychological training. Therefore, it may be concluded that Imagery scores were improved with the training.



**Fig 1:** Progression of visual ability after Imagery practice

Figure No. 1 shows the progression of visual ability after Imagery practice shows the improvement in Gymnast’s ability in total.

**Table 3:** Descriptive Statistics of Imagery (Audio) on skill learning in Gymnastics

Session	Mean	Std. Deviation	N
pre session	1.7500	1.05529	12
post 1	2.7500	1.05529	12
post 2	3.0000	.73855	12
post 3	2.5000	.67420	12
post 4	3.2500	.75378	12
post 5	3.0833	1.08362	12

The table No. 3 shows the mean score obtained by the Gymnast in Pre, post 1, post 2, post 3, post 4 and post 5 was 1.75 SD1.0, 2.7 SD 1.0, 3.0 SD.73, 2.5 SD.67, 3.2 SD.75 and 3.0 SD 1.0 respectively. Researcher observed the mean

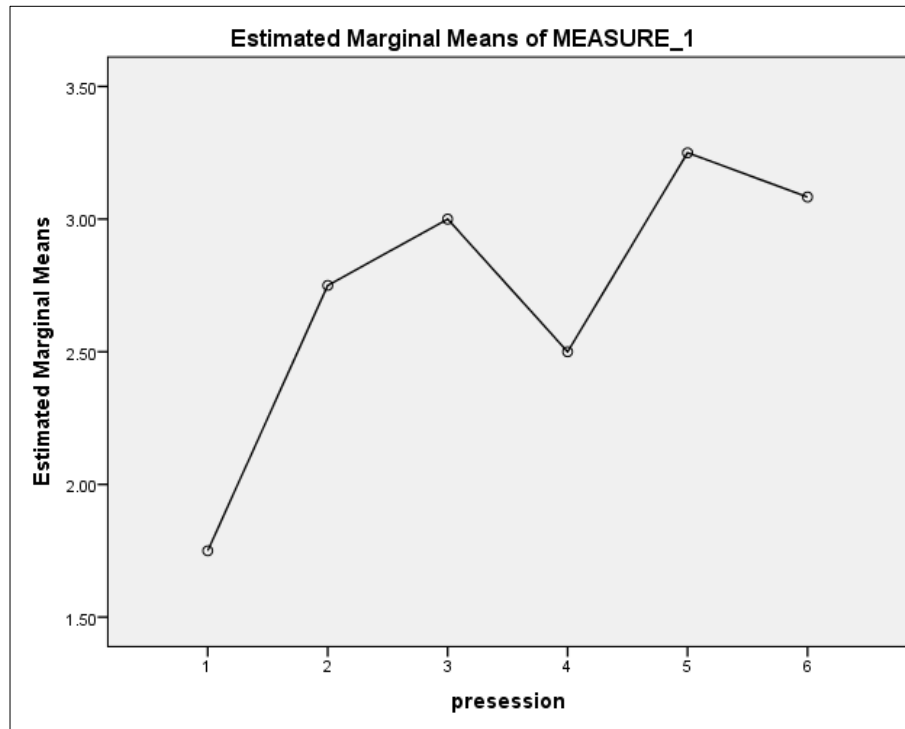
score of the Audio skill was changed after every session. As per the table and graph, the linear trend in the learning were found in Imagery Audio skill. Researcher found the change of mean score of Audio skill lesser than the visual.

**Table 4:** Trend analysis on Imagery (Audio) on skill learning in Gymnastics

Source	pre session	Type III Sum of Squares	DF	Mean Square	F	Sig.	Partial Eta Squared
Pre session	Linear	10.076	1	10.076	31.201	.000	.739
	Quadratic	2.099	1	2.099	3.913	.073	.262
	Cubic	1.780	1	1.780	4.738	.052	.301
	Order 4	2.012	1	2.012	11.132	.007	.503
	Order 5	1.811	1	1.811	5.458	.039	.332

Table 4 reveals the trend in the data. There was a linear change in the Imagery (Audio) scores due to the

psychological training. Therefore, it may be concluded that Imagery scores were improved with the training.



**Fig 2:** Progression of Auditory ability after Imagery practice

In the Figure No. 2 Progression of Auditory ability after Imagery practice researcher found a linear trend and also found the change in auditory development in post 3.

**Table 5:** Descriptive Statistics of Imagery (Focus on body parts) on skill learning in Gymnastics

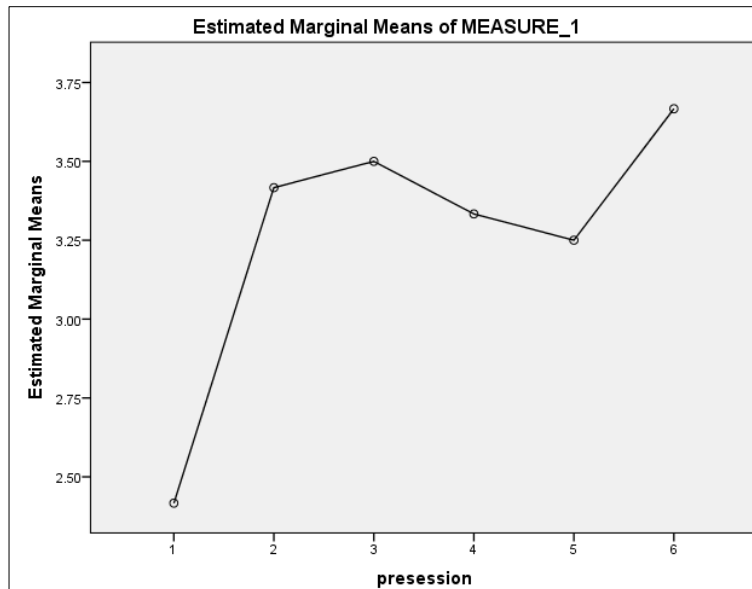
	Mean	Std. Deviation	N
Pre session	2.4167	.66856	12
post 1	3.4167	.66856	12
post 2	3.5000	.67420	12
post 3	3.3333	.88763	12
post 4	3.2500	.86603	12
post 5	3.6667	.88763	12

Table 5. Descriptive Statistics of Imagery (Focus on body parts) reveals that Mean score of Kinaesthetic ability (Focus on the body parts) in Pre, Post 1, Post 2, Post 3, Post 4, and

Post 5, was 2.41 SD.66, 3.41 SD.66, 3.5 SD.67, 3.33 SD.88, 3.25 SD.86, 3.66 SD.88 respectively.

**Table 6:** Trend analysis on Imagery (focus on body part) on skill learning in Gymnastics

Source	Pre session	Type III Sum of Squares	DF	Mean Square	F	Sig.	Partial Eta Squared
Pre session	Linear	5.344	1	5.344	6.481	.027	.371
	Quadratic	1.834	1	1.834	2.695	.129	.197
	Cubic	4.356	1	4.356	7.877	.017	.417
	Order 4	.027	1	.027	.039	.848	.003
	Order 5	.008	1	.008	.055	.818	.005



**Fig 3:** Progression of focusing ability after Imagery practice

As per the table and graph, the linear trend in the learning were found in Gymnast’s kinaesthetic ability as we found in the visual and Audio skill.

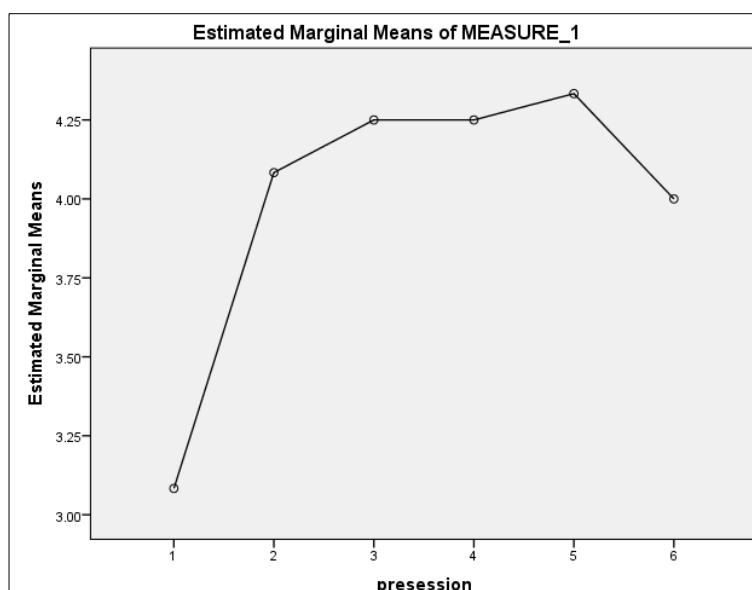
**Table 7:** Descriptive Statistics of Imagery (Mood) on skill learning in Gymnastics

	Mean	Std. Deviation	N
HPRE session	3.0833	.79296	12
post 1	4.0833	.79296	12
post 2	4.2500	.62158	12
post 3	4.2500	.75378	12
post 4	4.3333	.88763	12
post 5	4.0000	1.12815	12

The mean Scores of Imagery (Mood) after Pre, post 1, post 2, post 3, post,4 & 5 was 3.0 SD.79, 4.0 SD.79, 4.25 SD.62, 4.25 SD.75, 4.3 SD.88, 4.0 SD 1.12 respectively.

**Table 8:** Trend analysis on Imagery (Mood) on skill learning in Gymnastics

Source	pre-session	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
	Linear	4.876	1	4.876	7.239	.021	.397
	Quadratic	7.000	1	7.000	9.214	.011	.456
	Cubic	.535	1	.535	2.562	.138	.189
	Order 4	.583	1	.583	2.097	.175	.160



**Fig 4:** Effect on Mood after Imagery practice

As per the table and graph, the linear trend in the learning Mood ability were found as we found in other three skills i.e., visual, Audio and kinaesthetic skills.

### Discussion of Findings

This study was conducted with 12 gymnasts for five (5) sessions on various apparatuses, and the researcher discovered a significant change in the physical presentation of Gymnastics elements/skills at the start of the study, which improved with practise. Vishal. Singh, *et al.* (2018) <sup>[57]</sup> conducted a study to determine the effects of a twelve-week psychological skill training programme on a few psychological variables and found PST program has a significant effect on the selected variables i.e. mental imagery. Athan N. Amasiatu (2013) <sup>[3]</sup> while his study on mental imagery rehearsal as a psychological strategy to improve sports performance, came to the conclusion that mental imagery rehearsal is a legitimate psychological ability that, when used effectively, has the potential to improve athletic performance. Raichur. Himani 2017 <sup>[54]</sup> also studied on visual mental imagery and Joel Pearson and Rebecca Keogh (2011) <sup>[34]</sup> conducted research on visual working memory and mental imagery and found the significant result. In this study, after analysing all of the scores, the researcher discovered that the mean score of each session increased positively, and gymnasts were able to visualise their body parts with proper execution according to Gymnastics while performing Imagery practise of the gymnastics skill. Not only did they improve their imagery, but they also improved their physical performance and were able to feel their limbs. During the practise session, the gymnast's concentration level increased steadily. According to the data, the mood of the beginners was better than that of the intermediate gymnasts. Hearing ability during skill performance also increased. Coach should encourage gymnast from the early stage to imagine. Bianca A. Simonsmeier and Cornelia Frank (2016) <sup>[56]</sup> recommended that coaches and gymnasts should both get instruction on how to use imagery effectively in order to encourage imagery and its use in training and coaching.

### Conclusion

On the basis of the results the following conclusions are drawn.

1. There were significant differences in gymnasts' visual imagery. It is possible that intermediate gymnasts had more visual imagery than beginners due to their greater training age.
2. There were significant differences in gymnast audio imagery. Gymnast has improved as evidenced by an increase in mean score after each session. It is safe to say that intermediate gymnasts have more audio imagery than beginner players.
3. There were significant differences in the Gymnast's Kinaesthetic imagery because they were able to feel their multiple limbs at the same time, which improved their physical skills.
4. There were significant differences in gymnasts' mood imagery. It has also been observed that the mood of the beginners is better than that of the intermediate gymnasts.
5. The immediate score of session 1 in all skills shows a rise in the mean score, demonstrating its significance and necessity for the athlete.

### Educational implications

In today's world, where people's minds are affected by many things and athletes are experiencing various types of anxiety and stress and are unable to cope with coaches, administration, teammates, and so on; practising mental imagery can be a very helpful tool to cope with and deal with numerous problems and perform better. The study's findings show that practising Mental Imagery has improved their Imagery skill learning as well as their physical learning. If a gymnast practises Mental Imagery every day, it will undoubtedly lead to the highest or optimum level of their capacity. The imagery intervention programme should be practised at least three times per week for a minimum of ten minutes.

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