



# Analyzing the Impact of VMBR Training on Table Tennis Players' Competence in Performing Alternate Counter and Forehand Drive Shots With Precision

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## Abstract

**Objectives.** The study aimed to examine the impact of VMBR training on performing certain table tennis skills.

**Materials and methods.** A total of 50 male state table tennis players, aged between 17 and 23, were selected at the Inspire Table-Tennis Academy in Secunderabad, Telangana. These players were randomly divided into two groups: an experimental group and a control group, each comprising 25 participants. The experimental group underwent a 12-week VMBR training regimen three times a week, while the control group simply continued with their regular daily practice routines. Prior to the study and after the 12-week period, assessments were conducted using Pushpendra Purashwani's table tennis skill tests, specifically the alternate counter test and the forehand drive techniques on target test, developed in 2011. Statistical analyses involved the application of dependent t-tests and descriptive statistics to evaluate the outcomes.

**Results.** The experimental group's results indicated that both the alternate counter test and the forehand drive on target test had a marked positive effect on players of table tennis at the 0.01 significance level. The study contributes to our understanding of psychological elements' crucial role in influencing skill performance.

**Conclusions.** The research delves into how various psychological factors affect performance. Previous studies have demonstrated that visualization and images can significantly enhance performance. Table tennis players can overcome mental hurdles through a systematic psychological technique called rehearsal. This process involves mentally replaying an event in a step-by-step manner. The phases of Visual Motor Behavior Rehearsal (VMBR) that lead to better performance include technique refinement, error analysis and correction, preparation for competition, and enhancement of psychological aspects. Future studies could investigate VMBR's impact on specific table tennis skills or other sports in order to assist athletes in improving their psychological parameters and performance.

**Keywords:** VMBR Training, Table Tennis, Alternate Counter, Forehand Drive, Skill Performance, Psychological Factors.

## Introduction

Being a top player is not simple. Players must have the right psychological traits in order to succeed in addition to having the necessary technical skills, physical capabilities, and physical fitness (Weinberg, 1998). According to Salazar et al., the most important element influencing how well athletic

talent's function is the mental state just before the skill is executed (Salazar et al., 1990). Psychological concepts like wisdom, feeling, inspiration, joy, zeal, and sportsmanship (Santosa & Soegiyanto, 2016).

Table tennis is essentially a straightforward game that involves striking the ball after it has landed on the table and constantly hitting, guiding, and positioning the ball to the opponent's table with the expectation that the opponent would be unable to return the ball (Carrasco, Pradas, Floría, Martínez, Herrero, & González Jurado, 2010). In this sport, the ball is constantly hit, directed, and placed on the

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opponent's table with the aim that the opponent will be unable to retrieve the ball (Mahendra, Nugroho & Junaidi, 2012). Mastering the technical aspects of the game is crucial for success in table tennis since they may determine a player's outcome. Table tennis as a racquet sport with a limited playing area that requires remarkable precision, speed, and self-assurance. High levels of anxiety might be detrimental to a player, since they could cause issues including trembling, poor coordination, and a loss of confidence (Schlager & Gross, 2011). A psychology skill-training course benefits national table tennis players' performance (Lim et al., 2018). In addition, technical, physical, and mental elements govern the game of table tennis. principles of technique, including movement, strokes, and grip. Physical attributes including strength, power, agility, balance, stamina, flexibility, and precision (Pluta et al., 2020). Most attacking techniques in Table Tennis are both the forehand and backhand drives (Maheshwari et al., 2023).

In modern world of competition cognitive intervention for players become a very essential and widely accepted by everyone. In performance psychology, visualization technique has been widely popularized and VMBR is a standardized training method contributes to improving athletic performance in a wide range of sports. It is a mental practice required the combined involvement of both relaxation and mental imagery. The VMBR makes it possible for the player to train under actual match circumstances. Anxiety and mental toughness are the most common concepts related to sports competitive environment and are widely discussed by the performers and the trainers. Anxiety disrupted the attention and worries about the performance in competitive situation (Sharma & Prasad, 2023).

Achievement in a competitive sporting environment, motivation is essential for achieving the highest degree of improved athletic performance (Sharma & Purashwani, 2021). In VMBR, an event is mentally recorded and then replayed piece by piece. Athletes can increase their performance through the VMBR phases of technique development, error analysis and correction, and completion preparation. the raising of psychological barriers and skill development (Chauhan et al., 2020). The premise of VMBR is that tasks may be made easier and more exact by employing imagination before they are carried out. It is also possible to use imagination that extends beyond what is practical for athletes to do both intellectually and physically. VMBR training helps athletes eliminate mistakes and improve performance by making them understand their motor controls defects through visualization exercises (Chaudhary, 2018). VMBR has been demonstrated to be one of the techniques that may speed up and improve the learning process for beginners. VMBR training and physical practice together improve skill performance and increase effectiveness (Sa'ari & Isa, 2018).

Relaxation training, visualization, and simulation of stressful environments are all components of VMBR. The foundation of the VMBR is the knowledge that past imagination is used to carry out the task; this makes the task easier and more accurate to perform and imagination of exercise make physical and intellectual achievement (Alrahamneh & Elbokai, 2011; Sharma & Prasad, 2023).

Therefore, Investigating the impact of VMBR training on certain table tennis skill executing skills was the goal

of this study. Through some earlier research on VMBR training, it was discovered that the intervention was carried out among athletes who mostly participated in team sports, and other closed skill games with pre-defined motions, like archery (Sa'ari & Isa, 2018). In racket sports, where the demands are so high and the emotions so high, the mental aspect of performance has a distinct role (Cece et al., 2020), and considering table tennis as a most popular racket sports on earth (Jiangzhou et al., 2020), The researchers planned to undertake VMBR training for table tennis players in order to investigate its impact on certain playing skills through skill performance capabilities.

## Materials and Methods

### Subjects

Fifty male table tennis players at the state level were chosen from the Inspire Table-Tennis Academy in Secundarabad, Telangana, to participate in the study. The individuals' ages varied from 17 to 23 years old. Two complete groups were developed for administration feasibility; one was an experimental group and the other was a control group. The participants had a minimum of three years of playing experience at the time the data was collected. Men who play state-level table tennis and are physically active were the only volunteers chosen at random for the study. The participants were asked to sign written consent forms before to data collection. The subjects received a thorough explanation of the study's objectives as well as an orientation to the training and skill testing.

### Procedure

Alternate Counter Test and Forehand Drive on Target Test were the variables chosen for the study based on the literature that was accessible and the results of comparable research investigations. Pre-Test Post-Test Randomized group design was employed for this investigation.

In the experimental group, participants engaged in a structured regimen known as VMBR training over a period of twelve weeks. Sessions were scheduled from six thirty to seven twenty in the morning on Mondays, Wednesdays, and Fridays. The training commenced with a 6–10-minute warm-up, encompassing stretching and running exercises. Participants resumed their regular evening table tennis activities following the morning sessions.

The VMBR training protocol comprised three stages:

1. This initial stage spanned eight to ten minutes and involved progressively tensing and relaxing specific muscle groups, starting from the forehead and scalp, then moving to the neck and shoulders, upper chest, thighs, and concluding with the calves.

2. Lasting 8 to 10 minutes, this stage utilized a projector to deliver visual presentations on game-related topics like inspiration, talent, and strategy. Participants were then prompted to engage in visualization exercises, meticulously recreating mental images and focusing on every detail presented.

3. In this final stage, participants employed visualization techniques to link the content observed in the previous stage with their own abilities. They immersed themselves

in imagined scenarios, incorporating sensory experiences such as crowd noise, the encouragement of teammates, and the physical sensations associated with real game situations.

Contrarily, individuals in the control group solely participated in regular table tennis sessions without the additional VMBR training components.

### Data Analysis

The tools used for conducting the skill test were scoresheet, pen, stopwatch, chalk marker, ball picker, table tennis racket, table tennis table and balls.

*Alternate Counter Test:* As shown in Figure 1, the participants were instructed to make the numbers of rallies with the controller for a period of 30 seconds after sufficient warming up and practice. A sufficient number of balls were in the controller's hand or pocket when the instruction to "Start" was given, allowing the rally to continue even if the ball was taken out of play. Two chances were given, maximum numbers of returns were counted by the researcher out of two chances of 30 seconds each (Purashwani, 2011).



Fig. 1. Player performing Alternate Counter Test

*Forehand Drive on Target:* As shown in Figure 2, the controller feed the ball and the subjects were asked to attack forehand drive with foot movement from left side of a particular half after playing back hand push from at the left corner of the table (in case of right-handed player). Enough trials were provided. Two chances comprising three attempts each were given. Score was given according to the bounce of the ball in the marked areas. The best of two chances (each comprising of three attempts) was counted as the score of the subjects (Purashwani, 2011).



Fig. 2. Player performing Forehand Drive on Target

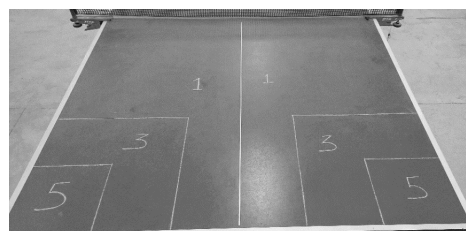


Fig. 3. Marking on the table for scoring as per Forehand Drive on Target

### Statistical Analysis

The collected data were statistically analysed using IBM SPSS (version 26.0.0) software. The Shapiro-Wilk test for the parametric test was used to confirm the assumptions of data normality, and the data did not deviate from the assumptions (Das & Jhajharia, 2022). The Shapiro-Wilk test so revealed that the data had a normal distribution. When comparing the experimental and control groups, Levene's test identified homogeneity in the variances. The requirements of homogeneity were upheld; hence a parametric test was used to statistically analyse data both before to and during the experimental period from the control and experimental groups using a dependent t-test.

### Results

Table 1 displayed descriptive data (mean and standard deviation) for the control group and the experimental group on a set of table tennis skill competencies before and after 12 weeks of training.

**Table 1.** Table tennis players' skill abilities are described using descriptive statistics (mean and standard deviation)

Table Tennis Skill Tests	Control Group		Experimental Group	
	Mean	Standard Deviation	Mean	Standard Deviation
1. Pre-Alternate Counter Test	25.00	2.19	26.76	2.27
2. Post-Alternate Counter Test	24.48	2.40	28.40	1.77
3. Pre-Forehand Drive on Target	06.24	1.85	06.60	2.16
4. Post-Forehand Drive on Target	06.72	1.45	08.44	1.38

**Table 2.** Table tennis players in the control and experimental groups were compared using a dependent sample t-test to measure their skill levels

Table Tennis Skill Tests	Control Group			Experimental Group		
	t- Value	p-Value (0.05)	Sig.	t- Value	p-Value (0.05)	Sig.
Alternate Counter Test	1.236	0.229	Not Sig.	4.389	0.000	Sig.
Forehand Drive on Target	1.423	0.168	Not Sig.	5.754	0.000	Sig.

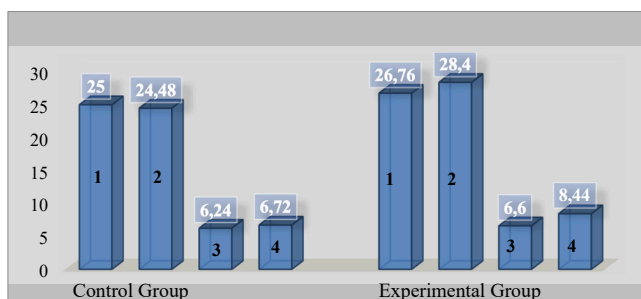


Fig. 4. Mean value of Table Tennis Skill Competencies

Table 2 showed the inferential statistics (dependent t-test) of the control group and experimental group before and after 12 weeks of training on a subset of table tennis skill competencies. At the 0.01 level of significance, the experimental group showed a significant effect on both the alternate counter test and the forehand drive on target.

## Discussion

The aim of the research was to analyse the impact of a 12-week VMBR training programme on certain table tennis players' skill abilities. The findings show significant improvement of table tennis skill performing ability among those who actively participated in the VMBR training sessions, i.e., the experimental Group found significant effect at 0.01 level of significance for both alternate counter test and forehand drive on target test among table tennis players. The study helps us understand how crucial psychological elements are in influencing skill performance. Technique improvement, error analysis and repair, competition readiness, and enhanced playing abilities are all aspects of VMBR training that lead to better performance.

One open skill sport where it might be difficult to control a player's emotions is table tennis. In this activity, fear and doubtful thoughts can quickly rise. The ability to consistently perform at one's best in table tennis is among most difficult aspects of the sport. Self-assurance, positive thinking, and the ability to unwind and control emotions were shown to be the psychological factors that Table Tennis best mirrored (Martinent & Decret, 2015).

A research found that VMBR considerably reduced state anxiety and activation over time compared to controls. For all three karate performance metrics (skill, combos, and sparring), VMBR showed better levels of progress over time than controls. Results are examined in terms of the connection between arousal and performance as well as the value of customised practise and instruction when utilising cognitive intervention approaches (Seabourne et al., 1984).

A research looked into how self-administered VMBR training affected athletes' ability to execute. Results showed that the VMBR group showed much larger gains in athletic compared to the delayed-training control group's performance, which included 36 male and female collegiate athletes competing in 7 sports (Lohr & Scogin, 1998).

As for the results, novice archers shot score increased when comparing pre-test score 73.83 (9.806) and post-test score 81.83 (7.80) with  $t_{(5)} = 4.619$ ,  $p = 0.0057$ . VMBR has been found to be an effective psychological aid in increasing sports performance. In the shooting test, the inexperienced archers likewise shown positive correlation with  $r = 0.9085$ ,  $p = 0.00$ , and  $R^2 = 0.8101$ . This study came to the conclusion

that using images as a training tool really did increase beginner archers' shot accuracy (Sa'ari & Isa, 2018).

In contrast to the control group, which received 16 sessions of standard archery skill instruction, the experimental group endured 4 sessions of VMBR training. The physical practical group outperformed the VMBR group on the archery shooting skill after 4 weeks (4 days/week) of archery instruction, with a substantial difference being seen (Dachen, 2019).

It was clear that VMBR training and a composite bio-feedback intervention routine were sufficient to boost athletes' physical performance indices, particularly their agility. Less weariness was felt by the athletes in the VMBR group, and this, combined with other mood characteristics, predicted quicker agility (Soumendra, 2021).

In a study, it was investigated how imagery training affected skilled tennis players' ability to increase their motor performance when returning serves accurately. Results showed that the motor imagery intervention greatly increased the skillful players' accuracy of the service returns. Additionally, individuals considered to be excellent imagers considerably increased their directional accuracy and were less variable than those with lesser imaging ability after the 15 imagery sessions (Robin, Dominique, Toussaint, Blandin, Guillot, & Le-Her, 2007).

Thirty systematic, meta-analytic, and narrative reviews that (a) examined research involving the use of PST to athletes and (b) summarised the effects of PST treatments on sport performance, or a motor performance-based substitute for a sports activity, were included. 90% of evaluations came to the conclusion that PST treatments might improve performance (Lange-Smith, Cabot, Coffee, Gunnell, & Tod, 2023).

## Limitations

In this research, we did not consider the anthropometric variables, which could affect the measured parameters. Namely, for highly overweighted category player may find difficulty in movement while playing alternate counter as it requires agility and precision. This study was conducted with 12 weeks of training, so, being inactive by any player in frequent sessions due to their personal thought of control could be taken and considered as the limitations of the study.

## Conclusions

The study helps us comprehend the numerous psychological factors that influence performance. The visualization and images have been employed as a powerful aid for improving performance, according to earlier literature. Visual Motor Behaviour, while Table tennis players can overcome psychological obstacles by using a methodical psychological strategy called rehearsal. In VMBR training, an event is mentally filmed and then repeatedly played back step by step. The VMBR phases that lead to better performance are: technique improvement, error analysis & rectification, completion preparation, and improvement of psychological aspects. Using a mental movie, VMBR entails step-by-step reliving an event. In order to determine the impact of VMBR on playing ability or skill competency and use it in accordance with the needs of the athlete, future research could be conducted with more table tennis-related skill-related parameters or playing abilities on other sports. This would help an athlete improve psychological parameters and enhance performance.

## Conflicts of interest

The authors declare no conflicts of interest.

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# Аналіз впливу тренувань відпрацювання зорово-моторної реакції на компетентність гравців у настільний теніс у точному виконанні поперемінних контр- та прямих ударів праворуч

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Реферат. Стаття: 6 с., 2 табл., 4 рис., 26 джерел.

**Мета дослідження.** Метою дослідження було вивчити вплив тренувань відпрацювання зорово-моторної реакції на виконання певних навичок гри в настільний теніс.

**Матеріали та методи.** В Академії настільного тенісу Inspire в Секундерабаді, штат Телангана, було відібрано 50 гравців чоловічої статі у віці від 17 до 23 років. Учасників дослідження було розподілено методом рандомізації на дві групи: експериментальну та контрольну, кожна з яких складалася з 25 осіб. Експериментальна група проходила 12-тижневу програму тренувань відпрацювання зорово-моторної реакції тричі на тиждень, тоді як контрольна група продовжувала дотримуватися звичайного режиму щоденних тренувань. До початку дослідження і після 12-тижневого періоду було проведено оцінювання результатів за допомогою тестів на володіння навичками настільного тенісу за методикою професора Пушпендри Пурашвані, зокрема, тестів на виконання техніки поперемінних контр- та прямих ударів праворуч по цілі, розроблених у 2011 році. Методи статистичного аналізу включали застосування t-критеріїв для залежних вибірок та описової статистики для оцінки результатів.

**Результати.** Результати експериментальної групи показали, що виконання обох тестів, а саме — поперемінних контр- та прямих ударів праворуч по цілі, мають виражений позитивний вплив на гравців у настільний теніс на рівні значущості 0,01. Це дослідження сприяє нашому розумінню вирішальної ролі психологічних елементів з точки зору впливу на результативність навичок.

**Висновки.** Дослідження поглиблює розуміння того, як різні психологічні фактори впливають на показники результативності. Попередні дослідження продемонстрували, що візуалізація та уявлення можуть значно підвищити результативність. Гравці в настільний теніс здатні долати психологічні бар'єри шляхом застосування систематичної психологічної техніки, яка називається відпрацюванням. Цей процес передбачає покрокове відтворення події на рівні мислення. До етапів відпрацювання зорово-моторної реакції (ВЗМР), які сприяють покращенню показників результативності, належать: вдосконалення техніки, аналіз та корекція помилок, підготовка до змагань, а також поліпшення психологічних аспектів. Майбутні дослідження можуть бути присвячені вивченню впливу ВЗМР на конкретні навички гри в настільний теніс або інші види спорту з метою допомогти спортсменам покращити свої психологічні параметри та результативність.

**Ключові слова:** тренування ВЗМР, настільний теніс, поперемінний контрудар, прямий удар праворуч, результативність навичок, психологічні фактори.

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