



ORIGINAL SCIENTIFIC ARTICLE

EFFECT OF VMBR TRAINING ON PSYCHOLOGICAL DIMENSIONS OF ANXIETY AND MENTAL TOUGHNESS OF TABLE TENNIS PLAYERS

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Abstract

Study purpose. The study was conducted to examine the effects of Visual Motor Behavior Rehearsal (VMBR) Training on sports anxiety and mental toughness of table tennis players after six weeks of the training.

Materials and methods. Fifty male state-level table tennis players within the age group of 17 to 23 years were selected from Inspire Table Tennis Academy, Secunderabad, Telangana and divided randomly into two groups, the Control and Main Groups, each one consisting of 25 subjects. The Main Group underwent VMBR Training for six weeks, three times a week, and the Control Group was not involved in any kind of training program except for their daily practice. Measurements of anxiety of all table tennis players with the use of Sports Anxiety Scale-2 (SAS-2) with three dimensions which were somatic, worry and concentration disruption developed by Ronald E. Smith, Frank L. Smoll, Sean P. Cumming, and Joel R. Grossbard in 2006 and Sports Mental Toughness Questionnaire (SMTQ) with three dimensions which were confidence, consistency and control developed by Michael Sheard, Jim Golby, and Anna Van Wersch in 2009 were taken at the beginning of and after the experimental period of six weeks.

Results. Significant effect was found in the Main Group at a significance level of 0.05 for dimensions which were sports mental toughness and somatic, worry and concentration disruption from anxiety scale dimensions of table tennis players.

Conclusions. The visualization and imagery has been used as an effective tool for enhancing performance. Visual-Motor Behavior Rehearsal is a systematic psychological technique that helps table tennis players in overcoming psychological factors.

Keywords: visual motor behavior rehearsal, sports anxiety scale, sports mental toughness.

Introduction

The definition of Cognitive anxiety is as “negative expectations and cognitive concerns about oneself, the situation at hand and potential consequences”, and somatic anxiety defines as “one’s perceptions of the physiological affective elements of the anxiety experience, that is, indications of autonomic arousal and unpleasant feelings states such as nervousness and tension” (Soundarapandian Dhinakaran et al., 2020)

Visual Motor Behavioural Rehearsal serves as the cornerstone of all programmed mental skill training in applied sports psychology. The primary goals of VMBR

are to make players feel more confident and perform better while also reducing stress, negative emotions, and anxious thoughts (Singh & Bhowmik, 2020).

Cognitive restructuring strategy used in Cognitive Behavioural Therapy assists athletes in locating the root of their stress, comprehending their emotional reactions, and empowering them to respond more positively. Players begin to see challenges as opposed to dangers as a result, leading to an increase in positive feelings and performance satisfaction (Oelberger, 2020). The use of visualisation and imaging as a method for improving performance has proven to be successful. Visual-Motor Behaviour Rehearsal, however, is a methodical psychological strategy that aids athletes from a variety of sports in overcoming psychological challenges and improving performance. The technique known as Visual-

Motor Behaviour Rehearsal (VMBR) involves mentally recording an event and playing it again piece by piece. Technique improvement, mistake analysis and repair, and completion preparation are all phases in VMR that help athletes perform better, raise psychological thresholds and skill development (Chauhan et al., 2020). The foundation of VMBR is the idea that using imagination before doing a task may make it simpler and more precise. It is also feasible to achieve intellectual and physical feats by using imagination in ways that go beyond what is achievable for athletes. Through visualization exercises, VMBR training enables athletes to become aware of their motor performance flaws, which helps them to reduce errors and enhance performance (Chaudhary, 2018). VMBR is proven as one of the methods that can help novice learning process become faster and more accurate. Combining VMBR training with physical practice help in skill performance enhancement become more efficient (Sa'ari & Isa, 2018)

One of the most popular sports in the world is Table Tennis. Table Tennis, which has been around for just over a century, has steadily risen to become the seventh-largest sport in the world (Jiangzhou et al., 2020). By concentrating on high degrees of achievement, it is possible to comprehend self-confidence in sports. According to scientists, self-assured athletes are those that are both physically and intellectually capable of using their current abilities to win (Öntürk & Asma, 2020)

Mental imagery can be defined as a “quasi-perceptual experience” that “resembles perceptual experience, but occurs in the absence of appropriate external stimuli” (Nanay, 2021). It occurs regularly in everyday life, be it while recalling past experiences, projecting ourselves into the future, or picturing the path someone is explaining to us. It should be emphasized that the term imagery refers to more than just visual elements. When imagining spatial relationships, motions of things and their components, and spatial transformations such mental rotation, it is possible to use object imaging, which involves perceiving the specifics of particular items and situations in terms of shape, colour, brightness, and texture (Blazhenkova, 2016).

Similar neural activity in the brain are triggered by perception and imagery (Dijkstra et al., 2017). If we can conjure up accurate mental representations, our brain will respond as if we had actually seen that image (Maier et al., 2021) similar brain regions become active. Yet, the time course and mechanisms with which imagery engages perceptual networks remain to be better understood. An emerging view holds that imagery and perception follow distinct dynamics during early visual processing with similarities arising only during later, high-level visual processing. However, confounds of visual stimulation and paradigms favoring observation of high-level processes associated with subjective imagery strength may have precluded evidence of earlier shared mechanisms. We therefore manipulated prior knowledge that informs early-stage top-down predictions and tracked electrophysiological brain responses while fully controlling visual stimulation. Participants saw and imagined objects associated with varying amounts of semantic knowledge. Imagery and perception were equally influenced by knowledge at an early stage (P1 component). Additionally, research indicates a link between vividness of images and perception in the visual regions. These findings

suggest that improving visual perception is necessary to enhance imagery's vividness (Dijkstra et al., 2017). It is likely that by enhancing our perception in the visual domains, we will be able to execute imaging better.

In a sporting context, imaging has been defined as the mental state in which athletes envision themselves as they prepare for a task or work to enhance performance. Both deliberate and unintentional recall processes can result in imagery, which is when a person perceives an image or experiences a movement as an image without really witnessing the real thing. In this setting, imagery has a key role in enhancing motor task performance (Di Corrado et al., 2014)

On the basis of reviews related to literatures, available research findings, and researchers own understanding, it was hypothesized that there would be a significant improvement in selected psychological dimensions of state level male Table Tennis players after the 6 weeks Visual Motor Behaviour rehearsal training programme.

Therefore, an investigation into the effects of training in Visual Motor Behaviour Rehearsal was conducted in this study on selected psychological dimensions of sports anxiety that were somatic anxiety, worry and concentration disruption and mental toughness dimensions that were confidence, consistency, control. Through some previous studies on Visual Motor Behaviour Rehearsal training it, it was observed that, the intervention was conducted among athletes with a majority of team sports like Hockey, Football, Handball and closed skill sports where the movements were pre-defined like Archery (Sa'ari & Isa, 2018). Considering the inherent demands of such intense and emotional activities, racket sports place a special emphasis on the mental component of performance (Cece et al., 2020) athletes, parents. The researchers thought to conduct Visual Motor Behaviour Rehearsal training to examine its effect on selected psychological dimensions of Table Tennis players.

Material and methods

Study participants

To attain the purpose of the study, 50 male Table Tennis player of state level were selected as subjects from Inspire Table Tennis Academy, Secunderabad (Telengana). The age of the subjects was ranged between 17 to 23 years. For administration feasibility two intact groups were formed, one was Control Group and second group was Main Group.

Study organization

On the basis of the available literature, the age group 17-23 was selected on the basis of few researches which suggested for the application of cognitive intervention or psychological skill training to the subjects. In a study where 20 male players were selected age ranging from 17-23 years from LNIPE, Gwalior for the application of VMBR training, the result was found that there was significant difference found in sports competition anxiety of treatment group is less than control group with a 4 weeks of training (Ashish et al., 2017). As per the findings of the related research studies, variables selected for the present study were Somatic anxiety, Worry and Concentration disruption under Sports anxiety

and Confidence, Consistency and Control under Mental Toughness.

Research design used for this study was Pre-Test Post-Test randomized group Design.

Training protocols:

1. Control Group:

The participants of the Control Group undertook only regular Table Tennis practice.

2. Main Group:



Fig. 1. Main Group players giving responses to the questionnaires

The participants of the Main Group went through the Visual motor Behaviour rehearsal training programme. This was scheduled for three days (Monday, Wednesday and Friday) per week in the morning between 6.30 a.m. to 7:10 a.m. for six weeks. The visual motor Behaviour rehearsal training programs consisted of warm up for 5-8 minutes of stretching and jogging. In evening they went for their regular Table Tennis practice.

The training protocol of Visual Motor Behaviour Rehearsal Training (Cox, 2012) involves the following procedure:

A: Phase 1- Players of Main Group takes part in the Progressive muscle relaxation technique that involved systematically tensing and relaxing specific muscle groups in a predetermined order of forehead and scalp, neck and shoulder, upper chest, thighs and calves for 5-8 minutes.



Figure 2 Main group players experiencing VMBR Training session

B: Phase 2- Players of Main Group takes part in the Visual presentation of game related contents like motivation, skills, technique and matches shown with help of projector for the duration of 5 to 7 Minutes. Then they were instructed to step into Visualization to recreate the mental image and see every detail through successful visualization for 5 to 7 minutes.

C: Phase 3- Players of Main Group takes part through Imagery technique, whatever they had seen during second phase, they reconnected the skills with their own involving somatic sensations, sound of audience, colleagues' motivation, sights and emotions which they had experienced during actual game conditions for 5 to 8 minutes.

The above specified information can also be implemented with the reproduction of training by others researchers/followers with slide modification in the frequency and duration of the technique. As the present training schedule was set on the basis of supportive literatures available on the previous conducted studies, (Singh & Bhowmik, 2020). The results are likely to be approximately same if conducted with same procedure with the similar age group among male table tennis players.

The tools used for the purpose of the study to examine Sports Anxiety, (SAS-2) Sports Anxiety Scale-2 with an alpha coefficient for the Somatic, Worry, and Concentration Disruption scales were 0.89, 0.91 and 0.84, respectively, and the total score alpha was 0.91. Thus, the SAS-2 exhibits acceptable internal consistency (Smith et al., 2006, p. 2) developed by Ronald E. Smith, Frank L. Smoll, Sean P. Cumming, and Joel R. Grossbard with 15 statements on a 4 point likert scale anchored by Not at all, A Little Bit, Pretty Much, Very Much was used. To examine Mental Toughness, (SMTQ) Sports Mental Toughness Questionnaire with Cronbach's alpha showed acceptable internal consistency for each of the three factors: Confidence = 0.80, Constancy = 0.74 and Control = 0.71. Constancy, and Control developed by Michael Sheard, Jim Golby, and Anna Van Wersch with 14 statements on a 4-point likert scale anchored by Very true, mostly true, A Little true and not at all was used (Sheard et al., 2009).

Administration of the Test:

Players were instructed to fill the questionnaires with their honesty and clearly understanding each statement. They were also instructed to ask for any doubt if necessarily required for the statement's understanding. There was no time limit to fill the questionnaires. The questionnaires were filled twice, pre and post, i.e., before and after 6 weeks of VMBR Training for both Control and Main Group of the selected Table Tennis players.

Statistical Analysis

First, normality assumption of data was checked by Shapiro-Wilk test, after that Levene's test was used to test the Homogeneity of Variances between experimental and Control Group. The assumptions of normality and homogeneity was not violated, thus parametric test was implemented where data obtained from the Control and Main Group, before and after the experimental period were statistically analyzed with dependent 't' test with the help of SPSS Version 20.

The study was conducted in accordance with the ethical principles of the Helsinki Declaration for human research

and was approved by the Research Ethics Committee of the Lakshmibai National Institute of Physical Education.

Results

Table 1. Descriptive Statistics (Mean and Standard Deviation) of Psychological Variables

Variables	Control Group		Main Group	
	Mean	SD	Mean	SD
Pre-Confidence	16.36	1.46	16.92	1.35
Post-Confidence	16.52	1.50	17.32	1.60
Pre-Consistency	09.04	1.36	9.680	1.34
Post-Consistency	09.28	1.27	10.08	1.52
Pre-Control	09.12	1.45	09.44	1.47
Post-Control	09.44	1.35	09.92	1.18
Pre-Somatic	11.84	1.28	11.68	1.51
Post-Somatic	11.80	1.41	11.04	1.36
Pre-Worry	12.36	1.43	11.84	1.65
Post-Worry	11.80	1.35	10.92	1.49
Pre-Concentration Disruption	10.44	1.55	10.96	1.61
Post-Concentration Disruption	10.76	1.56	10.28	1.30

Table 1 showed the descriptive statistics (mean and standard deviation) of Control Group and Main Group before 6 week of training and after 6 week of training on selected psychological variables (Confidence, Consistency, Control, Somatic Anxiety, Worry and Concentration Disruption).

Table 2. Dependent sample t-test of Anxiety and Mental Toughness between Control and Main Group of Table Tennis players

Variables	Control Group		Main Group	
	t- Value	p-Value	t- Value	p-Value
Confidence	0.778	.444	1.852	.076
Consistency	0.901	.376	1.922	.067
Control	1.034	.311	2.071	.049
Somatic	0.101	.921	2.268	.033
Worry	1.593	.124	3.016	.006
Concentration Disruption	0.902	.376	2.652	.014

Table 2 showed the inferential statistics (dependent t-test) of Control Group and Main Group before 6 week of training and after 6 week of training on selected psychological variables (Confidence, Consistency, Control, Somatic Anxiety, Worry, and Concentration Disruption). No significant effect was found among players of Control Group at 0.05 level of significance. Significant effect was found in Main Group for Control, Somatic Anxiety, Worry and Concentration Disruption from sports mental toughness and anxiety scale dimensions of Table Tennis players at 0.05 level of significance. It also showed that, there was No significant

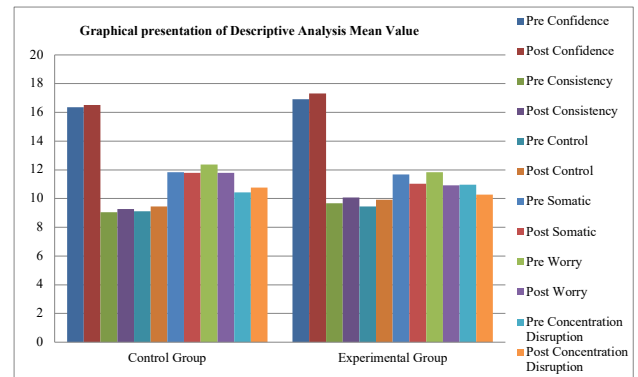


Fig. 3. Graphical Representation of Descriptive Analysis

effect found in Main Group for Confidence and Consistency from sports mental toughness dimensions at 0.05 level of significance.

Discussion

Table Tennis is an example of an open skill sport where it is challenging to manage a player's emotions and where anxiety and negative thoughts are swiftly elevated (Martinent & Decret, 2015). Table Tennis is one of the most challenging sports for an athlete to constantly perform at their best. Martinent and Decret (2015) discovered that the psychological variables most reflected in Table Tennis include self-confidence, optimistic thinking, and the capacity to relax and manage emotions. The mental skills capable of satisfying psychological needs can make Table Tennis student-athletes mentally tough. The dynamic link that exists among the skills calls sports practitioners to be judicious in developing mental toughness (Maranan & Lopez, 2021).

The present study evaluated the effect of six (6) weeks Visual Motor Behaviour Rehearsal training to examine its effect on Anxiety and Mental Toughness of Table Tennis players. To achieve the purpose of the study dependent t-test was applied. As per the previous studies that were conducted with more frequency and duration of the VMBR Training has shown significant effect on psychological variables conducted with 8 and 12 weeks of training as well (Chaudhary, 2018; Choudhary et al., 2018; Sa'ari & Isa, 2018; Singh & Bhowmik, 2020). In a research study, which was conducted on Table Tennis players, where 20 male players were selected age ranging from 17-23 years from LNIPE, Gwalior for the application of VMBR training, the result was found that there was significant difference found in sports competition anxiety of training group is less than control group with a 4 weeks of training (Ashish et al., 2017). Considering Table Tennis as an open skill sport, it was necessary to conduct the training with other psychological dimensions such as mental toughness, to check whether 6 weeks of VMBR Training could be beneficial to the dimensions of anxiety and mental toughness or not. Visual Motor Behaviour Rehearsal has its origin in the techniques used in Behaviour therapy, which rely upon imagery and visualization rehearsal for anxiety reduction. Desensitization and anxiety management training both being with relaxation training, followed by imagery related to anxiety to phobic situations. The goal of

each is to train the client to be in anxiety related settings but with the, achievement of a relaxed, rather than anxiety state. In essence, these Behaviour therapies emphasize retraining of emotional aspects of situations (Chauhan et al., 2020) Visual-Motor Behaviour Rehearsal research initially grew from case study illustration to more recent sophisticated research design. Visual-Motor Behaviour Rehearsal training contributes to the enhancement of sports performance across a wide variety of different sports, besides its approach to mental practice seems to require the synergistic involvement to both relaxation and mental imagery. A significant decrease in sports competition anxiety was also observed for Visual-Motor Behaviour Rehearsal Group (Alrahamneh & Elbokai, 2011). A study of the effects of Visual Motor Behaviour Rehearsal on athletes with special needs where 63 male and female athletes of national team age ranging from 20 to 35 years participated in the study. Based on a pre assessment of subject's anxiety and self-control the subjects were the assigned to experimental conditions. Visual Motor Behaviour Rehearsal post-assessment data for experimental performance was analyzed by means of two groups. Pre- to post-assessment data indicated that the Main Group had a significant main effect, indicating a significant improvement in self-concept and low anxiety (Alrahamneh & Elbokai, 2011). The Effectiveness of Visual-Motor Behaviour Rehearsal (VMBR) to Reduce the Anxiety and to Improve Self Concept for Athletes with Special Needs. The VMBR includes imagery and breathing techniques that also allowed participants to significantly affect several of the dependent variables' subfactors of Mental Toughness. The belief that visual-motor behaviour rehearsal improves self-confidence, emotions, negative thoughts, and primarily anxiety of the players can be used to explain the marginally significant improvement. Participants are taught breathing techniques as a relaxation technique, which helps the players stay calm and react to situations positively and to remain calm under pressure. Negative energy control helps to ignore the negative thought, and distraction helps to refocus attention (Singh & Bhowmik, 2020). Psychology skill-training programme has positive impact on the performance of national Table Tennis players (Lim et al., 2018).

In the present study, there was no significant difference seen in other dimensions like Confidence and Consistency from Mental Toughness to enhance these parameters. The reason may be due to the fact that the duration, i.e., 6 weeks, as well as frequency wasn't sufficient, or with just a fraction of score, i.e., with 0.026 for confidence and 0.017 for consistency which was above 0.05, it was found insignificant at 0.05 level of significance. The reason may be due to the fact that the participants were required with more consistent serious account in training session and the duration specifically considering the dimensions of confidence and consistency. But still, it's also a debatable matter of fact for showing insignificant with very less score considering the sample size which was taken in the Main Group. In fact, according to a research, it was stated that in order to attain significant improvement in self-confidence, subjects attended 24 sessions of self-talk and imagery training under psychological skill training to get significant effect in self-confidence (Heydari et al., 2018). The proven effectiveness if provided with the continuation of third slice after 6 weeks with one more post-test, the result may vary and could have a possibility of

getting significant effect among all the selected psychological variables. The study could also be conducted on playing ability and other psychological dimensions of Table Tennis players to reach performance effects based on the intervention technique.

Conclusion

The study gives us an understanding of various psychological components that affect performance. Previous literature also indicated that the visualization and imagery has been used as an effective tool for enhancing performance. However, Visual-Motor Behaviour Rehearsal is a systematic psychological technique helps Table Tennis players in overcoming psychological factors. VMBR (Visual-Motor Behaviour Rehearsal) involves replaying an event step by step based on a mental video. The steps of Visual Motor Behaviour Rehearsal that contribute to improved performance are; Technique enhancement, error analysis & correction, preparation for completion improve psychological parameters. Thus, future research could be undertaken with a long duration to understand the effectiveness of Visual Motor Behaviour Rehearsal on psychological parameters and applied as per the athlete's requirement, thus helping an athlete to enhance his/her performance and improve psychological parameters. Research has shown mental toughness and anxiety have significant impact through cognitive intervention technique. More research is needed to understand the relationship between cognitive intervention with players' ages anxiety and mental toughness, gender differences in anxiety and mental toughness, individual versus team sports, and sexual diversity in anxiety and mental toughness.

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Conflict of interest

The authors do not have any conflicts of interest.

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ВПЛИВ ТРЕНУВАННЯ НАВИЧКИ ВМРП НА ПСИХОЛОГІЧНІ АСПЕКТИ ТРИВОГИ ТА ПСИХІЧНОЇ ВИТРИВАЛОСТІ ГРАВЦІВ У НАСТІЛЬНИЙ ТЕНІС

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 7 с., 2 табл., 3 рис., 24 джерела.

Мета дослідження. Це дослідження було проведене для вивчення впливу тренування навички візуально-моторної репетиції поведінки (ВМРП) на спортивну тривогу та психічну витривалість гравців у настільний теніс після шести тижнів такого тренування.

Матеріали та методи. Для участі в дослідженні були відібрані п'ятдесят гравців у настільний теніс державного рівня чоловічої статі у віковій групі від 17 до 23 років з Академії настільного тенісу «Інспайе», місто Секундерабад, штат Телангана (Індія), і розділені випадковим чином на дві групи, контрольну та основну, кожна з яких складалася з 25 учасників. Основна група проходила тренування ВМРП протягом шести тижнів, тричі на тиждень, а контрольна група не брала участі в жодній програмі тренувань, окрім своїх повсякденних вправ. Вимірювання тривожності всіх гравців у настільний теніс за допомогою Шкали Спортивної Тривоги-2 (SAS-2) із трьома аспектами, якими були соматичний компонент, занепокоєння та порушення концентрації, розробленої Рональдом Е. Смітом, Френком Л. Смоллом, Шоном П. Каммінгом і Джоел Р. Гроссбард у 2006 році, та Опитувальника на предмет спортивної психічної стійкості (SMTQ) із трьома аспектами, якими були впевненість, послідовність і контроль, розробленого Майклом Шеардом, Джимом Голбі та Анною Ван Верш у 2009 році, проводили на початку та після завершення експериментального періоду тривалістю шість тижнів.

Результати. Статистично значущий вплив було встановлено в основній групі на рівні значущості 0,05 для таких аспектів, як спортивна психічна витривалість і соматичний компонент, занепокоєння та порушення концентрації, за аспектами шкали тривожності гравців у настільний теніс.

Висновки. Візуалізація та уявлення образів були використані як ефективний інструмент для підвищення показників. Візуально-моторна репетиція поведінки – це систематична психологічна техніка, яка допомагає гравцям у настільний теніс долати психологічні чинники.

Ключові слова: візуально-моторна репетиція поведінки, шкала спортивної тривоги, спортивна психічна витривалість.

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