

Immediate effect of mental imagery on the performance time in sprinters of age group 18-25 years.

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Citation this Article: Dhara Pooj, Dr. Priti Agni, “Immediate effect of mental imagery on the performance time in sprinters of age group 18-25 years”, IJMSIR- September - 2021, Vol – 6, Issue - 5, P. No. 170 – 177.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Mental imagery is a psychological tool to develop or enhance a sport performance in an athlete. Imagery training is helpful for acquisition of various skills, improving confidence and motivation, reducing fear of injury, anxiety and also for relaxation. The purpose of this study was to analyze the immediate effect of mental imagery on the performance time in sprinters. Twenty-one college- level sprinters (13 females and 8 males), fitting in the inclusion criteria were selected to participate in this study. The participants were asked to perform a 50-meter dash test and their time of completion was recorded using an electronic timer. The participants then had to listen to a pre- recorded audio script for a single mental imagery session lasting for fifteen minutes which focused on relaxation, motivation, positive reinforcement, boosting self-confidence and practicing proper form during the sprint. Immediately post the session, the performance time of sprinters for 50-meter dash test was noted again and the pre imagery and post imagery time was compared. The data obtained was analyzed using paired t-test at $p < 0.0001$ level of significance. The findings

revealed that the athletes showed significant improvement in performance time after a single mental imagery session. This study concludes that a single session of mental imagery may benefit sprinters in enhancing their performance.

Keywords: 50-meter dash test, immediate effect, mental imagery, performance time, sprinters.

Introduction

Sprinting is an athletic event that requires individuals to cover a set distance as fast as possible and it predominantly consists of three phases i.e. acceleration phase, transitional phase and maximal velocity phase^[1]. In a track and field event, sprint starts are carried out in a number of ways including the standing start, crouched start, or block start^[2].

Sprint distances at Olympic events include 100m, 200m and also the 400m, with competitors perpetually seeking individual improvement. It's common to observe winning margins of less than 0.01s in several of those sprint events; so little alterations in performance are often the deciding factor between gold and silver placings and rankings^{[3], [4]}. The distinction within the sprinting performance time for 100m

between the highest sprinters of the planet is in milliseconds (Usain Bolt: 9.58s, Tyson Gay: 9.69s, Yohan Blake: 9.69s, Asafa Powell: 9.72s, Justin Gatlin: 9.74s) ^[5]. Therefore, improving the sprint or sport performance of an athlete is of utmost importance.

The sport performance of an athlete doesn't solely rely on the great physical and technical preparation; it's conjointly the results of the mix of physical and psychological factors, absolutely placed within the frame of a coaching that promotes performance. Psychological skills during a sport principally embrace imaging, attention, concentration, self-assurance, goal setting and motivation ^[6].

Humans have the power to get mental correlates of sensory activity and motor events without a triggering external stimulus; this function is understood as imagery. Studies of this method return from completely different areas of analysis like sport psychology, cognitive psychology, and recently, cognitive neuroscience. ^[7]

Mental imagery is often outlined as photos within the mind or a visible illustration within the absence of an environmental input ^[8]. Mental imagery is "the process of imaging the performance of ability with no connected disclosed actions" ^[9].

Healthy individuals using mental imagery may experience performance gains in areas like strength, arm-pointing capability, range of motion, speed, accuracy, motor skills ^[10].

Apart from influencing performance, mental imagery has been utilized in conjunction with rehabilitation and recovery to address pain, speed the healing recovery method, forestall the deterioration of physical skills because of injury and immobility ^[11], increase adherence to a program ^[12], ^[10].

Mental imagery is the most prevalent type of mental rehearsal which is utilized in athletics. Studies with elite, world-class athletes have found rates of imagery use from 70% ^[13] to 90% ^[14] and 99% ^[15]. Mental imagery has also been used with non-elite athletes ^[16]. It has been shown to facilitate the learning and acquisition of motor skills and patterns of movement. ^[12]

This use of imagery for practicing the skill mentally is defined as mental practice. Many studies in sport psychological science have shown that mental practice is often effective in optimizing the execution of movements in athletes and it facilitates novice learners in progressive acquisition of latest trained behaviours ^[17], ^[18], ^[19]. Mental practice has the potential to supplement practical experiences for a better and quicker learning of motor skills ^[20]. Studies have evidenced that there's vital muscular activity throughout a mental imagery session, recorded by EMG ^[21].

Studies have proven that the majority of the athletes do not use mental imagery on a standardized basis and yet it has been helpful. It's been found that largely the elite athletes' use imaging before a contest and during the competition ^[22], particularly in sports like soccer, track and field, ice hockey, squash, gymnastics, and ice skating. The frequency of imagery use suggests a positive relationship between the utilization of mental imagery and a better athletic performance in competitive things. ^[12]

Mental imagery is unarguably one among the most widely researched psychological techniques utilized in athletics. In fact, it has become so well accepted that it's currently considered one among the fundamental areas of analysis within the field of sports psychological science. ^[23]

Mental imagery training is achieving a great deal of attention by a lot of elite as well as novice trainees and trainers in this field. The purpose of this study is to view the immediate effect of a single mental imagery session in this field.

Imagery is used to improve motor task performance and learning^{[14], [24]}. It is generally seen that mental imagery can contribute to increasing the performance in soccer and basketball players;^{[25], [26]} hence this might be helpful for sprinters as well. There have been studies showing the use of mental imagery for improving the response time in sprinters, but they are intervention based(3-6 weeks based). This study is thus undertaken to determine the immediate use of mental imagery in sprinters and to know if a single session of imagery training is effective or not. Many researchers have studied the effect of imagery on strength (biceps curls, leg press), long jumps, squat ability, and other activities but very few studies are based on enhancing performance time in athletes.

It will not only help sprinters having specific training but also those having non-specific training. Also, in sprinters having a calm and composed mind-set is essential, which is beneficial for improving the sprint performance and this can be achieved via mental imagery.^[27]

Moreover, imagery training can help to improve or practice a skill in a shorter duration. There is scarcity of research done to study the immediate effect of mental imagery in sports, hence this study is undertaken to study the immediate effect of mental imagery on the performance time in sprinters.

The aim was to study the immediate effect of mental imagery on the performance time in sprinters of age group 18-25 years. The objectives of present study

were to assess the performance time in sprinters prior to imagery session, to assess the performance time in sprinters post the imagery session and to compare the performance time pre and post imagery session to know its effectiveness.

It has been hypothesized that there is a significant immediate effect of mental imagery on the performance time in sprinters aged 18-25 years.

Materials and Methods

This study was an experimental study, which was conducted over the duration of 6 months. The study population included college-level sprinters.

The sample size was 21 as calculated by samplesize.net.

Sprinters within the age group of 18-25 years without any former imagery training were included in this study whereas sprinters with lower limb injuries in the past 3 months, with any cognitive and cardiovascular impairment, neurological conditions like MS or nerve discrepancies and chronic illnesses like Diabetes Mellitus, Hypertension were excluded from the study.

The study was presented to the Institutional Review Board and the permission from the Review Board was granted for the same.

Sprinters fulfilling the inclusion criteria were selected and explained about the study procedure. An informed consent was taken from all the participants prior to the start of the study. The materials required were a running track or an area of 50 meters on the plane surface (Flat and clear surface of minimum 70 meters), measuring tape, electronic timer / stopwatch, cone markers.

The outcome measure used was a 50-meter dash test to measure sprint performance. The reliability of 50-meter dash test is 0.904- ICC.^[28]

A. Study procedure

The participants were instructed to stand at the starting line for performing the 50-meter dash test. The procedure involved running over 50 meters of a single maximal sprint, with the time registered using a stopwatch. Cone markers were kept at either ends of the track to demarcate the start and the finish line. Participants started from a standing stationary posture with hands not in contact with the ground, with one foot in front of the other. The forefoot had to be right behind the starting line. Once the participant was geared up, the instructor instructed the "ready" then "go" instructions. The instructor advised the participant not to slow down until crossing the finish line. Their performance was recorded on an electronic timer. Scoring of each participant was done in seconds. Post their performance, all the participants were guided individually through a mental imagery session. No participant was allowed to view others' performance during the entire study procedure. The imagery session was for 15 minutes and divided into 2 components:

- For the first 5 minutes, the athletes were guided through breathing exercises and relaxation so that they can relax and gain control of their physiological responses (like heart rate, respiratory rate, etc.).
- For the next 10 minutes they were guided through event specific script to target on the points that would help them to boost their confidence as well as improve their performance.

Immediately post the training session, the participants were asked to sprint again for 50-m and the time of completion was noted.

B. Statistical analysis

The data was entered using Microsoft Excel and was analyzed using Graphpad Instat software version 3.10. Frequency, percentages, cross tables, bar diagrams, Pie charts were used for data summarization and presentation. Descriptive and Inferential statistical analysis were carried out and results on continuous measurements were presented as Mean \pm SD and results on categorical measurements in Frequency (Percentage). Kolmogorov-Smirnov test was used to check the normality of the data. The data follows normal distribution so the statistical analysis was done by using the Paired t-test as a test of significance. Conclusions were obtained by calculating & comparing P value with level of significance i.e. 5%.

Results and Discussion

The participant population contained 21 individuals, of which 13 were females and 8 were males, within 18-25 years of age group. The mean age of females was 21.384 years whereas that of males was 21.375 years. A paired t-test was used to compare the pre-test results.

Table 1: Demographic data of participants

Parameters	Males	Females
Participants (Percentage)	38.1	61.9
Age (Years)	21.384	21.375
	Mean age	

Table 2: Comparison of performance time pre and post mental imagery sessions

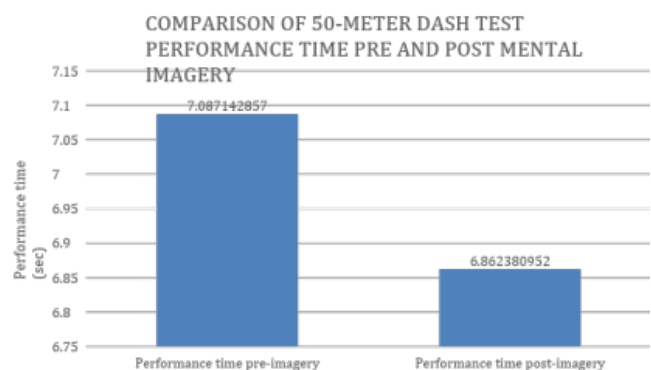
Parameters	Mean	Standard Deviation	Passed Normality Test
50-meter dash test performance time pre-imagery	7.087	0.5022	YES

50-meter dash test performance time post-imagery	6.862	0.6078	YES
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Table 3: Analysis of 50-meter dash test

	P value	Significance
50-meter dash test	0.0010	Very significant

t = 3.829 with 20 degrees of freedom.



Graph 1: Comparison of performance time pre and post mental imagery sessions

Discussion

The study aimed to look at the immediate effect of mental imagery on the performance time in sprinters. Twenty-one participants (thirteen females and eight males) of 18-25 years participated in the study. The result showed that a single mental imagery session was significant and successful in improving the performance time.

The improvement in the performance can be attributed to the use of a single mental imagery session. The first part of the audio recording of the mental imagery script focused on the components of relaxation which significantly helped in reducing anxiety and nervousness and therefore allowed participants' to be in a calm state of mind. Being calm and stress-free is very important during races and competitions, since a nervous participant may attempt a false start under

pressure, and this may lead to disqualification prior to the competition itself. The relaxation protocol helped the participants to gain control and therefore focus on their performance. Mental Imagery has an effect on autonomic nervous system; therefore it helps in controlling anxiety, stress and help in relaxation^[29].

Mousavi and Meshkini found that among elite tennis players with similar physical ability, the group who used mental imagery during sport had a mean reduction of 21.5 for their scores on the Kettle 40-item anxiety questionnaire compared to the cluster who did not use mental imagery which had a mean score reduction of 1.2^[30].

Additionally, Naylor suggests that supplementing diaphragmatic breathing training with mental imagery further enhances relaxation and reduces sport-related stress and anxiety^[31].

The second part of the imagery script focused on motivation, positive reinforcement, boosting self-confidence and practicing proper form during the sprint. This part of the session mainly focused on visualization of successfully accomplishing the goal by believing in oneself, giving the best and completely focusing on the goal. Almost all participants were able to visualize themselves achieving their goal after listening to the audio script, and this contributed to the improvement in their performance.

Mental imagery serves two functions in sport due to the numerous possibilities of its usage^[32]. One is motivational imagery and the other is cognitive imagery, which incorporates pictures of specific sport skills, methods and game plans.^[33]

According to a previous study conducted by Md. Hamidur Rahman and Muhammad Shahidul Islam titled as, "The immediate effect of mental imagery

training on the improvement of free-throw shooting accuracy in basketball,” the results showed that the experimental group had a higher average number of free-throw shooting accuracy than the control group.^[34]

This study proves that a single session of mental imagery is also beneficial. So, a single session of mental imagery can be equally beneficial for other sports players like gymnasts, sprinters, football players, etc.

As per Robert Weinberg, mental imagery has been widely suggested as a means of enhancing self-confidence. Laboratory studies have shown that using mental imagery without prior practice is still effective as long as the performance comes directly after the mental imagery use. It also concluded that imagery could be effective for both beginners and highly skilled performers, although there was a lot of variability found across studies^[35], so this might be the reason that resulted in enhancing the performance in novice sprinters.

Also, Psychoneuromuscular and Bio informational theories are two most common theories that help to explain the basis of how mental imagery works. The Psychoneuromuscular theory states that vivid imagined events produce innervations in our muscles which are similar to that produced by the actual physical execution of the event.^[35] As per Bio informational theory, for imagery to facilitate athletic performance, response characteristics must be activated so they can be modified, improved and strengthened. By repeatedly accessing response characteristics for a particular stimulus situation and modifying these responses to represent perfect control and execution of a skill, imagery is predicted to enhance performance.^[35]

Mental imagery has a positive effect on the enhancement of a particular skill, hence it can be used in various areas of sports rehab, however many coaches and novice athletes are not aware of imagery, and the various abilities of imagery that are beneficial to them. So, imagery training can be used to enhance the performance of an athlete. It can be incorporated in daily routine or can be used as an adjunct or in conjugation with the daily practice. Most of the times, the psychological aspect in any sport is overlooked during the training period. Mental imagery is helpful and can be used during all phases of rehabilitation to reduce stress, anxiety, fear of re-injury, and thus help to manage mental well-being.

The direction or speed of wind wasn't taken into consideration while performing the research. The performance time was noted using a stop-watch, which isn't as accurate as a slow-motion video recording or photocells.

This study suggests that an experimental study design involving a control group can be done to study the immediate effect of mental imagery in sprinters. A similar study can also be carried out in different age group, gender (only males or females) and in sports players like football players, gymnasts, swimmers, etc. to know the immediate effect of mental imagery.

Conclusion

The present study showed that there is a significant immediate effect of mental imagery on the performance time in sprinters.

Acknowledgment

I, Dhara Pooj would like to thank Dr. Shweta Manwadkar, Principal, K.J. Somaiya College of Physiotherapy; my project guide, Dr. Priti Agni, Professor, for the sincere efforts and guidance. I would

also like to thank all my subjects for their invaluable contribution to my research project.

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