

## EFFECT OF MENTAL TRAINING ON TRACK & FIELD PERFORMANCE AND MENTAL SKILLS - A SINGLE SUBJECT DESIGN

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### Abstract:

*A single-subject/qualitative design was employed to determine if mental training program improved athlete's performance in track & field events as well as a variety of mental skills such as Imagery ability, Mental Preparation ability, Self Confidence, Anxiety Management, Concentration ability, Relaxation ability. Four male participants (age 18 – 24) participated in the study. To measure mental skills, all the athletes completed Hardy and Nelson's mental skills Questionnaire both during baseline and intervention period. Nine performance trials for each athlete were taken including baseline and intervention. Results of visual inspection of multiple baseline graphs suggested an increase in track & field performance for all the athletes. There was also an increase in all the mental skills for all the athletes except participant 3 and participant 4 had a decrease in concentration ability whereas self confidence for participant 3 was constant.*

### INTRODUCTION

For sports performance, physical skills, physical fitness and mental skills are the building blocks. These are the main requirements of the complete athlete that produce outstanding sports performances. At top level of sport, where many athletes have equal physical ability, the difference between a great performance and a good performance or between winning and losing is often related to mental rather than physical abilities. Many different psychological skills training (PST) programs have been developed to teach athletes skills and techniques such as arousal control, imagery, goal setting, and confidence. In fact, a growing body of empirical literature demonstrates the effectiveness of PST programs. Weinberg and Gould (2007) advocate the use of oral interviews and various written psychological inventories when designing individualized PST programs to optimize the effectiveness of the program. Martens (1987) requested that sport psychology professionals remain open to different scientific paradigms and research strategies. Smith (1988) also suggested that case studies and single-subject designs might provide insights important to the study of sporting behaviour and the effectiveness of interventions. Case studies and single-subject designs allow researchers to investigate the internal experiences of participants. These designs are particularly useful when determining the effectiveness of psychological skills training due to the need for individualization. Previous studies have used single-subject designs to study the effectiveness of psychological interventions and their relationship to performance with notable success (Goudas et.al., 2007; Mellalieu et.al 2006).

The purpose of the study was to find out the effects of mental training on track & field performance and mental skills.

Please cite this Article as : RAJARSHI KAR AND JAI PRAKASH BHUKAR , EFFECT OF MENTAL TRAINING ON TRACK & FIELD PERFORMANCE AND MENTAL SKILLS - A SINGLE SUBJECT DESIGN : Academic Sports Scholar (Jan. ; 2013)

## **METHODS**

### **Selection of Participants**

Four participants (age = 18 – 24 years) were chosen from a subject pool of 42 athletes representing various events of track & field including sprints, middle & long distance races, jumps, throws and combined events. For the purpose of the study, the scholar had contacted to the faculty members and coaches belonging to track & field discipline and oriented them about the purpose and procedure of the study. Their consent was also taken. A meeting with all track & field athletes was held. All athletes completed Hardy and Nelson's mental skills Questionnaire. Athletes were identified for the study based on low scores achieved from mental skills inventory, having good physical ability; shown poorer performance than they could have done, who were also willing to undergo the training. Eight athletes were identified for inclusion in the study and were contacted about participating in the study. Four athletes agreed to participate in the study. Their consent was taken for future research plan. They were named participant 1, 2, 3 and 4 to maintain confidentiality and ethical standards in the study and the events they participate are Long Jump, hammer throw, shot put and 400 meters respectively.

### **Selection of Variables**

To find out the effects of selected mental skills training on performance of four track & field athletes, following variables were measured. Performances in Track & Field events were recorded for four athletes separately and in their own event. Athlete's major events were Long Jump, hammer throw, shot put and 400 meters. Mental skills were measured with Hardy and Nelson's mental skills Questionnaire (1996) which measure following six factors: Imagery ability, Mental Preparation ability, Self Confidence Level, Anxiety and worry Management, Concentration ability, Relaxation ability.

### **Experimental design**

A multiple baseline design (across subjects) was used in this study. Baseline observations were collected for all subjects. When stability of the baseline was achieved, the intervention was given only to one subject while baseline phase continued for the others. This process was continued until all subjects received the intervention. The effects of the treatment are demonstrated by introducing the intervention to the subjects at different times (staggered baseline). When a graphical change in level from baseline to treatment occurs, the effects of the treatment can be attributed to the intervention rather than to any extraneous variables such as maturation or history since the subjects serve as their own control (Kazdin, 1982; p. 126).

## **COLLECTION OF DATA**

The data was collected for each variable administering their respective tests i.e. to judge track & field performance particular events of track & field were conducted and to investigate mental skills a self report questionnaire was administered. The tests for performance were administered on Saturdays of each week. Total nine numbers of trials for each athlete including baseline and intervention period was taken.

### **Baseline Phase**

This phase is also called non-treatment phase. Participants were observed for a number of trials and when stability in performance was achieved, treatment was introduced. Performances of track & field events were assessed for three observation sessions for participant 1, four sessions for participant 2, five sessions for participant 3 and five sessions for participant 4 during baseline. The introduction of the treatment was staggered across all subjects. Participant 1 received the treatment first because of greater stability of dependent measures during baseline. Data for mental skills was collected two times during the baseline phase to determine stability.

### **Intervention Phase**

After determining stability during baseline phase in terms of track & field performance, mental skills intervention was started. The intervention included multiple psychological skills, mainly focusing on Goal Setting, Mental Imagery, arousal control, self-talk and Relaxation Techniques were also used. During

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treatment phase there were six observation sessions of track & field performance for participant 1, five sessions for participant 2, four sessions for participant 3 and three sessions for participant 4. Mental skills questionnaire was administered again after completion of the training program.

### TRAINING PROGRAM

The training schedule prescribed by the research scholar was applied to the four participants and training was personally implemented by the researcher. Training program for participant 1, 2, 3 and 4 was of Six weeks, Five weeks, Four weeks and Three weeks respectively. As training schedules also varied due to individual needs, basis of personalized training schedules for each athlete are described below:

Participant 1 was a Long Jumper. According to the pre intervention scores of mental skills inventory, participant 1 was identified as an athlete having low anxiety management skills and relaxation ability. His event was a long jump which involves high level of physical skill. So, mental skill rehearsal was also a major focus of the training program. Advance skills such as activation techniques were also included in his training schedule.

Participant 2 was a hammer thrower. He had shown extremely low scores in most of the factors especially self-confidence, anxiety management and relaxation ability. He was not able to perform during competitions as he was doing in practice sessions. Mental training package for him mainly focused on controlling competitive anxiety. Mental skill rehearsal was included in training for improvement of technique of hammer throw and to maintain consistency during competition.

Participant 3 was a Shot putter. He was having good physique as per the need of the event but was performing less than he could with his ability. Basic cause of low performance in his event was poor skill, which could be the problem at the time of technique learning. He was also unable to set realistic goals for practice and competition.

Participant 4 was a 400 meters runner. Pre intervention scores of mental skills inventory had shown a low relaxation ability, anxiety management skills and self-confidence.

### RESULTS

The traditional method for analyzing single case design research is visual inspection. This method involves visually examining the graphed data and reaching a judgment about whether the intervention has produced a reliable change in the data. This judgment is related to the magnitude of these changes (trend and latency). In analyzing such data, the following characteristics are considered:

The immediacy and magnitude of the change.  
The number of overlapping data points between baseline and intervention.  
Consistency of these changes with and across participants.

The intervention effect on each participant's performance in different events is shown graphically in Figure 1.

**Figure 1: Performance of athletes during baseline and Intervention**

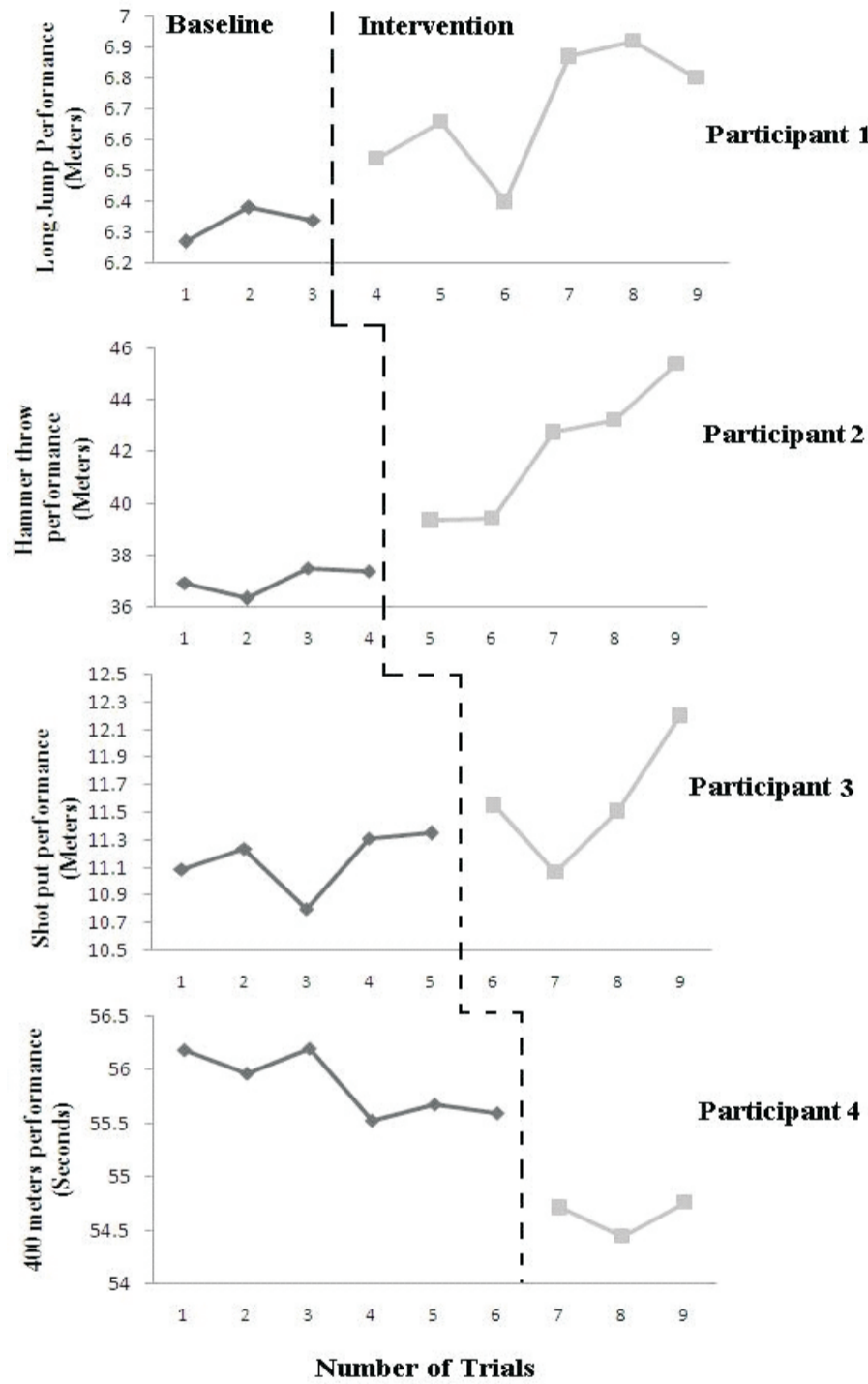


Figure 1 shows change in performance from baseline to intervention was immediate for all the participants.

In terms of the magnitude of the change, means for each player shows improvement from baseline to intervention. Changes were 6.33 meters to 6.70 meters in long jump performance for participant 1, mean hammer throw performance of participant 2 changed from 37.04 meters to 42.03 meters; mean of shot put performance of participant 3 went from 11.16 meters to 11.58 meters and participant 4 also improved mean

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performance from 55.9 seconds to 54.6 seconds. For participant 1, 2 and 3 graph shows an increasing trend but in case of participant 4, graph shows a decreasing trend. But all the performances are describing an improvement in performance. As, 400 meters performance is calculated in seconds, a lower score is considered as a better performance.

In terms of number of overlapping data, it has been seen that only one data point for participant 3 overlapped between baseline and intervention.

Intervention results are more stable across the athletes. In short, intervention affected each player similarly.

**Comparison of Mental Skills during baseline and Intervention**

Mental skills questionnaire were administered two times during the baseline phase. Mean values for two of the scores were calculated for each variable and each athlete separately.

The improvement of level in mental skills from baseline to intervention phase is presented in table 1.

**Table 1: Comparison of mental skills between baseline and intervention**

Participant	1		2		3		4	
	Baseline	Intervention	Baseline	Intervention	Baseline	Intervention	Baseline	Intervention
<b>Imagery ability</b>	17.5	18	19.5	23	19	23	18.5	19
<b>Mental preparation</b>	16.5	20	12	20	18.5	23	14	16
<b>Self Confidence</b>	15	18	8	18	19	19	12.5	15
<b>Anxiety management</b>	10	15	8.5	16	13	15	6.5	10
<b>Concentration ability</b>	17.5	21	14	21	19.5	17	21.5	20
<b>Relaxation ability</b>	13	16	10.5	21	16	19	9.5	10

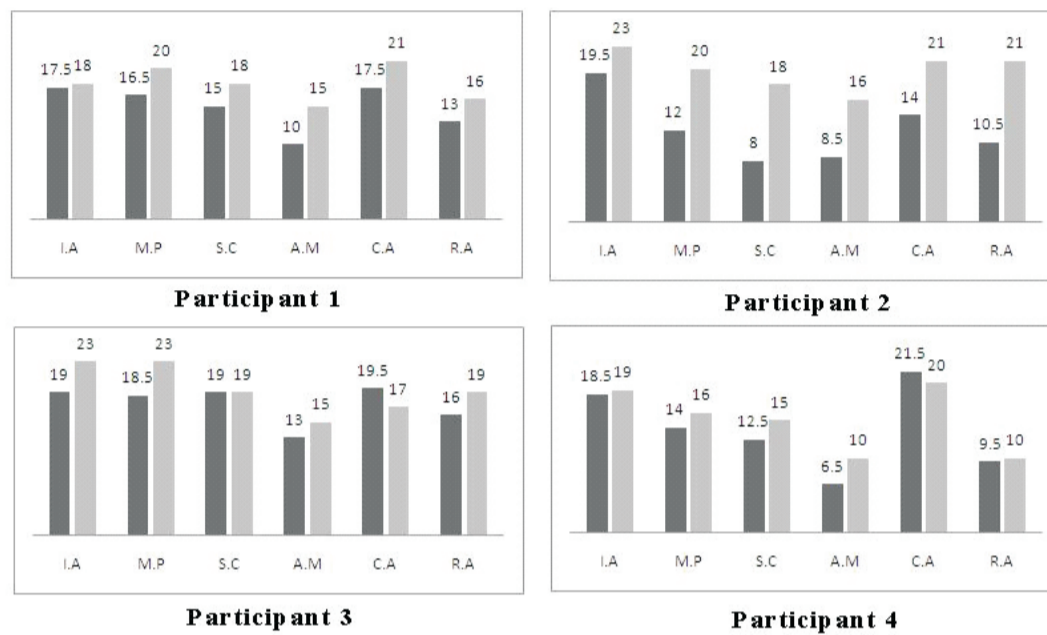
**Individual Analysis of Mental Skills**

Participant 1 was a Long Jumper (male, age 18). His scores of mental skills inventory showed improvement in all the six factors. Participant 2 was a hammer thrower (male, age 24). His scores of mental skills inventory had shown improvement in all the six factors it measured. Participant 3 was a Shot putter (male, age 19). His scores of mental skills inventory showed improvement in four factors it measured except. Other two factors were self confidence, which was constant at 19 and concentration ability went

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down. Participant 4 was a 400 meters sprinter (male, age 20). His scores of mental skills inventory demonstrated improvement in five factors it measured. Concentration ability in his case went down.

Figure2: Mental skill analysis of athletes.



\*\*I.A= Imagery ability  
M.P= Mental preparation  
S.C= Self-Confidence  
A.M= Anxiety management  
C.A= Concentration ability  
R.A= Relaxation ability

DISCUSSION OF FINDINGS

The purpose of this study was to determine whether mental training could influence Track & Field performance. Another purpose of the study was to investigate if the mental training program has a positive effect on the necessary mental skills of athletes. The mental skills intervention used in this study proved effective in improving the performance of track & field athletes. It was hypothesized that practicing a mental skills training program, athletes would have higher levels of mental skills and improved performance. All the four athletes improved performance in their own event and also improved upon their mental skills except participant 3 and 4 who had experienced a decrease in concentration. Training for improving concentration was not a part of the training package. This could have caused the decrease in concentration ability of both the athletes.

The qualitative aspect of this study added substantial depth in understanding how different athletes experience mental skills. While the questionnaire provided a base level of understanding, unstructured interviews allowed the researcher for better understanding about particular mental skill that has developed to improve performance. Allowing the athletes to expand upon answers enabled personalized mental training programs, which in turn enhanced the efficacy of the program. For instance, participant 2 stated that anxiety in sport competitions used to decrease the quality of his technique which ultimately resulted in reduction of performance. Interventions such as relaxation techniques in combination of mental skill rehearsal were designed to address the particular issue.

Overall, an evaluation of experimental participants' performance throughout the study showed that all individuals clearly improved their performance in their events and that performance changes were due to introduction of mental skills training package. A positive relationship clearly existed between mental

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skills training and track & field performance. (i.e. as mental skills training was introduced, athletes performance improved).

It was hypothesized that there would be improvement in performance of track & field athletes following a program of goal setting and mental skills training. It was also hypothesized that mental skills will improve as a result of the intervention.

Visual inspection of the multiple baseline graph enable us to decide that there was an improvement in the performance of the track & field athletes. Bar diagrams concerning mental skills depict that there was an improvement in almost all the factors following mental skills training and goal setting. Thus, on the basis of findings, research hypothesis may be accepted.

The results support research findings by Salehian et.al (2011) who investigated the effect of frequency of feedback (internal and external) with goal setting intervention (coach setting and self- setting) for university male basketball beginners participating on learning of basketball set shot, and by Hidayat (2011) who examined the influence of goal setting and mental imagery as two methods of psychological skill training on learning achievement of badminton motor skill. So, results also supports that using a mental skills training program improves athletic performance.

The study further supports utilizing single-subject designs when assessing effectiveness of a mental skills training program (Patrik and Hrycaike, 1998), and Hamstra et al. (2004)

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