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Effect of Mental Training on Non-Visual Baton Changeover in Sprint Relay

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Abstract – The study investigated the effects of mental training on Non-visual Baton pass in sprint relay. The participants of the study were sixteen boys (age range 16-20) from Athletics summer camp organized at L.N.I.P.E, Gwalior. Baton changeover performance was assessed with three variables such as Exchange Zone Velocity, Instantaneous Velocity and Number of errors. Two group Pretest–posttest randomized-groups design was used as experimental design. Both the groups received baton exchange training whereas mental training was imparted to only one group. Analysis of Covariance found significant difference between silent and Verbal Exchange Groups in Exchange Zone Velocity (F-value = 6.939, p = .021), but insignificant difference in Instantaneous Velocity (F-value = 1.362, p = .264) and errors during baton exchange (F-value = .888, p = .363). The results indicated that Mental Training is effective in improving performance of baton changeover.

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INTRODUCATION

Relay events are one of the most popular track & field events. In a track & field meet, 4×100 meters relay and 4×400 meters relay races are most common. Four runners in a team run equal distances to complete the race while competing with other teams. In 4×400 meters relay, a visual baton pass is used while a non-visual/ blind pass is used in 4×100 meters relay. As athletes run and pass baton in their near maximal speed in 4×100 meters relay, it is called as sprint relay. Baton changeover in a very high running speed makes baton pass a very challenging skill. Sprint relay demands very high level of motor coordination and skills of baton exchange. It is also seen that relay athletes often prioritize individual events over relay, thus making the relay performance vulnerable to mistakes in competitions. Even if a single athlete commits mistake, the whole team suffers. Sprint relay runners must also be mentally tough enough to pass baton successfully in competitions under high pressure. Emmanuel (2000) emphasized the importance of psychological preparation for relay runners. Colfer (1973) mentioned psychological factors for relay team selection and the kind of athletes to be avoided for the relay team. There was a need to investigate the impact of mental training on the performance of sprint relay. The present study intends to determine the effect of mental training on Non-visual Baton pass in sprint relay. On the basis of the literature reviewed, hypothesis framed was mental training would have a positive impact on the performance of Non-visual Baton pass in sprint relay.

METHODOLOGY:

Participants of the study: Participants of the study were from Athletics summer camp organized at L.N.I.P.E, Gwalior. Total 16 boys from the age group of 16 – 20 years participated in the study. They had no prior experience of participating in relay events.

Variables of the study- Three variables were chosen to assess improvement in the ability of baton changeover such as Exchange Zone Velocity, Instantaneous Velocity and Number of errors. Exchange Zone Velocity is the baton carrying runners' velocity within the baton exchange zone of 20 meters. Instantaneous Velocity is the outgoing runners' ability to maintain speed after baton is handed over to him. Both Exchange Zone Velocity and Instantaneous Velocity were recorded in meters per second. Number of errors were measured by videography method. Five common errors during baton exchange were tested such as Running in wrong side of track, Accuracy of take-off, Time of backward extension of receiver's arm, Position of backward extension of receiver's arm, looking back during the exchange. Errors were traced out by visually observing the videos. High speed camera was used for video recording and Silicon Coach 7 software was used for video analysis.

Experimental Design: Pretest–posttest randomized-groups design was used where participants were randomly assigned to the training groups i.e. Mental Training (MT) Group and the Group without Mental Training (WMT). Both the groups received baton

exchange training but only MT group received mental training.

Baton exchange Training Program: Training for relay baton exchange was common for both the groups. Each participant of the study had opportunity to train with their pair for the total duration of training program. For non-visual exchange, outgoing runners place a check-mark on their lanes behind their starting positions. Chalk lines, Colored tape were used for marking. When incoming runner crosses the mark, outgoing runner starts running in speed. After the outgoing runner enters the exchange zone and the incoming runner feels that outgoing runner is approachable (within 2 to 3 meters) he indicates by a verbal signal directing the outgoing runner to extend the receiving arm back. After the arm extended backwards is fixed, incoming runner passes the baton with down sweep technique. Various drills and games were used to teach participants the technique of non-visual baton pass.

Mental Training Program: Mental training program was implemented to only one group out of the two experimental groups. The duration of the training program was of six weeks and three days per week mental training was imparted. The detail of training capsule is given below.

Table 1: Weekly Mental Training Program for the Experimental Group

Week	Day	Training Program
First	Monday	Introduction to the Training program
	Wednesday	Breathing Techniques
	Friday	Progressive Muscular Relaxation
Second	Monday	Breathing Techniques
	Wednesday	Mental Imagery practice
	Friday	Progressive Muscular Relaxation
Third	Monday	Breathing Techniques
	Wednesday	Mental Imagery practice
	Friday	Progressive Muscular Relaxation
Fourth	Monday	Arousal Control training
	Wednesday	Short Term Goal Setting
	Friday	Mental Imagery practice
Fifth	Monday	Team Building session- Strengths of Teammate
	Wednesday	Arousal Control
	Friday	Mental skill Rehearsal
Sixth	Monday	Team Building Session- Trust Fall
	Wednesday	Short Term Goal Setting
	Friday	Mental skill Rehearsal

Statistical Analysis: To test the significance of difference between mean values of control and experimental groups after eliminating the effect of covariates, ANCOVA was used. The level of significance was set at 0.05. The data was analyzed using SPSS 20.

RESULTS

Table 2: Descriptive Statistics of different variables in Mental Training (MT) group and the Without Mental Training (WMT) group

Variables	Groups	Pre-test		Post-test		N
		Mean	Std. Deviation	Mean	Std. Deviation	
Exchange Zone Velocity	With mental Training	6.97	0.42	7.74	0.47	8
	Without mental Training	7.02	0.72	7.37	0.52	8
Instantaneous Velocity	With mental Training	5.33	0.50	6.09	0.58	8
	Without mental Training	5.97	1.24	6.73	0.86	8
Errors	With mental Training	4.38	0.74	0.75	0.71	8
	Without mental Training	4.63	0.52	1.25	1.04	8

Table 2 shows the descriptive statistics (mean and standard deviation) of pre-test scores and post test scores of different Baton Exchange Performance variables in both the groups (With mental Training and without mental Training).

Table 3: Adjusted mean and standard error of different variables in Mental Training (MT) group and the Without Mental Training (WMT) group in post testing

Variables	Groups	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Exchange Zone Velocity	With mental Training	7.757	.109	7.521	7.994
	Without mental Training	7.349	.109	7.113	7.586
Instantaneous Velocity	With mental Training	6.329	.100	6.113	6.544
	Without mental Training	6.499	.100	6.283	6.714
Errors	With mental Training	.783	.323	.085	1.480
	Without mental Training	1.217	.323	.520	1.915

In table 3, means and standard errors are presented after adjusting the initial differences in scores. After eliminating the covariates ANCOVA was calculated and presented in table 4.

Table 4: ANCOVA table of different Baton Exchange Performance variables

Variables	Source	Type I Sum of Squares	df	Mean Square	F	P value
Exchange Zone Velocity	Between Groups	.665	1	.665	6.939*	.021
	Within Groups	1.246	13	.096		
Instantaneous Velocity	Between Groups	.102	1	.102	1.362	.264
	Within Groups	.971	13	.075		
Errors	Between Groups	.725	1	.725	.888	.363
	Within Groups	10.609	13	.816		

* Significant at 0.05 level

Table 4 revels that significant difference was found between silent and Verbal Exchange Groups in Exchange Zone Velocity (F-value = 6.939, p = .021), but no significant difference was found in Instantaneous Velocity (F-value = 1.362, p = .264) and errors during baton exchange (F-value = .888, p = .363).

DISCUSSION

The study investigated the effects of mental training on Non-visual Baton changeover in sprint relay. Breathing techniques, goal setting, progressive muscular relaxation, mental imagery, arousal control, mental skill rehearsal and team building sessions were conducted as a part of the mental training program. Team building sessions were included in mental training program because team work is a vital component of relay race. Analysis of data revealed that mental training significantly improved baton exchange performance by improving exchange zone velocity of the athletes. But it failed to show any significant improvement in Instantaneous Velocity and errors during baton exchange. There are evidences that mental training improves sports performance (Mellalieu et.al, 2006; Hidayat, 2011; Sadeghi et al. 2010; Hamstra et al., 2004). Track & Field performance is also improved with application of mental training (Goudas et.al 2007; Patrik and Hrycaike, 1998; Nässi, 2011). Among the very few studies conducted on sprint relay, Bry et.al. (2009) suggested that mental training consisted of priming about cooperation vs. individualism improved baton speed in the exchange zone. Depken & Haglund (2011) also found similar results while investigating peer effects on 4×400 m relay teams. This study also showed similar results where at least one variable shown significant improvement in baton changeover performance due to mental training intervention.

CONCLUSION

Mental Training is effective in improving Exchange Zone Velocity. But there is no effect on other two variables indicating baton exchange performance i.e. Instantaneous Velocity and Errors during baton exchange.

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