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Mental toughness among athletes

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Abstract
The present study was planned with the aim to assess the differences between different team game players of Hockey, Kabaddi and Volleyball. It was hypothesized that there would be a significant difference between team game players on Mental Toughness. The sample consisted of 106 male respondents chosen from Sports Authority of India's (SAI), under sports promotional scheme (STC= SAI Training Centres). The sample comprised of Hockey players (n=40; Mean age=18.08; SD=1.61), Volleyball players (STC players n=26; Mean age=18.19; SD= 1.72), and Kabaddi players (STC players n=40; Mean age= 17.83; SD= 1.29) within the age range of 14- 21 years (Mean age=18.01; SD=1.52). Psychological Performance Inventory was administered under standardized conditions. Results showed significant differences among the Team game players on different dimensions of Mental Toughness.

Keywords: Hockey, Mental Toughness, Volleyball, Kabaddi

Introduction
Irrespective of the kind of sport, an athlete's success or failure is dependent on a combination of physical and psychological abilities**.** Everyone is born with specific physical and psychological strengths and weaknesses, but sports skills can also be learned and developed. A champion requires mental skills to be systematically practiced and integrated with different physical abilities. There are two kinds of sports, individual and team sports. The team sport has a different effect on the player as compared to individual sport where team cohesion, group dynamics etc. play a vital role in making an individual's mental strength. Coaches and athletes have been searching for mental skills that will enhance their competitive abilities to excel in the competition. There are differences in athlete's use of skills between different team game players.

Aim of the current research was to assess the Mental Toughness between Team Game Players. In objective separate profiles of subjects from different team games on the variable of mental toughness will be investigated. An alternate hypothesis was formulated as "There would be a significant difference among different Team Game Players on level of Mental Toughness".

Methodology
The sample was stratified in the sense that all the participants were from a homogeneous group as all were team sport players. Purposive sampling was done where participants were approached blindly without having any background of the participants. The questionnaires were completed by 106 sportspersons.

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Score on the item of each variable is summed up to get the mean and standard deviation to determine the level of mental toughness of the players. The higher the score of an individual, the higher will be the level of mental toughness. The reliability value of the scale is between 0.64-0.80 (Burgess, 1995; Kuan and Roy, 2007) [2] and 0.42 to 0.82 (Golby and Shread, 2004).

All subjects were comfortably seated in a quiet room. The test instructions were read out to the subjects. Supervised self administration technique was used. In order to ensure effective supervision the subjects were taken in batches of 10.

The information obtained from the sample was computerized and analyzed by means of the Statistical Product and Service Solutions (SPSS) Package. Keeping in view the objectives of the study, the results were analyzed by means of the following statistical methods: Descriptive statistics: mean, standard Deviation (SD) skewness, and kurtosis. One-Way Analysis of Variance (ANOVA) was administered which gives a single overall test of whether there exist differences between the groups or treatments. For Multiple between groups Comparisons Dunnett's T3 Post- hoc test was administered: The post hoc tests will help to determine if particular pairs of values are significantly different from each other. Dunnett's T3 Post-hoc test was applied as equal variance was not assumed.

Results and Discussion
Mean, SD, Skewness and kurtosis were computed for all the seven variable of Psychological Performance Inventory (PPI). Table 1 clearly shows that scores of all the seven variables of PPI were normally distributed which is shown by values of Skewness and kurtosis.

Table 1: Mean, Standard Deviation, Skewness and Kurtosis on different variables of Mental Toughness as measured by Psychological Performance Inventory (PPI).

Variable	Game	N	Mean(SD)	Skewness	Kurtosis
Self-Confidence	Hockey	40	22.30 (2.63)	0.10	-0.92
	Volleyball	26	20.88 (2.20)	-0.28	1.76
	Kabaddi	40	22.83 (2.78)	-0.67	-0.36
Negative Energy Control	Hockey	40	17.90 (2.94)	-0.40	0.27
	Volleyball	26	17.73 (3.41)	0.05	-0.62
	Kabaddi	40	16.60 (2.72)	0.88	1.39
Attention Control	Hockey	40	18.43 (2.84)	0.43	-0.57
	Volleyball	26	19.00 (2.33)	0.20	0.18
	Kabaddi	40	17.13 (2.64)	-0.61	0.25
Visual & Imagery Control	Hockey	40	23.85 (3.96)	0.32	-0.23
	Volleyball	26	24.88 (5.49)	-0.27	-1.82
	Kabaddi	40	26.63 (2.53)	-0.54	-0.37
Motivation Level	Hockey	40	23.05 (2.60)	-0.19	-0.61
	Volleyball	26	24.62 (3.81)	-0.66	0.89
	Kabaddi	40	24.48 (2.16)	-0.25	-0.06
Positive Energy Control	Hockey	40	21.48 (2.79)	0.57	1.62
	Volleyball	26	22.73 (3.18)	-0.38	-0.10
	Kabaddi	40	22.83 (2.90)	-0.01	-1.0
Attitude Control	Hockey	40	22.50 (3.16)	-0.37	-0.41
	Volleyball	26	22.38 (3.62)	-0.37	-0.31
	Kabaddi	40	22.03 (4.05)	0.10	-0.97
Mental Toughness	Hockey	40	149.50 (12.14)	-0.17	-0.77
	Volleyball	26	152.23 (12.75)	-0.33	1.26
	Kabaddi	40	152.50 (9.08)	-0.84	1.96

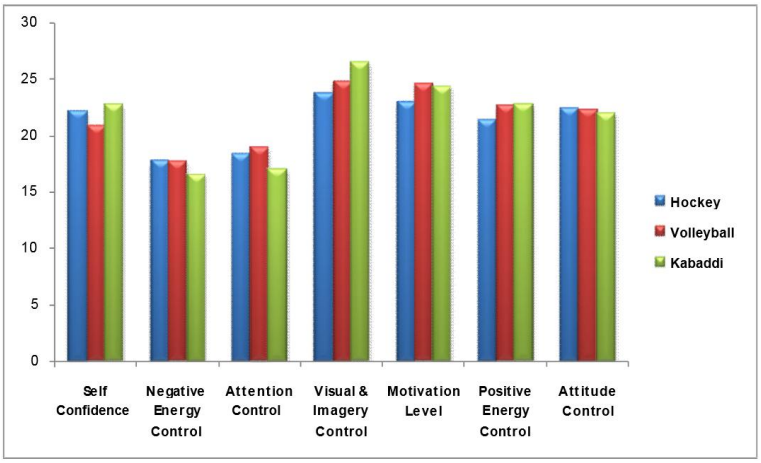

Fig 1: Represents Mean Scores of different team games players on the variables of Mental Toughness as measured by Psychological Performance Inventory (PPI).

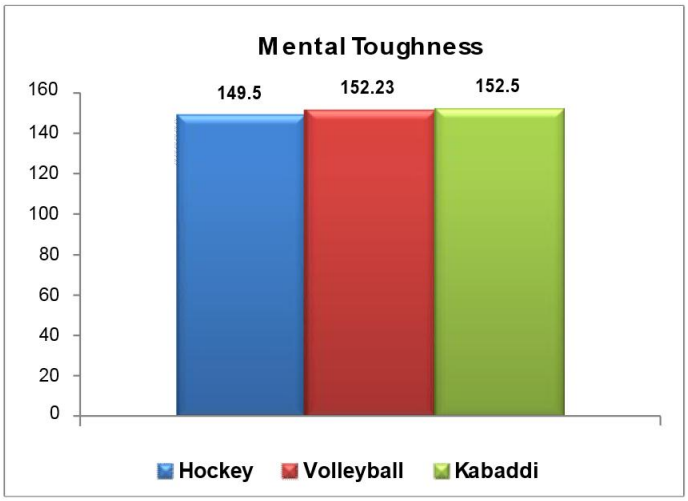

Fig 2: Represents Mean Scores of different team games players on the variable of Mental Toughness (Total Score) as measured by Psychological Performance Inventory (PPI).

One-Way Analysis of Variance (ANOVA) was administered to assess differences in various variables of mental toughness between team game players of Hockey, Volleyball and Kabaddi.

Table 2: One way ANNOVA showing differences in various variables of Mental Toughness between team game players of Hockey, Volleyball and Kabaddi.

Variable	Sources of Variance	Sum of Squares	df	Mean Sum of Squares	F-Value	p-value
Self-Confidence	Between Groups	60.76	2	30.38	4.51	0.05
	Within Groups	692.83	103	6.73		
Negative Energy Control	Between Groups	38.34	2	19.17	2.15	0.12
	Within Groups	918.31	103	8.92		
Attention Control	Between Groups	63.25	2	31.62	4.51	0.05
	Within Groups	722.15	103	7.01		
Visual & Imagery Control	Between Groups	156.46	2	78.23	4.99	0.00
	Within Groups	1615.13	103	15.68		
Motivation Level	Between Groups	54.89	2	27.44	3.50	0.04
	Within Groups	808.03	103	7.84		
Positive Energy Control	Between Groups	43.07	2	21.53	2.51	0.09
	Within Groups	884.86	103	8.59		
Attitude Control	Between Groups	4.80	2	2.40	0.18	0.83
	Within Groups	1357.13	103	13.18		
Mental Toughness	Between Groups	209.72	2	104.86	0.83	0.44
	Within Groups	13032.61	103	126.53		

One-way Analysis of variance (ANOVA) for the variable of Self-Confidence revealed F- value of 4.51 which is significant at $p < .05$ level of significance. It shows that there are significant differences among Hockey, Volleyball and Kabaddi players.

One-way Analysis of variance (ANOVA) for the variable Negative Energy Control revealed F-value of 2.15 which is non-significant at $p > 0.12$ level of significance which implies that there exists no significant difference among the Hockey, Volleyball and Kabaddi players.

One-way Analysis of variance (ANOVA) for the variable Attention Control revealed F- value of 4.51 which is significant at $p < .05$ level of significance. This shows that there are significant differences among the Hockey, Volleyball and Kabaddi players.

One-way Analysis of variance (ANOVA) for the variable Visual and Imagery Control showed F-value of 4.99 which is significant at $p < .01$ level of significance. This indicates that there are significant differences among the Hockey, Volleyball and Kabaddi players.

One-way Analysis of variance (ANOVA) for the variable Motivation Level depicted F- value of 4.51 which is significant at $p < .05$ level of significance. This shows that there are significant differences among the Hockey, Volleyball and Kabaddi players.

One-way Analysis of variance (ANOVA) for the variable Positive Energy Control revealed F-value of 2.51 which is non-significant at $p < .05$ level of significance. This depicts that there are no significant difference among the Hockey, Volleyball and Kabaddi players.

One-way Analysis of variance (ANOVA) for the variable Attitude Control reveals F- value of 0.18 which is non-significant at $p < .05$ level of significance. This indicates that there are no significant differences among the Hockey, Volleyball and Kabaddi players.

One-way Analysis of variance (ANOVA) for the variable of overall Mental Toughness shows that F-value of 0.83 which is non-significant at $p < .05$ level of significance. This shows that there are no significant differences among the Hockey, Volleyball and Kabaddi players.

From one way ANOVA we came to know that there are significant differences among hockey, volleyball and kabaddi players on the variable of self-confidence, attention control, visual-imagery control and motivation. But this analysis is not sufficient enough to tell the direction of our results. Further, to know which group performed better than others, Dunnett's Post-hoc analysis was done.

Table 3: Multiple Comparisons of 3 groups on the variable of Self-confidence, Attention Control, Visual-Imagery Control and Motivation level (Dunnett's T3 Post-hoc Test)

Variable	(I) Game	(J) Game	Mean Difference (I-J)	Level of Significance
Self Confidence	Hockey	Volleyball	1.41	0.06
		Kabaddi	-0.52	0.77
	Volleyball	Kabaddi	-1.94*	0.00
Attention Control	Hockey	Volleyball	-0.57	0.75
		Kabaddi	1.30	0.11
	Volleyball	Kabaddi	1.87*	0.01
Visual & Imagery Control	Hockey	Volleyball	-1.03	0.79
		Kabaddi	-2.77*	0.00
	Volleyball	Kabaddi	-1.74	0.36
Motivation level	Hockey	Volleyball	-1.56	0.20
		Kabaddi	-1.42*	0.03
	Volleyball	Kabaddi	0.14	0.10

While comparing the mean differences of all 3 games by using Dunnett's T3, Table 3 shows that on Self-Confidence mean score of Kabaddi players was significantly higher than Volleyball players (Mean Difference (I-J) = 1.94, $p < 0.01$). This implies that Kabaddi players were better on Self-Confidence as compared with Volleyball players. There were no significant differences among Hockey players and Volleyball players; Hockey players and Kabaddi players.

On Attention Control mean score of Volleyball players was significantly higher than Kabaddi players (Mean Difference (I-J) = 1.87, $p < 0.01$). This showed that Volleyball players were better on Attention Control than Kabaddi players. There existed no significant differences among Hockey players and Volleyball players; Hockey players and Kabaddi players.

Mean score of Kabaddi players was significantly higher than Hockey players (Mean Difference (I-J) = 2.77, $p < 0.01$) on Visual and Imagery Control. This revealed that Kabaddi players were better on Visual and Imagery Control than Hockey players. There existed no significant difference among Hockey players and Volleyball players; Kabaddi players and Volleyball players.

On Motivation Level Mean score of Kabaddi players was significantly higher than Hockey players (Mean Difference (I-J) = 1.42, $p < 0.03$). This showed that Kabaddi players had better Motivation Level than Hockey players. No significant differences were found among Hockey players and Volleyball players; Kabaddi players and Volleyball players.

Coaches and teams seek skillful performers who possess both the essential components of skills and mental toughness. The present research was planned to assess Team Games Players on different components of Mental Toughness as measured by Psychological Performance Inventory. Based on the review of literature the following hypothesis was proposed for Mental Toughness: **"**There would be a significant difference among different Team Game Players on level of Mental Toughness".

Results of group comparison by one way ANOVA revealed significant differences on the variables of Self-Confidence, Attention Control, Visual and Imagery Control and Motivation Level. A glance at the table of mean scores (Table 1) revealed that on Self-Confidence Kabaddi players scored the highest followed by Hockey players and Volleyball players. On Attention Control (Table 1) Volleyball players scored the highest followed by Hockey players and Kabaddi players. On Visual and Imagery Control (Table 1) Kabaddi Players scored the highest followed by Volleyball players and Hockey players. On Motivation Level (Table 1) Volleyball players scored the highest followed by Kabaddi players and Hockey players.

A glance at Multiple Comparisons (Dunnett's T3 Post – hoc test) of Self-Confidence (Table 3) revealed that Kabaddi players were significantly higher than Volleyball players. The possible reason for this result might be difference between the two games. The game of kabaddi involves physical contact and it requires more physical strength in comparison to Volleyball. With regard to skills both games require equal input of skills. Physical strength might be a contributory factor in higher self confidence in Kabaddi players. Bull, Shambrook, James, and Brooks (2005) [1] have suggested that mental toughness might be specific to certain sports. It could possibly result in differences between team and individual athletes as well as those competing in contact and non-contact sports, which suggests that athletes participating in contact sport are more mentally tough. On Attention Control Volleyball players were significantly higher than Kabaddi players. Here, Volleyball is a game which has a stimulus in the form of a ball which requires consistent visual attention and vigilance on the part of players. In case of Kabaddi such stimulus is absent and players themselves work as stimulus for paying attention. Golby and Sheard (2003) studied mental toughness at different levels of rugby league and reported that the athletes scored significantly higher on attention control one of the seven mental toughness subscales. Like, Volleyball Rugby also involves a ball which requires not only physical strength but also constant attention and vigilance on the part of players. On Visual and Imagery Control Kabaddi players were significantly higher than Hockey players. On Motivation Level Kabaddi players were significantly higher than Hockey players. Motivation is one of the most important factors in determining success. One possible reason for this result might be individual responsibility with regard to performance. Kabaddi is a team game which requires a single player to make a score and take the responsibility to lead the team while in case of Hockey most of the time its team effort which is determinant of success. It is factual that individual responsibility influence motivation level and performance of a player. When given full responsibility to perform, players have more motivation to do well and they attribute their success to themselves. It can be argued that attribution styles and locus of control is a key psychological construct influencing different aspects of motivation which leads to success or failure. Players with higher self-confidence have higher internal locus of control which acts as a driving force for performing at optimum level. Horsburgh *et al*. (2009) have suggested that mental toughness appears to have a strong genetic component. So it's not only team sports who influence mental toughness but genetic component in athletes and mental toughness as a personality trait also have significant contribution in sports outcome. From the results of the present study it became clear that there are differences in mental toughness of different team game players. It is established fact that high achievers are mentally tougher than low achievers (Yadav *et al*., 2013). But little evidence is available with regard to differences in mental toughness of different team game players. More comprehensive research is required to generalize results of current study.

Conclusions

From the results of the current study following conclusion can be drawn. Firstly, the group of Kabaddi players was more confident than the rest of their counter parts. Kabaddi players also showed higher visual and imagery control and they were high on motivation as well. Volleyball players possessed greater attention control than other two team game players. Volleyball players were more focused in match situation than the rest of the groups. Secondly, the

groups were not significantly different on overall Mental Toughness level. Finally, all the three groups were found higher on Mental Toughness. All the three games players were Mentally Tough as their mean scores were higher than average mean scores of the scale.

Recommendations

Coaches, athletes and sports psychology practitioners have become increasingly interested in penetrating the explanations for why and how the degree of performance and efforts vary among individuals who participate in sport. The results of the current study yielded some important information for coaches, athletes and sports psychology consultants. Coaches that have an in-depth knowledge of their athlete's individual characteristics (e.g., mental toughness) could develop effective training regimens for each individual athlete or groups of athletes. Considering the favoring fact that mental toughness can offer higher success to the performer, this research would be beneficial for those trying to construct and develop this mental skill.

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