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RESEARCH ARTICLE

COMPARATIVE STUDY AMONG SWIMMERS, WATER POLO PLAYERS AND DIVERS ON MENTAL TOUGHNESS

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ABSTRACT

To assess the level of mental toughness and to compare the factors of mental toughness among the athletes of different sports like, water polo, swimming and diving.

Methodology: For the purpose of the study 33 swimmers (both and male and female), 31 water polo players (male) and 22 divers (both male and female) from All India Inter-University held at Amritsar, Punjab, 2013 were selected. The age of the athletes were ranging from 17 to 25 year of age. For the assessment of the data on mental toughness of the selected athletes the questionnaire "Mental Toughness Questionnaire" developed by Dr. Alan Goldberg was used to assess the mental toughness level of the athletes. Descriptive statistics was used to find out the mental toughness level of the selected athletes and to examine the significance differences among the athletes of different sports on mental toughness One Way ANOVA was used and the hypothesis was tested at .05 levels of significance.

Results: The mean and standard deviation of the factors of mental toughness for shooters and archers are Rebound Ability (4.52 ± .85), (3.88 ± .93) and (3.77 ± 1.45), Handle Pressure (4.65 ± 1.05), (4.18 ± 1.24) and (4.45 ± .80), Concentration Ability (4.13 ± 1.06), (3.91 ± 1.23) and (4.77 ± .61), Level of Confidence (4.13 ± 1.45), (4.45 ± 1.12) and (4.45 ± 1.53) Motivation (4.32 ± .94), (4.12 ± 1.17) and (4.27 ± 1.32) and Total Mental Toughness Scores (21.74 ± 3.32), (20.55 ± 3.82) and (21.73 ± 3.63) respectively. To compare the mental toughness of the selected sports athletes, the one way analysis of variance was applied. The ANOVA result shows that the p-value of the factors of the sports motivation of the selected athletes is less than 0.05 and hence the F - value is significant at 5 % level. In order to determine which groups differs significantly, the post hoc mean comparison was obtained by applying LSD Test. The Post hoc Comparison of Means results shows that there exists a significant difference in the different factors in between Water Polo and Swimming ($p = .018$), Water Polo and Diving ($p = .014$) on Rebound Ability and Water Polo and Diving ($p = .029$), Swimming and Diving ($p = .003$) on Concentration Ability as their obtained p–values were less than 0.05 ($p < .05$). This implies that in spite of similarities in nature of events there exist differences, or there are special requirements for participation in these sports. The existence of similarities in between these groups is prevalent in Swimming and Diving ($p = .717$) on Rebound Ability, Water Polo and Swimming ($p = .088$), Water Polo and Diving ($p = .525$) and Swimming and Diving ($p = .358$) on Handle Pressure, Water Polo and Swimming ($p = .401$) on Concentration Ability, Water Polo and Swimming ($p = .341$), Water Polo and Diving ($p = .392$) and Swimming and Diving ($p = 1.00$) on Level of Confidence, Water Polo and Swimming ($p = .480$), Water Polo and Diving ($p = .875$) and Swimming and Diving ($p = .629$) on Motivation, and Water Polo and Swimming ($p = .187$), Water Polo and Diving ($p = .988$) and Swimming and Diving ($p = .236$) on Total Mental Toughness Scores as their obtained p-values were greater than .05 ($p > .05$).

Conclusion: The present study shows that the significant differences in between athletes of Water Polo and Swimming, Water Polo and Diving. The Additional research is needed to find out the real reason of similarities and difference exists in the present study. The efficacy of proposed methods of enhancing mental toughness such as environmental manipulations, and mental skills training approaches need to be evaluated if the gap between theoretical research and practice is to be bridged.

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INTRODUCTION

Previous research on psychological aspects and comparison of swimming, diving and water polo (aquatic) sport is rather limited. But some studies stated that stay motivated and setting a strong goals and targets is necessary for all the athletes and are contributing for prediction of performance for athletes (Wielinga *et al*., 2011). "Characteristics of great athletes: ruggedness, courage, intelligence, exuberance, buoyancies, emotional adjustment, optimism, conscientiousness, alertness, loyalty and respect for authority". Successful athletes did indeed possess more positive mental health characteristics and fewer negative mental health characteristics than the general population. Successful athletes were above the waterline (population norm) on vigor, but below the surface on the more negative moods of tension, depression, anger, fatigue and confusion. But little evidence exists to support the existence of a given athletic personality type, a personality profile that

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separates elite athletes from the rest of athletes or specific personality types associated with specific activities (Gill, 1986). Mental practices are almost as effective as true physical practice and that doing both is more effective than either alone (Friel *et al*., 2013). Kleanthous (2013) state that it is impossible to be successful in any sport without the correct mental attitude. Mental preparation has long been thought of as an important aspect of physical performance, especially in tasks requiring muscular strength (Biddle, 1985). Mental toughness is the resolute decision not to quit. It's the discipline that keeps athletes on track, that doesn't allow the effort to fade off into the distance at the end of a set that keeps your mental energy focused on maintaining perfect technique when your muscles and lungs are screaming to let your form fall apart. Psychological, endocrinogical, physiological, and immunological factors all play a role in the failure to recover from exercise. Careful monitoring of athletes and their response to training may help to prevent the overtraining syndrome (Budgett, 1998). Hollander and Acevedo (2000) noted that several swimmers are having the perception of increased occupational effectiveness, self-confidence, and an awareness of unlimited potential. Whereas, other swimmers noted a more competitive post event focus. Water polo originated in Europe in the late 1800's and first appeared in the Olympics in 1900, but its growth in America is evident by the American women's team winning first place in the 2012 London Olympics. The sport of water polo requires high mental and physical demands. In order to obtain the necessary skills for peak performance, a water polo athlete must participate in a highly structured training program (Bradley and Tschirhart, 2013). Nationally ranked water polo player and was taught to embody the physical struggle and mental grit required of an emerging professional athlete. The mental and physical toughness has formed identity and continues to inform ideas about discipline, value, and working for a goal that is far larger than what an athlete could accomplish by own (Nussbaum, 2016). To be an elite player means having the ability to be communicative, competitive, conscientious, perfectionist, and resilient, among others (Lopez *et al*. 2012).

Mental fitness as well as physical and technical aspects developed the attention of athletes. Factors such as motivation, will power, concentration, anxiety and determination have a decisive influence on developing profile for elite athletes (Wielinga *et al*., 2011). Stoeber *et al*. (2009) in their study stated that perfectionist personal standards develop the goals setting and also help athletes to achieve their best possible performance. Driska *et al*. (2012) state that both the coach and the swimmer are trained to develop mental toughness in to improve or maintaining performance. Athletes seeking to improve performance can benefit from using imagery scripts that help them mentally rehearse a task before actually engaging in the task itself. With practice, individuals can increase their ability to use imagery, which can result in working smarter, rather than harder when strength training (Richter *et al*., 2012). It is argued that more innovative approaches to research are required to further develop knowledge. This should include more experimental studies, longitudinal research, psycho physiological approaches, and testing the influence of mental toughness in contexts outside sport performance. Further efforts to understand how mental toughness develops are encouraged. With recent advances in instruments to measure mental toughness, further quantitative research is deemed appropriate. The efficacy of proposed methods of enhancing mental toughness such as environmental manipulations, and mental skills training approaches need to be evaluated if the gap between theoretical research and practice is to be bridged (Crust, 2008). So the researcher is very interested to know the present mental toughness level of the Indian swimmers, divers and water polo players and to compare them which sport having better in level of mental toughness.

MATERIALS AND METHODS

For the purpose of the study 33 swimmers (both and male and female), 31 water polo players (male) and 22 divers (both male and female) from All India Inter-University held at Amritsar, Punjab, 2013 were selected. The age of the athletes were ranging from 17 to 25 year of age. For the assessment of the data on mental toughness of the selected athletes the questionnaire "Mental Toughness Questionnaire" developed by Dr. Alan Goldberg was used to assess the mental toughness level of the athletes. Descriptive statistics was used to find out the mental toughness level of the selected athletes and to examine the significance differences among the athletes of different sports on mental toughness One Way ANOVA was used and the hypothesis was tested at .05 levels of significance.

Interpretation of Mental Toughness

Factors	Scores	Norms
Five factors (RA, HP, CA, LOC & MT)	6	Indicates Special Strength
Five factors (RA, HP, CA, LOC & MT)	5	Indicates Solid Skill
Five factors (RA, HP, CA, LOC & MT)	= or < 4 (4 or less than)	Indicates Weakness need to improve
TMTS	26 - 30	Indicates Strength
TMTS	23 - 25	Indicates Moderate Skill
TMTS	= or < 22 (22 or less than)	Indicates Need to start putting more time into mental training

Rebound Ability (RA), Handle Pressure (HP), Concentration Ability (CA), Level of Confidence (LOC), Motivation (MT) and Total Mental Toughness Scores (TMTS).

RESULTS

The mean and standard deviation of the factors of mental toughness for shooters and archers are Rebound Ability (4.52 ± .85), (3.88 ± .93) and (3.77 ± 1.45), Handle Pressure (4.65 ± 1.05), (4.18 ± 1.24) and (4.45 ± .80), Concentration Ability (4.13 ± 1.06), (3.91 ± 1.23) and (4.77 ± .61), Level of Confidence (4.13 ± 1.45), (4.45 ± 1.12) and (4.45 ± 1.53) Motivation (4.32 ± .94), (4.12 ± 1.17) and (4.27 ± 1.32) and Total Mental Toughness Scores (21.74 ± 3.32), (20.55 ± 3.82) and (21.73 ± 3.63) respectively. To compare the mental toughness of the selected sports athletes, the one way analysis of variance was applied and data pertaining to these have been presented in Table 2. The ANOVA result shows that the p-value of the factors of the mental toughness of the selected athletes is less than 0.05 and hence the F - value is significant at 5 % level. In order to determine which groups differs significantly, the post hoc mean comparison was obtained by applying LSD Test. The Post hoc Comparison of Means was applying by using LSD Test and the results shows that there exists a significant difference in the different factors in between Water Polo and Swimming (p = .018), Water Polo and Diving (p = .014) on Rebound Ability and Water Polo and Diving (p = .029), Swimming and Diving (p = .003) on Concentration Ability as their obtained p–values were less than 0.05 (p < .05).

Table 1. Descriptive Statistics of selected athletes on various factors of sports motivation scale

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
						Lower Bound	Upper Bound		
Rebound Ability	Water Polo	31	4.52	.85	.15	4.20	4.83	3	6
	Swimming	33	3.88	.93	.16	3.55	4.21	2	6
	Diving	22	3.77	1.45	.31	3.13	4.41	1	6
	Total	86	4.08	1.10	.12	3.85	4.32	1	6
Handle Pressure	Water Polo	31	4.65	1.05	.19	4.26	5.03	3	6
	Swimming	33	4.18	1.24	.22	3.74	4.62	1	6
	Diving	22	4.45	.80	.17	4.10	4.81	3	5
	Total	86	4.42	1.08	.12	4.19	4.65	1	6
Concentration Ability	Water Polo	31	4.13	1.06	.19	3.74	4.52	2	6
	Swimming	33	3.91	1.23	.21	3.47	4.35	2	6
	Diving	22	4.77	.61	.13	4.50	5.04	3	6
	Total	86	4.21	1.09	.12	3.98	4.44	2	6
Level of	Water Polo	31	4.13	1.45	.26	3.60	4.66	2	9
Confidence	Swimming	33	4.45	1.12	.20	4.06	4.85	2	6
	Diving	22	4.45	1.53	.33	3.77	5.13	2	9
	Total	86	4.34	1.35	.15	4.05	4.63	2	9
Motivation	Water Polo	31	4.32	.94	.17	3.98	4.67	2	6
	Swimming	33	4.12	1.17	.20	3.71	4.53	1	6
	Diving	22	4.27	1.32	.28	3.69	4.86	2	6
	Total	86	4.23	1.12	.12	3.99	4.47	1	6
Total Mental	Water Polo	31	21.74	3.32	.60	20.53	22.96	14	30
Toughness Scores	Swimming	33	20.55	3.82	.66	19.19	21.90	14	28
	Diving	22	21.73	3.63	.77	20.12	23.34	15	29
	Total	86	21.28	3.60	.39	20.51	22.05	14	30

Table 2. Comparison of selected athletes by applying one way analysis of variance

		df	Mean Square	Sum of Squares	F	Sig.
Rebound Ability	Between Groups	2	4.65	9.31	4.149	.019*
	Within Groups	83	1.12	93.12		
	Total	85		102.43		
Handle Pressure	Between Groups	2	1.73	3.47	1.508	.227
	Within Groups	83	1.15	95.46		
	Total	85		98.93		
Concentration Ability	Between Groups	2	5.08	10.16	4.680	.012*
	Within Groups	83	1.09	90.07		
	Total	85		100.23		
Confidence	Between Groups	2	1.05	2.10	.569	.568
	Within Groups	83	1.84	153.12		
	Total	85		155.22		
Motivation	Between Groups	2	.35	.70	.271	.763
	Within Groups	83	1.28	106.65		
	Total	85		107.35		
Total Mental Toughness Scores	Between Groups	2	14.41	28.82	1.115	.333
	Within Groups	83	12.92	1072.48		
	Total	85		1101.30		

* The mean difference is significant at the 0.05 level.

Table 3. Post hoc Comparison of Means by using LSD Test

Dependent Variable	(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.
Rebound	Water Polo	Swimming	.64	.26	.018*
Ability		Diving	.74	.30	.014*
	Swimming	Diving	.11	.29	.717
Handle	Water Polo	Swimming	.46	.27	.088
Pressure		Diving	.19	.30	.525
	Swimming	Diving	-.27	.30	.358
Concentration Ability	Water Polo	Swimming	.22	.26	.401
		Diving	-.64	.29	.029*
	Swimming	Diving	-.86	.29	.003*
Level of Confidence	Water Polo	Swimming	-.33	.34	.341
		Diving	-.33	.38	.392
	Swimming	Diving	.00	.37	1.000
Motivation	Water Polo	Swimming	.20	.28	.480
		Diving	.05	.32	.875
	Swimming	Diving	-.15	.31	.629
Total Mental Toughness	Water Polo	Swimming	1.20	.90	.187
Scores		Diving	.01	1.00	.988
	Swimming	Diving	-1.18	.99	.236

* The mean difference is significant at the 0.05 level.

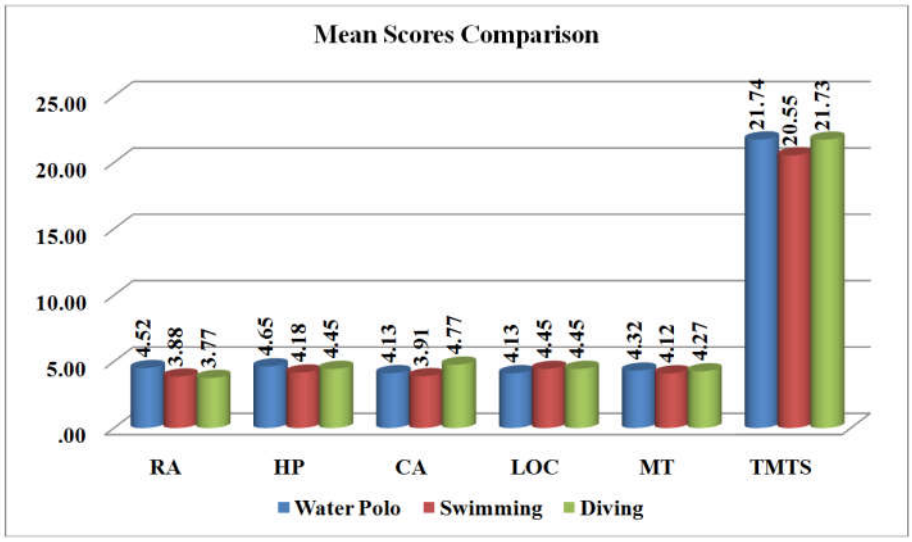

Figure 1. Comparison of mean scores of the various factors of Mental Toughness in pie diagram chart

This implies that in spite of similarities in nature of events there exist differences, or there are special requirements for participation in these sports. The existence of similarities in between these groups is prevalent in Swimming and Diving (p = .717) on Rebound Ability, Water Polo and Swimming (p = .088), Water Polo and Diving (p = .525) and Swimming and Diving (p = .358) on Handle Pressure, Water Polo and Swimming (p = .401) on Concentration Ability, Water Polo and Swimming (p = .341), Water Polo and Diving (p = .392) and Swimming and Diving (p = 1.00) on Level of Confidence, Water Polo and Swimming (p = .480), Water Polo and Diving (p = .875) and Swimming and Diving (p = .629) on Motivation, and Water Polo and Swimming (p = .187), Water Polo and Diving (p = .988) and Swimming and Diving (p = .236) on Total Mental Toughness Scores as their obtained p-values were greater than .05 (p > .05).

Rebound Ability (RA), Handle Pressure (HP), Concentration Ability (CA), Level of Confidence (LOC), Motivation (MT) and Total Mental Toughness Scores (TMTS).

Mean of the groups with graphics on Rebound Ability (RA)

Water Polo	Swimming	Diving
4.52	3.88	3.77

“ ”Represent no significant difference between the means at 5 % level.

Mean of the groups with graphics on Handle Pressure (HP)

Water Polo	Swimming	Diving
4.65	4.18	4.45

“ ”Represent no significant-difference between the means at 5 % level.

Mean of the groups with graphics on Concentration Ability (CA)

Water Polo	Swimming	Diving
4.13	3.91	4.77

“ ”Represent no significant-difference between the means at 5 % level.

Mean of the groups with graphics on Level of Confidence (LOC)

Water Polo	Swimming	Diving
4.13	4.45	4.45

“ ”Represent no significant-difference between the means at 5 % level.

Mean of the groups with graphics on Motivation (MT)

Water Polo	Swimming	Diving
4.32	4.12	4.27

“ ”Represent no significant-difference between the means at 5 % level.

Mean of the groups with graphics on Total Mental Toughness Scores (TMTS)

Water Polo	Swimming	Diving
21.74	20.55	21.73

“ ”Represent no significant-difference between the means at 5 % level.

RESULTS AND DISCUSSION

Water polo players are near to solid skill (moderate consistent ability to bounce back quickly from mistakes, failure and looses) and swimmers and divers are having weakness and need to give attention in rebound ability. And the three sports (water polo, swimming and diving) athletes are very near to solid i.e. moderate in ability to handling pressure, ability to concentrate on the performance and training, level of confidence or unshaken by setback and failure and motivation to a successful completion and the accomplishment of goal except swimmer need to give attention on concentration ability. The three sports (water polo, swimming and diving) athletes are very much needed to start putting more time into the mental training area because as their mean scores were less than 22, that comes under weak in mental toughness. As comparison among the three disciplines there exist significant differences in rebound ability between water polo and swimming and water polo and diving. Kahrovic *et al*. (2014) in their study shows that successful athletes use more often positive self -talk in comparison to the less successful athletes. And confirm that the positive effects of self-talk, and relate to improving athletic performance, improvement of self-

confidence, as well as reducing anxiety in different kinds of sports. The differences between levels of athletic achievement are minimal or subtle and that other factors like physical attributes, technical skill, or different psychological factors predict achievement level more accurately (Golby *et al*., 2004 and Nicholls *et al*., 2009). And water polo is an game of scoring goal to the opponent so players have attempt many time, some attempt might fail or some attempt might success but the only goal is to win the match or championship so during the match they need to have very strong will or not to bounce back by one attempt in mind. These might be the reason to bring significance differences between water polo player and swimmers and water polo players and divers in rebound ability and also having bit higher score than swimmers and divers. And significant differences in concentration ability between water polo and diving and swimming and diving. The types of tasks, the length or duration of loading and interval between the training and repetition effect on the mental strength of the athletes (Driskell *et al*., 1994). Athlete's encounters a variety of scenarios can store their responses in memory, improve their ability to take action and learn to return their focus to a relevant object more quickly (Friel *et al*., 2013). And Diving is the sport of jumping or falling into water from a platform or springboard, usually while performing acrobatics (Wikipedia). Divers perform a set number of dives according to established requirements, including somersaults and twists and judged whether and how well a diver completed all aspects of the dive, the conformance of their body to the requirements of the dive, and the amount of splash created by their entry to the water. So a diver need to concentrate on the technique in the air so this might be the reason to bring the significant difference between divers and water polo players and divers and swimmers and also divers scored bit higher than water polo players and swimmers in concentration ability.

And the existence of similarities was prevalent in swimming and diving in rebound ability and water polo and swimming in concentration ability. And no significant difference was found between the three groups in handle pressure, level of confidence, motivation and total mental toughness scores. Physical exercise has been linked to good mental health and positive self-concepts (James, 1982). The characteristics of champions or elite athletes have an ability to cope with and control anxiety, high confidence to his or her performance, mental toughness/resiliency, sport intelligence, an ability to focus and block distractions, competitiveness, having a hard-work ethic an ability to set and achieve goals, believe in coaches ability, high levels of dispositional hope, optimism, high level of adaptive perfectionism (Gould, 2002). Nicholls *et al*. (2009) stated that athletes at higher achievement levels are normally mentally tough. Cox (1998) stated that the elite athletes are homogeneity of mental ability and toughness, because as aspiring elite athlete's moves up the athletic pyramid (at top), they became more alike in their psychological traits. These might be the reason for similarities exists between the three sports groups. There is still lack of critical literature on area so the scholar can't bring to any conclusion. But the present study will help to give guideline in doing further studies by increasing sample size or by increasing psychological variables.

Conclusion

The present study shows that the significant differences in between Water Polo and Swimming, Water Polo and Diving on Rebound Ability and Water Polo and Diving, Swimming and Diving on Concentration Ability and similarities exists in between Swimming and Diving on Rebound Ability, Water Polo and Swimming, Water Polo and Diving and Swimming and Diving on Handle Pressure, Water Polo and Swimming on Concentration Ability, Water Polo and Swimming, Water Polo and Diving and Swimming and Diving on Level of Confidence, Water Polo and Swimming, Water Polo and Diving and Swimming and Diving on Motivation, and Water Polo and Swimming, Water Polo and Diving and Swimming and Diving on Total Mental Toughness Scores. Additional research is needed to find out the real reason of similarities and difference exists in the present study. The efficacy of proposed methods of enhancing mental toughness such as environmental manipulations, and mental skills training approaches need to be evaluated if the gap between theoretical research and practice is to be bridged.

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