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Comparative analysis of fear of failure, use of self-talk, and mental toughness attributes between junior-level male and female hockey players from various training centers of sports authority of India

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Abstract
The study compared between junior male and female hockey players from SAI with average age of 17.15 years ± 1.6 SD, on variables of Mental Touhgness (MT), Positive Self-Talk (PST), Negative Self-Talk (NST), Fear of Failure (FoF), and also dived into comparing the 4Cs (Control, Challenge, Commitment, and Confidence) of MT. MANOVA was used for comparison where girls showed higher use of PST and boys showed higher overall MT. Further examination of correlations between PST/NST with MT was performed between genders revealing strong correlation in the boys group between PST and Commitment. At the end the analysis of Moderation Multiple Regression (MMR) Model Summaries showed that gender significantly moderated the relationship between both PST/NST and Commitment (MTcm).

Keywords: Mental toughness, fear of failure, self-talk, 4cs (control, challenge, commitment, confidence), psychological skills training

Introduction
Elite sports performance depends as much on psychological abilities as they do on physical capacities [1]. Competitive games are riddled with numerous up and down phases which make consistent performance a challenge for any athlete. Mental faculties play an immense role in keeping calm, and the ever-narrowing differences of physical capabilities in contemporary times, the psychological make-up often differentiate great athletes from the rest [2]. Since the early 2000s many studies have been showing the growing role of sports psychologists, while many indicating towards initiating psychological routines for young athletes as a long term preparation for managing anxiety and stress [3] as precursor to athletic success.
A prominent psychological obstacle that affects budding athletes is the Fear of Failure (FoF). It has its roots in low self-perception, or feeling of not being able to achieve and takes an emotional toll on young minds [4]. To cope with this challenge, mental routines and practices are being promoted to help the athletes overcome FoF. One such practice being Self-Talk (ST) [5], can be either empowering or enslaving depending on the type that dominates the athlete's mind i.e. Positive Self-Talk (PST) or Negative Self-Talk (NST) [6]. Making PST and NST, good indicators of superior athletic performance.
Another such measure of psychological resilience is Mental Toughness (MT). Touted amongst the crucial characteristics to predict sporting successs [2], it can be better comprehended by studying its ingredients under the 4C's [Control (MTct), Challenge (MTch), Commitment (MTcm), and Confidence (MTcf)] [7]. While it's established that mental faculties of FoF, ST and MT are crucial indicators of performance levels, another aspect of interest is whether these factors function indifferent to the gender of the athlete. In the limited search of related literature no conclusive answer could be found by the researcher. Hence, this comparative analysis was primarily intended to discover the differences in FoF experienced, use of PST & NST, and MT including 4Cs (MTct, MTch, MTcm, MTcf) amongst the junior-level male and

female hockey players training with Sports Authority of India (SAI), a premier organization dedicated towards achieving sporting excellence at international stages for the nation[8]. Further analysis focused on testing correlations of PST, NST with MT amongst girls and boys separately and finally a moderated multiple regression model (MMR) analysis was performed to test the moderation effect of gender on the relationships between PST, NST and MT.

2. Materials and Methods

2.1 Selection of participants

130 junior hockey players (65 Girls and 65 Boys) were randomly selected from various Sports Authority of India Training Centers throughout the country, Age ranging from 13 to 19 years (M=17.15 years ± 1.6 SD).

2.2 Selection of questionnaires and collection of data

Standardized questionnaires were used for respective variables as follows:-

FoF: The Performance Failure Appraisal Inventory (PFAI)-Short Form [9]. (2) ST (PST & NST): Automatic Self-Talk Questionnaire for Sports (ASTQS) [10]. (3) MT (4Cs): Mental Toughness Questionnaire-10 items (MTQ10) [11, 12]. The data was collected remotely through a google form, with the prior permission from authority, consent from the participants and due ethical protocol. Received responses were further verified to eliminate any false or spontaneous filling and 130 responses were randomly selected using MS-Excel's sort by sequence and random array functions.

2.3 Statistical techniques employed in the study:

Multivariate analysis of variance (MANOVA) was used to compare the group of girls with boys [Independent Variable (Gender)] on the dependent variables of FoF, PST, NST, MT, & 4Cs (MTct, MTch, MTcm, and MTcf). Further Pearson's Correlation Coefficients were used to analyze the relationship between PST and MT, & 4Cs for both the groups separately. And lastly, to observe the moderation effect of gender on all the dependent variables, moderation multiple regression (MMR) was used. For data sorting MS-Excel (Office 365 version) was used and for analysis part SPSS v26 was used.

3. Results and Discussion

3.1 Descriptive Analysis

Table 1 presents the ranges, means, and SDs of each data set. Further the normality is confirmed by the statistical values of skewness and kurtosis lying within ±1 for each one of them [13].

Table 1: Descriptive Analysis (Combined)

VAR	N	Range	Min	Max	M	S.D.	Var	Skewness	Kurtosis
Age (Years)	130	6	13	19	17.15	1.572	2.472	-.465	-.586
FoF	130	3.8	-2.0	1.8	-.518	1.0059	1.012	.615	-.520
PST	130	52	38	90	70.12	11.711	137.157	-.840	.094
NST	130	49	15	64	37.78	10.402	108.201	-.135	-.408
MT	130	19	26	45	34.34	3.877	15.032	.307	.060
MTct	130	10	5	15	10.68	1.818	3.306	-.388	.464
sMTch	130	7	3	10	6.45	1.590	2.529	.185	-.221
MTcm	130	8	2	10	5.35	1.661	2.758	.379	-.283
MTcf	130	7	8	15	11.85	1.610	2.591	-.166	-.455

Table 2 presents the group wise descriptive analysis of girls and boys while Levene's test of equal variances (homoscedasticity) revealed the group were heteroscedastic for FoF, PST, and MTct. Therefore, while testing for significance during comparison between girls and boys junior hockey players on these variables, the significance values considered were assuming unequal means.

Table 2: Group Statistics for FoF, ST, & MT

Variables	Gender	N	Mean	Std. Deviation	Std. Error Mean	Sig. (Levene's Test
FoF	Girl	65	-.634	.8857	.1099	.005
	Boy	65	-.403	1.1082	.1375	
PST	Girl	65	73.68	9.338	1.158	.002
	Boy	65	66.55	12.787	1.586	
NST	Girl	65	38.95	10.217	1.267	.930
	Boy	65	36.62	10.532	1.306	
MT	Girl	65	33.18	3.579	.444	.922
	Boy	65	35.49	3.845	.477	
MTct	Girl	65	10.23	1.982	.246	.025
	Boy	65	11.12	1.526	.189	
MTch	Girl	65	6.26	1.670	.207	.640
	Boy	65	6.65	1.494	.185	
MTcm	Girl	65	5.46	1.459	.181	.147
	Boy	65	5.25	1.846	.229	
MTcf	Girl	65	11.23	1.508	.187	.920
	Boy	65	12.48	1.470	.182	

3.2 Comparative analysis between genders

The result of multivariate analysis (MANOVA) of dependent variables when compared between genders (Table 3) revealed that girls and boys differed in the use of positive self-talk, mental toughness, and control and confidence dimensions from the MT's 4C model. Drawing from Table 2, girls on average used significantly more positive self-talk while playing, compared to boys. Whereas boys showed significantly higher mean score for mental toughness compared to girls. This increase is further reflected in the

dimensions of control and confidence where the average score for boys is evidently higher than mean score of the girl's hockey players (Table 2). The higher use of PST by girls supports the findings of Tamres *et al*. 2002 study which suggested that women tend to engage in coping strategies more than men [14]. On the other hand, despite using less positive self-talk, the boys' group had a higher mean mental toughness score. Further higher mean scores were reflected in the dimensions of control and confidence, compared to girls. This observation is against the common findings of positive associations between self-talk and mental toughness [15]. However, the finding is consistent with studies that suggested higher mental toughness scores in men might be associated with problem or approach coping strategies more, rather than just explicit positive self-talk [16].

Table 3: Tests of between-subjects effects (MANOVA)

Independent Variable	Dependent Variables	Sum of Squares	DF	Mean Square	F	Sig.
Gender	Fear of Failure (FoF)	1.731	1	1.731	1.720	.192
	Positive Self Talk (PST)	1648.992	1	1648.992	13.156	.000
	Negative Self Talk (NST)	177.723	1	177.723	1.651	.201
	Mental Toughness (MT)	173.077	1	173.077	12.544	.001
	Control [MTct]	25.877	1	25.877	8.269	.005
	Challenge [MTch]	4.808	1	4.808	1.915	.169
	Commitment [MTcm]	1.508	1	1.508	.545	.462
	Confidence [MTcf]	50.469	1	50.469	22.766	.000

3.3 Correlational analysis among PST/NST, FoF and MT (Boys/Girls/Combined)

FoF was found negatively correlated with MT and PST while positively correlated with NST for all the groups (boys/girls/combined). A finding that is consistent with studies that advocate overcoming or the fear of failure through coping mechanisms for athletic success[17]. Correlation between PST and MT for boys, girls, and combined (Tables 4, 6, & 8 respectively) revealed a general positive correlation with MT and its 4Cs, with the boys group showing significant correlation with MT at 0.05 (α) and with MTcm (commitment dimension) at 0.01 (α). And the combined group's correlation was significant at 0.05 (α) between PST and MTcm. Further, relationships for NST revealed a general negative correlation with MT and its 4Cs for all groups (Tables 5, 7, & 9). Boys' association were significantly negative with MT & MTcm at 0.01 (α) and with MTct (Control) at 0.05 (α). While combined groups association was significant at 0.01 for MT and MTcm and at 0.05 for MTch (Challenge).

Table 4: Correlations (PST with MT in Girls)

		FoF	MT	MTct	MTch	MTcm	MTcf
PST	Pearson (r)	-.233	.133	.128	.065	-.037	.111
FoF	Pearson (r)	1	-.350**	-.230	-.374**	-.203	.083

Table 5: Correlations (NST with MT in Girls)

		FoF	MT	MTct	MTch	MTcm	MTcf
NST	Pearson (r)	.241	-.108	.083	-.185	-.181	.015
FoF	Pearson (r)	1	-.350**	-.230	-.374**	-.203	.083

Table 6: Correlations (PST with MT in Boys)

		FoF	MT	MTct	MTch	MTcm	MTcf
PST	Pearson (r)	-.403**	.281*	.105	.115	.356**	.063
FoF	Pearson (r)	1	-.547**	-.360**	-.405**	-.550**	.043

Table 7: Correlations (NST with MT in Boys)

		FoF	MT	MTct	MTch	MTcm	MTcf
NST	Pearson (r)	.405**	-.415**	-.290*	-.157	-.620**	.152
FoF	Pearson (r)	1	-.547**	-.360**	-.405**	-.550**	.043

Table 8: Correlations (PST with MT Combined)

		FoF	MT	MTct	MTch	MTcm	MTcf
PST	Pearson (r)	-.357**	.108	.028	.048	.221*	-.046
FoF	Pearson (r)	1	-.403**	-.247**	-.365**	-.419**	.100

Table 9: Correlations (NST with MT Combined)

		FoF	MT	MTct	MTch	MTcm	MTcf
NST	Pearson (r)	.314**	-.289**	-.106	-.182*	-.417**	.033
FoF	Pearson (r)	1	-.403**	-.247**	-.365**	-.419**	.100

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

3.4 Moderation Multiple Regression (MMR) Model Analysis

The MMR analysis were carried out with gender as the moderating variable to see if it affects the associations between PST/NST-MT and its 4Cs for the junior level hockey players and the summaries revealed that the moderation was not significant on the relationship between MT-PST/NST (Tables 10 & 12) however between MTcm and PST/NST it was significant (Tables 11 & 13) with Sig. F change calculated as 0.34 and 0.001 respectively. These findings suggest that the associations we found in the previous sections between uses of positive/negative self-talk and mental toughness is independent of gender. However, the association of PST/NST with the Commitment dimension from the 4Cs of Mental Toughness did show significant moderation due to gender. With implications of the commitment dimension [7], in the light of info from Table 3 it can be stated that though the sample group of boys and girls in this study did not significantly differed on commitment scale of mental toughness, their use of positive or negative self-talk, while faced with distractions during performing in sports is affected differently. This adds to the related knowledge base which has mixed and inconclusive findings [18].

Table 10: MMR Summary (MT-PST, moderated by Gender)

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 Change	F Change	DF1	DF2	Sig. F Change
1	.365[a]	.133	.120	3.638	.133	9.757	2	127	.000
2	.368[b]	.135	.115	3.648	.002	.311	1	126	.578

A) Predictors: (Constant), Gender, Positive Self Talk
B) Predictors: (Constant), gender, positive self-talk, Int_PST_GEN

Table 11: MMR Summary (MTcm-PST, moderated by Gender)

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics				
					R^2 Change	F Change	DF1	DF2	Sig. F Change
1	.221[a]	.049	.034	1.632	.049	3.264	2	127	.041
2	.287[b]	.082	.060	1.610	.033	4.583	1	126	.034

A) Predictors: (Constant), Gender, Positive Self Talk
B) Predictors: (Constant), gender, positive self-talk, Int_PST_GEN

Table 12: MMR Summary (MT-NST, moderated by Gender)

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics				
					R^2 Change	F Change	DF1	DF2	Sig. F Change
1	.394[a]	.155	.142	3.591	.155	11.681	2	127	.000
2	.422[b]	.178	.159	3.556	.023	3.530	1	126	.063

A) Predictors: (Constant), Gender, Negative Self Talk
B) Predictors: (Constant), Gender, Negative Self Talk, Int_NST_GEN

Table 13: MMR Summary (MTcm-NST, moderated by Gender

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics				
					R^2 Change	F Change	DF1	DF2	Sig. F Change
1	.432[a]	.186	.173	1.510	.186	14.530	2	127	.000
2	.503[b]	.253	.235	1.453	.066	11.207	1	126	.001

A) Predictors: (Constant), Gender, Negative Self Talk
B) Predictors: (Constant), Gender, Negative Self Talk, Int_NST_GEN

4. Conclusions

In conclusion, mental toughness and self-talk were found to be differentiators between elite junior level hockey players training at various SAI centers. Though girls appeared to be using more positive self-talk, boys showed higher mental toughness scores overall with differences evident in control and confidence dimensions specifically. These finding suggest that psychological training for youth level female players must focus on effective translation of positive self-talk use into confidence and control subdomains of mental toughness. While for the youth level male athletes the stronger negative association between negative self-talk and mental toughness suggests a need of emphasis on maintaining an optimistic mental state. Further, gender - specific psychological skills training interventions must be further investigated that target the dimension of commitment for improving mental toughness. Further studies investigating the interventions at the dimensional levels is suggested to add to this knowledge base.

5. Conflict of Interest

The authors declare no financial or non-financial conflict of interest.

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