



SIGNIFICANCE OF HEART RATE AND BP IN PSYCHO-PHYSIOLOGICAL PREPAREDNESS IN CONTEXT OF SPORTS

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Abstract

Sports are the popular pass time for psycho-physiological recreation. Competitiveness is another dimension of sports requiring certain level of physiological preparedness. The sports enthusiasts need to be compatible in their physically as well as psychological preparedness. Mental functioning is characteristic with competitive anxiety and stress referring to significant impact on sports outcomes. These can be prevented or managed by advance progressive preparation. Both aspects of preparedness are scientifically collaborative in nature. Physiological preparedness is the unconditional function of intrinsic measures of human body. The present study intends to investigate the significance of heart rate and blood pressure [intrinsic body measures] in physiological preparedness in context of sports. 30 sports persons (age 16-25 years) (both gender) that represented state in their chosen sports were selected on the basis of achievement criterion. The sampled sportspersons were from team as well as individual games from different colleges of Sirsa district of Haryana. 48 hours prior to competition their heart rate and BP was measured 6 times in the time slab of 12 hours and 24 hours prior to their participation their psychological preparedness was assessed using Psychological Preparedness Scale (Singh, 2017). The scores were correlated and results indicated significant high positive correlation between the scores. The findings suggest that the optimal level of HR and BP correlates positively and significantly with psychological preparedness.

Keywords: *Physiological Preparedness, Heart Rate, Blood Pressure.*

Introduction

Other than tragedy one's preparedness (both physiological and psychological) is very supportive in difficult situations, day to day life chores including sports competitions. Preparedness is a psycho-physiological state which includes both aspects of functions i.e. mind and brain. Preparedness is a conscious reflexive defence mechanism evolved alongside cognitive and physiological development. The preparedness is the expression of involvement of chosen sports or discipline which an individual belongs to. The well known survival component i.e. *Psychological Preparedness* has been extensively studied in the form of community preparedness by disaster management researchers (Mashiach, 2012). Physiological preparedness is another major contributor of whole preparedness (Deyou, et al. 2014). Physiological preparedness is the unconditional function of intrinsic measures of human body. Physiological preparedness as a factor is constituted by bio-physiological functional systems of human body such as heart rate (HR) and blood pressure (BP) which has been one of the major criteria found helping in emergency situations. Competitiveness in sports is another dimension requiring certain level of physiological preparedness. It is observed that sports performance is the combined effort or expression of both i.e. psychological and physiological preparedness. The sports enthusiasts need to be compatible in their physically as well as psychological preparedness (Gupta, et al. 2014). Mental functioning is characteristic with competitive anxiety and stress referring to significant impact on sports outcomes. These can be prevented or managed by advance progressive preparation. Both aspects of preparedness are scientifically collaborative in



nature. Total preparedness (psycho-physiological) has been considered significant for an individual's own sense of well-being (Salih et al. 2014) so that to have an aptitude of expecting and planning for a stressful situations occurring across the life span (Banerjee & Gillespie, 1994). Evidences suggest that lifelong physical exercises lead to enhanced cognitive functioning during twilight years of life. The physiological preparedness operates through the sympathetic (SNS) and parasympathetic nervous system (PSNS) which function within their respective psycho-somatic limits. The SNS activation is a type of physiological preparedness which keeps the individual in readiness state. For operational purpose the physiological preparedness is taken as Heart Rate and Blood Pressure (Systolic & Diastolic). Heart rate is the number of times the heart beats in a minute while the pressure applied by movement of blood on the inner walls of the arteries is termed as blood pressure. The blood pressure operates within two ranges i.e. diastolic and systolic. Dong (2016) studied the role of post exercise heart rate variability (HRV) in sports physiology and found that it is significantly correlated with athletic fitness. Findings from several studies indicated that heart rate is relevant in the final analysis of stress that the human body experiences during training (Bompa & Haff, 2009; Meeusen et al. 2006). Heart rate is found to be helpful in understanding the physiological recovery post sports training.

Purpose

To assess the significance of HR and BP in Psycho-Physiological Preparedness in context of sports.

Methodology

30 sports persons (both gender), with mean age 22 years that represented state (inclusion criterion) in their selected sports were sampled from different colleges of Sirsa district of Haryana. The sample was from team as well as individual games. Psychological preparedness was assessed by Psychological Preparedness Scale (PPS) (Singh, 2017) which has been standardized on 300 subjects by IRT technique. The reliability alpha coefficient of psychological preparedness scale is 0.7712. The scale contains 15 items and required to be scored from five responses arranged from least prepared to the most in progression. The scaling of items' responses is on situational judgment test (SJT) format. The test was administered before their participation in actual competition. Heart rate and BP of all the participants were measured 48 hours prior to the main competition 6 times within 12 hours.

Statistical Analysis

The raw scores were than statistically analysed by multiple regression (Enter method) with the help of SPSS version 20.0. The psychological preparedness was taken as dependent variable while Heart Rate, Blood Pressure (Systolic) and Blood Pressure (Diastolic) were taken as predictor variable.

Table 1.1: Descriptives

	Mean	Std. Deviation	N
PsyPre	55.900	8.1000	30
HeartRate	70.100	4.8163	30
BPSys	127.567	8.4433	30
BPDias	85.733	3.8946	30

Table 1.2: Correlation Coefficient (N=30)

		PsyPre	HeartRate	BPSys	BPDias
Pearson Correlation (r)	PsyPre	1.000			
	HeartRate	-.659	1.000		
	BPSys	.516	-.431	1.000	



BPDias	-.634	.540	-.481	1.000
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Results

The statistical analysis showed that the correlation (Pearson r) among psychological preparedness (DV) and predictor variables is dichotomous type (both positive as well as negative) (Table 1.2). Psychological

preparedness have significantly moderate negative correlation with Heart Rate (-.659), Blood pressure (Diastolic) (-.634) and have significant moderate positive with Blood pressure (Systolic) (.516).

Table 1.3: Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	BPDias BPSys HeartRate ^b		Enter
<i>a. Dependent Variable: PsyPre</i>			
<i>b. All requested variables entered.</i>			

Table 1.4: Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.754 ^a	.568	.518	5.6218
<i>a. Predictors: (Constant), BPDias, BPSys, HeartRate</i>				
<i>b. Dependent Variable: PsyPre</i>				

The R is .754 and R square is .568 (Table 1.4). All the three predictors together explain 56.8% of total variance in respect of psychological preparedness which is considerably large. The ANOVA table 1.5 shows the significance of fitment of regression equation with data. It indicates that selected model of regression significantly predicts the outcome variable (Psychological

preparedness) with F ratio = 11.401 at $p < .05$ (Table 1.5). In other words at $\alpha = 0.05$ level of significance, it can be statistically confidentially concluded that the slope of the selected population regression line is not-zero which means that HR, BP (Sys) and BP (Dias) are the significant predictors of psychological preparedness.

Table 1.5: Analysis of Variance^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1080.978	3	360.326	11.401	.000 ^b
	Residual	821.722	26	31.605		
	Total	1902.700	29			
<i>a. Dependent Variable: PsyPre</i>						
<i>b. Predictors: (Constant), BPDias, BPSys, HeartRate</i>						

Table 1.6: Coefficients^a

Model		Un-standardized Coefficients		Standardized Coefficients	t	Sig.
		B	SE	Beta		
1	(Constant)	139.210	39.745		3.503	.002
	HeartRate	-.677	.265	-.403	-2.557	.017
	BPSys	.177	.145	.184	1.221	.233
	BPDias	-.681	.337	-.328	-2.022	.054
<i>a. Dependent Variable: PsyPre</i>						

The coefficients table 1.6 indicates the coefficients used to predict the psychological preparedness and helps in

understanding whether predictors contribute significantly to the regression model. The values in the column titled



'B' under the heading 'Un-standardized coefficients' are used for formation of regression equation which is explained below.

The equation of the multiple regression is

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3$$

where, Y is the value of the dependent variable

B_0 is the regression constant
 B_1 , B_2 and B_3 are regression coefficient for the independent variables, 1, 2, and 3.

Therefore, Psychological preparedness = 139.210 + (-

0.677) [Heart rate] + 0.177 (BPSys) +

(- 0.681)

[BPDias]

Table 1.7: Residual Statistics^a

	Minimum	Maximum	Mean	SD	N
Predicted Value	46.305	66.814	55.900	6.1053	30
Residual	-16.4469	10.2703	.0000	5.3231	30
Std. Predicted Value	-1.572	1.788	.000	1.000	30
Std. Residual	-2.926	1.827	.000	.947	30

a. Dependent Variable: PsyPre

Fig 1.1: Histogram-cum-Non Probability Curve

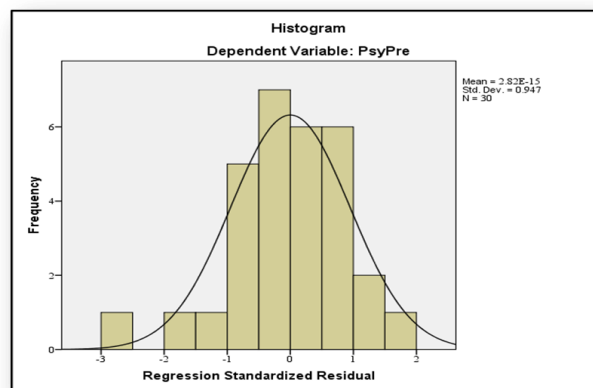
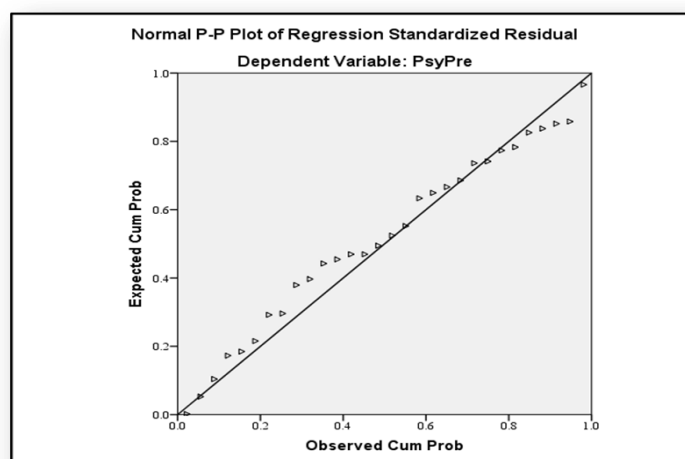


Fig 1.2: Normal P-P Plot of Regression Standardized Residual





Discussion

The findings suggest that HR and BP (both Sys and Dias) are the significant predictors of psychological preparedness in context of selected population (sportspersons). Sports involve twofold simultaneous preparedness jointly known as psycho-physiological preparedness. It might be due to the fact that psychological preparedness is a cognitive function (Singh, 2017) while heart rate (HR) and BP (Sys and Dias) are representative of physiological preparedness. The joint concept of preparedness tends to require enhanced O₂ supply for production of required energy for optimal functioning and improved output. The study suggests that the optimal level of HR and BP correlates positively and significantly with psychological preparedness.

Limitations

1. The study was limited to state level sports persons and sampling was purposive.
2. The sample was limited to 30 sportspersons.

Funding

It is self financed study because researchers didn't receive any funding from any institutions or sports agency.

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