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PSYCHOLOGICAL AND PSYCHOBIOLOGICAL FACTORS AS MEASURE OF INTEGRITY IN SOCCER PLAYERS

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ABSTRACT

Present study was conducted to observe the predictive association between differential mood states; emotional feelings and corroborative psychobiological changes with regard to inner core emotional reactions observed in high-performing soccer players of Malaysia. Based on the selection criteria altogether two-hundred and thirteen young male soccer players were recruited as participants, who were subjected to evaluation of projective analyses of emotionality (in the form of index of emotional integrity; impulsivity and irritability); mood states and inner psychobiological status (autonomic indices of habituation paradigm skin conductance response components). Multiple linear regression analyses outcomes however clarified relationships between the inner core of emotionality; differential mood variations and psychobiological indices of emotionality. The combined impact of Skin conductance indices and mood states revealed that those can explain differential etiological aspects of emotional integrity, while inclusion of emotional feelings of impulsivity and irritability were observed to predict stronger relationships. Innate psychological make-up of players was found substantially associated with autonomic orienting activity indices, which were evidentially capable of explaining cognitive-motivational aspects of soccer performance.

KEYWORDS: Soccer performance; Emotional Integrity; Mood; Skin conductance.

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1. INTRODUCTION

Consistency in emotional behavior, maintaining a disciplined and stable emotionality is the index of emotional integrity, which could be synonymously recognized as resilience achieved by virtue of the persistent effort of self-development, destined to a serene determination. Most vital aspects of emotional integrity would be optimal regulation over feelings and emotional expressions under challenging situations. In soccer players, this optimal regulation over cognitive-perceptual appraisal of inner core emotionality as yet is scarce. A useful framework on how such interpretations are regulated in soccer players would be the control-process model of anxiety[1]. It clarifies that the intrinsic attractiveness (positive valence) or aversiveness[2] (negative valence) of expectancies and the individual player's perceived ability to cope[3] and attain goals would determine the degree of achievement urge and the extent of perceived apprehension in the players[4–8]. Psychobiological explanation for this phenomenon would hint upon the role of vagus complex or vagal brake in enhancing sympathovagal balance, diminishing HPA (hypothalamic-pituitary-adrenal) axis activity[9]. Researches from present experimental set-up carried out on the role of psychobiological factors in the field of soccer performance confirmed the significance of HPA axis activity (evaluated on the basis of electrodermal orienting activity) [4–7, 10 – 12]. One of such valid study[8] carried out on soccer players emphasized on corroborative relationship between electrodermal or skin conductance (Sc) orienting reflex and phasic Sc indices and emotional resilience observed in high performing soccer players of Malaysia. Sc phasic activities pertain to the evaluation of latency; amplitude & recovery time (see Figure 1), and the orienting reflex (OR) represents sharply evoked Sc amplitude, followed by adequately faster recovery from autonomic arousal [4–7, 10 – 12]. This OR serves as the basis of vagal brake[9] in enhancing the possibility of active social engagement without apprehensions, and optimal performance under challenging situations. This evaluation of sympathovagal balance and HPA axis activity based on evaluation of respiratory sinus arrhythmia (RSA), particularly in the field of soccer psychology either remained untouched or yielded perplexing outcomes[8,10–13], while the role of HPA axis in exercise set-ups mainly focused onto the gender-differences in stress process[14] and burnt out syndrome[15], rather to focus onto emotional aspects related to performance. With such a background, we felt that there is valid reason to investigate into the predictive contribution of psychobiological indices of emotionality and mood states in defining sympathovagal activity related control-process model of emotion and the consequent impacts on the mental make-up of soccer performers. Thus, this study was carried out

- To determine the contribution of mood states on inner core emotionality, if any observed amongst the young soccer players;
- To identify the role of other emotional process onto an emotional integrity with the young players, and
- To observe the relationship between phasic skin conductance activity indices as predictor of emotional integrity observed in soccer players.

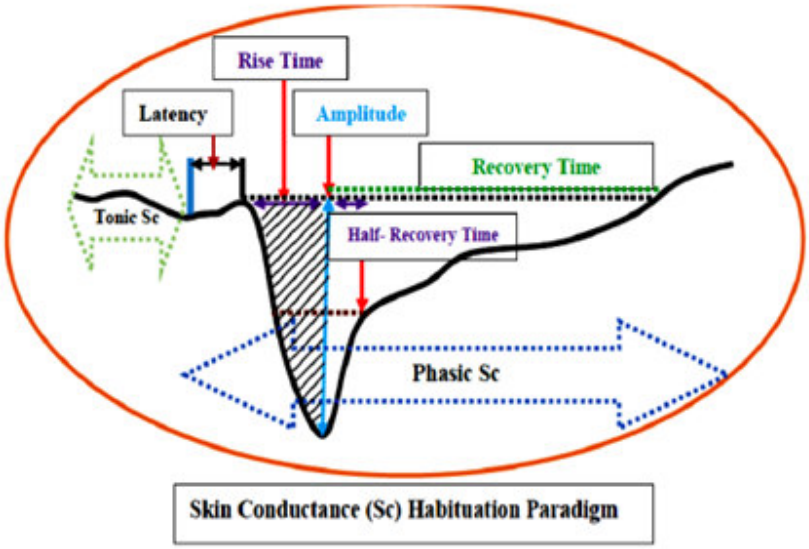

Figure 1. Adapted from Saha et al. 2015

2. METHODOLOGY

2.1. *Participants*

Two hundred and thirteen high performing young male soccer players (age range = 20.3 – 22.7 years) from Malaysia were recruited as participants for this study. They were mostly high-performance trainee soccer players and they were selected unanimously based on their resting Heart rate, VO_2max and their consistent high performance.

[1] -- *Tuesday, January 20, 2015 -- 20:31:06*

F tests - Linear multiple regression: Fixed model, R^2 deviation from zero

Analysis:	A priori: Compute required sample size	
Input:	Effect size f^2	= 0.12
	α err prob	= 0.05
	Power (1-β err prob)	= 0.95
	Number of predictors	= 10
Output:	Noncentrality parameter λ	= 25.5600000
	Critical F	= 1.8778068
	Numerator df	= 10
	Denominator df	= 202
	Total sample size	= 213
	Actual power	= 0.9505003

(Sample size calculation[16])

2.2. *Materials Used*

1. Brunel's Mood Scale[17] was administered for evaluation of mood states and mood valences.
2. Rorschach inkblot test[18] – was administered to evaluate the personality and emotionality of the participants.
3. Skin Conductance Apparatus (ProComp5 Infinity, USA 2014) – was used to assess the extent of tonic as well as phasic i.e., habituation paradigm component of autonomic regulation as indices of emotionality of the participants.

2.3. Procedure

After the selection of participants, according to the inclusion criteria (e.g., resting HR; VO_2max; soccer juggling & square-passing skills; with the ball running. etc.), and the signed consent forms received from them, all of them were subjected to an assessment of projective evaluation of emotionality; self- report assessment of their mood states and psychobiological evaluation as indices of emotionality. All of the assessments followed counter-balancing methods to avoid subject-relevant and sequence-relevant bias during evaluation of the aforementioned parameters. At first they were subjected to evaluation of their situation-specific or transient mood states by employing Brunel's Mood State Scale, in which they had to respond to a structured self-report inventory containing 24 items. Once the evaluation was over the outcome of the self-report responses could be processed to derive differential mood –states and to derive variations in mood valences too. Thereafter projective evaluation of emotionality and evaluation of psychobiological indices of emotionality (both tonic and phasic skin conductance assessments) were done following standard method of administration[11]. Here in this study, along with tonic skin conductance (Sc), phasic Sc activity data were also collected, which decomposed as stimulus-specific orienting response measures (viz. latency; amplitude and recovery time). In order to obtain phasic Sc indices, Sc data were collected following habituation paradigm, in which after obtaining tonic Sc data for 5 minutes, participants are provided with white noise (ringing of a bell), which are supposed to evoke EDR or Sc responses. Thereafter the Sc data were decomposed to obtain, autonomic or ANS peak amplitude or the peak Sc deflection, which can be determined by evaluating the SCR curve to the point of maximum curvature[19]. Further to that, phasic SF or NS-SCR (non-specific Sc response, which is also termed as spontaneous fluctuation or SF), were collected and evaluated to identify extent of post-stimulation non-specific or residual ANS arousal remaining in the participants. The data were treated with SPSS 22.0 for identification of normality index and wherever required log transformations were done. Thereafter multiple linear regression analyses were performed to identify the extent of contribution of different psychobiological variables; mood states; mood constellations and emotional feelings of irritability and impulsivity onto the shared etiology of emotional core integrity.

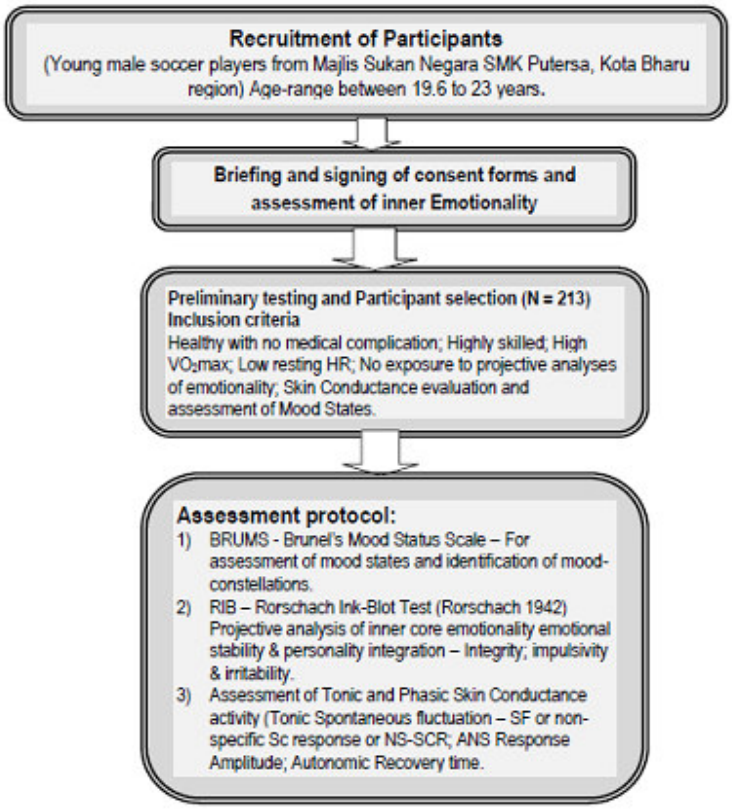

Figure 2 - Flow chart of the experiment

3. RESULTS AND DISCUSSION

Descriptive data concerning measures of mood states, mood valences, emotionality and skin conductance parameters are represented in the Tables 1a, 1b, 1c & 1d, which , however revealed that some of the data on psychobiology evaluations had relatively higher dispersions from normality, and hence wherever required data were transformed to ensure normality.

Table 1a
Descriptive Reports on Different measures of mood

	N	Mean	Std. Deviation
Variables	Statistic	Statistic	Statistic
Depression	213	54.29	8.83
Vigour	213	50.24	8.71
Confusion	213	49.57	9. 92

Table 1b
Descriptive Reports on Different mood valences

	N	Mean	Std. Deviation
Variables	Statistic	Statistic	Statistic
Positive mood	213	53.84	8.24
Negative mood	213	52.46	7.15

Table 1c
Descriptive Reports on Different measures of Emotionality

Variables	N	Mean	Std. Deviation
	Statistic	Statistic	Statistic
Integrity	213	2.91	1.30
Impulsivity	213	1.86	1.49
Irritability	213	1.87	1.18

Table 1d
Descriptive Reports on Different measures of Skin Conductance indices

Variables	N	Mean	Std. Deviation
	Statistic	Statistic	Statistic
Tonic Sc	*213*	*3.95*	*2.30*
Phasic SF	*213*	*4.24*	*1.94*
Latency	213	3.58	1.57
Amplitude	213	4.19	.96
Recovery	*213*	*12.04*	*5.22*
Orienting Reflex	*213*	*56*	*1.81*

Outcomes of the regression analyses are represented in the Tables 2, 3 & 4 (Model *a, b & c*). Model *a* was conceived to identify relative contributions from psychobiological indices and mood variables as well, which emerged as significant. Similarly models *b* & *c* also emerged as significant, and those explained contribution of other emotional factors (viz., impulsivity & irritability) along with the mood constellations and psychobiological indices onto dependent measure of emotional integrity.

Table 2
Model a - Summary of multiple linear regression analysis, when integrity is defined by moods & Sc variables

Model *a* Dependent Variable – Integrity	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations Coefficients			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Intercept)	9.526	4.183		2.277	.024					
Tonic Sc	.030	.006	.601	5.413	.000	.054	.361	.259	.186	5.389
Confusion	-.415	.040	-.558	-10.468	.000	-.347	-.599	-.501	.436	2.295
Depression	-.144	.043	-.440	-3.361	.001	-.132	-.233	-.161	.447	2.236
Phasic SF	-1.292	.266	-.324	-4.854	.000	-.195	-.328	-.232	.585	1.709
Orienting reflex	-.443	.080	-.310	-5.512	.000	-.246	-.366	-.264	.724	1.380
Recovery	.038	.017	.156	2.230	.027	-.118	.157	.107	.469	2.133

[a] *(F (13, 196) = 18.554, P < 0.000)) Model Adj.R^2 = 52.2%.*

Table – 2 (Model *a*) confirmed that changes in emotional integrity was contributed by psychobiological and various mood states, together those could explain 52.2% of changes in the extent of integrity. The model further revealed that if facilitative contribution of tonic Sc is regressed from the model, players those who had lesser extent of confusion and depression and had lesser extent of phasic Sc startle response (Phasic SF) were observed to have higher emotional integrity.

Table 3
Model b - Summary of multiple linear regression analysis when integrity is defined by Irritability; moods & Sc

Model *b* Dependent Variable –Integrity	**Unstandardized Coefficients**		**Standardized Coefficients**			**Correlations Coefficients**			**Collinearity Statistics**	
	B	Std. Error	Beta	**t**	**Sig.**	Zero-order	Partial	Part	Tolerance	VIF
(Intercept)	10.032	4.290		2.338	.020					
Irritability	-.387	.171	-.429	-2.269	.024	.183	-.160	-.108	.528	1.896
Orienting reflex	-.543	.090	-.380	-6.037	.000	-.246	-.397	-.288	.573	1.745
Depression	-.196	.055	-.338	-3.544	.000	-.132	-.246	-.169	.265	3.770
Phasic SF	-1.428	.270	-.326	-5.284	.000	-.195	-.354	-.252	.563	1.777
Positive mood	.117	.041	.160	2.831	.005	.225	.199	.135	.710	1.408

[b](F (14, 195) = 17.546, P < 0.000)) Model Adj.R^2 = 52.6%.

Similarly, Table 3 (Model ***b***) reported about 52.6% of changes in the extent of integrity, which revealed that if facilitative contribution reduced extent of feelings of irritability could be controlled for or regressed from an index of integrity, those who had higher extent of irritability, perhaps for having faster orienting reflex; lower extent of depression and infrequent phasic SF and also had favourable extent of positive mood, could have better emotional integrity.

Table 4
Model c - Summary of multiple linear regression analysis when integrity is defined by Impulsivity; moods & Sc

Model *c* Dependent Variable – Integrity	**Unstandardized Coefficients**		**Standardized Coefficients**			**Correlations Coefficients**			**Collinearity Statistics**	
	B	Std. Error	Beta	**t**	**Sig.**	Zero-order	Partial	Part	Tolerance	VIF
(Intercept)	14.850	2.914		5.097	.000					
Impulsivity	1.049	.078	.758	13.503	.000	.548	.699	.490	.555	1.801
Positive mood	.603	.224	.742	2.691	.008	.225	.191	.098	.014	70.902
Confusion	-.285	.036	-.520	-8.004	.000	-.347	-.501	-.291	.312	3.205
Depression	-.225	.045	-.427	-4.992	.000	-.132	-.340	-.181	.232	4.317
Recovery	.106	.023	.419	4.692	.000	-.118	.321	.170	.151	6.630
Amplitude	-.242	.044	-.402	-5.489	.000	-.093	-.369	-.199	.245	4.077
Orienting reflex	-.528	.072	-.369	-7.345	.000	-.246	-.469	-.267	.521	1.918
Latency	.851	.271	.294	3.141	.002	-.267	.222	.114	.151	6.641

[c](F (18, 191) = 31.545, P < 0.000)) Model Adj.R^2 = 72.5%.

Similarly, findings from the Model *c* (refer to Table 4) however explained the relationships existing between emotional integrity and emotional impulsivity; positive mood and other mood states and psychobiological indices as well, which however could explain 72.5% of variance changes in the extent of emotional integrity. This model further revealed that, if inhibitive contribution high extent of feelings of impulsivity could be controlled for integrity, those who had lower extent of impulsivity, perhaps for having higher extent of positive mood; lower extent of confusion and depression and autonomic competence, also had a favourable extent of emotional integrity. Prediction analyses reports (represented in the Tables 2, 3 & 4) revealed that the inner unconscious core of integrity has been contributed by all of the psychological and psychobiological indices in different extents. Model *a* explained that for every 1% increment in tonic Sc would lead to .601% improvement in emotional integrity (refer to Beta Coefficient of tonic Sc, having 55.5% of tolerance). This corroborative contribution of tonic skin conduction activity onto an emotional integrity got support from a few of previous researches[8, 11 & 13]carried out on identical set ups. Similarly, in case of model *b* for every 1% reduction in the feelings of irritability would result in .429% improvement in integrity, while beneficial contribution of positive mood was evident as of vital importance (tolerance index was 70.1%) [11, 12]. Model *c* on the other hand clarified that, for every 1% increment in feelings of impulsivity, .758% improvement in integrity could be observed (tolerance index was 55.5%). Here it seemed perplexing, since heightened impulsivity scores led to improved integrity. This had happened perhaps for the reason that in terms of scores on feelings of impulsivity, inconsistencies remained amongst participants, which might have resulted in relatively confusing report. In resolving this issue, we looked into the beta coefficient and tolerance scores for the predictor variables, which revealed that those who had higher extent of positive mood (for every 1% increment in positive mood, .742% improvement in emotional integrity would occur), and tolerance index hinted up on the significance of the faster orienting reflex index (tolerance index was 52.1%) in contributing to improvement in emotional integrity. This corroborative contribution of mood states and Sc components amongst soccer players [8, 10, 13] and other athletes [11, 12] of South-East Asian region were reported in our previous research endeavours, which were carried out incorporating similar experimental set ups. Apart from all of the models clarified particular significance of faster orienting reflex and enhanced positive mood behind improvement in emotional integrity. In sum, outcomes of the present study would like to hint upon the vital role of faster orienting reflex; enhanced positive mood; reduced feeling of irritability and reduction in confusion and depression along with adequately flexible and competent autonomic adaptation, which could aptly regulate inner core emotional integrity observed in the soccer players.

4. CONCLUSION

Out of the findings of the present study, it is concluded that

- Reduction in negative mood states and enhancement in positive mood in general were observed to be associated with emotional integrity evident in the soccer players.
- Emotional feelings of irritability and impulsivity had significant contribution on emotional integrity.
- Faster orienting reflex and infrequent phasic startle response and phasic skin conductance activities were found to be the key predictors of changes in emotional integrity.

5. ACKNOWLEDGEMENT

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