International Journal of Science Culture and Sport
June 2014; 2(2)
ISSN : 2148-1148
Doi : 10.14486/IJSCS74

Factor Analysis of Subjective Psychological Experiences and States of Football Referees[1]

Tomáš ZEMAN*, Jiří VOBORNÝ, Radoslav BEŇUŠ*, Marie BLAHUTKOVÁ*****
* Department of Anthropology, Faculty of Natural Sciences, Comenius University in Bratislava, Mlynská dolina, 842 15 Bratislava 4, SLOVAK REPUBLIC
** Department of Social Sciences and Sport Management, Faculty of Sports Studies, Masaryk University, Kamenice 753/5, 625 00 Brno, CZECH REPUBLIC
*** Centre of Sports Activities, Brno University of Technology, Technická 2896/2, 616 69 Brno, CZECH REP
tomas.zeman@fns.uniba.sk, jirka.voborny@seznam.cz, benus@fns.uniba.sk, blahutkova@cesa.vutbr.cz

Abstract

Correlations between values of components of subjective psychological experiences and states in 26 male football referees before the match and after the match were explored using factor analysis. For evaluation of subjective psychological experiences and states the standardized questionnaire SUPSO was used. The questionnaire was filled in twice by referees: before the match and immediately after the match. Four most important factors were described and named. The first factor was called "tendency to discomfort". It relates to referee´s current mental state being probably a reflection of long-term negative circumstances in referee´s life. It is neither related to the completed match, nor referee´s temperament. The second factor was called "depression from failure" and it is connected directly to the completed match. It is probably determined by current referee´s physical and mental conditions. The third and fourth factors proved to be consequences of temperament of referees. In conclusion, the two most important factors of current mental state of football referee during the game can probably be influenced by a systematic psychological preparation. Psychological preparation should therefore become an effective part of the pre-match preparation of football referees.

Key Words: Football, Psychological States, Referee, Temperament

[1] *This article was presented orally in the 3rd ISCS Conference, 24-26 May, 2014, Sarajevo*

1. Introduction

Football is a game which attracts millions of players and fans all over the world. Like the players and fans, the referees also play an important role in this game. From a historical point of view they have been an integral part of the game. Demands on their job remain hidden both to the professionals and general public. A referee of high quality must have not only a good physical condition, which gives him the potential for fast reaction and effective movement around the pitch, but also a very good and stable level of psychological characteristics and abilities which allow them to manage non-standard and specific situations in football matches. We can often see some kind of aggression towards the referees, which usually stems from a feeling of injustice in connection with some of the referees' statements and subsequent frustration of potential aggressor (Todd et al., 2010). Psychological pressure that referees must resist in every match, and inadequate mental relaxation often results in a decline in performance quality as a result of the frustration.

In our research we deal with the dynamics of subjective psychological experiences and states of football referees during the match measured by a standardized self-assessment questionnaire SUPSO (Mikšík, 2004). We proved that psychological burden associated with football matches affects significantly the mental state of referees (Voborný et al., 2012). As a result of a completed match, particularly the values of the components of depression (D) increase in referees. We also considered the possible negative impact of pre-start mental states on the stress management during the match. Normally, there are two negative pre-start states distinguished (Mikšík, 2007):

"Pre-launch fever" - a state of extreme excitement resulting from uncertainty, fear and nervousness from the further development of the situation, which results into an enormous depletion of reserves before the actual solution to the situation.

"Apathy" - is symptomatic of depression, it reflects the desire to withdraw and avoid pressure, owing to the mistrust of the success and irritability, at this stage terminating in the formation and development of excessive protective downturn.

It turns out that the current mental state of football referees before the match affects their ability to cope successfully with this burden. Along with high levels of the component of anxious expectations and fears (U) before the math values of component of depression (D) after the match grow significantly (Voborný, Zeman, 2012). We also found out that this dependency is to some extent mediated by temperament of referees. Therefore, we decided to perform factor analysis of assessed variables. Besides the values of components of subjective experiences and states, we also included percentage of the dominant components of referees' temperament in the analysis. The main aim of our research is to identify and describe the most important factors which influence the subjective psychological experiences and states of football referees during the match.

2. Materials and Methods

2. 1. Research Sample

The research sample consisted of 26 referees, all of them were men. These referees supervise competitions governed by the football association of Vysočina county, which is one of 14 counties of the Czech Republic. They were mostly referees with short and medium-long experience; the only exception was the referee with a length of practice of 36 years. The

median length of practice was 9 years. This corresponds to the median of age distribution of 31 years.

2. 2. Temperament test

In order to understand better the personality of referees and the dynamics of their experience, we examined contribution of each component of temperament in football referees using Czech version of Belov's temperament test. This test (Blahutková, 1999) uses the basic standard personality theory of four temperament types: choleric, sanguine, phlegmatic and melancholic. Belov's temperament test consists of 79 questions - claims divided into four groups. These are actually sets of manifestations characteristic of each temperament type. The task for each proband is to decide whether each claim is true or not, and their responses are recorded in the recording sheet. If the statement is true for the person, the answer is YES.

Otherwise, the answer is NO. In the box plot (Figure 1) we can see the percentage of these components in our sample. Sanguine component is most often represented, followed by phlegmatic and choleric components.Melancholic component is significantly less represented.

2. 3. SUPSO

The standardized questionnaire SUPSO (Mikšík, 2004) was used to describe the dynamics of subjective experiences and personality states of referees before and after the match. The questionnaire consists of 28 Czech adjectives, e. g. calm, and respondent's task is to express how they identify themselves with those adjectives on the scale from 0 to 4. On the basis of factor analysis of given adjectives Mikšík defined following 7 components of subjective psychological experiences and states:

P = psychological well-being (feeling of satisfaction, a pleasant mood and pleasant mental warm-up, which is often accompanied by feelings of euphoria and confidence). This component shows a degree of freshness, satisfaction, peace and mental balance, optimism and good mood.

A = activity and vigorousness (feelings of power and energy which are associated with a hankering after the action). It is a readiness for active interaction among various situational variables. It can be described with the qualities of psychological phenomena, such as vigorousness and assertiveness.

O = impulsiveness, letting off steam (uncontrolled, spontaneous release of energy stress and mental tension). It is described by feelings like moodiness, difficulty in self-control, explosiveness, irritability and uncorrected aggressiveness.

N = mental unrest, discomfort (experiencing psychological stress, when it is not possible to find ways to release it). Characteristic symptoms are mental and motoric restlessness, annoyance, discontent, impatience and distractibility.

D = mental depression, tiredness (complex of feelings and states, of which the main characteristics represent a tendency towards passivity and apathy).

U = anxious expectations, fears (complex of feelings of insecurity, experience of psychological, tension, feelings of anxiety, fear of the possible future consequences, etc.). Experiencing possible future development is being updated within inner experiences, but here's lack of readiness to deal with situational components.

S = sadness (these experiences can be expressed by adjectives sad, lonely, hypersensitive, unhappy). It can be defined as a passive experiencing of situational variables. Experiences are not turned out to interact with the outer environment, but "inside".

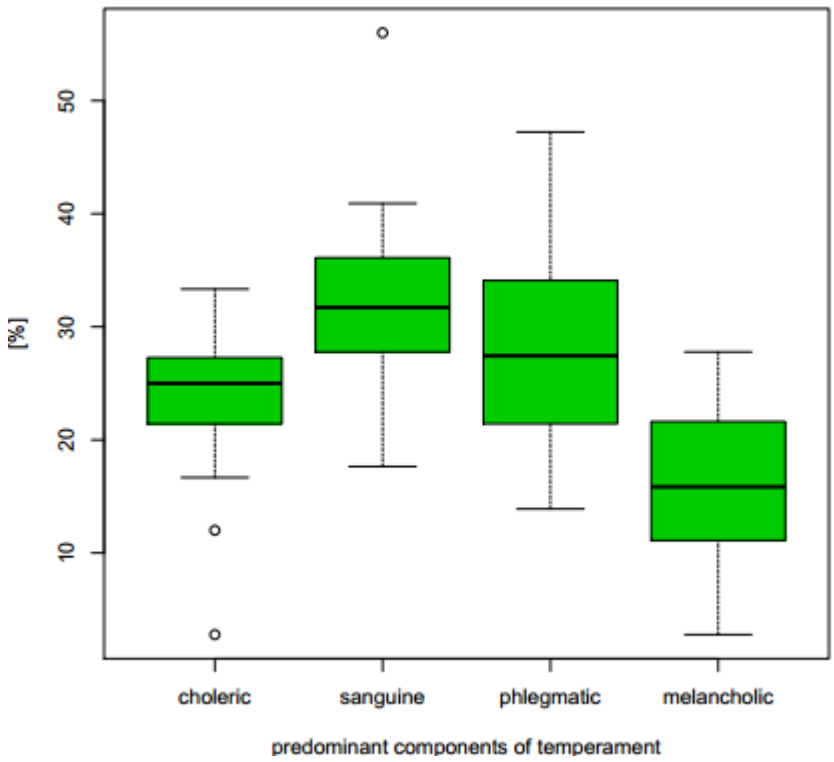

Figure 1. Box plot of the percentage of personality temperament components in our sample

2. 4. Factor Analysis

During factor analysis we used the method of Principal components and Varimax rotation (Abdi, 2003; Hebák, 2007). Principal components are created to replace the original variables and they have to fulfil the following three conditions:

a. Principal components are perpendicular to each other.

b. Principal components are mutually uncorrelated. If the assumption of normality of data is satisfied it also means that the principal components are independent of each other.

This allows us to test the statistical significance of the identified factors. Otherwise, we can only use the so-called exploratory factor analysis, where the described factors work only as a guideline for further research.

c. Principal components are always constructed so that they run through the maximum variability of the data set. It is achieved by maximizing the variance of each component values. The first principal component runs through the data at the peak of variability in the data set, which can be described by a single line. The second and each additional component explain always less amount of variability than the previous one, because it must fulfil first two conditions mentioned above.

Mathematically, equations of the principal components are obtained as a linear combination of the original variables, where coefficients of these combinations are given by coordinates of eigenvectors of covariance matrix. Eigenvalues of this matrix represent the variance explained by the respective principal component. The sum of the eigenvalues equals the sum of variances of the original variables. Number of considered principal components is chosen according to the amount of explained variability which is sufficient for our objectives.

However, it is often reported that the principal components are not suitable for a substantive interpretation, only for mathematically simplified orientation in the data set (Hendl, 2009). If we want to proceed to the interpretation of certain hidden phenomena having an impact on our sample, so-called factors, it is necessary to rotate the principal components in a certain way. The simplest and most commonly used method is the Varimax rotation (Hebák, 2007). This method transforms the original principal components into new factor axes so as to achieve formation of factors, of which the correlation coefficients with original variables are as close to 1, 0 or -1 as possible, under the condition of their mutual non-correlation. Owing to this we get factorial axes, which strongly correlate with only a few variables, while with other variables they correlate slightly or moderately at most. This allows the factual interpretation of the factor axes. It is based on a matrix of factor load, which are the values of correlation coefficients between the original variables and the new factors. In factor analysis it is necessary to decide in advance how many factors we want to interpret, because the Varimax method provides different solutions for different numbers of factors.

For all statistical analyses we used R (R Development Core Team, 2008) and STATISTICA 10 (StatSoft, 2010) software.

3. Results

Before conducting the actual factor analysis we tested the normality of input variables. Components of subjective psychological experiences and states were significantly deviated ($p < 0.05$) from the normal distribution in half of the cases. Factor analysis can therefore be used only as an exploratory method. Based on the analysis of eigenvalues, we decided to interpret the first four factors which together explain 66% of the data variability.

Factor 1 explains 36% of the variability in the data set. In the graph of factor loads (Figure 2) we can see that this factor separates components of comfort from the components of discomfort. It correlates very closely with sadness component (S), psychological discomfort (N) and depression (D) before the match (S1, N1, D1), while it correlates negatively particularly strongly with psychological well-being before the match (P1). Factor 1 can be therefore identified with the general inclination of football referees to discomfort psychological experiences and states. It is significant that this factor is positively correlated with the melancholic temperament component, while negatively with the phlegmatic component. This factor therefore can be described as a "tendency to discomfort" and is probably related to referee´s life situation.

Factor 2 explains 11% of the variability in the data set and correlates positively with the component of depression after the match (D2) and strongly negatively with the component of activity after the match (A2). It is positively correlated with almost all components of psychological discomfort, negatively with all components of psychological comfort. This means that a significant portion of the variability of mental states in football referees can be described on the basis of whether the referee tends to be active and lively or tends to fall into

depression after completing the match, which are fundamentally contradictory phenomena (Mikšík, 2007). It is interesting that this factor is not influenced by the component of the referee's temperament. The factor is therefore probably independent of the referee's personal characteristics. It is likely related to his physical condition, or it reflects his actual performance or other circumstances connected with a completed match. In both cases it is probably associated with some kind of failure of the referee. This factor can be therefore called "depression from failure".

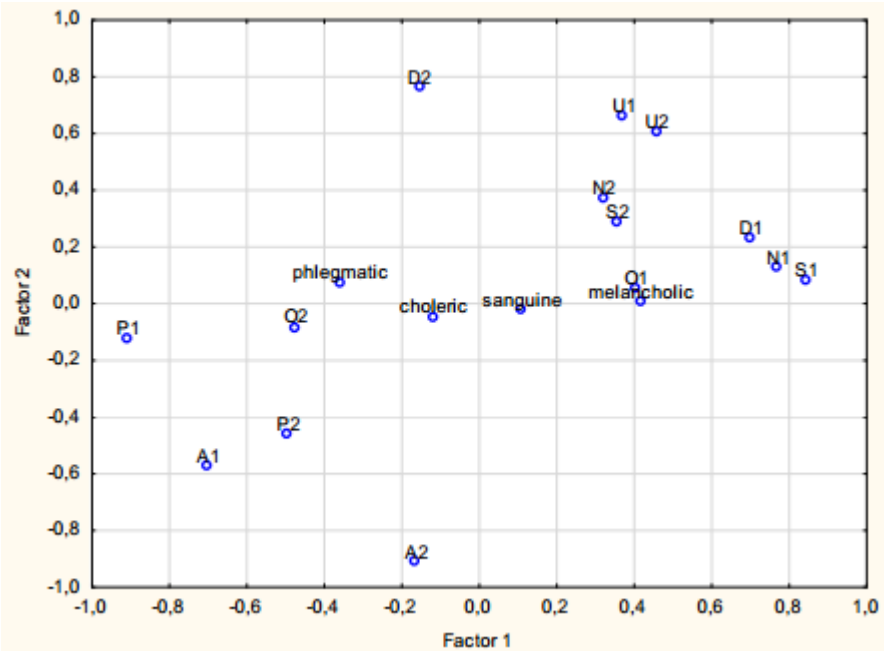

Figure 2. Graph of Pearson´s correlation coefficients between original variables and interpreted factors 1 and 2

Factor 3 explains 9% of the variability and is largely influenced by the referee's temperament. This factor is strongly positively correlated with the choleric temperament component, while it is negatively correlated with the phlegmatic component (Figure 3). From the theory of temperament we know that phlegmatic as a stable introvert along with choleric as an unstable extrovert represent opposites (Eysenck, 2007). Factor 3 practically does not correlate with melancholic and sanguine components. However, it separates components of psychological comfort after the match (P2, A2) and discomfort (N2, S2, D2, U2, O2) after the match. The only exception is a component of anxiety after the match (U2), which correlates with the factor 3 slightly negatively.

Factor 4 explains 10% of the variability and is largely influenced by the temperament of the referee. The factor strongly positively correlates with the melancholic temperament component, while strongly negatively correlates with the sanguine component. From the theory of temperament we know that melancholic as an unstable introvert and sanguine as a stable extrovert represent opposites (Eysenck, 2007). The factor 4 correlates only weakly with choleric and phlegmatic temperament components. Factor is thus closely connected to the melancholic temperament component, but it is fundamentally different from the factor 1. Factor 1 represents a general "tendency to discomfort," which is manifested, among others, by

very strong negative correlation with the component of psychological well-being before the match (P1). Factor 1 negatively correlates with the phlegmatic temperament component and separates mainly the components of psychological comfort before the match (P1, A1) and discomfort before the match (N1, S1, D1, U1, O1). In contrast, factor 4 correlates with the phlegmatic temperament component positively and separates components of psychological comfort after the match (P2, A2) and discomfort after the match (N2, S2, D2, U2). The only exception is a component of impulsiveness after the match (O2), which correlates positively with the factor 4.

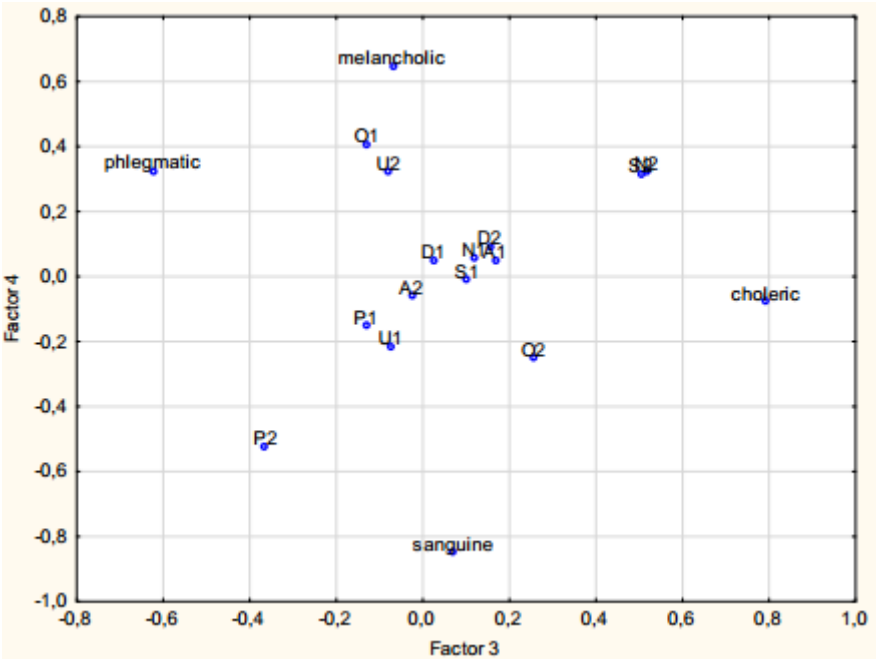

Figure 3. Graph of Pearson´s correlation coefficients between original variables and interpreted factors 3 and 4

Factors 3 and 4 are important especially when they are put together. Together they create a structure similar to Eysenck's cross, within which individual components of subjective experiences and psychological states are divided as well. Particularly worthy of attention is the fact that when we mark out the axis of neuroticism in the graph, this axis divides perfectly the components of psychological comfort (P, A) and discomfort (N, S, D, U, O) after the match. Neuroticism is characterized by an emotional lability (Mikšík, 2007; Eysenck, 2007; Smékal, 2009) and probably significantly affects the ability of the football referee to cope with mental stress associated with completed match. If we mark out perpendicular axis of extroversion vs. introversion we find out that this axis divides the component of anxious anticipation and fears after the match (U2) from the components of impulsivity after the match (02). This corresponds to the difference between experiencing stress "inside", typical for an introvert and experiencing stress directed "out", characteristic of an extrovert.

4. Conclusions

We interpreted and named four factors which affect the mental state of football referees in connection with football matches. Factor 1 was called "tendency to discomfort," and is probably a reflection of circumstances of referee´s life and it is not related to the completed match. Factor 2 was called "depression from failure" and is probably a reflection of a certain type of failure of football referee. We do not know whether this failure is related to their condition, performance or circumstances that surrounded the game. Further investigation would be useful to identify this factor, because it is possible that, this factor is connected directly to the completed match and can be influenced. New research involving besides questionnaire SUPSO also parameters relating to the condition of referee and quality of his performance will, in our opinion, explain the importance of this factor.

Factors 3 and 4 are strongly related to the temperament of the referees and thus cannot be influenced by a psychological preparation. In practice, however, they can be used as indicators of the tendencies of referees' temperament types to certain types of psychological experiences and states. For this application, however, the significant expansion of the research sample, including referees from other leagues, is necessary.

REFERENCES

Abdi H (2003). Factor Rotations in Factor Analyses. In: Encyclopedia of Social Sciences Research Methods, Thousand Oaks: SAGE.

Blahutková M (1999). Rozdíly aspirační úrovně jako faktoru výkonové motivace u sportující a nesportující mládeže. Brno: Masarykova univerzita.

Eysenck HJ (2007). Dimensions of Personality. London: Paul, Trench, Trubner.

Hebák P (2007). Vícerozměrné statistické metody. Praha: Informatorium.

Hendl J (2009). Přehled statistických metod: analýza a metaanalýza dat. Praha: Portál.

Mikšík O (2004). Dotazník SUPSO: Manuál. Brno: Psychodiagnostika.

Mikšík O (2007). Psychologická charakteristika osobnosti. Praha: Karolinum.

R development core team (2008). R: A language and environment for statistical computing. Vienna: R Foundation for Statistical Computing.

Smékal V (2009). Pozvání do psychologie osobnosti. Člověk v zrcadle vědomí a jednání. Brno: Barrister & Principal.

StatSoft (2010). STATISTICA, version 10.

Todd D, Thatcher J, Rahman R (2010). Sport psychology. Hampshire: Palgrave Macmillian.

Voborný J, Zeman T (2012). Analýza vybraných komponent psychického stavu fotbalových rozhodčích a jejich souvislost s dominantními temperamentovými složkami osobnosti. In: Od výskumu k praxi. Bratislava: Slovenská technická univerzita v Bratislavě, 345-348.

Voborný J, Zeman T, Blahutková M (2012). Dynamika předzápasových a pozápasových subjektivních prožitků a stavů fotbalových rozhodčích a jejich porovnání s běžnou populací ČR In: Psychologie sportu v praxi 2012 aneb nedílná součást přípravy sportovce. Brno: Masarykova univerzita, Asociace psychologů sportu České republiky, 182-192