Original Article

Psychological characteristics of sports performance: analysis of professional and semiprofessional football referees

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Abstract:

Sports psychology acknowledges the importance of referees in sports. However, evidence is still needed on psychological variables related to refereeing decisions. Psychological characteristics related to sports performance (Stress Control, Influence of Performance Evaluation, Motivation, Mental Skills, and Team Cohesion) were assessed and compared to referee role (referees vs assistant referees), experience, age, and education level. A cross-sectional design was realized, sixty-one professional and semiprofessional referees from Colombia ($M_{age} = 22.5$; $SD = 4.1$) completed the questionnaire for Psychological Characteristics related to Sports Performance adapted for Football Referees (CPRD-AF, for its Spanish acronym). Findings revealed that psychological characteristics are consistent regarding the referee role and experience. Differences were found between stress control and age [$F_{SC}(3, 57) = 3.83$, $p = .27$, $\eta^2 = .38$], where the 28-34-year-old group was significantly higher than the 16-21-year-old group. Significant differences were found between stress control and education level [$F_{SC}(4, 56) = 3.19$, $p = .030$, $\eta^2 = .14$], postgraduate referees had higher stress control compared with undergraduate referees ($p < .027$). Performance evaluation has a significantly higher influence on postgraduate referees than college referees ($p < .036$). Future research needs to evaluate social factor and psychological characteristics related to refereeing performance and include different types of referees role

Key Words: Sports Psychology; Experience; Mental Skill; Stress Control; Assistant Referees

Introduction

In sports psychology, referee performance is recognized as an emerging and relevant research field (Philippe et al., 2009; Raab et al., 2019; Slack et al., 2012). The existence of environmental and personal factors related to referee performance has been proven. Thus, for example, known potential influences among football referees include the media (Webb, 2016); spectators with regard to a referee's bias (Picazo-Tadeo et al., 2016); the presence of noise and decisions favoring the home team (Nevill et al., 2002); attempts to deceive or cheat (Morris & Lewis, 2010); and loud vocalization by the athletes. As a consequence, the interaction of these and other variables seem to have an effect that favors the home team (Pollard, 2006, 2008; Pollard & Pollard, 2005). Likewise, soccer refereeing is related to factors that in the long term can lead to the appearance of occupational stress and burnout syndrome, significantly affecting job satisfaction, professional commitment and to quit their career (Choi & Chiu, 2017; Kerem Zelyurt & Şaşmaz Ataçoğlu, 2017; Nogueira Da Gama et al., 2018).

On the contrary, personal factors may be associated with refereeing performance. Physical training (Costa et al., 2013; Maslennikov et al., 2019; Weston et al., 2004); position and angle of view of the action affecting the error rate (Mallo et al., 2012); the coefficient of variation in distance covered and speed (Weston et al., 2011); and the influence of psychological variables (Pedrosa & García-Cueto, 2015; Slack et al., 2012). In this regard, the sports judgment-related psychological variables under study (Slack et al., 2012), are those that are relevant for referees' level of professionalism and increasingly larger referee team with distinct roles and complex duties (Catteeuw et al., 2009). Moreover, the psychological preparation of main referees is highly related to the experience as a professional referee during a long period (Kovalchuk & Mospan, 2020).

In the same vein, decision-making is a significant and complex aspect in refereeing performance. At the same time, different psychological and cognitive variables such as executive attention (Pietraszewski, Rocznio, et al.,

2014), perceptual speed (Pietraszewski, Maszczyk, et al., 2014), and immediate reactions under different stressful situations also affect referee performance (Pietraszewski, Roczniok, et al., 2014; Slack et al., 2012). Decision-making is influenced by cognitive biases and mechanisms in the case of penalties (Plessner & Betsch, 2001) and the specificity of the refereeing role (Catteeuw et al., 2009). Accordingly, these are current issues of practical interest (e.g., the implementation of a Video Assistant Referee [VAR]), as well as of scientific interest. Therefore, and based on the studies reviewed, the importance of the psychological variables in refereeing performance is well demonstrated.

Nevertheless, there are still several unresolved questions, and there is a wide range of issues. As in the case of past studies that assess the profiles of athletes and coaches with superior performance (see, Olmedilla et al., 2018), and aspects linked to understand the referees' and assistant referees' training process across gender, level, and age (see, Castillo et al., 2016) we still need to understand the psychological characteristics of refereeing and connect it to key variables such as age and experience in the refereeing organization, role within the refereeing team, or the level of personal training and professionalism. Moreover, the need to extend the scope of empirical research in refereeing to include various other topics, as well as a need to further develop theoretical models regarding the performance of football referees (Aragão et al., 2018).

Also, it is suggested amplify the number of studies that take into consideration role specificity, distinction between an assistant referees and central referee (Louvet et al., 2015). Previous studies emphasize the need to understand the differences between expert and non-expert (Weston et al., 2012) referees, and suggest that there are too little published studies for that purpose (Mascarenhas et al., 2005). Along these lines, systematic research indicates that there is a growing interest in football refereeing and specially, being interesting consider themes such as psychology should take into account the specialization of the different functions performed by referees and assistant referees (Aragão et al., 2018). On the basis of the above, the main objective of this paper is to assess the psychological characteristics related to sports performance compared to the refereeing role, sports experience, education level, and age.

Material & methods

Participants

Participants comprised an opportunity sampling of Colombian football referees from professional and semiprofessional categories. Ages ranged from 16 to 34 years old ($M_{age} = 22.5$; $SD = 4.1$). With regard to the referee role, there were 36 central referees (59.0%) and 25 assistants (41.0%).

Measure

In accordance with the study's theoretical approach, the *Questionnaire for Psychological Characteristics related to Sports Performance* [CPRD, for its Spanish acronym] (Gimeno & Buceta, 2010) was administered, using the version adapted for football referees, CPRD-AF (Buceta et al., 2010). The CPRD is an instrument comprising 55 items to be scored on a Likert scale from 0 to 4. The internal structure of five factors accounting for 63% of total variance (0) has been reported. The conceptual operationalization of dimensions corresponds to (a) *Stress Control* (SC), the response associated with the demands of training-competition and potentially stressful situations; (b) *Influence of Performance Evaluation* (IPE), which refers to the response in situations wherein subjects assess their own performance or think significant individuals are examining them; (c) *Motivation* (M), which refers to the continuous drive to improve oneself, the effort-reward ratio, and recognition from others; (d) *Mental Skills* (MS), which is the ability to self-assess and regulate one's activation level, visualization, focus, control of cognitive dysfunctions, goal setting, and objectively assessing performance; and (e) *Team Cohesion* (TC), the integration into the sports group, including interpersonal relationships between team members, level of satisfaction with the team, and individualistic attitude compared to the group.

The CPRD's internal consistency measured through Cronbach's alpha coefficient has been repeatedly regarded as acceptable. In our study, reliability was estimated through McDonald's Omega coefficient (ω); for the universal questionnaire, $\omega = .89$; and acceptable for the factors ($\omega_{SC} = .85$, $\omega_M = .68$, $\omega_{MS} = .42$, $\omega_{TC} = .68$).

Procedure and ethical considerations

Referees were contacted by the Directors of the Referees' Association. In accordance with their annual schedule, physical fitness and theoretical tests were conducted to assess knowledge of the game's rules. The results allow for the verification of salary scales and renewal. Data was collected before conducting the aforementioned tests in Colombian cities (Buga, Cali, Armenia, and Manizales). The evaluation protocol comprised two parts: first, data regarding age, education level, refereeing experience, and performance was collected; second, the CPRD was completed. It was academically and ethically supported by the University of Quindío, Colombia. Each referee was informed of the research objectives and signed the informed consent in accordance with international ethical regulations (APA, 2017; IUPS, 2008); the Declaration of Helsinki (WMA, 2013); and Colombian codes of ethics (*Deontología y Bioética Del Ejercicio de La Psicología En Colombia*, 2012).

Data Analysis

In accordance with the objective, data was processed using the SPSS v.22 statistics package. An exploratory analysis of data was conducted, and normality and homoscedasticity assumptions were checked using the Kolmogorov-Smirnov and Levene tests, respectively. All the CPRD-AF questionnaire's factors

showed normal distribution except Team Cohesion ($p < .05$), for which they were assessed using nonparametric tests. Central tendency and dispersion measurements (M and SD) were estimated in the descriptive analysis, while for the statistical inference, independent sample student's t -tests on refereeing procedures were applied (central versus assistant referees). An ANOVA was conducted to analyze refereeing experience, age, and education level. The Bonferroni post-hoc test allowed for using the average-to-average method. Furthermore, the sizes of the effect of Cohen's d and the η^2 ratio (η^2) were estimated using the G*Power program (Faul et al., 2009).

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Results

The comparison of refereeing performance's psychological characteristics (referee versus assistant referee) can be reviewed in the figure 1. Data showed no differences between sports performance-related psychological characteristics. Nevertheless, descriptive scores indicated higher median values in the SC, IPE, and TC features of the central referees compared to assistant referees, whereas M and MS showed exactly similar median values.

Note: SC= Stress Control, IPE= Influence of Performances Evaluation, M =Motivation, MS=Mental Skills, TC= Team Cohesion

Figure 1. Comparison of psychological characteristics according central referee and assistants (*Mean and SD*).

Professional experience in refereeing (age ranges) had no significant difference in sports performance-related psychological characteristics (see Table 1). However, more experienced referees (> 6 years of working experience) showed higher scores in SC ($M = 66.2$; $SD = 9.9$) and IPE ($M = 37.6$, $SD = 8.3$) compared to the less experienced ones.

Table 1. *Psychological Characteristics according arbitrated experience*

CPRD-AF	Refereeing Experience (years)				(F)p-value
	1 a 2 M(SD)	3 a 4 M(SD)	5 a 6 M(SD)	> 6 M(SD)	
Stress Control (SC)	59.9(7.4)	59.3(11.8)	62.8(10.4)	66.2(9.9)	(1.17) .327
Influence of Performances Ev.(IPE)	30.7(7.7)	28.8(9.8)	33.2(7.9)	37.6(8.3)	(2.33) .084
Motivation (M)	25.8(3.9)	23.9(2.8)	24.3(5.0)	25.0(3.8)	(.76) .519
Mental Skills (MS)	23.2(3.6)	22.5(3.6)	24.1(4.1)	23.6(4.3)	(.52) .673
Team Cohesion (TC) ^a	19.2(2.6)	18.4(3.1)	18.5(2.9)	18.3(2.5)	(.95) .814

Note: a = Team cohesion was analyzed by the Kruskal-Wallis (K), F= ANOVA one way. Ev.= Evaluation

The age and education level variables showed differences in psychological characteristics (Table 2). Differences were observed among age groups [$F_{SC}(3, 57) = 3.83, p = .27, \eta^2 = .38$]. The post-hoc analysis of the 28–34-year-old group was significantly higher than that of the 16–21-year-old group ($p < .022$). Education level was also different [$F_{SC}(4, 56) = 3.19, p = .030, \eta^2 = .14$], with more favorable median values for postgraduate referees compared to undergraduates ($p < .027$) and for IPE, $F_{IPE}(4, 56) = 2.84, p = .046, \eta^2 = .13$, with differences between those with technical and postgraduate degrees ($p < .036$).

Table 2. *Comparison between psychological characteristics related to sport performance and socio-contextual variables.*

Variable	SC M(SD)	IPE M(SD)	M M(SD)	MS M(SD)	TC ^a M(SD)
Age (years)					
16 a 21	58.7(9.8)	29.6(7.3)	25.0(3.6)	23.0(3.4)	19.2(2.7)
22 a 27	61.9(10.0)	32.6(9.5)	24.4(4.0)	23.0(3.9)	18.1(3.1)
28 a 34	69.9(4.8)	37.3(9.9)	24.6(5.4)	25.4(4.9)	18.7(1.5)
(F) p-value	(3.83) .027*	(2.37) .102	(.15) .858	(1.25) .293	K = (1.90) .386
Scholarship					
Bachelor	58.5(8.2)	31.1(6.5)	24.7(4.1)	22.9(4.3)	18.8 (2.9)
Technical	61.3(6.4)	27.1(7.4)	23.9(3.3)	22.5(3.1)	17.8 (2.8)
Undergraduate	59.1(14.6)	33.0(12.7)	24.3(4.9)	22.2(3.3)	17.9 (2.1)
Postgraduate	68.1(8.9)	36.4(8.2)	25.9(3.4)	25.4(3.6)	19.9 (2.7)
(F) p-value	(3.19) .030*	(2.84) .046*	(.602) .616	(2.13) .106	K = (6.52) .089

Note: a= Team cohesion was analyzed by the Kruskal-Wallis (K), F= ANOVA one way, SC= Stress Control, IPE= Influence of Performances Evaluation, M=Motivation, MS=Mental Skills, TC= Team Cohesion.

* $p < .05$; ** $p < .01$.

Dicussion

There are technical and physical differences in the sports performance of referees and assistant referees. Thus, the objective has been to assess the psychological characteristics related to sports performance according to refereeing role, experience, age, and education level. The main results revealed that sports performance-related psychological characteristics are consistent among roles. Likewise, no differences were found in the varying refereeing experience. On the contrary, older and highly educated referees can better manage stress. In addition, there were differences in the IPEs in postgraduate professionals.

Studying the psychological variables associated with the refereeing performance is crucial and has implications on the development of refereeing abilities. Football referees usually undergo high external and internal stress (Costa et al., 2013; Weston et al., 2004). Physical stress control is associated with correct judgment, which is in line with appropriate decision-making (Weston, 2014). For instance, there is an increase in the risk of making incorrect decisions with regard to refereeing performance of referees versus assistant referees toward the end of games, with an overall error rate of 14.0% for visiting teams (Mallo et al., 2012).

Another point for consideration involves recognizing that the psychological variables regulate and may affect refereeing decisions. Pressure from the players themselves while vocalizing may be a source of stress, so stress management is crucial although it has been stated that vocalizations do not influence decisions (Lex et al., 2015). A positive effect on decision-making has been shown, in other team sports, when referee-players interactions are displayed, since even verbal pressure can influence good performance (Płoszaj et al., 2020), although this aspect has also been controversial in other studies (Lex et al., 2015). Actions that reproduce penalty kicks have been biased by prior decisions (Plessner & Betsch, 2001). Similarly, it has been noticed in laboratory environments that noise had an effect on the decisions made by referees favoring the home team (Nevill et al., 2002), in addition to deceptive behaviors by athletes (Morris & Lewis, 2010). The actual environment for refereeing proceedings is subject to conditions of pressure, limited time control, and prior decisions. In other team sports, has been shown that high experienced referees have a higher performance and cognitive-perceptual skills related to decision-making than young referees (Nabli et al., 2019).

No significant differences were observed in relation to refereeing performance, these results differ from other research that has measured various psychological and cognitive variables. Perceptive skills differ between referees and assistant referees (Catteeuw et al., 2009; Pietraszewski, Maszczyk, et al., 2014), although assistants' executive attention is better than that of referees (Pietraszewski, Rocznio, et al., 2014). Nonetheless, our results should be cautiously considered as the use of other evaluation methods and techniques may illustrate an improved understanding of the psychological behavior of referees.

With regard to the age and education level variables, and in accordance with the literature reviewed, there is little research on these variables in refereeing psychology, although the positive effect on interaction is reported depending on the level of education and training (Płoszaj et al., 2020). It has only been pointed out that experience and age may be associated with refereeing procedures (Pietraszewski, Rocznio, et al., 2014). For their part, data from this work affirm that age (the older group) and an education level involving postgraduate training tend to respond better to stress management and influence performance evaluation. It has been shown professional development and specific technical training are associated with the perception of psychological factors of excellence in football referees (Mendes et al., 2020).

Therefore, it is possible that these results may be understood from two perspectives. First, to highlight that psychological characteristics are different between team sports (Arias et al., 2016); as a result, it can be expected that data support the nature of each sport with relevant implications in refereeing performance (Pedrosa & García-Cueto, 2015; Slack et al., 2012). Second, our results provide favorable evidence of contextual variables such as age and education level as possible covariates of refereeing performance (e.g., Stress control and Influence Performance Evaluation). On the contrary, the psychological behavior of referees and assistant referees is consistent, and differences may be present in other factors such as physical, technical, or tactical factors (Weston et al., 2011). It is important to consider some of the limitations of this study. First, the sample size could be larger if Referees' Associations acknowledge their importance in research cooperation. Second, the limited methodological and technical development (e.g., techniques, protocols and psychometric tests) applied to refereeing decisions in sports contexts. Finally, the relevance of repeated measures allows for longitudinal observation and exploration of the effects on conditions of training and ability. This suggests the need to carry out training programs depending on age and oriented to the quality of decisions in natural situations of psychological pressure (Nabli et al., 2019).

After comparing the existing findings and defining limitations, it is worth highlighting the promising opportunities available for applied sports psychology, specifically in sports decision-making: (i) addition to the evidence of psychological criteria and referee selection; (ii) an understanding of the importance of the refereeing role and consequently, the incorporation of new programs strengthening referees in "green" applications in simulated and actual contexts (e.g., decision-making at high-pressure moments and refereeing cooperation through the use of the VAR (Video Assistant Referee) system; (iii) new research that consider social contextual variables according to which sports experience is still a relevant variable for decision-making (Nevill et al., 2002); (iv) exploration of cognitive variables of data processing (e.g., perception, codification-categorization, memory, social cognition [ToM], etc.), as well as variables to study tactical systems of teams and refereeing cooperation in case of unclear situations; and (v) implementation of cognitive-behavioral psychological training techniques that help overcome potential bias (Pietraszewski, Rocznio, et al., 2014). To improve the decision-making process of football referees the training system must be adjusted and include what research has found and keep exploring the relationship of age, experience and success in high-level decisions (Samuel et al., 2019). To successfully achieve this, it is essential to define a theoretical framework that provides a better understanding of the decision-making process in soccer referees, as suggested by Samuel et al., 2020. Finally, we suggest exploring the interaction between psychological characteristics of referees and athletes, for example, anxiety competitive before a competence (Aguirre-Loaiza & Ramos, 2011; Arenas et al., 2016), attention-concentration in performance sport (Aguirre-Loaiza et al., 2016), and others factors associated with deciding on the sport.

Conclusion

Sports performance-related psychological characteristics of football referees are not different between main referees and assistant referees according to the refereeing procedure or work experience. However, differences were observed with regard to age and education level: those who are 28–34 years old and are postgraduates can better manage stress and the Influence Performance Evaluation. This information supports the fact that there are social environmental factors that can be directly associated with psychological characteristics.

Author Contributions

HA-L, JH, JA participated in the design of the study. JH conducted the data collection. HA-L and JA performed the statistical analysis. CN, SB, and AG-M collaborated in the interpretation of the data. All authors drafted the manuscript and approved the final version

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Conflicts of interest - the authors declare no conflict of interest

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