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Abstract

The relationship between coach and athlete has been identified as a key factor for several positive outcomes in the sports context. Thus, the aims of this study were to analyze the association between the quality of the coach-athlete relationship (CAR) and the perception of team cohesion of youth athletes. Participants were 301 athletes, aged 15 to 17 years, who participated in the School Games of Pernambuco, Brazil. The instruments used were the Coach-Athlete Relationship Questionnaire (CART-Q) and the Group Environment Questionnaire (GEQ). Data analysis was conducted through the Structural Equation Modeling ($p < .05$). The results showed that the quality of CAR showed a significant association ($p < .05$) with team cohesion, explaining 25% of the variance of task cohesion and 15% of social cohesion. Specifically, the effect of CAR on task ($\beta = 0.50$) and social ($\beta = 0.39$) cohesion was significant ($p < .05$) and positive. It was concluded that the quality of CAR is a key factor for the engagement of the adolescent with the teamwork and its goals as well as for the development of positive interpersonal relationships.

Keywords: School sports, group environment, social relationship, sports psychology

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El papel de la relación con el entrenador en el entorno grupal de los deportes escolares

Resumen

La relación entre entrenador y atleta ha sido identificada como un factor determinante para varios resultados positivos en el contexto deportivo. Por lo tanto, los objetivos del estudio fueron analizar la asociación entre la calidad de la relación entrenador-atleta (CAR) y la percepción de la cohesión del equipo de los atletas jóvenes. Participaron 301 atletas, de 15 a 17 años, que compitieron en los Juegos Escolares de Pernambuco, Brasil. Los instrumentos utilizados fueron el Cuestionario de Relación Entrenador-Atleta (CART-Q) y el Cuestionario de Ambiente Grupal (GEQ). El análisis de los datos se realizó a través del modelado de ecuaciones estructurales ($p < .05$). Los resultados mostraron que la calidad de la CAR mostró una asociación significativa ($p < .05$) con la cohesión del equipo, explicando el 25% de la varianza de la cohesión de la tarea y el 15% de la cohesión social. Específicamente, el efecto de CAR en la cohesión de tareas ($\beta = 0.50$) y social ($\beta = 0.39$) fue significativo ($p < .05$) y positivo. Se concluyó que la calidad de CAR es un factor clave para el compromiso del adolescente con el trabajo en equipo y las metas de este, así como para el desarrollo de relaciones interpersonales positivas.

Palabras clave: Deportes escolares, cohesión del grupo, relaciones sociales, psicología del deporte

Introduction

Studies regarding the positive youth development (PYD) highlight that the coaches contribute to the well-being of athletes, considering that the social environment favors positive thoughts as well as overcoming negative thoughts (Gaion et al., 2020; MacDonald et al., 2020; Newman et al., 2020). Thus, the coach can provide sports teams with a psychosocial environment that favors the maximum performance of athletes, optimizing the development of their physical, technical, and tactical skills (Contreira et al., 2020; Contreira et al., 2019; Jowett, 2017). In addition, the coach has a fundamental role in the emotional growth of athletes, transmitting moral values that favor PYD (Jowett et al., 2017; Jowett & Shanmugam, 2016).

Recent literature shows that the behavior of coaches in both amateur and professional sports significantly affect the performance of athletes and, especially among women; factors such as the coaches' knowledge and skills contribute to sports development (Contreira et al., 2020; Contreira et al., 2019; Jowett et al., 2017; Nascimento Junior et al., 2019a). In this perspective, the quality of the coach-athlete relationship (CAR) can be identified as one of the main mediators of sports performance (Contreira et al., 2020; Contreira et al., 2019; Jowett et al., 2017; Nascimento Junior et al., 2019a). CAR is characterized as a dynamic process of thoughts, feelings and behaviors that are mutually and causally interconnected (Jowett, 2017). The interconnection of cognitions makes it possible to verify the quality of the relationships between coaches and athletes in sports teams

(Contreira et al., 2020; Jowett, 2017; Jowett et al., 2017; Jowett & Shanmugam, 2016).

The conceptual framework that has guided research on CAR is known as 3+1 "Cs" (Jowett et al., 2012; Jowett & Poczwardowski, 2007). In this model, four dimensions are used to understand the quality of this relationship. The first dimension is *closeness*, which is understood as the feelings of respect, trust and mutual appreciation; the second is *commitment*, which refers to thoughts of connection, motivation and intention to maintain the relationship over time; the third is *complementarity*, which is understood as cooperative behaviors between coach and athlete and the responsiveness and willingness of both parts; and the last one is *co-orientation*, which refers to the interpersonal perceptions of both, athlete and coach, about reciprocity in their relationship (Jowett et al., 2012; Jowett & Poczwardowski, 2007).

In this scenario, the coach can also be considered as the main social agent to provide a favorable environment for team cohesion, since the coaches' leadership style affects not only the relationship with athletes, but also the teamwork for social coexistence and for the achievement of goals (Contreira et al., 2020; Nascimento Junior et al., 2019a). As proof of this, recent investigations have pointed out that the quality of CAR directly affects the team cohesion of sports teams and, consequently, the performance and positive development of athletes (Cheuczuk et al., 2016; Nascimento Junior et al., 2019a).

Team cohesion is a dynamic process that reflects the tendency of a group to remain united in the pursuit of

achieving its goals and satisfying the members' affective needs (Carron et al., 1985). According to Carron and Brawley (2012), team cohesion can be assessed according to the task and the social aspects. Task cohesion corresponds to the unity of the team members towards the achievement of the goals and teamwork, whilst social cohesion refers to the quality of social interactions and the tendency of the members to spend time together (Eys et al., 2019; Eys & Brawley, 2012).

Previous studies state that cohesion is a multidimensional process influenced by environmental and inherent factors to the individual (e.g., perfectionism, social relationships, leadership and self-efficacy) (Nascimento Junior et al., 2019a; Nascimento Junior et al., 2016), which can interfere in the perception of sports teams' cohesion. Thus, the coach has been appointed as an element that acts on the performance and well-being of athletes, considering that sports situations require the leader to use different behaviors in team leadership (Contreira et al., 2020; Nascimento Junior et al., 2019B). Vieira et al. (2017) investigated whether CAR is a key factor in the association between motivation and team cohesion among professional soccer players. They found that CAR influence the perception of group cohesion in the context of soccer. Jowett and Chaundy (2004) identified that CAR predicted positively team cohesion among 111 university athletes, indicating that teams with high quality of CAR tend to develop high levels of cohesion.

Although several studies have explored the association between the quality of CAR and team cohesion, few studies have been related to the quality of CAR and team cohesion in the context of Brazilian school sports, which is the gap to be explored in the present study. Therefore, one of the suggestions of recent studies is to verify the impact of the quality of CAR on other psychological variables in team sports athletes of different competitive levels (Contreira et al., 2020; Jowett & Chaudy, 2004; Nascimento Junior et al., 2019). Thus, this research can provide parameters for the creation of strategies to optimize social relationships and their importance for teamwork in youth sport. Therefore, this study aimed to analyze the association between the quality of CAR and the perception of team cohesion of youth athletes from the state of Pernambuco, Brazil. The hypothesis is that the quality of CAR will show positive effect on both task and social cohesion.

Method

Study design

The present study is defined as a descriptive methodological research with a cross-sectional design (Ato et al., 2013). The study was developed according to the guidelines of Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (Malta et al., 2010).

Participants

The study population consisted of team sports athletes, aged between 15 and 17 years, who competed in the final phase of the School Games of Pernambuco, Brazil. This competition covers students-athletes from all regions of the state, who played in the following team sports: basketball, futsal, handball, soccer, and volleyball. The minimum number of participants was decided using the finite populations equation, with a confidence level of 95%, an estimation error of 5% and an expected proportion of 50% (Richardson et al., 2014). Therefore, the participation of approximately 2500 athletes in this competition was estimated, requiring a minimum number of 333 student-athletes participants, considering possible sample losses. Then, 335 student-athletes were recruited for the study, but 35 of them were excluded for not completing the questionnaires properly. Thus, in the end, the participants were 301 athletes of both sexes (136 boys and 165 girls), with a mean age of 16.02 ± 0.83 years. The athletes were competitors of the following team sports: futsal ($n = 124$), volleyball ($n = 133$), handball ($n = 24$) and basketball ($n = 20$).

The following inclusion criteria were adopted: 1) having participated in any regional/state level competition during the 2015/2016 seasons; and 2) participating in the final phase of the 2017 Pernambuco School Games. Failure to complete the instruments was adopted as an exclusion criterion. Only the athletes who had the free consent signed by the coaches (responsible for the athletes in the event), and who verbally expressed the desire to be voluntarily included, participated of the study.

Ethical aspects

The procedures adopted in this research complied with the criteria of ethics in research with human beings according

to resolution 466/12 from the National Health Council. The present study is integrated to an institutional research project approved by the Research and Ethics Committee of the Federal University of Vale do São Francisco (protocol n. 1.648.086).

Instruments

Coach-Athlete Relationship (CAR)

The quality of the CAR was measured using the Coach-Athlete Relationship Questionnaire (CART-Q) - Athlete Version - developed by Jowett and Ntoumanis (2004) and validated for the Brazilian context by Vieira et al. (2015). It consists of 11 items divided into three subscales: Closeness (e.g., “*I respect my coach*”), Commitment (e.g., “*I am committed to my coach*”); and Complementarity (e.g., “*When I’m trained by my coach, I am at ease*”). Answers are given on a seven-point Likert type scale (1 = *strongly disagree* to 7 = *strongly agree*). Previous research has demonstrated the factorial validity, test-retest reliability, and internal consistency reliability of this scale in youth sport participants (Davis et al., 2018; do Nascimento Junior et al., 2019).

Group Environment Questionnaire (GEQ)

Created by Carron et al. (1985) and validated for the Brazilian context (Nascimento Junior et al., 2012), this questionnaire consists of 16 items in a 9-Point-Likert-type scale (1-*strongly disagree* to 9-*strongly agree*), and is divided into four dimensions: 1) IA-T = Individual Attraction to the Group-Task; 2) GI-T = Group Integration-Task; 3) IA-S = Individual attraction to the Group-Social; 4) GI-S = Group Integration-Social. Previous research has demonstrated the factorial validity, test-retest reliability, and internal consistency reliability of this scale in youth sport participants (Gordon et al., 2020; Nascimento Junior et al., 2012, 2016; Tatsumi & Tsuchiya, 2020).

Procedures

Initially, contact was made with team head coaches in order to obtain authorization for data collection. Data collection was conducted in the athletes’ accommodations in the city where the competition took place. Questionnaires were answered collectively, in a private room, without the presence of the coaches. The time to answer the questionnaires was of approximately 30 minutes and the order of

the questionnaires was randomized among participants to avoid bias.

Data analysis

Preliminary analysis

Preliminary analysis of the data was carried out by means of the Kolmogorov Smirnov normality test. Spearman’s correlation (non-parametric) was used to verify the relationship between CAR and team cohesion. Such analysis was conducted using the software SPSS v. 22.0.

Structural Equation Modeling (SEM)

The main analysis involved SEM, using AMOS 22.0. The hypothetical model verified the existence of three latent factors (CAR, social cohesion, and task cohesion) from the dimensions of the questionnaires. Thus, the assumptions described in the hypothetical model were tested by the SEM, in order to verify how CAR affects the perception of team cohesion in the context of school sport. SEM was tested according to the two-step method: the first step specified and identified the measurement model, performing a confirmatory factor analysis (CFA) of the measurement model; and the second step specified and identified the structural model, establishing paths and errors for endogenous variables (Marôco, 2010). The model fit was analyzed according to the adjustment indexes and the local adjustment was evaluated by the factorial loadings and the reliability of the items. The maximum likelihood estimation method was used.

The verification of the existence of outliers was performed using the square distance of *Mahalanobis* (D^2). Considering that the analysis of normality by the Kolmogorov-Smirnov test is greatly influenced by the discrepant values (outliers), the univariate distribution through asymmetry ($ISkI < 3.0$) and kurtosis ($IKuI < 10$), and the multivariate distribution (Mardia’s coefficient for multivariate kurtosis) (Marôco, 2010) were also evaluated. The model adequacy indicators (absolute, incremental and parsimonious adjustments) were: χ^2/df (values between 1.0 and 3.0 are satisfactory), RMSEA (lower than 0.08) and GFI/CFI/TLI (close to 0.95) (Kline, 2012). The interpretation of the paths had as reference: small effect for paths < 0.20 , medium effect for paths up to 0.49 and large effect for paths > 0.50 (Kline, 2012). The significance level adopted was $p < .05$.

In order to identify the invariance of the structural model across boys and girls, an appropriate adequacy model was initially defined for each sex. After obtaining the factors, they were simultaneously subjected to a multi-group analysis (with *emulisrel6* correction) that aimed to perform a progressive set of constraints (factor loadings, variances and covariances), in order to analyze the equivalence of the instrument for different subgroups (boys vs. girls).

Results

Preliminary analysis

Table 1 presents the means, standard deviations, scale ranges, reliability coefficients, and correlations for all variables. From Table 1, the mean scores on the 1–7 response scale of the CART-Q revealed that players perceived they were developing their CAR in the sports. The mean scores from highest to lowest were as follows: *closeness* (M = 6.60, SD = .69), *complementarity* (M = 6.41, SD = .73), and *commitment* (M = 6.17, SD = .86). From Table 1, it can be seen that the mean scores on the 1–9 response scale of the GEQ revealed that players perceived they were developing their team cohesion. The mean scores from highest to lowest were as follows: IA-T (M = 7.90, SD = 1.50),

GI-T (M = 7.78, SD = 1.36), IA-S (M = 7.51, SD = 1.33), and GI-S (M = 6.22, SD = 1.73).

From Table 1, it can also be observed the statistically significant correlations between the study variables which are discussed below. The correlations revealed that *closeness* was positively associated with IA-T, GI-T, IA-S, and GI-S (r range = .28 to .45); *commitment* was positively associated with IA-T, GI-T, IA-S, and GI-S (r range = .30 to .43); and *complementarity* was positively associated with IA-T, GI-T, IA-S, and GI-S (r range = .36 to .50).

Lastly, Table 1 shows the Cronbach's alpha coefficients for each subscale. The alpha values for all subscales of the study ranged from .71 to .82, indicating acceptable internal consistency reliability.

The measurement model (Step 1) presented acceptable fit [χ^2 (11) = 25.66; p = 0.012; χ^2/df = 2.29; CFI = 0.98; GFI = 0.98; TLI = 0.97; RMSEA = 0.07; p (RMSEA < 0.05) = 0.231]. The quality of the local adjustment and the internal reliability of the items were also confirmed, with all paths obtaining significant factorial loadings (p < .05) and higher than 0.50. Then, the hypothetical model was analyzed (Step 2). The tested model (Figure 1) presented satisfactory fit [χ^2 (11) = 24.34; p = 0.011; χ^2/df = 2.21; CFI = 0.99; GFI = 0.98; TLI = 0.98; RMSEA = 0.06; p (RMSEA < 0.05) = 0.226].

Both latent variables task and social cohesion were explained in 25% and 15%, respectively, by the quality

Table 1

Correlation between the dimensions of CAR and the perception of team cohesion of youth athletes from the State of Pernambuco, Brazil

Variables	CAR				Team Cohesion		
	1	2	3	4	5	6	7
1. Closeness		0.67*	0.71*	0.42*	0.45*	0.33*	0.28*
2. Commitment			0.69*	0.38*	0.43*	0.34*	0.30*
3. Complementarity				0.50*	0.50*	0.36*	0.37*
4. IA-T					0.67*	0.55*	0.44*
5. GI-T						0.57*	0.52*
6. IA-S							0.61*
7. GI-S							
Mean	6.60	6.17	6.41	7.90	7.78	7.51	6.22
Standard deviation	0.69	0.86	0.73	1.50	1.36	1.33	1.73
Scale Range	1-7	1-7	1-7	1-9	1-9	1-9	1-9
α	.76	.79	.75	.82	.72	.71	.79

*Significant correlation – p < .05. Note: IA-T = Individual Attraction to the Group-Task; GI-T = Group Integration-Task; IA-S = Individual Attraction to the Group-Social; GI-S = Group Integration-Social.

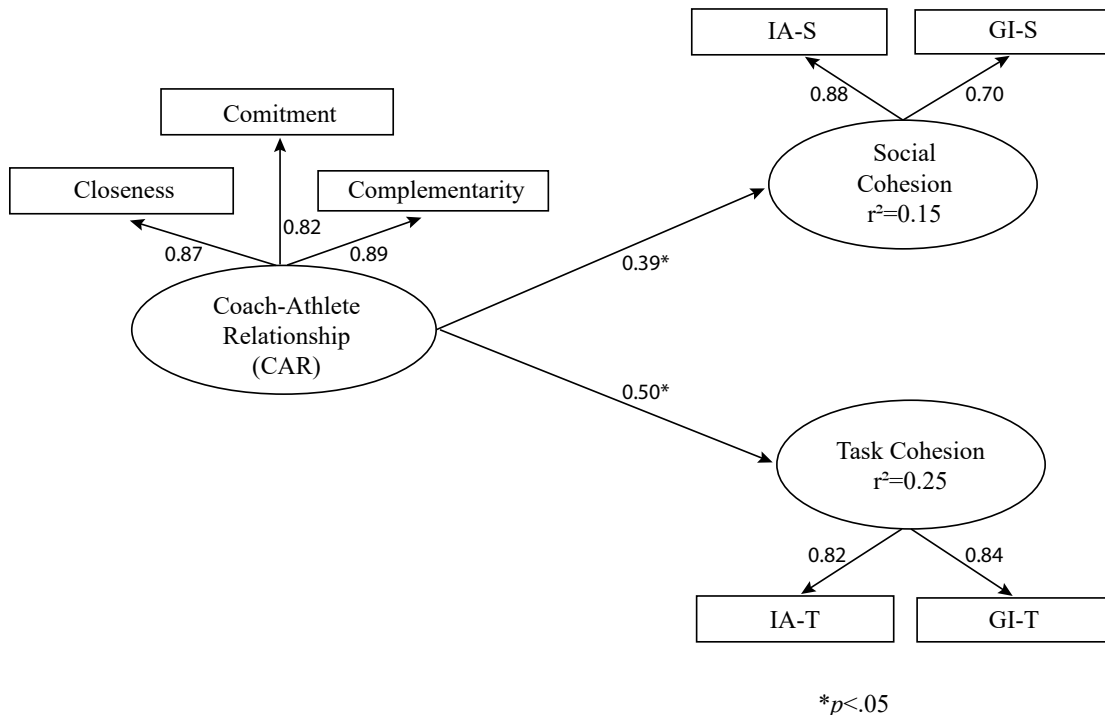
of CAR (Figure 1). In the direct relationship established between the quality of CAR and the task and social cohesion, the effects were significant ($p < .05$) and positive ($\beta = 0.50$ and $\beta = 0.39$), indicating that with each increase of 1 standard deviation in the unit of quality of CAR there is an increase of 0.50 and 0.39 standard deviation in the unit of task and social cohesion, respectively. In addition, the analysis of the Bias-corrected confidence interval generated by Bootstrap replication revealed a significant effect of CAR quality on both social and task cohesion. These findings suggest that a positive relationship with the coach, mainly based on admiration, respect, trust and affiliation, favors the engagement of the adolescent with the teamwork and the goals as well as the development of friendships within the group.

According to the analytical procedures recommended by the literature (Kline, 2012; Marôco, 2010), an invariance analysis was performed in order to investigate the degree to which the final model presents equivalence regarding sex (boys and girls).

When analyzing the configurational invariance of the structural model between boys and girls ($\chi^2(22) = 46.26$; $\chi^2/df = 2.10$ CFI=0.98; GFI=0.96; AGFI=0.91; TLI=0.96; RMSEA=0.06; $P(\text{rmsea} < 0.05) = 0.22$), it was observed that the model showed adequate fit between boys and girls, indicating that the proposed structure remains stable for different sexes. That is, the same model has satisfactory adjustment for both boys and girls. It was found that the constrained model with fixed factor loadings in athletes (boys x girls) did not present a significantly worse adjustment than the model with free parameters ($\chi^2_{diff}(4) = 2.35$; $p = 0.671$). In other words, the model with fixed factorial weights fits as well to both groups as the model with free parameters, thus evidencing the metric equivalence of the weights of measure of the structural model among athletes of both sexes. In addition, the structural invariance of the model was also obtained ($\chi^2_{diff}(6) = 2.96$; $p = 0.814$), demonstrating that the levels of correlation between factors and structural weights are the same for both groups. Thus, the configurational, metric, and structural invariance of the model in both groups is demonstrated.

Figure 1.

Structural model of the association between the quality of CAR and the perception of team cohesion of youth athletes from the State of Pernambuco, Brazil



Discussion

This study aimed to analyze the association between the quality of CAR and the perception of team cohesion of youth athletes from the state of Pernambuco, Brazil. The literature has demonstrated the relevance of these psychological variables in the context of Sport Psychology. The results of this investigation may provide new information for future studies involving CAR and team cohesion in school sports.

The results show the influence of the quality of CAR on the perception of team cohesion among youth athletes, especially focused on the task. This result confirms our hypotheses, reinforcing the importance of a quality relationship with the coach to promote team unity in pursuit of performance-oriented goals. The literature points out that team cohesion is an essential variable for the performance of a team, because it is a transforming agent of the ambition of youth athletes in an integrated and winning team (Eys et al., 2019; Eys & Brawley, 2018; Tatsumi & Tsuchiya, 2020). In this way, the coach could manage the group in pursuit of the goals, transmitting to young athletes' principles and values that favor the positive development of young people (Gaion et al., 2020; MacDonald et al., 2020).

When analyzing the relationship between CAR quality and team cohesion, all dimensions of the two variables presented linear relationships. The task-oriented dimensions of team cohesion showed higher significant correlations. These results reveal that athletes who perceived themselves as close, committed and with greater affiliation with their coaches, developed greater individual attraction and perception of group integration in the pursuit of achieving the best performance (Nascimento Junior et al., 2019a; Nascimento Junior et al., 2019b). There were also slightly lower values in the correlations between the dimensions of CAR and social cohesion. However, these relationships still indicated that feelings of affiliation, engagement and affective attachment with the coach contributed to attraction and integration in performing social activities outside competitions (Contreira et al., 2020; Contreira et al., 2019; Davis et al., 2018).

The student-athletes in this study presented high levels of CAR, demonstrating feelings of trust, respect, intention to continue in the relationship and cooperation with their

coaches. Such findings reveal a favorable group environment for PYD (MacDonald et al., 2020; Newman et al., 2020). The continued preparation of these teams and the intention of maintaining CAR and team cohesion may result in positive sporting experiences that could reduce dropout in sport (Contreira et al., 2020; Nascimento Junior et al., 2019a). Hampson and Jowett (2014) point out that positive perception of CAR can favor the development of youth athletes' personal skills.

Young athletes also showed high scores on both task and social cohesion. According to Eys and Brawley (2018), high levels of team cohesion enable better performance and success of sports teams. A previous study conducted by Bruner et al. (2013) pointed out that team cohesion is a relevant social factor that models the behavior of youth athletes, favoring continuity in sport and the development of interpersonal skills. Nascimento Junior et al. (2019b), studying high-performance Brazilian futsal athletes, found similar results to those of this study, but with slightly higher values than those found with youth athletes of the state of Pernambuco. This difference could be related to the influence of environmental, personal, leadership and team factors, as pointed out by the literature (Eys et al., 2019; Eys et al., 2017; Eys & Brawley, 2018).

Finally, although the results of this study provide important contributions to the literature regarding the association between the quality of CAR and team cohesion in the context of school sport in the Northeast region of Brazil, some limitations need to be considered. First, students from only one state of Brazil (Pernambuco) were recruited for the study, which does not represent the whole reality of the country and make impossible to generalize the results for the whole of Brazil. However, the sample can be considered relevant because the analysis was performed with youth athletes participating in the main school competition of the state of Pernambuco. Another limitation refers to the design used to analyze the association between the quality of CAR and team cohesion, since the results are based on a cross-sectional design, not allowing causality inferences. Finally, the lack of individual sports in the competition in which data collection was carried out did not allow comparisons across groups and the behavior of the variables according to each type of sport. Thus, future investigations should continue exploring the relationships between

these variables, analyzing players from other regions of the country, of other sports and the use of a longitudinal design, in order to establish new evidence about the impact of the quality of CAR on the perception of team cohesion of youth athletes over time.

Conclusion

It can be concluded that, in the context of Brazilian school sport, the quality of CAR has a key role in the perception of athletes' team cohesion. It can be considered a potential facilitator of unity for teamwork and their goals, as well as for interpersonal relationships within the team. This result is even more relevant to the sports context of the Northeast region of Brazil, since many athletes from this region arrive at clubs and achieve high performance through school sports. As practical implications, the findings provide empirical support for the development of interventions based on high-quality social relationships to promote greater engagement within the team goals as well as to maintain those positive relationships.

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