
Predicting Perceived Sport Performance via Self-Determination Theory

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Abstract

Sport performance depends in part on psychological factors. Self-determination theory emphasizes that the satisfaction of basic psychological needs and autonomous motivation may be linked to positive behavioral results and positive perceptions of performance. Our main objective in this study was to analyze the predictive power of such variables as perceived autonomy support, the satisfaction of psychological needs, and autonomous motivation on perceived sport performance. We recruited 447 young Portuguese athletes/participants (340 males, 107 females; *Age* = 15.72 years, *SD* = 1.8). We had participants complete Portuguese sport versions of the Perceived Autonomy Support Exercise Climate Questionnaire, the Basic Psychological Needs in Exercise Scale, the Behavior Regulation Sport Questionnaire and the Perceived Performance in Sport Questionnaire. A gender invariant structural equation model showed that the coach's autonomy support significantly predicted the satisfaction of psychological needs for autonomy, competence, and relatedness. The satisfaction of these three psychological needs predicted autonomous motivation. Satisfying the need for competence positively predicted perceived sport performance, but autonomous motivation was not significantly related to perceived performance.

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Keywords

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Introduction

Sport performance is determined by a complex interaction of variables that particularly include physiological, biomechanical and tactical considerations (Glazier, 2015). A competitive athlete's success will be linked to varied skills associated with performance in their chosen sport (e.g. reaching a position, improving a personal record, winning a championship or a league, etc.). In recent decades, coaches, professionals and research investigators have shown interests in identifying these main performance indicators, so that they might be incorporated within the training schedule to improve the athletes' performance (Butterworth et al., 2013; Hughes & Barlett, 2002; Mackenzie & Cushion, 2013). Psychological factors are relevant to sport performance, not only for their direct impact, but also as a mediator between the athlete's physical, technical and tactical skills and their performance in competition (Anderson et al., 2014; Arthur et al., 2017; Olmedilla et al., 2018). Thus, the study and manipulation of these variables can contribute to optimizing athletic performance (Gimeno et al., 2007; MacNamara et al., 2010).

To date, various studies have found motivation to be linked to sport performance (e.g., Abdullah et al., 2016; Gillet et al., 2009; Gómez-López et al., 2013). In fact, as Clancy et al. (2016) reported in their review, motivation is a fundamental construct for the precise analysis of the athlete's behavior, training process, and performance. One of the motivational theories that has best helped to understand athletes' cognitive, behavioral, and emotional patterns has been self-determination theory (SDT; Deci & Ryan, 1985, 2000, 2012; Ryan & Deci, 2000, 2017). SDT research (e.g., Ryan & Deci, 2017) has established the following sequence of motivational influencing factors: (a) The interpersonal style of the coach (autonomy support or controlling style); (b) satisfaction/thwarting of the athlete's psychological needs; (c) sub-categories of controlled and autonomous motivation) and (d) motivational consequences (including sport performance). More specifically, this theory assumes that environmental factors can facilitate or forestall more autonomous forms of motivation (Ryan & Deci, 2000), by satisfying or thwarting basic psychological needs (Deci & Ryan, 2000). According to SDT (Deci & Ryan, 2002), the three basic psychological needs are competence (a feeling of confidence and effectiveness in action), autonomy (a perception that you are the origin and the source of your own behavior) and relatedness (feeling connected to others). These three basic psychological needs explain the regulation of human behavior along a motivational continuum, ranging from no regulation or lack of intention to act (amotivation) to the most controlled forms of motivation, which are external and introjected regulation, leading to the most autonomous forms of motivation: identified regulation, integrated regulation and intrinsic regulation (Deci & Ryan, 2000; 2008).

In SDT (Deci & Ryan, 2000; Ryan & Deci, 2017), the athlete's behavior regulation type establishes different forms of motivation, ranging from lower to higher degrees of relative autonomy. Thus, the athlete may show controlled motivation (i.e., external regulation and introjected regulation) and autonomous motivation (i.e., identified regulation, integrated regulation and intrinsic motivation). An athlete might practice sport because of external pressures (external regulation), feelings of guilt (introjected regulation), an understanding of its health benefits (identified regulation) or as an integral aspect of their lifestyle (integrated regulation). Optimally, a motivated athlete might intrinsically perform for the inherent satisfaction and pleasure of the activity itself (Deci & Ryan, 2000). Autonomous motivation is an important predictor of positive sport outcomes, and it is formed by intrinsic motivation and identified/integrated forms of extrinsic motivation (Ryan & Deci, 2017). Intrinsically motivated behavior truly comes from within the self. In the case of identified or integrated motivation, the individual comes to accept that certain behavior is personally relevant (Ryan & Deci, 2002). SDT research in the sport context, has shown that autonomous motivation (e.g., Almagro et al., 2010; Monteiro, Teixeira, et al., 2018) has more positive consequences than controlled motivation (e.g., Ntoumanis & Standage, 2009; Ramis et al., 2017).

In the scientific literature one can find many studies that used the theoretical framework of SDT in the sport context; and, in this work, investigators have analyzed various motivational consequences, such as psychological well-being (Balaguer et al., 2008; Gagne' et al., 2003; Jowett et al., 2017), flow (Montero-Carretero et al., 2015), sporting commitment (Pulido et al., 2018), intention to continue practicing (Guzma'n & Kingston, 2012; Sarrazin et al., 2002), and the positive associations between performance and the perception of effort (e.g., Gillet et al., 2012; Monteiro, Teixeira, et al., 2018; Pope & Wilson, 2012, 2015). This is exemplified by previous studies, in football (Álvarez et al., 2012), swimming (Pelletier et al., 2001), rugby (Pope & Wilson, 2012), handball (Sarrazin et al., 2002), and other individual and team sports (Guzma'n & Kingston, 2012).

In line with SDT (Deci & Ryan, 1985; 2000), Mageau and Vallerand (2003) developed a motivational model of the athlete-coach relationship. This model suggests that the personal orientation of the coach to training, the training context, and the athlete and coach's perceptions of the athletes' behaviors and motivation, will influence the coach's training behavior (the interpersonal style of the coach) to favor the athlete's autonomy and positively influence the satisfaction of the athlete's basic psychological needs of autonomy, competence and relatedness. This will lead, in turn, to developing an athlete's intrinsic motivation and the athlete's more self-determined extrinsic motivation type in athletes (that is, autonomous motivation). Several studies (Almagro et al., 2010; Pope & Wilson, 2015; Pulido et al., 2018) have supported this model, with data showing that the coaching style of interpersonal autonomy support significantly predicts the satisfaction of the basic psychological needs and, in turn, autonomous motivation.

Although various studies have addressed these variables, few have tested the complete motivational sequence proposed by both SDT and the motivational model of the athlete-coach relationship while using as a result, the athlete's perceived performance. Therefore, our main objective in this research was to study the predictive power of autonomy support on the athletes' basic psychological needs, their autonomous motivation, and their perceived performance. Based on this objective and on prior research results (Almagro et al., 2020; Gillet et al., 2010; Jowett et al., 2017; Pope & Wilson, 2012; 2015; Pulido et al., 2018), we formulated the following hypothesis: The coach's autonomy support, the satisfaction of basic psychological needs, and autonomous motivation will significantly predict the athletes' perceived performance. In addition, based on the differences found in some studies on the athlete's motivation as a function of gender (Amado et al., 2014; Deaner et al., 2016; Fortier et al., 1995), we sought to analyze the separate influence of the athlete's gender in the proposed structural equation model.

Method

Participants

We recruited a convenience sample of 447 young athletes who competed regionally and nationally during the 2016/2017 season on teams from Alentejo (Portugal) in various sports: handball ($n = 41$), basketball ($n = 50$), football ($n = 172$), futsal ($n = 54$), roller hockey ($n = 15$), volleyball ($n = 22$), athletics ($n = 16$), canoing ($n = 16$), gymnastics ($n = 8$), judo ($n = 3$), karate ($n = 14$), swimming ($n = 12$), figure skating ($n = 14$) and tennis ($n = 10$). Athletes ranged in age from 13 to 20 years old (M age = 15.72, $SD = 1.80$). There were 340 male athletes (76.1%) and 107 female athletes (23.9%).

Prior to data collection, we obtained approval for the research protocol from the Ethics Committee of the Instituto Polite'cnico de Beja (Beja, Portugal), and we obtained separate informed consent from the sport clubs, the coaches, the athletes, and the parents of all underage athletes.

Measures

Autonomy Support. To measure the levels of the athletes' self-perceived autonomy support, we used the Portuguese version (Moutão, Cid, Leitão, & Alves, 2012) of the Perceived Autonomy Support Exercise Climate Questionnaire, which is a version of the original Perceived Autonomy Support: Health Care Climate Questionnaire (Williams et al., 1996) adapted to the context of physical exercise by Edmunds et al. (2006). The items were preceded by the phrase "I feel like my coach ". This questionnaire is made up of six items (e.g., " listens to how I would like to do things"), which result in a single factor that evaluates the athlete's perception of the autonomy support given by the coach. The answer is given on a Likert 1–7 scale, with the option, "Strongly

disagree” corresponding to the value 1 and “Completely agree” to the value 7. Internal consistency obtained on this instrument was .85.

Basic Psychological Needs. To measure basic psychological needs, we used the Portuguese version (BPNEsp, Moutão, Cid, Leitão, Alves, et al., 2012) of the Basic Psychological Needs in Exercise Scale (Vlachopoulos & Michailidou, 2006). This instrument consists of 12 items that are answered on a five level Likert scale, ranging from 1 (Strongly disagree) to 5 (Completely agree). The phrase “In training, usually...” preceded all items, grouped along three dimensions (with four items on each) reflecting SDT satisfaction of the three basic psychological needs (Deci & Ryan, 1985; 2000): autonomy (e.g., “...I feel that I have the opportunity to make choices with regard to the way I exercise”), competence (e.g., “...I feel I have made a lot of progress in relation to the goal I want to achieve”) and relatedness (e.g., “...I feel comfortable with the people I exercise with”). The reliability of the three dimensions of these measurements was calculated with the Cronbach’s alpha, yielding the following values: .71 for autonomy, .76 for competence and .83 for relatedness with others.

Autonomous Motivation. To assess the participants’ intrinsic regulation, integrated regulation and identified regulation factors we used sub-scales of the Portuguese version (Monteiro et al., 2013) of the Behavior Regulation Sport Questionnaire (Lonsdale et al., 2008). This questionnaire has been used in other studies (Monteiro et al., 2014) and has recently been re-tested (Monteiro, Moutão, & Cid, 2018). The preceding phrase for each item was, “I participate in my sport...”. Each factor consisted of four items measuring intrinsic regulation (e.g., “...because it’s fun”), integrated regulation (e.g., “...because what I do in sport is an expression of who I am”) and identified regulation (e.g., “...because the benefits of sport are important to me”). The questionnaire items were answered on a Likert scale, ranging from 1 (Strongly disagree) to 7 (completely agree). In this investigation, reliability was appropriate for the various factors ($\alpha > .7$), with a Cronbach’s alpha of .77 obtained for intrinsic regulation, .89 for integrated regulation, .80 for identified regulation and .96 for autonomus motivation.

Perception of Sport Performance. To measure the athletes’ perceptions of their own sport performance, we used the previously validated “*Questionário de Percepção do Rendimento no Desporto*” (Perceived Performance in Sport Questionnaire) (Lourenço et al., 2018). This instrument consists of five items of a single factor (e.g., “I believe my performance is good”). All items are given on a Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree) with the following phrase preceding each item, “In general, when I practice my sport during competition...” The Cronbach’s alpha for this scale’s reliability was found to be .88 (Lourenço et al., 2018); and in separate research, the Spanish version of the questionnaire also obtained good psychometric properties (Almagro et al., 2020).

Procedure

The administration of these questionnaires took place with the principal investigator present, to give a brief explanation of the purpose of the study, to tell them how to fill out the instruments and to resolve any doubts that might arise during the process. Emphasis was placed on the anonymity of participant responses and on the honest answering and reading of each item. Similarly, emphasis was placed on the voluntary nature of participation. The time required to complete the questionnaires was approximately 20 min.

Data Analyses

First, we refined the data matrix and calculated the internal consistency of the study instruments and variables. Subsequently, we calculated descriptive statistics of the variables and the bivariate correlations. We tested the hypothesized structural equation model in two steps. The first step was to create a measurement model in which the six latent variables were correlated, and the second step was to prepare a structural equation model to analyze the hypothesized relationships between these variables. To verify the validity of the measurement model, we considered the following goodness-of-fit indices: the ratio between chi-squared and degrees of freedom ($\chi^2/g.l.$), the CFI (Comparative Fit Index), the IFI (Incremental Fit Index), the SRMR (Standardized Root Mean Square Residual) and the RMSEA (Root Mean Square Error of Approximation). Finally, to check if the proposed structural model was gender invariant, we conducted a multi-group analysis. These different analyses were carried out with the Statistical Package for the Social Sciences (SPSS, version 25.0, IBM Corporation, Amonk, N.Y.) and SPSS Analysis of Moment Structures (AMOS, version 25.0, IBM Corporation, Amonk, N.Y.).

Results

Descriptive Statistics and Bivariate Correlations

The descriptive statistics and the bivariate correlations between the study variables are given in [Table 1](#). The highest average score for the young athletes was for integrated regulation and the lowest score was for perceived performance. For the bivariate correlations, all the variables were significantly positively correlated to each other.

Structural Equation Model

As noted above, we tested the hypothesized structural equation model in two steps. The first step was to prepare a measurement model in which the six latent variables were correlated (interpersonal autonomy support style, satisfaction of the basic psychological needs of autonomy, competence and relatedness with others, autonomous

Table 1. Descriptive Statistics and Bivariate Correlations of the Study Variables.

Variables	<i>M (SD)</i>	R	1	2	3	4	5	6	7	8	9
1. Autonomy support	5.50 (.92)	1-7	-	.52**	.51**	.40**	.56**	.49**	.53**	.43**	.57**
2. Autonomy	3.89 (.66)	1-5	-	-	.52**	.35**	.35**	.27**	.36**	.42**	.35**
3. Competence	4.09 (.53)	1-5	-	-	-	.36**	.51**	.46**	.44**	.65**	.51**
4. Relatedness	4.57 (.56)	1-5	-	-	-	-	.43**	.37**	.41**	.34**	.44**
5. Intrinsic motivation	6.08 (.75)	1-7	-	-	-	-	-	.80**	.81**	.40**	.97**
6. Integrated regulation	6.11 (.95)	1-7	-	-	-	-	-	-	.70**	.43**	.87**
7. Identified regulation	6.08 (.87)	1-7	-	-	-	-	-	-	-	.40**	.87**
8. Perceived performance	3.86 (.70)	1-5	-	-	-	-	-	-	-	-	.43**
9. Autonomus motivation	6.20 (.78)	1-7	-	-	-	-	-	-	-	-	-

Note. ** $p < .01$; *M* = Mean; *SD* = Standard deviation; R = Rank.

motivation, and perceived performance), as grouped into a total of 26 observed measurements. We then found the indices of the measurement model to be appropriate: $\chi^2 (284, N = 447) = 773.51, p = .00, \chi^2/d.f. = 2.61, CFI = .92, IFI = .93, SRMR = .06, RMSEA = .06$.

The second step was to analyze the existing predictive relationships between the study variables through a structural model that hypothesized that the coach's autonomy support would positively predict satisfaction of the basic psychological needs of autonomy, competence, and relatedness with others. Likewise, we expected those psychological mediators to predict autonomous motivation, and we expected that autonomous motivation would be positively related to perceived performance in sport. However, as this model did not show adequate fit indices: $\chi^2 (292, N = 447) = 995.91, p = .00, \chi^2/d.f. = 3.41, CFI = .88, IFI = .88, SRMR = .10, RMSEA = .07$, we added a direct relationship between satisfying the basic need for competence and perceived performance, and we eliminated the relationship between autonomous motivation and perceived performance since this relationship was not statistically significant. After these changes, the indices of the measurement model were appropriate: $\chi^2 (292, N = 447) = 843.36, p = .00, \chi^2/g.l. = 2.89, CFI = .91, IFI = .91, SRMR = .07, RMSEA = .06$.

As can be seen in [Figure 1](#), the results of the analysis of the structural equation model showed that the perception of an interpersonal style of autonomy support positively predicted the satisfaction of the three basic psychological needs (autonomy, competence and relatedness) of the athletes. In turn, the satisfaction of autonomy, competence and relatedness needs predicted autonomous motivation with an explained variance of 45%. On the other hand, the satisfaction of the need for competence predicted perceived performance in sport with an explained variance of 61%.

Gender Invariance Analysis

To check if the structural equation model was gender invariant, we conducted a multi-group analysis after dividing the participant sample into males ($n = 340$) and females ($n = 107$). The results ([Table 2](#)) showed that five of the six models (models 1, 2, 3, 4 and 5) gave good adjustment indices, with no significant differences between the unrestricted model (model 1) and models 2, 3 and 4 (with restrictions). This provides strong support for the model's gender invariance.

Discussion

This investigation was designed to analyze the predictive power of variables such as the coach's autonomy support, the satisfaction of psychological needs and autonomous motivation on athletes' self-perceived performance in sport. There are few studies, to date, that have shown the relationships analyzed between these variables within the Portuguese sport context. The results of our structural equation model showed that the coach's autonomy support predicted satisfaction of the psychological needs for autonomy, competition and relationship. The satisfaction of the three psychological needs

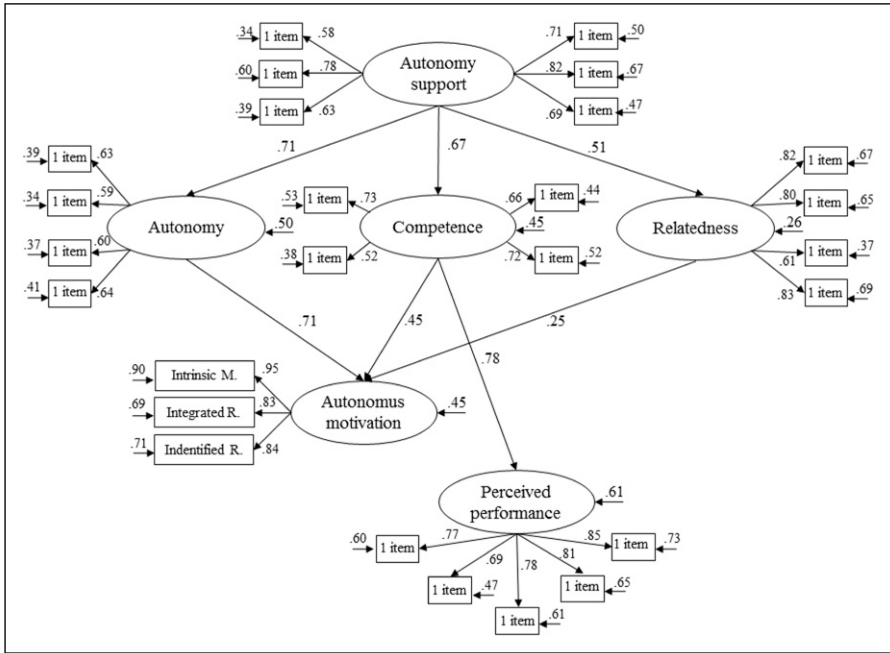


Figure 1. Structural Equation Model of the Relationships Between Interpersonal Autonomy Support Style, Satisfaction of the Three Basic Psychological Needs, Autonomus Motivation, and the Athletes' Perceived Performance. Note: All regression weights were standardized and statistically significant. The explained variances are given next to the smaller arrows pointing to the left.

Table 2. Multi-Group Analysis of Model Invariance for Gender.

Models	χ^2	g.l	$\chi^2/g.l$	$\Delta \chi^2$	$\Delta g.l$	CFI	IFI	RMSEA	SRMR
Model 1	1178.29	584	2.02	—	—	.90	.90	.05	.06
Model 2	1196.70	604	1.98	18.41	20	.90	.90	.05	.06
Model 3	1216.97	611	1.99	38.68	27	.90	.90	.05	.07
Model 4	1216.97	612	1.99	38.68	28	.90	.90	.05	.07
Model 5	1226.80	617	1.99	48.51*	33	.90	.90	.05	.07
Model 6	1290.71	643	2.01	112.42**	59	.89	.89	.05	.08

Note. Model 1 = no restrictions; Model 2 = invariant measurement weights; Model 3 = invariant structural weights; Model 4 = invariant structural covariances; Model 5 = invariant structural residues; Model 6 = invariant measurement residues; * $p < .05$; ** $p < .01$.

predicted autonomous motivation. In addition, the need for competition positively predicted perceived performance among these Portuguese athletes, giving an explained variance of 61%.

Our results reveal the importance of a coach generating a climate of autonomy support sufficient to meet the basic psychological needs suggested by SDT and demonstrated by the motivational model of the athlete-coach relationship (Mageau & Vallerand, 2003) and numerous other studies (Adie et al., 2008; Gonza'lez et al., 2016; Pope & Wilson, 2012; 2015; Qusted et al., 2013). These results are consistent with previous research in sport (e.g., Conroy & Coatsworth, 2007; Gillet et al., 2010; Pelletier et al., 2001) and exercise (e.g., Edmunds et al., 2006; Mossman et al., 2022) that have shown that perceived autonomy support was positively linked to the most autonomous forms of motivation.

In addition, as stated in our hypothesis, satisfying basic psychological needs predicted autonomous motivation, as was found in other studies too (Monteiro, Teixeira, et al., 2018; Pulido et al., 2018). However, we could not fully confirm the hypothesized model since autonomous motivation did not predict the athlete's perceived performance as had occurred in some past studies (Almagro et al., 2020; Claver, Jimé'nez, Conejero, et al., 2015; Gillet et al., 2009; Pope & Wilson, 2015) but not in others (Claver, Jimé'nez, Del Villar, et al., 2015), including one prior study that even found a negative relationship (Chantal et al., 1996). More research is needed to resolve these mixed results.

We did find that satisfaction of the athlete's need for competence predicted perceived performance. Sheldon et al. (2013) found that satisfying the need for competence was a strong predictor of performance (number of throws scoring 1 and 2 points) in basketball players. Thus, it seems that satisfying the basic need for competence can help the perceived performance to be more positive and can help athletes achieve greater autonomous motivation, with all the consequences associated with it, such as well-being (Balaguer et al., 2008), effort (Monteiro et al., 2014, 2018; Pope & Wilson, 2012), and intention to continue practicing (Guzma'n & Kingston, 2012; Sarrazin et al., 2002).

As for our second hypothesis, we found our structural equation model to be gender invariant. Thus, the relationships described between the variables in the structural equation model was similar for male and female athletes, as had already been shown by a previous study on psychosocial factors that are associated with sport participation in adolescents (Castillo et al., 2004). This gender invariance makes sense as does the idea that satisfying psychological needs predicts autonomous motivation. Of note, however, some past studies have shown gender differences in the type of motivation and the satisfaction of the need for competence in favor of male athletes (e.g., Amado et al., 2012).

Limitations and Directions for Futher Research

This study's limitations include its correlational nature, meaning that we cannot infer causal relationships between these variables. However, our work is a first step toward providing an explanatory model of possible relationships between different motivational variables and the athlete's perceived performance, and it may initiate sport

interventions to improve athletes' self-perceived performance through strategies to encourage autonomy support in which the athlete's free choice minimizes performance pressure and encourages experimentation and autonomous behavior of the athlete. On the other hand, due to the problem of equivalent models associated with the technique of structural equations (Hershberger, 2006), our proposed model is one of many possible ones that may apply, and further research will be necessary to discover the one with the best fit. Another limitation is that our use of self-report to determine perceived performance may not fully capture the complexity of athletes' behaviors (Meredith et al., 2018).

Conclusion

In this study, we tested an SDT-inspired structural equation model in which autonomy support predicted the satisfaction of basic psychological needs and the autonomous motivation of young, non-professional athletes in group and individual sports. Finally, the satisfaction of the athletes' need for competence predicted the young athletes' self-perceived performance, and the model was gender invariant. Implications of these results are that the coach's autonomy support is very important to satisfying athletes' psychological needs, and satisfying the need for competence is important to predicting autonomous motivation and perceived performance.

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Author Contributions

J. L. was responsible for conducting the study process, collaborating in the design of the study, collecting the data, conducting a preliminary analysis and writing part of the manuscript. B. J. A. collaborated in the design of the study, was responsible for carrying out the analysis of the data and writing the results, collaborated in writing various sections of the manuscript and has reviewed the final version. J. C-M. has reviewed the analysis and results of the study, has collaborated in the writing of the manuscript. P. S-L. had primary responsibility for the design of the study, collaborated in the writing of the article and reviewed the final version. All the authors collaborated significantly in the preparation of the manuscript and have given their approval to the final version of the article.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical Approval

Prior to data collection, we obtained approval for the research protocol from the Ethics Committee of the Instituto Politécnico de Beja (Beja, Portugal), and we obtained separate informed consent from the sport clubs, the coaches, the athletes, and the parents of all underage athletes.

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