

Research article

Prediction of sport adherence through the influence of autonomy-supportive coaching among Spanish adolescent athletes

Bartolomé J. Almagro ¹✉, Pedro Sáenz-López ¹ and Juan A. Moreno ²

¹ Faculty of Educational Sciences, University of Huelva, Spain, ² Faculty of Sociosanitary Sciences, Miguel Hernández University of Elche, Spain.

Abstract

The purpose of this study was to test a motivational model of the coach-athlete relationship, based on self-determination theory and on the hierarchical model of intrinsic and extrinsic motivation. The sample comprised of 608 athletes (ages of 12-17 years) completed the following measures: interest in athlete's input, praise for autonomous behavior, perceived autonomy, intrinsic motivation, and the intention to be physically active. Structural equation modeling results demonstrated that interest in athletes' input and praise for autonomous behavior predicted perceived autonomy, and perceived autonomy positively predicted intrinsic motivation. Finally, intrinsic motivation predicted the intention to be physically active in the future. The results are discussed in relation to the importance of the climate of autonomy support created by the coach on intrinsic motivation and adherence to sport by adolescent athletes. Further, the results provide information related to the possible objectives of future interventions for the education of coaches, with the goal of providing them with tools and strategies to favor the development of intrinsic motivation among their athletes. In conclusion, the climate of autonomy support created by the coach can predict the autonomy perceived by the athletes which predicts the intrinsic motivation experienced by the athletes, and therefore, their adherence to athletic practice.

Key words: Autonomy support, perceived autonomy, intrinsic motivation, sport adherence.

Introduction

Adolescence is a key period for young athletes to commit to becoming regular participants of physical activity, or on the other hand, completely abandon it (Boiché and Sarrazin, 2009; Cervelló et al., 2007; Fraser-Thomas et al., 2008). Training and competition can be an ideal context to foster the adolescent's athletic engagement, but for that, it is necessary that the young athlete be motivated. Along these lines, the majority of scientific studies confirm that motivation is key for achieving adherence to physical activity or athletic practice (Moreno et al., 2007; Sarrazin et al., 2002; Ulrich-French and Smith, 2009). Further, in sport, it has been widely demonstrated that the figure of the coach plays a necessary role in the behavior and the motivation of his or her athletes (Adie et al., 2008; Ballaguer et al., 2008; Conroy and Coatsworth, 2007).

Along the lines of self-determination theory (Deci and Ryan, 1985; 1987; 2000) and the hierarchical model of intrinsic and extrinsic motivation (Vallerand, 2001), Mageau and Vallerand (2003) developed a motivational

model of the athlete-coach relationship. This model establishes that the coach's personal orientation toward coaching, the coaching context in which he or she is, and his or her perception of the behavior and motivation of the athletes will influence their conduct. Then, according to this model, behavior of the coach that is in favor of autonomy, provided by a good structure and involvement, will positively influence the basic psychological needs of autonomy, competence, and relatedness, thereby developing intrinsic motivation and the types of self-determined extrinsic motivations in athletes.

Self-determination theory (Deci and Ryan, 1987) assumes that autonomy support is the essential element for satisfying psychological needs. Deci and Ryan (1991) conceive the context of autonomy support as that which allows one to choose, is opposed to control, minimizes pressure during participation, and encourages initiation. The studies carried out both in the educational context (Moreno et al., 2008; Standage et al., 2006; Standage and Gillison, 2007) as well as the athletic context (Amorose and Anderson-Butcher, 2007; Balaguer et al., 2008; Reinboth et al., 2004) have offered support to these theories, and these studies have demonstrated positive relationships between climate of autonomy support offered by the teacher or coach and the satisfaction of basic psychological needs.

In various research studies, autonomy support by the coach or teacher has been related to intrinsic motivation, to the most self-determined extrinsic motivations, and to the behavior of continuing to practice a sport (Lim and Wang, 2009; Pelletier et al., 2001). Other studies (Adie et al., 2008; Gagné et al., 2003; Reinboth et al., 2004) that have also focused on the autonomy support offered by the coach, have considered the satisfaction of basic psychological needs as a mediator of athletes' well-being. Along these lines, the study by Balaguer et al. (2008) demonstrates the psychological need for competence, autonomy, and relatedness as predictors of self-determined motivation and it positively relates this self-determined motivation with the psychological well-being of the athlete.

Recently, Conroy and Coatsworth (2007) examined the psychometric properties of the Autonomy-Supportive Coaching Questionnaire (ASCQ), and they found two factors: interest in athletes' input and praise for autonomous behavior. Both factors positively predicted the satisfaction of the three basic psychological needs of the athletes (autonomy, competence, and relatedness).

Following the principles of self-determination

theory and using Hierarchical Model of Intrinsic and Extrinsic Motivation (HMIEM) as a reference, the purpose of this study was to find out the power of predicting autonomy support on adherence to athletic practice in adolescents. Therefore, a structural equations model that analyzed the relationships between interest in athletes' input and praise for autonomous behavior, basic psychological need for autonomy, intrinsic motivation, and intention to be physically active in the future was designed. Utilizing this model, it was hypothesized that the administration of some autonomy by the coach in training sessions, whether through the interest in athletes' input or praising his or her autonomous behavior, would positively predict the need for autonomy. At the same time, the satisfaction of the psychological need for autonomy would be positively related to intrinsic motivation, which in turn would be positively related to the intention of being physically active in the future.

Methods

Participants

The study's sample was composed of a total of 608 athletes, of which 109 were girls and 499 were boys, whose ages were between 12 and 17 years ($M = 14.43$, $SD = 1.04$). All the participants practiced some competitive sport in the Spanish province of Huelva, specifically, soccer, basketball, volleyball, team handball, swimming, canoeing, rhythmic gymnastics, tennis, or judo. The sample was collected both in municipal sport schools and in sport clubs from various towns in Huelva (Aljaraque, Ayamonte, Cartaya, Gibraleón, Huelva, Lepe, etc.). A selection of sports and towns was made through a conglomerated random sampling (Sheskin, 2004). Both the athletic schools and clubs, as well as the coaches and athletes, voluntarily collaborated in this study.

Instruments

Autonomy-Supportive Coaching Questionnaire (ASCQ). The Spanish version (*Cuestionario del Entrenamiento a favor de la Autonomía*; Conde et al., in press) of the ASCQ by Conroy and Coatsworth (2007) was used. This questionnaire is composed of a total of nine items grouped into two dimensions: interest in athletes' input (for example, "My coaches offer me choices about what we do in practice") and praise for autonomous behavior (for example, "My coaches praise me for the things that I choose to do in practice"), with five and four items per dimension, respectively. The previous sentence was "In my practices...". The answers were responded to with a 7-point Likert scale that ranged from 1 (*Not true at all*) to 7 (*Very true*). Cronbach's alpha values of 0.86 and 0.70 for the interest in athletes' input factor and for the praise for autonomous behavior factor were obtained, respectively.

Autonomy: The autonomy factor from the Spanish version (Sánchez & Núñez, 2007) of *The Basic Psychological Needs in Exercise Scale (BPNES)* (Vlachopoulos and Michailidou, 2006) was utilized. The factor consists of four items (for example, "The exercise program that I follow is highly compatible with my choices and interests"), beginning with the phrase: "In my practices...". The answers were responded to with a Likert scale that

ranged from 1 (*Not true at all*) to 5 (*Very true*). A Cronbach's alpha of .67 was obtained which is probably due to the multifactorial nature of autonomy for these adolescents. Although the value was less than .70, the internal consistency could be marginally accepted (Hair et al., 1998) given the low number of items in the factor.

Intrinsic motivation: The three factors that measure intrinsic motivation from the validated Spanish version (Nuñez et al., 2006) of the *Sport Motivation Scale* by Brière et al. (1995) were employed. This part of the scale measures intrinsic motivation (12 items) and, specifically, differentiates between three dimensions, each one composed of four items: intrinsic motivation to know, intrinsic motivation to experience stimulation, and intrinsic motivation toward accomplishment. The previous sentence was "Why do you practice your sport?". The answers were responded to with a Likert scale that ranged from 1 (*Does not correspond at all*) to 7 (*Corresponds exactly*). The following Cronbach's alphas were obtained: .76 for intrinsic motivation to know, .72 for intrinsic motivation to experience stimulation, and .76 for intrinsic motivation toward accomplishment. The total internal consistency of the three factors was .88.

Intention to be Physically Active Scale (IPAS): The adapted and translated version in Spanish (*Medida de la intencionalidad para ser físicamente activo*; Moreno et al., 2007) of the Hein et al. (2004) IPAS scale was utilized. It is composed of five items for measuring the subject's intention of being physically active (for example, "I am interested in developing my physical fitness"). The items are preceded by the phrase "Regarding your intention to practice sport...". The answers were responded to with a Likert scale that ranged from 1 (*Strongly disagree*) to 5 (*Strongly agree*). The analysis of the internal consistency revealed a Cronbach's alpha of 0.75.

Procedure

The coaches and directors of the clubs and sport schools were contacted, and they were informed of the goals and asked for collaboration. The administration of the questionnaires took place in the presence of the principle researcher. This researcher gave a brief explanation of the goals of the study, instructions on how to complete the instruments, and provided answers to any questions that arose. He also reminded participants that the answers were anonymous and asked them to complete the questionnaire honestly after reading each item. The time required to complete the scales was approximately 15 minutes, though there was slight variation according to the age of the athletes. As the athletes were minors, written, signed authorization from their parents was requested in order to participate in the study. Finally, it is necessary to emphasize that the study is correlational in design, and therefore the relationships that are described do not indicate a causal relationship. Despite this, this research provides an explanatory model of the possible relationships between the studied variables, which may help orient future experimental studies with coaches with the objective of positively influencing the motivation experienced by their athletes.

Data analysis

First of all, the descriptive statistics of the different variables of the study and the bivariate correlations were calculated. Next, a structural equations model was done to analyze the hypothesized relationships between the variables. The various analyses were carried out with the SPSS 16.0 and AMOS 16.0 statistical packets.

Results

Descriptive and bivariate correlation analyses

In Table 1, the descriptive statistics (means, standard deviations, asymmetry, and kurtosis) of each of the study's variables and the bivariate correlations are presented. With regard to the two factors from the Autonomy-Supportive Coaching Questionnaire (ASCQ), *praise for the autonomous behavior* obtained an average score that was greater than the *interest in athletes' input* variable. In the basic psychological need for autonomy, the average score was 3.51. With regard to intrinsic motivation (IM), it can be seen that these young athletes had the highest score in IM toward accomplishment, followed closely by IM to experience stimulation and IM to know. With regard to the intent of being physically active, the average score was 4.38.

In the correlation analysis, it was observed that the interest in athletes' input variable was positively and significantly correlated to *praise for autonomous behavior* and to *basic psychological need for autonomy*, while *praise for the autonomous behavior* is correlated positively and significantly with all the variables. Likewise, the *basic psychological need for autonomy* is correlated positively and significantly with all the variables. The IM to know, IM to experience stimulation, and IM toward accomplishment were related positively and significantly with all the variables except *interest in athletes' input*, while the intent to be physically active was correlated positively and significantly with all variables except with interest in athletes' input. However, the values of these correlations are not very high, so therefore, the coefficients of determination are not either (see Table 1). This could be due to the multifactorial nature of the related variables.

Analysis of the measurement model

In order to test the structural equations model (SEM)

which was posteriorly presented, a two-step approximation was employed, as recommended by Anderson and Gerbing (1988). First of all, a measurement model was carried out, which allowed for construct validity of the scales and corresponded to a confirmatory factorial analysis (CFA), based on the 20 observed measurements and on the five latent constructs. Each construct groups a set of observed measurements, consisting of an item or a group of items. The *interest in athletes' input* construct grouped five observed measurements, and *praise for autonomous behavior* grouped three, because item 8 was removed due to the fact that the adjustment indexes were not appropriate if item 8 were to be included in the measurement model. The autonomy factor was made up of four observable measurements. The IM grouped three observed measurements, and each of them consisted of four items. The *intent to be physically active in the future* construct consisted of five observed measurements.

The estimation method of maximum likelihood was utilized with the *bootstrapping* procedure, since the result of the Mardia multivariate coefficient was 41.45, indicating lack of multivariate normality of the data. This procedure provides a mean of the obtained estimates obtained from the bootstrap resampling and its standard error. Further, it compares the estimated values without the bootstrap with the means obtained through the resampling, indicating the level of bias. With regard to the confidence intervals (difference between the highest and lowest estimated values in the various resamplings) of the regression weights and the standardized regression weights, it was observed that the zero was not within the limits of confidence, which indicated that the estimated values were significantly different from zero. This allowed for the consideration that the results of the estimates were robust and, therefore, were not affected by the lack of normality (Byrne, 2001).

To verify the validity of the measurement model, a set of fit coefficients, also called goodness-of-fit indexes, were considered. Therefore, based on the contributions of various authors (Bentler, 1990; Bollen and Long, 1993; McDonald and Marsh, 1990), the fit indexes or goodness-of-fit indexes that were considered in evaluating the fit of the measurement model were: χ^2 , $\chi^2/\text{d.f.}$, RMSEA (Root Mean Square Error of Approximation), SRMR (Standardized Root Mean Square Residual) and the CFI (Comparative Fit Index), IFI (Incremental Fit Index) and TLI

Table 1. Descriptive and statistical data of the variables. Data are correlations (coefficient of determination).

Variables	M	ST	Asymmetry	Kurtosis	1	2	3	4	5	6	7
1. Interest in athlete's input	3.17	1.65	.33	-.93	-	.50** (.25)	.47** (.22)	.08 (.00)	.02 (.00)	-.01 (.00)	-.00 (.00)
2. Praise for autonomous behavior	4.68	1.36	-.50	-.21	-	-	.35** (.12)	.25** (.06)	.26** (.07)	.21** (.04)	.21** (.04)
3. Autonomy	3.51	.83	-.59	.38	-	-	-	.30** (.09)	.29** (.08)	.25** (.06)	.26** (.07)
4. IM to know	5.56	1.15	-.98	.98	-	-	-	-	.66** (.43)	.68** (.46)	.37** (.14)
5. IM to experience stimulation	5.70	1.05	-1.14	1.73	-	-	-	-	-	.68** (.46)	.42** (.18)
6. IM toward accomplishment	5.71	1.11	-1.15	1.54	-	-	-	-	-	-	.40** (.16)
7. Being physically active	4.38	.69	-1.89	4.84	-	-	-	-	-	-	-

** $p < .01$; * $p < .05$; IM = Intrinsic motivation; M = Mean; SD = Standard deviation.

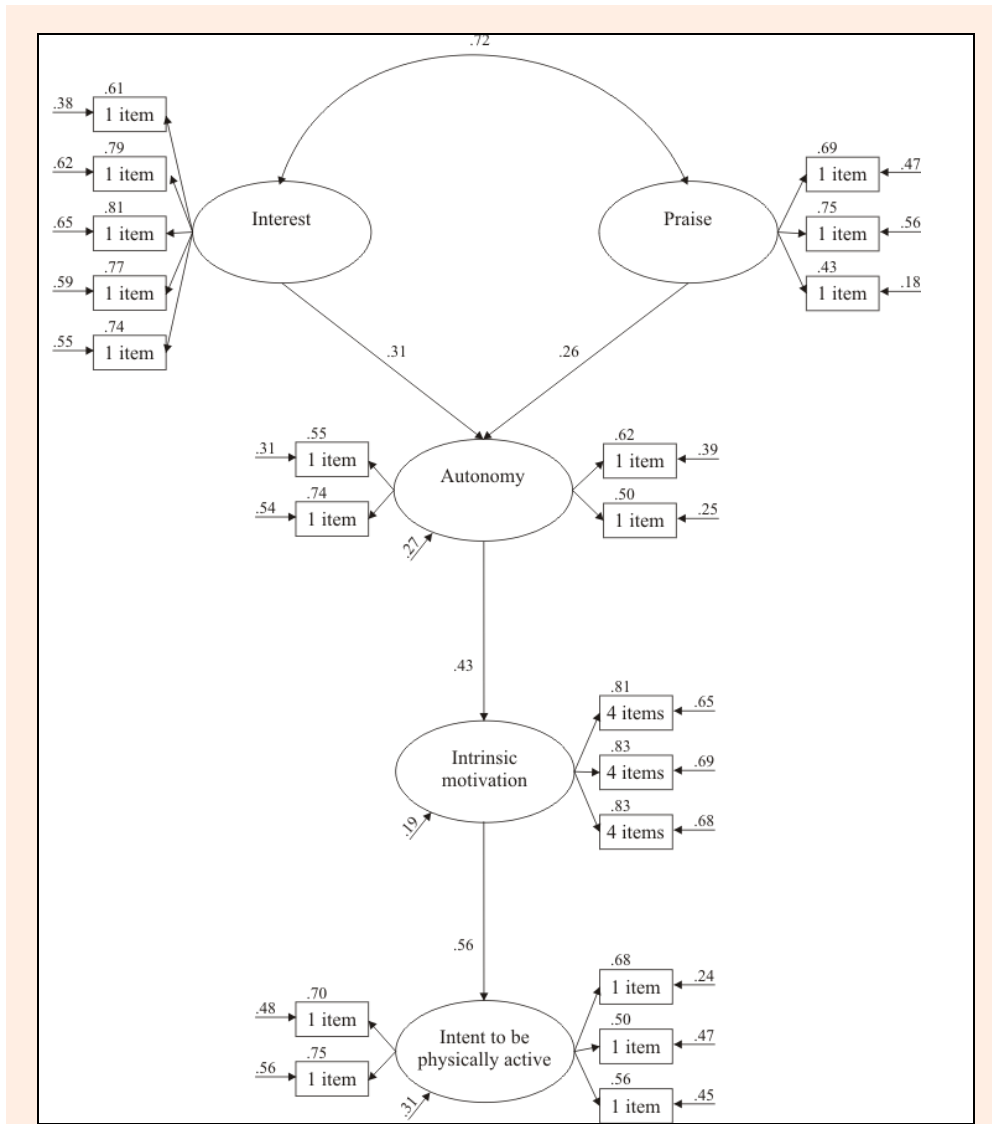


Figure 1. Structural equations model (SEM) that demonstrate the relationships between interest in athlete's input, praise for autonomous behavior, autonomy, intrinsic motivation, and the intent to be physically active. All the parameters are standardized and are statistically significant.

(Tucker-Lewis Index) incremental indexes. While the incremental indexes (CFI, IFI and TLI) demonstrate a good fit when values are greater than .90 (Hu & Bentler, 1995), these goodness-of-fit indexes are considered acceptable when the incremental indexes demonstrate values that are higher than .90 (Hu and Bentler, 1995). Hu and Bentler (1999) raised the cutoff point to .95. However, this rule has been criticized for being too restrictive (Marsh et al., 2004). On the other hand, the indexes of error are considered acceptable with values of .08 or lower for the RMSEA (Browne and Cudeck, 1993) and the SRMR (Hu and Bentler, 1999).

The indexes obtained were adequate: χ^2 (160, N = 608) = 497.94, p = 0.00; χ^2 /d.f. = 3.00; CFI = 0.93; IFI = 0.93; TLI = 0.91; RMSEA = 0.06; SRMR = 0.07. Further, the discriminant validity of the model was examined, keeping in mind that the correlation between the latent variables, attenuated by the measurement error (+/- 2 times the measurement error), was lower than 1.0. The different results indicate that the measurement error was adequate.

Structural equations model

The second step of the model (structural equations model) consisted of simultaneously testing the structural model and the measurement model, allowing us to focus on the conceptual interactions between the latent factors, interest in athlete's input, praise for the autonomous behavior, autonomy, intrinsic motivation, and the intent to be physically active.

With the objective of analyzing the relationships and interactions between the variables pertaining to the proposed model, the Structural Equations Model was utilized. To verify the fit or similarity of the proposed theoretical model with the empirical data, a set of fit indexes or goodness-of-fit indexes (previously described) were kept in mind. Thus, the data obtained were: χ^2 (165, N = 608) = 540.26, p = 0.00, χ^2 /d.f. = 3.27, CFI = 0.91, IFI = 0.91, TLI = 0.90, SRMR = 0.08, RMSEA = 0.06. These data fit the established parameters, so the proposed model can be considered accepted.

As demonstrated in Figure 1, the results from the structural equations model established that *interest in*

athletes' input and praise for autonomous behavior positively predicted the basic psychological need for autonomy. Autonomy positively predicted intrinsic motivation, and intrinsic motivation positively predicted the intent to be physically active in the future. Nineteen percent of the variation was explained for intrinsic motivation and 31% was explained for being physically active.

Discussion

This study was designed to study the importance of climate of autonomy support created by the coach on the motivation and the adherence to sport among adolescent athletes. The effect of the interest in athletes' input and the praise for autonomous behavior by the coach on the satisfaction of the basic psychological need for autonomy, intrinsic motivation, and the intent to be physically active. There are few studies to date that study the HMIEM model and focus on the variables studied in the present study. It is necessary to emphasize that due to the nature of the correlational study, the relationships that are described here do not indicate a causal relationship. In spite of this, this study demonstrates some of the possible relationships of the studied variables, as well as some predictions, that may serve as a starting point for future experimental designs.

The first part of the structural equations model which includes interest in athletes' input and praise for autonomous behavior has been demonstrated as a positive predictor of the psychological need for autonomy, coinciding with results from other studies that were also carried out in the athletic environment (Adie et al., 2008; Balaguer et al., 2008; Reinboth et al., 2004). Further, the results about the correlations of the two autonomy-support factors with regard to the psychological need for autonomy are similar to the results obtained by Conroy and Coatsworth (2007). In both cases, significant and positive correlations were obtained, and the numeric values were very similar. However, it must be kept in mind that these values are low or moderate, and therefore, it can be said that while there is a relationship between these variables, it is not very strong. All these results indicate that when athletes feel that their coaches give them greater freedom in making decisions, give them alternatives, support them in their decisions, and ask for their input about the activities or exercises to be done in training, logically, it is likely that these athletes feel that they influence their own actions and, therefore, their perception of autonomy is positively affected. Obviously, though, there are other factors that also influence the perception of autonomy among adolescent athletes.

The second part of the equations model, where the psychological need for autonomy and intrinsic motivation are positively and significantly related, coincides with the results from diverse studies that have previously demonstrated this relationship (Gagné et al., 2003; Hassandra et al., 2003; Moreno et al., 2008). This also occurs with the last part of the model presented in the current study in which intrinsic motivation and the intent to be physically active in the future are related, as found in some previous

studies (Papacharisis et al., 2003; Sproule et al., 2007; Wilson and Rogers, 2004).

The positive relationship between the autonomy support and the perception of autonomy constructs have been studied more in the educational context (Standage et al., 2006; Standage and Gillison, 2007; Vierling et al., 2007), as has the relationship between autonomy support and self-determined motivation (Mandigo et al., 2008; Prusak et al., 2004; Ward et al., 2008), as well as the positive relationship between autonomy support and the intent to be physically active (Chatzisarantis and Hagger, 2009; Chatzisarantis et al., 2008; Lim and Wang, 2009). However, in both contexts (athletic and educational), the need to utilize strategies of autonomy support has been widely demonstrated in order to increase an athlete's athletic commitment and foster more active and healthier lifestyles.

These results provide valuable information that may help foster intrinsic motivation in sports training, and along with this the athletic commitment of adolescents. For this, it would be interesting to focus on the education of athletic coaches, with the objective of providing them the tools and strategies for favoring the satisfaction of the psychological need for autonomy of his or her athletes, with special attention to the adolescent stage. In this sense, a greater stand should be taken against the lack of responsibility by adolescent athletes during training sessions, since, in many cases they demonstrate a desire to be independent from adults, to be autonomous, and to have control (Bycura and Darst, 2001).

The structural equation model presented in the present study seems to demonstrate how interest in athletes' input and praise for his or her autonomous behavior may allow one to predict perceived autonomy. At the same time, perceived autonomy predicts intrinsic motivation experienced by the athletes, and this intrinsic motivation predicts the intent to be physically active in the future with 31% variance. Further, these results offer support to self-determination theory (Deci and Ryan, 2000), which suggests that the need for autonomy is the most relevant for the athlete to develop the most self-determined ways of motivation. However, as previously mentioned, correlational studies have certain limitations, as the described relationships do not indicate a causal relationship. Due to the problem of equivalent models that the structural equations technique presents (Hershberger, 2006), it is assumed that the model posed in the present study would not be more than one possibility. Despite this, this research provides an explanatory model that may help orient future experimental designs with athletic techniques that have the objective of attaining an increase in the intrinsic motivation of its athletes and therefore favoring the athlete's athletic commitment.

Conclusion

In conclusion, this study reinforces the importance of the figure of the coach and the autonomy support construct experienced by athletes, and, consequently, their possible adherence to athletic practice. The model presented demonstrates that interest in athletes' input and praise for

autonomous behavior may allow for predicting perceived autonomy. At the same time, perceived autonomy predicts intrinsic motivation experienced by athletes and their intent to be physically active in the future. Therefore, the study shows how strategies favoring the satisfaction of the basic psychological need for autonomy of adolescent athletes can affect their intrinsic motivation and their athletic commitment.

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AUTHORS BIOGRAPHY



Bartolomé J. ALMAGRO

Employment

Predoctoral grant holder. Faculty of Educational Sciences, University of Huelva, Spain.

Degree

MSc

Research interests

Sports motivation.

E-mail: almagro@dempc.uhu.es



Pedro SÁENZ-LÓPEZ

Employment

Full professor. Faculty of Educational Sciences, University of Huelva, Spain.

Degree

PhD

Research interests

Sports motivation, physical education teaching

E-mail: psaenz@uhu.es



Juan Antonio MORENO

Employment

Full professor. Faculty of Sociosanitary Sciences, Miguel Hernández University of Elche, Spain.

Degree

PhD

Research interests

Sports motivation, aquatic activities.

E-mail: j.moreno@umh.es

✉ **Bartolomé Jesús Almagro**

Faculty of Educational Sciences, University of Huelva, Spain.

Key points

- Importance of the climate of autonomy support created by the coach on intrinsic motivation and adherence to sport by adolescent athletes.
- Interest in athletes' input and praise for autonomous behavior predicted perceived autonomy, and perceived autonomy positively predicted intrinsic motivation.
- Intrinsic motivation predicted the intention to be physically active in the future.