Conceptions of Ability and Self-Determined Motivation in Young Spanish Athletes

Concepções de Aptidão e Motivação Autodeterminada em Atletas Espanhóis Jovens

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Abstract
This investigation examined the relationship between implicit ability beliefs and self-determined motivation. The sample was comprised of 775 young athletes between the ages of 12 and 17 competing at national level in Spain. The participants completed the Spanish version of the Conceptions of the Nature of Athletic Ability Questionnaire (CNAAQ-2) and the Sport Motivation Scale (SMS). The results revealed a positive and significant correlation between stable ability beliefs and learning ability, and between self-determined motivation and perceived sports ability. To the contrary, stable entity beliefs were negatively correlated with self-determined motivation. Competitiveness in sports was significantly predicted by self-determined motivation, and the latter, in its turn, was positively predicted by learning belief and negatively by stable entity beliefs.
Keywords: Self-determined, ability beliefs, sport, competence.

Resumo
Esta pesquisa teve por objetivo analisar a relação entre as crenças implícitas de habilidade e a motivação autodeterminada. A amostra foi composta por 775 atletas competidores espanhóis nacionais de 12 a 17 anos de idade. Os participantes preencheram, em versão espanhola, o Questionário Crenças Implícitas de Habilidades (CNAAQ-2) e a Escala de Motivação Esportiva (SMS). Os resultados do modelo de equações estruturais revelaram uma correlação positiva e significativa entre as crenças de habilidade estável e as crenças de aprendizagem, e entre a motivação autodeterminada e a competência no esporte. Do contrário, a crença incremental estável correlacionou-se negativamente com a motivação autodeterminada. A competitividade no esporte é predita de forma positiva pela motivação autodeterminada, e essa, por sua vez, é predita significativamente pela crença de aprendizagem e negativamente pela crença de entidade estável.
Palavras-chave: Autodeterminação, concepções de aptidão, esporte, competência.

The decline in doing sport and physical activity during adolescence is becoming a public health problem (Wang & Biddle, 2001). In this context, understanding the motives behind why adolescents engage in sport and physical activity is critical to preventing physical inactivity and sports dropout. The self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000) provides an appropriate conceptual framework for the analysis of this issue, which has been widely used in the physical activity and sports context. Different types of motivation are considered within this theory along a motivational *continuum*, where motivation is considered to be more or less internal to the person (more or less self-determined). The least self determined form of motivation is "amotivation" which reflects a supposed lack of motivation or intention to do anything and as such will eventually result in sports dropout (Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002). A more self determined form that this is extrinsic motivation; whose different forms, according to the theory, vary in relation to the level of self-determination. A person may do sport for extrinsic incentives, such as external regulation, where the motives are to obtain recognition from others, to avoid feelings of guilt that would accompany non-participation (introjection), because they consider the activity important even though they do not necessarily get any enjoyment from it (identification), or because physical activity and sport are considered to be part of a healthy lifestyle (integrated regulation). The most self-determined form of motivation is intrinsic motivation, where behavior is

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determined by the satisfaction and pleasure that involvement in the activity brings.

As studies indicate that self-determined motivation is positively associated with doing sport (González-Cutre, Sicilia, & Fernández, 2010; Moreno, Huéscar, & Cervelló, 2012; Sarrazin et al., 2002; Standage, Duda, & Ntoumanis, 2003), it is, therefore, important to attempt to understand how to develop more self-determined motivational characteristics. In this respect, according to this theory, the achievement of a more self-determined form of motivation is expedited by the satisfaction of three basic psychological needs. These refer to a subject's desire to experience efficiency (competence), feel they are the originator of their actions (autonomy) and to dominate others, feel they are accepted (relationship to others) (Deci & Ryan, 1991; Ryan, 1991). It is the mediatory role they have in the development of self-determined motivation that led Vallerand (1997, 2007) to call them "mediators".

The implicit beliefs about the ability that young athletes may have also play an important role in their motivation (Li & Lee, 2004). Dweck and colleagues have suggested that there are two clusters of beliefs that focus on the way people view the malleability of attributes (Dweck, 1999, 2002). According to Dweck and her colleagues, some people see ability as an acquirable skill that can be increased through practice and effort. In contrast, some people view ability as a capacity or fixed entity, and they cannot do very much to change that inherent aptitude. Individuals may attribute their level of ability to something inherited and stable (entity view) or as something that can be improved by practice and learning (incremental belief). However, it seems that young people may have implicit ability beliefs that are both entity related and incremental. That is to say, they may consider that there is an innate natural gift in people, but it can be improved through practice and effort (Ommundsen, 2003; Spray, Wang, Biddle, Chatzisarantis, & Warburton, 2006). Therefore, people could score high in both dimensions without this result being contradictory.

In the sports domain, motivational profile research (e.g., Wang & Biddle, 2001; Wang, Chatzisarantis, Spray, & Biddle, 2002) and cross-sectional studies (Jourden, Bandura, & Banfield, 1991; Li, Lee, & Solmon, 2005; Moreno, González-Cutre, Martín-Albo, & Cervelló, 2010) have found that incremental beliefs about ability are more strongly associated with greater self-determination and with more positive consequences (effort, satisfaction, intention to be physically active), while entity-related beliefs tend to be associated positively with more negative consequences (amotivation, anxiety and low participation in sports and physical activities) and negatively with intrinsic motivation. Furthermore, those who do physical activity with an entity based belief in their ability to maintain an appearance of competence and have fixed concepts are more likely to choose easy, low-effort tasks which they can achieve easily so they can be seen as able by those around them (Dweck & Bempechat, 1983).

Similarly, perceived competence is a consequence that relates positively with incremental ability belief and self-determined motivation (Biddle, Wang, Chatzisarantis, & Spray, 2003; Ommundsen, Haugen, & Lund, 2005; Spray et al., 2006). If people see themselves as able to achieve new goals and also believe their skill can improve, they will probably enjoy sports and physical activity more. They know that if they make an effort, they will manage to improve and this will lead to satisfaction. However, if they do not perceive themselves as competent enough to achieve a goal and believe that the skill is stable, then for as much as they try they will not achieve any progress. Consequently, they will feel frustrated and demotivated, especially when they try to compare their skill with that of others and they do not achieve satisfactory results. One of the most recent findings by Wang, Liu, Lochbaum, and Stevenson (2009) was that incremental beliefs associated positively with competence, and intrinsic motivation. Their study of 309 university students from physical education classes aimed to examine the role of perceived competence with regard to implicit theories, 2x2 achievement goals and intrinsic motivation.

Based on present research about this subject, it seems appropriate, therefore, to develop an incremental ability belief in adolescent sportspeople in order to develop behavioral patterns which are as adaptive as possible (Moreno et al., 2010). There has been little research which analyses the effect of these variables on the Spanish population, so this study aims to try and further our knowledge about these relationships. For this reason, the purpose of this study is to attempt to examine the influence of ability beliefs on self-determined motivation and is concerned with the competence of practitioners to assess these relationships in Spanish adolescent athletes. Based on previous research studies that have used the self-determination theory and related research on implicit abilities and self-determined motivation, it was hypothesized that incremental ability beliefs that reflect the idea that ability can be improved through effort and learning will be positively linked to self-determined motivation. Conversely, when young athletes hold entity beliefs about ability there will be a negative effect upon self-determined motivation.

Method

Participants

The participants in this study were 774 young athletes between the ages of 12 and 17 ($M = 14.56$, $SD = 1.32$) contributing at national competition level in team (basketball and volleyball) and individual (tennis and judo) sports from the region of Murcia, Spain. This study was approved for the Ethics Committee for the investigation in the Miguel Hernández University of Elche (Spain). Four hundred and four of the participants were male and 370 were female.

Measures

Conceptions of the Nature of Athletic Ability Questionnaire. A Spanish language version of an instrument developed by Biddle et al. (2003) and called the Conceptions of the Nature of Athletic Ability Questionnaire-2 (CNAAQ-2) scale was used (González-Cutre et al., 2007), which recently, has been validated to Portuguese (Durão, Moreira, Calvo, Cervelló, & Rubio, 2010). The scale is comprised of 12 items (e.g., "It's difficult to change as good you're in sports") that are divided into groups of four factors. These four factors include subscales assessing incremental beliefs of improvement and ability (improvement and learning factors) and entity scales measuring the entity view that ability is stable and related to inherent talent (gift and stable factors). Each of these subscales comprises three items. The questionnaire follows a closed-item format and the respondents use a Likert-type scale ranging from 1-5 with endpoints of *totally agree* to *totally disagree*. Using the data collected in this study, a confirmatory factor analysis was conducted to assess the four factor structure. The corresponding fit indices were χ^2 (48, N = 774) = 149.91, p <.01; χ^2 /df = 3.12; CFI = .91; IFI = .91; TLI = .90; RMSEA = .06; SRMR = .05. Cronbach internal consistency levels ranged from .68 to .76.

Sport Motivation Scale. The Sport Motivation Scale (SMS; Pelletier et al., 1995) which has been translated and adapted into Spanish by Núñez, Martín-Albo, Navarro and González (2006) was used to measure the students' participation and effort in physical education lessons. This scale is comprised of 28 items (e.g. "I practice sport for the pleasure I feel in living exciting experiences") divided into groups of seven factors. These factors are intrinsic motivation (to know), to experience stimulation and achievement, extrinsic motivation (identified, introjected and externally regulated) and amotivation. The responses to the different items were scored on a Likert-type scale with a response range from 1 to 7 with 1 indicating *totally disagree* and 7 indicating *totally agree*. The goodness of fit indices of the corresponding confirmatory factor analysis were χ^2 (329, N = 774) = 1014.86, p< .01; χ^2 /df = 3.08; CFI = .91; IFI = .91; TLI = .92; RMSEA = .06; SRMR = .06. Cronbach alpha coefficients of internal consistency from data collected in this study ranged from a low of .67 (intrinsic motivation to experience stimulation) to .80 (amotivation).

Self-Determination Index. Self-determined motivation (SDM) in these athletes was measured using an index of self-determined motivation which had been employed in previous studies (Chantal, Robin, Vernat, & Bernache-Asollant, 2005; Kowal & Fortier, 2000; Losier & Vallerand, 1994). This index is used according to the following formula: (2 x [IM toward knowledge + IM toward practice + IM toward stimulation] / 3 + Identified regulation) – ([Introjection + External regulation] / 2 + 2 x Amotivation). In this study, the self-determined motivation quotient ranged between -4.88 and 14 for these participants.

Perceived Sport Competence. One of the five factors that constitute Fox and Corbin's (1989) Physical Self-Perception scale (PSE) is perceived sport competence. The overall scale was determined to be valid through a Spanish language adaptation developed by Moreno and Cervelló (2005). This scale measures perceptions of sport and athletic ability, ability to learn sports skills and confidence in the sport environment. It consists of six items (e.g., "I am good at nearly all sports"). The responses conform to a four choice Likert-type format ranging from one, which indicates *totally disagree* to four, which indicates *totally agree.* Indices of goodness of fit were χ^2 (2, N = 774) = 2.9, p = .22 χ^2 /df = 1.48; CFI = .99; IFI = .99; TLI = .99; RMSEA = .03; SRMR = .01. The overall Cronbach alpha obtained for the scale from data collected in this study was .80

Procedure

In conducting this study, administrators and coaches at different sport clubs in the region were initially contacted to inform them of our objectives and to request their collaboration in the study. Upon receiving this level of consent we requested the same support from the participants' parents as well as the participants themselves. Upon receiving approval from administrators, coaches, and parents, we administered the questionnaires under the supervision of the principal investigator who could address any questions or concerns from the participants. The subjects completed the questionnaires individually and were guaranteed that their responses would remain anonymous. They needed roughly twenty minutes to complete their questionnaires and each questionnaire was checked to ensure that each item had been completed.

Data Analysis

Firstly a descriptive analysis of the data was conducted and then structural equation modeling was used to determine whether theoretically anticipated relationships were present. SEM is particularly useful in longitudinal research (Bentler, 1980; MacCallum & Austin, 2000) and in the study of variables that have a sequential relationship, as in the case of our study. This statistical technique allows for the analysis of both the direct and the indirect effect of the variables, since it enables the same variable to be considered as both a dependent and an independent variable at the same time. Furthermore, by using a latent representation of the constructs to examine the hypothesized relationships between all of the constructs involved in a model, it is less vulnerable to measurement errors, such as those that can be encountered in research with child populations.

Results

Descriptive Statistics

The descriptive data analysis (Table 1) revealed that in relation to the entity beliefs of ability and stability the participants were most likely to hold an incremental view of ability, where ability could be improved by effort and learning. Correlations between the incremental beliefs

of effort and learning were positive as were correlations between the entity beliefs of ability and stability. To the contrary, significant negative relationships were present between the entity and incremental views of ability and between the gift and improvement factors. Correlational analysis presented a positive and significant relationship between self-determined motivation and incremental beliefs about improvement and learning and a significant negative correlation was present between stable entity beliefs and gift. Perceived sport competence correlated positively with the beliefs that ability can be improved through learning and with self-determined motivation.

Table 1
Descriptive Statistics and Correlations

	M	*SD*	1	2	3	4	5	6
1. Stable	2.54	.88		.33*	-.21*	-.24*	-.31*	-.05
2. Gift	2.72	1.06			-.16*	-.06	-.17*	.00
3. Improvement	4.26	.78				.61*	.29*	.38*
4. Learning	4.25	.79					.29*	.30*
5. SDI	5.17	4.26						.42*
6. Sport Competence	3.96	.60						

* $p < .01$.

Structural Equation Model

The relationships between the variables were analyzed using Structural Equation Modeling (SEM). For this purpose, version 6.0 of the AMOS program was used. An initial hypothetical model was proposed and the data were analyzed using maximum likelihood analysis. This method assumes multivariate normality. The Mardia coefficient was = 67.87, indicating normality of the variables. We expected incremental ability belief to predict self-determined motivation, and self-determined motivation to predict competence. The covariance matrix was employed in the analysis. To evaluate the adequacy of the model's fit to the data, some fit indices were considered from those provided by AMOS, enabling them to assess the overall fit of the model in relation to the size of the sample. Consequently, diverse indices of fit were used including the Chi-square statistic (χ^2), the Relative Chi-square (χ^2 / *df*), the CFI index (Comparative Fit Index), the Tucker-Lewis Index (TLI), the Incremental Fit Index (IFI) the RMSEA (Root Mean Square Error of Approximation) and the SRMR (Standardized Root Mean Square Residual). Values higher than .95 for CFI, TLI and IFI and lower than .06 for RMSEA and .08 for SRMR indicate a good fit of the model (Shumacker & Lomax, 1996).

Figure 1 illustrates the findings from the structural equation modeling procedure. Within the framework of this study, latent variables assessing self-determined motivation consisted of two composite indexes (because the number of items on each subscale was aggregated to form two-item-averaged scores). The results indicated that perceived sports competence was positively predicted by self-determined motivation and also by the implicit belief in ability through learning. Meanwhile, the view that ability is stable was negatively associated with self-determined motivation. Pathways that were not significantly related within the model were not included.

The results indicated an adequate fit to the model, having obtained the goodness of fit indices [χ^2 (26, N = 774) = 54.76; $p < .01$; χ^2 /*df* = 2.10; CFI = .97; TLI = .95; IFI = .97; RMSEA = .04; SRMR = .03].

Discussion

The general results of this study support the framework proposed by Dweck and her colleagues, showing that a person's concept of their ability has a relationship with motivational orientation. Although, in recent studies (Lawson, 2011; Moreno et al., 2010) this tendency has been corroborated in some areas such as education and there are some results in the area of competitive sports with results from different countries (e.g., Rodríguez & Caro, 2007), to date no study has analyzed the relationship between skill and motivation – competence in Spanish sports competitors.

For this reason, the purpose of this research was to assess the influence of implicit ability beliefs on self-determined motivation in this sample of Spanish athletes. This question is important given that a lack of intrinsic motivation has been associated with dropping out from sports and physical activity (Caspersen, Pereira, & Curran, 2000). Furthermore, these relations are studied in adolescent athletes, with the view of encouraging greater sports activity due to the high dropout risk in this sector of the population. A positive and significant correlation between the entity view of ability and gift and between the improvement and learning factors was found. To the

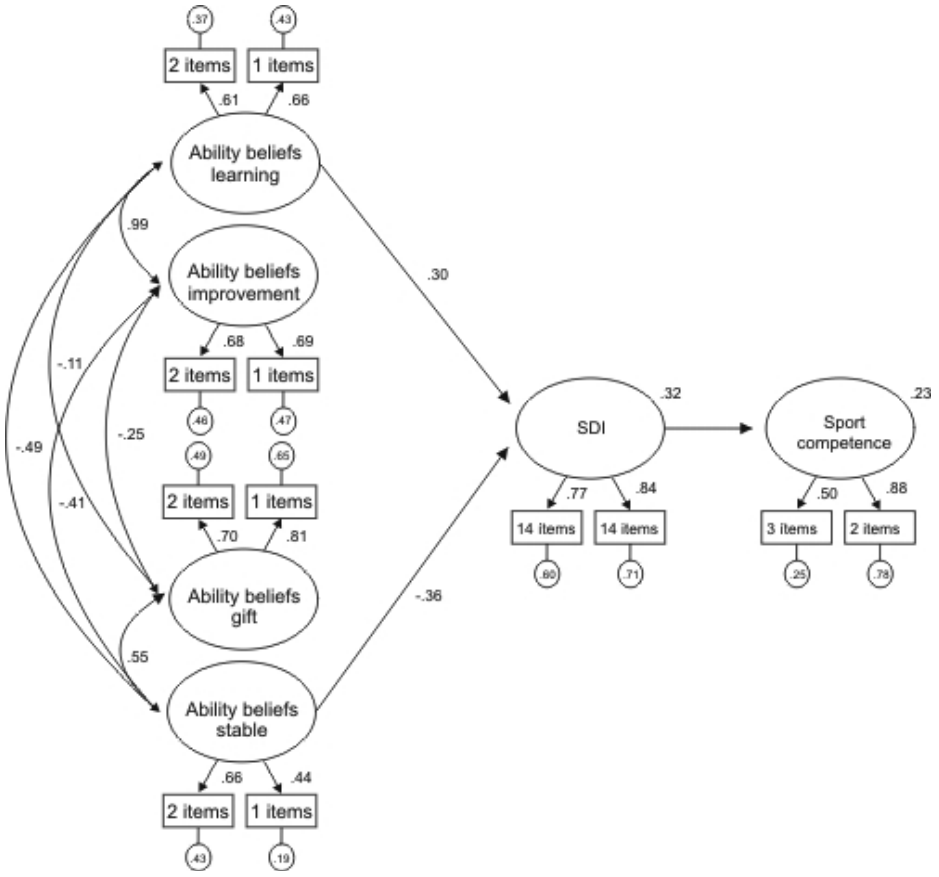

Figure 1. Structural equations analysis. Circles represent latent construct and squares represent measured variables (composite scores). All parameters are standardized and significant at $p < .05$ level. Residual variances are shown in small circles.

contrary, there was a significant and negative relationship between entity belief and incremental beliefs (improvement and learning) and between the factor of gift and improvement, which is similar to the findings obtained by Biddle et al. (2003) and Li et al. (2005). On the other hand, self-determined motivation correlated positively with the incremental beliefs of improvement and learning and negatively with the beliefs that ability is stable and related to gift, which is consistent with previous works (Li et al., 2005). Perceived sport competence correlated positively with improvement-related beliefs and learning and with self-determined motivation.

These results indicated that perceived sport competence was predicted by self-determined motivation which, in turn, was positively generated by the incremental beliefs of ability and learning, whereas stable incremental beliefs had a negative and significant influence. These results have been corroborated by Biddle et al. (2003) and Wang and Biddle (2001). In this sense, Li et al. (2005) found that intrinsic motivation was positively predicted by incremental beliefs.

These findings would suggest that it is desirable to help young athletes establish the belief that ability can be improved through effort and through a continuous learning process. In this way, athletes would demonstrate a stronger tendency toward intrinsic motivation and have more favorable perceptions of their sports ability. To the contrary, if young athletes develop the view that ability is a stable characteristic their intrinsic motivation and perceived sports competence are likely to be lower. Although individuals can have high levels of both sets of beliefs, it appears that if incremental belief is dominant, the negative effects of entity-related beliefs will be minimized (Spray et al., 2006). These relationships between ability related beliefs and self-determined motivation were previously identified in two studies that used a motivational profile approach (Wang & Biddle, 2001; Wang et al., 2002). Each study found that the self-determined and highly motivated groups demonstrated a stronger incremental-related belief toward ability while the unmotivated group showed lower incremental beliefs and higher entity-related beliefs. In this sense, it is apparent that encouraging effort and personal self-improvement are key aspects to be considered.

This study has attempted an initial understanding of the relationships between ability-related beliefs and self-determined motivation in Spanish athletes. One limitation of the study is the fact that because correlational analyses were used, cause and effect cannot be inferred. Future research could include an experimental design and also examine the role of coaches in influencing incremental

and entity-related beliefs in athletes, and the role of these beliefs in shaping self-determined motivation and commitment to sport. These relations should also be studied in a sample of non-sport involved adolescents. The self-determination theory proposes that intrinsic motivation results from satisfying the needs for competence, autonomy and relatedness. Future research can provide further insight by examining the relationships between these contributors to intrinsic motivation and perceptions of ability. Another interesting aspect, which could contribute towards a better knowledge of the relations between these variables, would be to study the moderator effect that perceived competence has on the relations between skill beliefs and intrinsic motivation, taking into account the achievement goal theory (Nicholls, 1984, 1989). These relations have recently been examined in physical education contexts (González-Cutre et al., 2007), but to date these data are not available on a competitive sports level. Finally, it would also be interesting to try to use the perspective of motivational profiles in competition, since the information obtained would be much more enriching than the information from an isolated analysis and would enable us to know more about which profiles should be intervened in order to increase adaptive results for doing sports or physical activity.

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