The relationship between competitive state anxiety, self-confidence and attentional control in athletes

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Abstract

The aim of this study was to assess the relationship between competitive state anxiety, self-confidence and attentional control. The impact of the number of years' experience in sporting practice on these variables was also analysed. Our study considered the following hypotheses: high levels of attentional control will be related to lower levels of competitive state anxiety, and higher levels of self-confidence. As well as competitive state anxiety and self-confidence will be significant predictors of attentional control; and athletes with more experience in their sport will have higher levels of attentional control and self-confidence, in addition to lower levels of competitive state anxiety. The sample consisted of 833 Spanish athletes, and the data analyses included calculation of descriptive statistics, a regression analysis and a comparative analysis, using an unpaired t-test, based on the number of years of sport experience. The results partially confirmed these hypotheses, providing evidence for the connection between anxiety and self-confidence with attentional control in sport, as well as confirming the impact of sport experience on self-confidence and competitive state anxiety. This research has implications for understanding which type of characteristics may help athletes develop good attentional control.

Keywords: Anxiety. Self-confidence. Attentional control. Experience. Sport.

This study aims to assess the relationship between competitive state anxiety, self-confidence and attentional control in a representative sample of Spanish athletes. A further objective is to determine any possible differences in attentional control, competitive state anxiety and self-confidence in terms of sport experience.

The influence of anxiety on sports performance has been a topic of great interest for sport psychology researchers and coaches (Listea, Ducrocq, Siminiceanu and Visu-Petra, 2017). Anxiety can be defined as a future-oriented emotional state characterized by a sense of apprehension, worry, and lack of control of one's own affective response (Otto, Calkins and Hearon, 2010). Anxiety responses are accompanied by an increase in physiological arousal that is mediated by the autonomic nervous system (Cashmore, 2008). The term competitive anxiety was coined by Martens (1977) in order to refer to sport-specific anxiety.

In this line, Weinberg and Gould (2010) differentiate between 'state' and 'trait' anxiety. *Trait anxiety* is seen as an acquired behavioural tendency or inclination that influences conduct, and therefore forms part of the athletes' personality or character. In contrast, *state anxiety* refers to an ever-changing emotional component. Generally speaking, athletes with high levels of trait anxiety show greater levels of state anxiety in highly competitive or test environments than people with lower levels of trait anxiety. These authors also propose that state anxiety is divided into two

components: one that is mental – sensations of worry and apprehension –, known as *cognitive anxiety*; and another, referred to as *somatic anxiety*, which describes perceived arousal.

Research has shown that these different dimensions of competitive state anxiety can be independently and differentially related to performance (Listea et al., 2017). This relationship is mediated by athletes' attention, which is regarded as a cognitive activity that involves selecting one or more sources of information for later processing, whilst at the same time inhibiting the selection of task-irrelevant information and responses (Smith and Kosslyn, 2007). Anxiety is considered an endogenous determinant of attention (Castillo, 2009). The relationship between anxiety and attention should therefore be considered essential when analysing sports performance and results, as competitive situations will always generate a certain degree of anxiety in athletes that may affect performance due to the deterioration of the attention process (Moran, 2012).

Anxiety produces attentional biases that lead to difficulties in the performance of certain attentional operations (Cooper and Tomporowski, 2017). These biases are understood as the predisposition to preferentially attend to threatening stimuli in the presence of neutral or positive stimuli (Cisler and Koster, 2010). The Attentional Control Theory (ACT) (Eysenck, Derakshan, Santos and Calvo, 2007) and its extension to the sports area (ACT:S, Eysenck

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and Wilson, 2016), describe how these biases and attentional dimensions work under conditions of anxiety.

The main assumption of ACT is that there is an important distinction between processing efficiency – index of the individual resources invested to achieve a given level of performance – and performance effectiveness – level of performance indicated by a behavioural measure of a specified task (Eysenck and Wilson, 2016). Processing efficiency is more negatively impacted than performance effectiveness under anxiety-provoking conditions (Eysenck et al., 2007). This greater affectation is due to the fact that anxiety impairs performance because of its detrimental impact on attentional control. Attentional control is essential for the central executive, a system involved in various complex functions such as planning or strategy selection (Derakshan and Eysenck, 2009), while inhibition and attentional shift are the core functions of the central executive that are affected. The inhibition executive function involves the use of attentional control in order to successfully resist distractions or interference that may arise from the presence of distracting stimuli that are not relevant to the task at hand. In turn, the attentional shift function refers to the use of attentional control in order to shift or assign attentional resources in a flexible manner and to manage all task-relevant information sources in an optimal way (Eysenck et al., 2007).

Any deterioration in these two main attentional functions will affect the balance between the two attentional systems posited by Corbetta and Schulman (2002). One influenced by the individual's current goals, expectations, and knowledge (goal driven or top-down system) for example, what an athlete chooses to focus on when defending a collective play. The other system is triggered by salient stimuli of the environment (stimulus driven or bottom-up system). In the previous example, the athlete's attention, instead of being focussed on what he chose, shifts towards a surprising action of the rival, perceived as a threat.

As a result of this imbalance, individuals tend to employ the bottom-up system to focus their attention, which is less efficient than the top-down system and could probably be considered an evolved mechanism intended to detect threatening stimuli (Eysenck et al., 2007). This means that athletes will focus on stimuli that are irrelevant for task success and, in particular, on those that represent a threat. At the same time, attentional resources are reduced and channelled to meet the demands of the task at hand, which will impact negatively on their performance (Moran, 2012).

Under high anxiety levels, and using the bottom-up system continuously, athletes show an automatic tendency to ruminate and worry about the quality of their performance, which may interfere with their ability to voluntarily regulate their attention, and damage their performance severely (Eysenck and Wilson, 2016). However, individuals can counteract the tendency to focus on task-irrelevant thoughts or stimuli by investing an additional effort or initiating self-regulatory processes (Eysenck et al., 2007). The extra effort can cause athletes to neutralise the negative effects of anxiety on their regulation and consequently keep up their performance, or it can lead to choking (Schmeichel and Baumeister, 2010). These self-regulatory processes depend on variables such as ego-depletion, a state of temporary self-control exhaustion where athletes do not perform up to their capabilities (Englert, 2016), or self-confidence, the belief that one can carry out successfully a desired behaviour (Otten, 2009; Weinberg and Gould, 2010).

In the current paper, we will focus on the study of self-confidence. The role of self-confidence can be framed within the research conducted on the ability of individuals to regulate their own cognitive functioning (Baumeister, Tice and Vohs, 2018) and on the factors that prevent choking under pressure (Roberts, Jackson and Grundy, 2017). Self-confidence influences the interpretation of anxiety by offering protection to individuals against the debilitating effects of its manifestations (Hagan-Jr, Pollmann and Schack, 2017). This construct is considered an important part of successful sports performance, since it has been shown to influence sports behaviour, attitudes and achievement (Cox, Shannon, McGuire and McBride, 2010).

When investigating self-confidence, athletes' level of expertise must be considered, as athletes with more experience in their discipline show higher levels of confidence in their execution (Baker and Farrow, 2015). In fact, sport experience is a variable which can also influence anxiety and attentional processing levels (Englert, Zwemmer, Bertrams and Oudejans, 2015; Sánchez-López, Fernández, Silva-Pereyra, Martínez-Mesa and Moreno-Aguirre, 2014). Expert athletes regulate distractions and the pressures of competition, and are able to focus their attention and eliminate any worries regarding what is happening around them. Furthermore, they are confident of their possibilities and abilities, which enables them to adopt the right decisions, as they have no fear of failure (Ruiz, Sánchez, Durán and Jiménez, 2006). These differences are due to the effect of practice, since expert athletes differ in the cognitive processing skills directly related to their field of experience (Furley and Wood, 2016). The dominant point of view regarding the effects of practice has been that expert athletes gain an advantage by acquiring cognitive skills and strategies which increase their efficiency of processing information (Furley and Dörr, 2015).

Following ACT, this study will examine the influence of self-confidence, anxiety and experience on attentional control, to obtain a better understanding of the characteristics that can help athletes to develop good attentional control. Moreover, our work investigates whether anxiety, self-confidence and attentional control vary as a function of sport experience. Thus, the study addresses the following two hypotheses:

Hypothesis 1. Attentional control will be predicted negatively by competitive state anxiety (both cognitive and somatic) and positively by self-confidence.

Hypothesis 2. Sport experience will result in higher levels of attentional control and self-confidence, in addition to lower levels of cognitive and somatic competitive state anxiety.

Method

Participants

The study was based on a sample of 833 Spanish athletes aged between 18 and 62 (M=30.49; SD=11.19). 76.6% were men and 22.4% women. At the time of data collection, 22.7% of the athletes were competing at local level; 49.3% at regional level, 23% nationally and 5% internationally. Athletes' experience in the sport practised ranged between 1 and 49 years (M=10.93; SD=7.97). All participants held a federation licence in 43 sports: 17.9% in football, 7.9% in Gaelic football, 5.9% in futsal, 5.6% in athletics, 4.9% in basketball, 4,8% in orienteering, 4.4% in triathlon, 4% in motorcycling, 4% in volleyball, 3.6% in padel tennis, 1.7% in swimming. The remaining 35.3% held licences in long distance running -more than 5,000 m-, canoeing, tennis, handball, rugby, chess, weightlifting, billiards, mountain sports, archery, judo, table tennis, cycling, gymnastics, fencing, American football, underwater sports, competitive dancesport, water polo, taekwondo, boxing, sailing, wrestling, equestrianism, skating, pétanque, shooting, karate, skiing, air sports, surfing and car racing.

Measures

Attentional control was measured via the competition subscale of the most recent version of the Test of Performance Strategies 3, consisting of 36 items listed under 9 factors (TOPS-3, Thomas, Hardy and Murphy, 2007), adapted to Spanish by Tomé-Lourido, Arce and Ponte (2018). Specifically, the attentional control factor assessed the ability to control intrusive thoughts and refocusing attention (Tomé-Lourido et al., 2018). Internal consistency rates were satisfactory for the whole test and for each factor as attentional control had a Cronbach's alpha coefficient of .774. This factor comprised four items (e.g. "I get distracted when competing") and Likert scale type response options were provided. The scale consisted of 5 options where 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Always.

Competitive state anxiety and self-confidence were measured by the CSAI-2R (Cox, Martens and Russel, 2003) adapted to Spanish under the name *Inventario del Estado de Ansiedad Competitiva Revisado* (Revised Competitive State Anxiety Inventory) (Andrade, Río and Arce, 2007). The instrument comprises 16 items grouped in three factors for the assessment of pre-competition sensations, namely cognitive anxiety, somatic anxiety and self-confidence. Cognitive anxiety had a Cronbach's alpha coefficient of .827 and comprised 5 items (e.g., "I am concerned about losing"); somatic anxiety had a Cronbach's alpha coefficient of .804 and comprised 6 items (e.g., "I feel tense in my stomach");

self-confidence had a Cronbach's alpha coefficient of .788 and comprised 5 items (e.g., "I'm confident I can meet the challenge"). Each item on the test is anchored by a 4-point Likert scale (1 = Not at all, 2 = Somewhat, 3 = Moderately so, 4 = Very much so).

In addition to the two previous tests, a demographic questionnaire was also administered in which information regarding age, sex, competitive level, years of experience and type of sport practiced were collected.

Procedure

The data were collected from November 2016 to January 2017. The selected clubs were contacted and informed of the purpose and objectives of our research and the athletes' consent was obtained. An agreement was reached with the clubs whereby the instruments were applied after the training sessions using an online format. All participants received the same instructions. In the case of the evaluation of precompetitive sensations, they were asked to express how they felt before their last competition. Both clubs and athletes were previously informed that participation was both voluntary and anonymous, guaranteeing that the data obtained would be processed in accordance with Spanish data protection laws.

Data analysis

The IBM SPSS Statistics version 20.0 software package was used to analyse the data. The analyses were carried out sequentially, beginning with the calculation of the descriptive statistics and Cronbach's alpha coefficients. This was followed a stepwise regression analysis to assess the impact of the dimensions of competitive state anxiety and self-confidence on attentional control. Finally, a comparative analysis was conducted based on the number of years of sport experience. Participants were divided into high and low experience groups based on the number of years of sport experience using a median split. The median split method has been used in sports psychology in similar investigations comparing groups of athletes based on experience (Hanton, Neil, Mellaieu and Fletcher, 2008). In this sample, the median value obtained was 10 years, so this was used for the median split. Furthermore, this value coincides with the "ten years rule" (Swann, Moran and Piggott, 2015) that has been used in previous research to classify an athlete as an expert. The group of less experienced athletes included the ones with 10 or fewer years of experience (n=464), and the group of more experienced athletes was composed of 369 participants. In order to analyse the differences between groups, an unpaired t-test was used.

Results

Descriptive statistics

Table 1 shows the descriptive statistics calculations for the attentional control construct and competitive state anx-

iety dimensions: cognitive anxiety, somatic anxiety and self-confidence. The attentional control factor displays a moderately high mean value. As for the dimensions of anxiety, both cognitive anxiety and somatic anxiety showed moderate mean scores, whilst self-confidence obtained moderately high scores. Attentional control and self-confidence skewness were negative, indicating that the scores tended to be higher than lower, unlike the other two di-

mensions of competitive sport anxiety. The distributions are platykurtic, as the kurtosis value of all 4 constructs is less than 0, denoting that extreme values are repeated more than the normal curve. The values of Cronbach's alpha coefficient showed that the internal consistency of the subscales did not deviate from normality. There were no missing values or outliers.

Table 1

Variable	Minimum	Maximum	Mean	Standard deviation	Skewness[a]	Kurtosis[b]	Cronbach's alpha coefficient
Attentional control	1	5	3.83	.76	-.436	-.206	.790
Cognitive anxiety	1	4	2.38	.80	.193	-.866	.819
Somatic anxiety	1	4	2.14	.74	.419	-.565	.864
Self-confidence	1	4	3.11	.67	-.655	-.070	.894

[a]*Standard error = .85.* [b] *Standard error =.169*

Regression analysis

Table 2 summarises the regression model which included attentional control as the dependent variable and competitive state anxiety factors and self-confidence as predictors. The initial model included self-confidence as the only predictor variable, with a positive direction, whilst somatic anxiety was also included in the second model, with a negative direction. The second model showed a higher proportion of variance explained for attentional control than the first one, as indicated by the statistic adjusted R squared (?R^2). These results partially confirm the first hypothesis, because cognitive anxiety failed to reach sufficient statistical significance to be considered a predictor variable for attentional control. The coefficients of the equation constant and the predictor variables were found to be statistically significant.

Table 2
Stepwise regression analysis of Attentional Control

Variable	Model 1 B	Model 2 B
Constant	2.190***	2.778***
Self-confidence	.530***	.463***
Somatic anxiety		-.178***
R^2	.219	.244
F	233.688***	135.382***
?R^2		.026***

Note. Model 1 = predictor variables: constant and self-confidence; Model 2 = predictor variables: constant, self-confidence and somatic anxiety; B = coefficient.
***p<.001

Comparisons based on the experience in the sport in question

Finally, the differences in the levels of competitive state anxiety and self-confidence were calculated in accordance with the athletes' years of experience in their sport. As indicated

in the Data Analysis section, participants were categorised into two groups; the group with fewest years' experience in their corresponding sports comprised those athletes with one to ten years' experience in their sport, whilst the second group was made up of athletes with between 11 and 49 years of experience. The results of the analyses conducted on these groups indicated that, as predicted by the second hypothesis, more experienced athletes - more than ten years' practice in their sport - scored higher in terms of and self-confidence ($t_{(831)}$=3.529; p<.001) and recorded lower levels of somatic anxiety ($t_{(831)}$=2.748; p<.01). However, although expert athletes also showed higher scores in attentional control ($t_{(831)}$=1.83; p=.068), and lower levels of cognitive anxiety ($t_{(831)}$=.629; p =.529), these differences did not reach statistical significance.

Discussion

The main aim of this study was to analyse the relationship between competitive state anxiety, self-confidence and attentional control in a sample of 833 Spanish athletes. A second objective was to determine the existence of differences in attentional control, competitive state anxiety and self-confidence as a function of sport experience.

The results of our research confirmed the first hypothesis, showing that self-confidence was a good positive predictor of attentional control, in line with previous studies that relate attentional control to competitive performance under pressure (Wood, Vine and Wilson, 2016). In this manner, when athletes perceive that their performance level is not in line with the demands required by the activity, self-confidence levels decrease, interfering with their motor skills and the athletic routine (Lorenzo, Gómez, Pujals and Lorenzo, 2012). This perception may not only cause a decrease in performance, but may also lead to abandoning the sport practice altogether when athletes cannot withstand the pressure.

We consider that strengthening the relationship between attentional control and self-confidence would be a good strategy for the acquisition of refocusing skills. Moreover, it would help prevent "choking" (Otten, 2009), being an important factor when controlling stress in sport situations (González-Campos, Valdivia-Moral, Zagalaz and Romero, 2015).

Regarding the relationship between anxiety and attentional control, only the somatic dimension of state anxiety was a significant negative predictor. Previous studies also provided evidence of an inverse relation between anxiety and lower attentional control levels (Derryberry and Reed, 2002; Edwards, Edwards and Lyvers, 2015). These findings suggest that when individuals are anxious they can be more affected by distractor stimuli and lose their concentration more easily (Moran, 2012). Our findings are in line with the Attentional Control Theory (Eysenck et al., 2007), as well as other studies in which anxiety was found to interfere with attentional processing at an experimental level (Listea et al., 2017; Pacheco-Unguetti, Lupiáñez and Acosta, 2009).

Finally, concerning the second hypothesis, the results partially confirmed our prediction, as athletes that had more years of experience in their sport scored higher on self-confidence indices and lower on somatic anxiety levels. These differences are in agreement with studies conducted on expert athletes (Baker and Farrow, 2015; Ruiz et al., 2006). These results suggest that highly-skilled athletes with long-standing expertise showed higher self-confidence indices and greater capacity for anxiety management, which enabled them to focus on relevant sports stimuli (Bebestos, 2015; Mann, Williams, Ward and Janelle, 2007).

Although the most experienced athletes had higher scores in attentional control, as predicted by the second hypothesis, these differences were not statistically significant. This result is not in accordance with previous scientific literature (Englert et al., 2015; Sánchez-López et al., 2014).

Understanding that levels of competitive anxiety and self-confidence vary depending on experience is relevant for sport psychology professionals. By teaching specific techniques, sports psychologists can help athletes to acquire a good command of these variables, which are essential to maintain good attentional control. Otherwise, and in the absence of specific psychological preparation, these athletes would have to rely on their own practice or competitive experience to develop their management of stressful situations.

In conclusion, the results of our study provide a greater insight into athletes' characteristics which constitute good predictors of good attentional control. This line of research will favour the design of training programs focused on the role of self-confidence for athletes and coaches. Working on these constructs would enable athletes to have greater control of their performance when experiencing high anxiety, because optimal levels of attentional control are essential to prevent athletes from experiencing performance breakdowns under pressure.

Limitations

Our research is limited due to its cross-sectional design rather than experimental nature, and consequently, it is difficult to predict whether the relationship established between athletes' self-confidence, competitive state anxiety and attentional control, as a function of sport experience, would also be found in experimental studies.

Furthermore, methodological choices, such as measuring competitive state anxiety before (instead of during) competition and splitting the sample in two groups could explain why attentional control failed to reach statistical significance as a function of sport experience.

Future research should also consider the relationship between self-confidence and other constructs related to attentional control, such as working memory (Furley and Wood, 2016), metacognition (Love, Kannis-Dymand and Lovell, 2018) and ego-depletion (Englert et al., 2015).

La relación entre la ansiedad estado competitiva, la autoconfianza y el control atencional en deportistas

Resumen

El objetivo de este estudio fue evaluar la relación entre la ansiedad competitiva estado y la autoconfianza sobre el control atencional. También se analizó el impacto de la cantidad de años de experiencia en la práctica deportiva sobre estas variables. Nuestro estudio consideró las siguientes hipótesis: altos niveles de control atencional se relacionarán con menores niveles de ansiedad competitiva estado, y mayores niveles de autoconfianza. Del mismo modo la ansiedad competitiva estado y la autoconfianza serán predictores significativos del control atencional; y los deportistas con más experiencia en su deporte tendrán mayores niveles de control atencional, autoconfianza, así como niveles más bajos de ansiedad competitiva estado. La muestra consistió en 833 deportistas españoles, y los análisis de datos incluyeron: cálculo de estadísticos descriptivos, análisis de regresión y análisis comparativos, empleando pruebas t para muestras no emparejadas, basados en la cantidad de años de experiencia deportiva. Los resultados de nuestro estudio confirmaron parcialmente estas hipótesis, proporcionando evidencia de la conexión entre la ansiedad estado competitiva y la autoconfianza con el control atencional en el deporte, así como confirmando el impacto de la experiencia deportiva sobre la autoconfianza y la ansiedad competitiva estado. Esta línea de investigación tiene implicaciones para la comprensión del tipo de características que pueden ayudar a los deportistas a desarrollar un buen control atencional.

Palabras clave: Ansiedad. Autoconfianza. Control atencional. Experiencia. Deporte.

A relação entre ansiedade do estado competitivo, autoconfiança e controle da atenção em atletas

Resumo

O objetivo deste estudo foi avaliar a relação entre a ansiedade do estado competitivo e a autoconfiança sobre o controle da atenção. O impacto do número de anos de experiência na prática esportiva nessas variáveis também foi analisado. Nosso estudo considerou as seguintes hipóteses: altos níveis de controle da atenção estarão relacionados a níveis mais baixos de ansiedade do estado competitivo e níveis mais altos de autoconfiança. Da mesma forma, a ansiedade e a autoconfiança do estado competitivo serão preditores significativos do controle da atenção; e atletas com mais experiência em seu esporte terão níveis mais elevados de controle da atenção, autoconfiança, assim como níveis mais baixos de ansiedade do estado competitivo. A amostra foi composta por 833 atletas espanhóis, e a análise dos dados incluiu: cálculo da estatística descritiva, análise de regressão e análise comparativa, utilizando-se testes t para amostras não pareadas, com base no número de anos de experiência esportiva. Os resultados do nosso estudo confirmaram parcialmente essas hipóteses, fornecendo evidências da conexão entre a ansiedade do estado competitivo e a autoconfiança com o controle da atenção no esporte, bem como confirmando o impacto da experiência esportiva na autoconfiança e na ansiedade competitiva do estado. Essa linha de pesquisa tem implicações para a compreensão do tipo de características que podem ajudar os atletas a desenvolver um bom controle da atenção.

Palavras-chave: Ansiedade. Autoconfiança. Controle atencional. Experiência. Esporte.

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