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ORIGINAL

SPANISH ADAPTATION OF THE CTAI-2D. TOOL FOR ASSESSING THE TRAIT ANXIETY IN ATHLETES

ADAPTACIÓN ESPAÑOLA DEL CTAI-2D. HERRAMIENTA PARA EVALUAR LA ANSIEDAD RASGO EN DEPORTISTAS

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ABSTRACT

Trait-Anxiety is a dispositional and stable measure whose evaluation is relevant in the sporting context as the way in which athlete's interpret feelings of anxiety is relevant to competitive performance. The purpose of the present study was to adapt the Competitive Trait Anxiety Inventory (CTAI-2D) into Spanish through a sample of 421 athletes (66.3% men and 33.7% women) aged between 18 and 46 years (mean = 21.16). Firstly, the CTAI-2D was translated. This was then followed by exploratory factor analysis (EFA) and examination of convergent validity. Finally, confirmatory factor analysis (CFA) was performed.

EFA outcomes showed an explained variance of 52.95% for the intensity dimension and 55.55% for valence/direction, whilst CFA produced satisfactory fit indices. The CTAI-2D is a valid and reliable instrument for evaluating trait anxiety. It describes athlete's perceptions of anxiety intensity and whether anxiety is interpreted as an obstacle or facilitator.

KEY WORDS: intensity; direction; translate; anxiety.

RESUMEN

La Ansiedad-Rasgo es una medida disposicional y estable, siendo en el contexto deportivo relevante su evaluación, por la interpretación que realiza el deportista de sus sensaciones ansiosas para el rendimiento competitivo. El propósito ha sido la adaptación al español del Competitive Trait Anxiety Inventory (CTAI-2D), en 421 deportistas (66.3% hombres y 33.7% mujeres) con edades entre los 18 y 46 años (M_{edad} = 21.16). En primer lugar, se efectuó la traducción del CTAI-2D, junto con el análisis factorial exploratorio (AFE) y validez convergente; y, en segundo lugar, se realizó el análisis factorial confirmatorio (AFC).

El AFE ha mostrado una varianza explicada del 52.95% para la dimensión intensidad y 55.55% para valencia/dirección; mientras el AFC muestra índices de ajuste satisfactorios. El CTAI-2D es un instrumento para evaluar el rasgo, válido y fiable, aportando la percepción del deportista acerca de la intensidad de la ansiedad y la interpretación como obstaculizadora o facilitadora.
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PALABRAS CLAVE: intensidad; dirección; traducción; ansiedad.

1. INTRODUCTION

In the sporting context, emotions (fear, sadness, anger, shame…) emerge and develop which fluctuate along the maladaptive-adaptive continuum as a function of whether or not they lead to desired performance standards being met. Athletes' stress perceptions when faced with high-pressure situations due to the need to obtain certain outcomes (scores, medals, results…) largely depend on their coping styles and threat/opportunity interpretations. Such processes lead to differences in psychological wellbeing (Lazarus, 2000) and sporting performance (Balyan, Tok, Tatar, Binboga and Balyan, 2016; Swettenham, Eubank, Won, and Whitehead, 2018).

Some researchers have focused attention on two types of emotional responses which are linked to threat. These include fear, due to its interference in sporting performance (Gustafsson, Sagar and Stenling, 2016) and anxiety (Geukes, Harvey, Trezise and Mesagno, 2017; Rowland and van Lankveld, 2019). Research has focused on understanding the conceptual and biological differences between both constructs (Mellalieu, Hanton and Fletcher, 2006). Concretely, fear is found to be linked to the perception of an imminent and specific threat, whilst anxiety is directed towards the anticipation of a future threat which is often undefined. Taking all of these differences together, a review conducted by Perusini and Fanselow (2015) showed differences at a neuro-behavioural level in the defensive responses provided by activation of the neural circuits.

In general, anxiety has been defined as the psychological response to a threat. It is characterised by negative affective responses (Barlow and Durand, 2005; Cantón, Checa and Espejo, 2015) and is accompanied by high levels of psychophysiological activation. It is from this activation that differences are derived between environmental demands and the repertoire of individual responses (coping styles). On the other hand, researchers in sport have defined competitive anxiety as an emotional mechanism through which the athlete responds, dictated by their coping style (Patridge and Wiggins, 2008; Pinto and Vázquez, 2013; Sepulveda-Páez, Díaz-Karmelic and Ferrer-Urbina, 2019), to the threatening or uncertain situations that arise during competition. This enables them to adapt to their environment (Gutiérrez-García and Contreras, 2013; Mellalieu et al., 2006; Pons, Viladrich, Ramis and Polman, 2018), with the effectiveness of this adaptation being determined by the frequency with which they employ strategies and their skills (Gantiva, Luna, Dávila and Salgado, 2010).

Spielberger (2010) distinguished between state- and trait anxiety as a function of the way in which behaviours are expressed. This has been indicated by other authors (Ries, Castañeda, Campos and Del Castillo, 2012). In keeping with the previously made distinction of Spielberger, (2010), concepts indicated by Simon and Martens (1979) are also found in the sporting ambit pertaining to competitive trait and state anxiety. Competitive state anxiety has been defined as an immediate emotional state. It is modified over time and characterised by a combination of feelings (tension, nerviousness and apprehension), cognitions and concerns, together with physiological changes that take place in competitive situations. Further, competitive trait anxiety refers to individual differences in relatively stable anxiety. It relates to one's disposition, tendency or trait towards perceiving competitive situations as threatening.

The relationship between both types of anxiety and trait influences over state influences highlight the importance of studying trait anxiety. Specifically, sports people with high levels of trait anxiety are more likely to perceive situations as threatening (Dias, Cruz and Fonseca, 2011; Ivaskevych et al., 2020; Peñaloza, Jaenes, Méndez-Sánchez and Jaenes-Amarillo, 2016) and are more vulnerable to experiencing both frequent and intense state anxiety. In addition to this, trait anxiety assumes a more stable trend. For this reason, it is possible to assume that lower individual variation and more consistent evaluations will be presented in relation to this type of anxiety than state anxiety.

Likewise, some research studies (Ford et al., 2017; Patel, Omar and Terry, 2010) have synthesised the various hypotheses conceived to define and explain the relationship between anxiety and performance. Traditional theories have related activation and performance, such as the inverted u hypothesis (Yerkes and Dodson, 1908) and drive theory (Spence and Spence, 1966). These theories considered anxiety as a point on a continuum. Despite the fact that comparisons have been carried out between variables, distinguishing individual differences and identifying both conceptual and methodological shortcomings (Perreault and Marisi, 1997), these theories have provided a useful base from which multi-dimensional models could emerge.

The multidimensional theory developed by Martens et al. (1990) solves some of the issues of the aforementioned hypotheses, distinguishing three factors (somatic anxiety, cognitive anxiety and self-confidence) as predictors of sport performance. Martens et al. (1990) define anxiety as a set of somatic and physiological reactions derived from autonomic activation. This also includes a cognitive response in the form of negative expectations and concerns about oneself, the situation and potential consequences. With regards to self-confidence, this refers to the degree of certainty possessed by sports people about their ability to achieve success in their next competition.

In relation to this theory, Jones and Swain (1992; 1995) introduced the term direction/valence as a new line of research. The intensity of anxiety can be understood as the magnitude or extent of resulting symptoms, whilst direction/valence refers to sports people's interpretation of these symptoms with regards to their future performance. Concretely, whether they see them as facilitators or obstacles.

Development of this conceptual standpoint proposed a new line of research in order to identify the influence of the direction of anxiety on personal variables such as those that are situational in nature. With respect to dispositional variables, these have been related with personality (Balyan et al., 2016; Cerin, 2004; Olefir, 2018), mental health (Cremades and Wiggins, 2008) and coping (Dias et al., 2011; Pinto et al., 2013; Pons et al., 2018). These are all understood to have a protective influence over athletes' interpretations of anxiety. With respect to situational variables, the interpretation of anxiety has been moderately explained by variables such as sporting experience and sport type (Mellalieu, Hanton and O'Brien, 2004).These have been related with performance (Balyan, et al., 2016; Swettenham, Eubank, Won and Whitehead, 2018) and influenced by affect (Jones, Swain and Harwood, 1996).

Instruments for evaluating anxiety in sport often rely on self-report measures designed for the general population. Examples include the Inventory of Situations and Responses to Anxiety (ISRA) conceived by Miguel-Tobal and Cano-Vindel (2002) and the State-Trait Anxiety Inventory (STAI) developed by Spielberger (1989). Whilst the STAI has shown good concurrent validity when compared with other instruments such as the CSAI-2 (Wilson Raglin and Harger, 2000), it is not a specific instrument for the sporting context.

Trait anxiety has been evaluated by the *Sport Competition Anxiety Test* (Martens, 1977), the *Sport Anxiety Scale* (Smith, Smoll and Schutz, 1990) and the *Competitive Trait Anxiety Inventory* (CTAI-2). The SCAT represents the adaptation of Spielberger's theory to the sporting context, with this being pioneering in this setting with sports people. Along these lines, the SAS and the CTAI-2 are based on multidimensional theories of anxiety. Further, the incorporation of evaluation of the magnitude of symptoms in the CTAI-2 through the direction/valence scale, leads it to present greater predictive validity than the intensity scale (Jones and Hanton, 2001).

To this end, the *Competitive Trait Anxiety Inventory-2* (CTAI-2D) is a combined questionnaire which consists of the trait anxiety version of the *Competitive State Anxiety Inventory-2* (CSAI-2, Martens, Burton, Vealey, Bump, and Smith, 1990) and a scale pertaining to the direction of anxiety (Jones and Swain, 1992). Nonetheless, at the time of writing, no Spanish translation of the CTAI-2D currently exists. This is important as scientific literature has demonstrated the need for appropriate measurement techniques in professional practice, in addition to for theoretical research into this psychological construct.

The aim of the present article focuses on the translation and adaptation of the Competitive Trait Anxiety Inventory 2 in a sample of Spanish sports people. The research presents the following hypotheses: (1) exploratory factor analysis of the CTAI-2D will produce three factors which will correspond to somatic anxiety, cognitive anxiety and self-confidence; (2) convergence analysis of trait anxiety will show positive correlations with insufficient coping styles and negative affect; (3) confirmatory factor analysis will corroborate the three explored factors and will enable a model for sports people to be developed.

2 MATERIAL AND METHODS

2.1 PARTICIPANTS

The sample was composed of 421 sports people, with self-reported ages between 18 and 46 years (*M* = 21.16; *SD* = 3.94). Of these, 279 were male (66.3%) and 142 were female (33.7%). All participants belonged to Spanish clubs from the cities of Alicante, Madrid, Granada and Murcia. With regards to sport type, participants were involved in basketball (*n* = 61; 14.5%), football (*n* = 105; 24.9%), athletics (*n* = 40; 9.5%), handball (*n* = 31; 7.4%), water polo (*n* = 19; 4.5%), volleyball (*n* = 25; 5.9%), indoor football (*n* = 32; 7.6%), American football (*n* = 10; 2.4%), cycling (*n* = 22; 5.2%), taekwondo (*n* = 9; 2.1%), tennis (*n* = 32; 7.6%), swimming (*n* = 12; 2.9%) and weightlifting (*n* = 23; 5.5%). With regards to distribution as a function of the competitive level of participants, this was distributed between regional or community level (75.3%) and national level (24.7%). With regards to time spent training, this was divided between 4 (45.6%) and 5 hours (54.4%) a day.

All researchers involved on the project were graduates of Psychology and specialists in Sport and Health Psychology, with experience in the applied and academic ambit. Two of the researchers are Doctors of Psychology and university teachers with more than 15 years of teaching and research experience. A third of the researchers involved have more than 5 years' experience.

2.2 INSTRUMENTS

Ad hoc sociodemographic questionnaire: This questionnaire follows a self-administration method developed by the study researchers to collect information related to the participant (sex, age and competitive level) and the type of sport they engage in.

Inventory of coping strategies adapted into Spanish by Cano, Rodríguez and García (2007). This questionnaire is composed of 40 items, plus and additional measure of the perceived effectiveness of coping. It comprises eight primary sub-scales: *Problem solving, cognitive restructuring, emotional expression, social support, hopeful thinking, problem avoidance, self-criticism and social withdrawal.* Each subscale comprises 5 items which are responded to on a Likert type scale that runs from 0 *("Not at all") to* 4 *("Totally").* These subscales are integrated into four second order scales: *Appropriate problem-focused management; appropriate emotion-focused management; inappropriate problem-focused management; inappropriate emotion-focused management.* The present research found reliability of the instrument to be 0.76.

Positive and Negative Affect Schedule (PANAS), validated in a Spanish population by López-Gomez, Hervás and Vázquez (2015). This is a self-report questionnaire containing 20 items. It is constituted of two scales, one that measures positive affect (AP) and the another measuring negative affect (AN). Each scale contains 10 items. Participants are requested to indicate the extent to which they have felt each presented emotion during a specified time-period (*the last week*) on a 5-point Likert type scale (running from 1=*not at all,* to *slightly,* to 5=*a lot*). In the present research study, the reliability index of the positive affect scale was 0.84, whilst that of the negative affect scale was 0.86.

Competitive Trait Anxiety Inventory (CTAI-2D): This is a combined questionnaire including the version of the Competitive State Anxiety Inventory (CSAI-2, Martens, et al., 1990) and the scale of direction and anxiety (Jones and Swain, 1992). It is composed of 27 items which evaluate 3 factors: Cognitive anxiety ("*I tend to worry about competition*"), somatic anxiety ("*my body feels tense before competing*") and self-confidence ("*I tend to feel good before competing*"). Participating sports people respond to each of the items following the initial stem "*Prior to competition*…". Information about the sports person is obtained such as the way in which they tend to feel (intensity) and the way in which this influences performance (valence/direction). On the one hand, items of the intensity scale are responded to by selecting from four response options which are presented on a 4-point Likert type scale, where 1 corresponds to "*not at all*" and 4 corresponds to "*a lot*". On the other hand, items in the valence/direction category are responded to by selecting from response options that vary from "-3: *highly negative*" to "+3: *highly positive*". Previously conducted research using the original version demonstrated concurrent validity with constructs such as burnout (Cremades, Wated and Wiggins, 2011;

Wiggins, Lai and Deiters, 2005) and coping (Patridge and Wiggins, 2008). Prior research also demonstrated adequate levels of reliability, with internal consistency values ranging between .83 and .90 in a sample of university athletes (Cremades and Wiggins, 2008) and between .75 and .76 in a sample of golfers and rugby players (Mellalieu, el al., 2004).

2.3 PROCEDURE

For the adaptation of the CTAI-2D into Spanish, methodological recommendations for health questionnaires were followed, as suggested by Ramada-Rodilla, Serra-Pujadas and Delclos (2013). Firstly, the translation was performed by three experts (two bilingual psychologists and a non-psychologist translator). The experts independently translated the instrument. Once the specific language of the translation was agreed upon, the items with greatest reliability indices were selected. From these, the questionnaire was back translated into the original language, adapting the language when imperfections were found.

Data collection processes were approved by the Ethics Committee of the Autonomous University of Madrid (CEI-85-1575). Pertinent authorities of the involved sporting entities were contacted via incidental sampling with the aim of explaining the purpose of the research and outlining data collection methods. Once agreement to participate was obtained from the organisations, questionnaire administration was coordinated with the trainers. Consent was then received from participants, all of whom were of adult age. The participant information and informed consent pack explained to participants that participation was entirely voluntary, data would be kept confidential and they could leave the study at any time. All questionnaires were administered to groups at relevant training facilities. This was normally a room equipped for this purpose, such as the changing room, where participating athletes could comfortably and appropriately complete the questionnaire. Study researchers spent half an hour giving instructions and waiting whilst participants responded to the scales.

2.4 DATA ANALYSIS

Data handling and coding was carried out using the statistical package SPSS 22.0 for Windows. Analysis of internal reliability was performed of all included measures (Cronbach's alpha). Normality of distribution was considered (Kolmogorov-Smirnov) and descriptive analysis performed (mean, standard deviation, asymmetry and kurtosis). Exploratory and confirmatory factor analyses were performed, together with evaluating the convergent validity of the evaluation instruments (Pearson correlations).

Following this, a structural equation model was developed to validate and quantify relationships between the items and factors of the CTAI-2D using the statistical program AMOS 23.0. The maximum likelihood method was used to calculate model fit, evaluating the following indices: RMSEA (*root mean square* *error of approximation*), NFI (n*ormed fit index*), CFI (*comparative fit index*), PNFI (*parsimony normed fit index*) and PCFI (*parsimony comparative fit index*).

3 RESULTS

3.1 DESCRIPTIVE ANALYSIS

Table 1 presents descriptive statistics (mean, standard deviation, asymmetry and kurtosis) for each of the items of the CTAI-2D. The largest overall means pertaining to the intensity scale correspond to the dimensions of self-confidence (M = 2.83; SD = 0.86) and cognitive anxiety (M = 2.73; SD = 0.93), whilst the lowest mean corresponded to somatic anxiety (M = 2.13; SD = 0.89). On the other hand, for the direction scale, the largest overall means were found for self-confidence (M = 1.16; SD = 1.48) and cognitive anxiety (M = 0.24; SD = 1.66). With regards to asymmetry, the dimensions of cognitive anxiety and self-confidence presented negative asymmetry on the intensity scale. In contrast, this only occurred in the self-confidence dimension on the direction scale. Examination of kurtosis identified a normal concentration of values for factors of both intensity and valence/direction.

Table 1. Descriptive analysis of items and internal consistency analysis (N = 421)

Factor	*Item*	*M (SD)*		*Asymmetry*		*Correlations Item-factor*		*Alpha following item elimination*	
		Intensity	Direction	Intensity	Direction	Intensity	Direction	Intensity	Direction
Somatic anxiety - Intensity; α = 0.76 - Direction; α = 0.84	2	2.67 (0.84)	0.35 (1.54)	-0.01	-0.72	0.59	0.50	0.72	0.82
	5	1.39 (0.71)	-0.20 (2.,15)	1.90	0.18	0.50	0.62	0.73	0.81
	8	2.44 (0.89)	0.07 (1.59)	-0.00	0.03	0.58	0.57	0.72	0.82
	11	2.14 (1.03)	-0.11 (1.71)	0.46	0.22	0.68	0.74	0.70	0.80
	14	2.35 (0.88)	0.47 (1.53)	0.13	-0.28	-0.54	0.07	0.86	0.86
	17	2.43 (0.90)	0.35 (1.47)	0.01	-0.21	0.56	0.57	0.72	0.82
	20	1.99 (0.96)	-0.13 (1.70)	0.61	0.14	0.70	0.71	0.70	0.80
	23	1.54 (0.85)	-0.03 (1.72)	1.53	0.05	0.43	0.51	0.74	0.82
	26	2.30 (0.92)	0.17 (1.59)	0.13	-0.08	0.71	0.68	0.70	0.81
Cognitive anxiety - Intensity; α = 0.80 - Direction; α = 0.84	1	3.22 (0.77)	1.22 (1.47)	-0.78	-0.72	0.42	0.46	0.78	0.84
	4	2 (0.95)	-0.02 (1.83)	0.55	0.18	0.41	0.44	0.79	0.84
	7	3.07 (0.86)	-0.09 (1.73)	-0.64	0.16	0.57	0.57	0.77	0.83
	10	2.83 (1.04)	0.51 (1.72)	-0.42	-0.12	0.42	0.56	0.79	0.83
	13	2.20 (1.01)	-0.28 (1.73)	0.31	0.28	0.51	0.59	0.77	0.82
	16	3.02 (0.92)	0.02 (1.77)	-0.57	0.08	0.63	0.68	0.76	0.81
	19	3.20 (0.79)	1.04 (1.42)	-0.83	-0.74	0.36	0.49	0.79	0.83
	22	2.80 (0.99)	-0.20 (1.74)	-0.47	0.17	0.54	0.62	0.77	0.82
	25	2.28 (1.02)	-0.01 (1.55)	0.21	0.14	0.52	0.62	0.77	0.82
Self-confidence - Intensity; α = 0.89 - Direction; α = 0.92	3	2.25 (0.96)	0.59 (1.58)	0.31	-0.13	0.43	0.55	0.90	0.92
	6	2.88 (0.87)	1.43 (1.40)	-0.43	-0.76	0.64	0.71	0.88	0.91
	9	2.99 (085)	1.32 (1.55)	-0.56	-0.95	0.77	0.77	0.87	0.90
	12	2.92 (087)	1.32 (1.54)	-0.49	-0.89	0.81	0.78	0.87	0.90
	15	3.18 (0.73)	1.50 (1.35)	-0.59	-0.89	0.63	0.75	0.88	0.91
	18	2.89 (0.85)	1.17 (1.51)	-0.42	-0.74	0.76	0.77	0.87	0.90
	21	2.56 (0.88)	0.65 (1.52)	-0.07	-0.34	0.54	0.63	0.89	0.91
	24	2.76 (0.88)	1.03 (1.49)	-0.27	-0.49	0.66	0.73	0.88	0.91
	27	3.10 (0.82)	1.43 (1.41)	-0.70	-0.85	0.70	0.77	0.88	0.90

3.2 RELIABILITY ANALYSIS

Internal consistency of the CTAI-2D was calculated according to Cronbach's alpha coefficient. For the intensity scale, a value of 0.76 was produced for the somatic anxiety dimension, 0.80 for cognitive anxiety and 0.89 for self-confidence. On the other hand, on the direction scale, these values were 0.84 for somatic anxiety, 0.84 for cognitive anxiety and 0.92 for self-confidence. All indices exceeded the critical value established by Nunnally (1978) for determining acceptable internal consistency.

Specifically, items relating to intensity of somatic anxiety presented Cronbach's alphas higher than 0.70 (except for item 12), whilst cognitive anxiety items were above 0.76. Items for the direction of somatic anxiety presented indices greater than 0.80, whilst cognitive anxiety indices were above 0.81. This enables us to conclude that the items forming each scale measure the same construct and are highly correlated. Similarly, items relating to self-confidence present a reliability index greater than 0.87 for the intensity scale and above 0.90 on the direction scale. In can, therefore, be concluded that the items evaluate the same construct and are correlated.

3.3 CONVERGENT VALIDITY

Table 2 present results of the analysis of the various instrument components. Analysis examined whether significant differences existed between questionnaire dimensions and other measures (coping [IEA] and affect [PANAS]). Negative affect presents a moderate positive correlation with cognitive anxiety-intensity ($p < 0.00$) and somatic anxiety-intensity ($p < 0.00$).Further, it was moderately and negatively correlated with self-confidence-intensity ($p < 0.00$) and self-confidence-direction ($p < 0.00$), and a weak correlation with somatic anxiety-direction ($p = 0.01$). Positive affect shows a positive moderate correlation with self-confidence for both the intensity ($p < 0.00$) and direction scales ($p < 0.00$), and a weak correlation with cognitive anxiety-direction ($p < 0.00$) and somatic anxiety-direction ($p = 0.01$).

With regards to the relationship between the dimensions of the CTAI-2D and the dimensions of coping, somatic anxiety-intensity shows a weak positive association with social avoidance ($p = 0.00$), problem avoidance ($p = 0.01$) and emotional expression ($p = 0.05$). In the same way, cognitive anxiety-intensity presents a weak positive correlation with social avoidance ($p = 0.00$) and problem avoidance ($p = 0.00$), and a negative correlation with problem solving ($p = 0.00$) and social support ($p = 0.00$). Self-confidence-intensity was weakly and positively related with social support ($p < .00$), self-criticism ($p = 0.01$), cognitive restructuring ($p < 0.00$) and problem solving ($p < 0.00$). On the other hand, the directional factor of somatic anxiety was weakly and positively related with social support ($p < 0.00$), emotional expression ($p = 0.00$), cognitive restructuring ($p < 0.00$), problem solving ($p = 0.00$) and wishful thinking ($p = .00$), and negatively related with self-criticism ($p < 0.00$). Cognitive anxiety was positively and weakly related with problem avoidance ($p = 0.01$). Self-confidence – direction was weakly and positively related with social support ($p < 0.00$), cognitive restructuring ($p < 0.00$) and problem solving ($p < 0.00$).

Table 2. Pearson correlations between the dimensions of CTAI-2D and factors of coping (IEA) and affect (PANAS) (N=421).

		1	2	3	4	5	6
Intensity	1. Somatic anxiety	--					
	2. Cognitive anxiety	0.58**	--				
	3. Self-confidence	-0.45**	-0.45**	--			
Direction	4. Somatic anxiety		-0.10*	0.17**	--		
	5. Cognitive anxiety			0.24**	0.56**	--	
	6. Self-confidence	-0.38**	-0.42**	0.78**	0.20**	0.20**	--
Affect	7. Positive affect			0.41**	0.11*	0.20**	0.40**
	8. Negative affect	0.47**	0.46**	-0.40**	-0.12*		-0.40**
Coping	9. Social support		-0.10*	0.21**	0.25**		0.19**
	10. Emotional expression	0.09*			0.14**		
	11. Social avoidance	0.14**	0.15**				
	12. Self-criticism			0.11*	-0.20**		
	13. Cognitive restructuring			0.16**	0.17**		0.16**
	14. Problem solving		-0.14**	0.27**	0.14**		0.27**
	15. Problem avoidance	0.11*	0.12**			0.12*	
	16. Wishful thinking				0.12**		

Note: **. p<0,00; *. p<0,05

3.4 CONSTRUCT VALIDITY

Values corresponding to the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett sphericity test were acceptable ($\chi^2 = 5837.19$; $p<.00$; KMO = 0.92). Factorisation was carried out using principal component extraction and varimax rotation. The three factors explained 52.95% of total variance, with factor 1 corresponding to the variable of self-confidence. This factor contributed most to the explained variance (21.43%), followed by factor 2 which corresponded to somatic anxiety (19.34%). Finally, factor 3 corresponded to cognitive anxiety (12.18%). The component matrix extracted via principal component analysis shows the resultant factors and their associated questionnaire items relating to the intensity dimension. Corresponding saturation values are also presented (Table 3).

Table 3. Principal components matrix for the intensity scale of the CTAI-2D (N=421)

	Factor 1	Factor 2	Factor 3
ITEM 18	0.83		
ITEM 12	0.81		
ITEM 9	0.80		
ITEM 27	0.80		
ITEM 15	0.75		
ITEM 24	0.74		
ITEM 6	0.62		
ITEM 4	-0.56		
ITEM 13	-0.40		0.40
ITEM 26		0.77	
ITEM 11		0.74	
ITEM 20		0.73	
ITEM 2		0.69	
ITEM 17		0.66	
ITEM 3		-0.64	
ITEM 8		0.63	
ITEM 14		-0.61	
ITEM 5	-0.40	0.48	
ITEM 21	0.44	-0.45	
ITEM 23		0.42	
ITEM 16			0.73
ITEM 22			0.65
ITEM 10			0.65
ITEM 7			0.64
ITEM 1			0.55
ITEM 19			0.51
ITEM 25			0.50

In the same way, relevant Kaiser-Meyer-Olkin (KMO) sampling adequacy values were acceptable, as were outcomes from the Bartlett sphericity test (χ^2 = 6214.22; p<0.00; KMO = 0.90). Factors were obtained via the method of principal components extraction and varimax rotation. The total variance explained by the three factors was 55.55%. Specifically, factor 1 corresponded to the variable of self-confidence and explained the greatest amount of variance (22.39%). This was followed by factor 2, which was related to somatic anxiety (19.42%), and factor 3 which pertained to cognitive anxiety (13.73%). Factors resulting from principal component analysis are presented in Table 4, alongside the questionnaire items relating to the valence/direction dimension according to the component matrix.

Table 4. Principal component matrix for the valence/direction scale of the CTAI-2D (N=421).

	Factor 1	Factor 2	Factor 3
ITEM 12	0.82		
ITEM 9	0.81		
ITEM 18	0.81		
ITEM 27	0.81		
ITEM 15	0.80		
ITEM 24	0.78		
ITEM 6	0.77		
ITEM 21	0.70		
ITEM 3	0.65		
ITEM 14	0.58		
ITEM 11		0.81	
ITEM 20		0.79	
ITEM 5		0.78	
ITEM 4		0.72	
ITEM 26		0.69	
ITEM 23		0.68	
ITEM 17		0.61	
ITEM 8		0.58	
ITEM 13		0.56	0.42
ITEM 25		0.53	0.46
ITEM 2		0.53	
ITEM 16			0.80
ITEM 7			0.79
ITEM 22			0.73
ITEM 19			0.62
ITEM 10			0.60
ITEM 1			0.50

Two models are presented with 3 latent variables (factors). A total of 9 observable variables (items) are associated with each factor, producing a total of 27 observed variables. In this way, an initial model of trait-anxiety was developed. In accordance with outcomes of the original exploratory analysis, a model of intensity with 3 factors was obtained (somatic anxiety, cognitive anxiety and self-confidence). This model included 27 items (Figure 1). Another model pertaining to valence/direction with 3 factors (somatic anxiety, cognitive anxiety and self-confidence) was obtained. This model also contained 27 items (Figure 2).

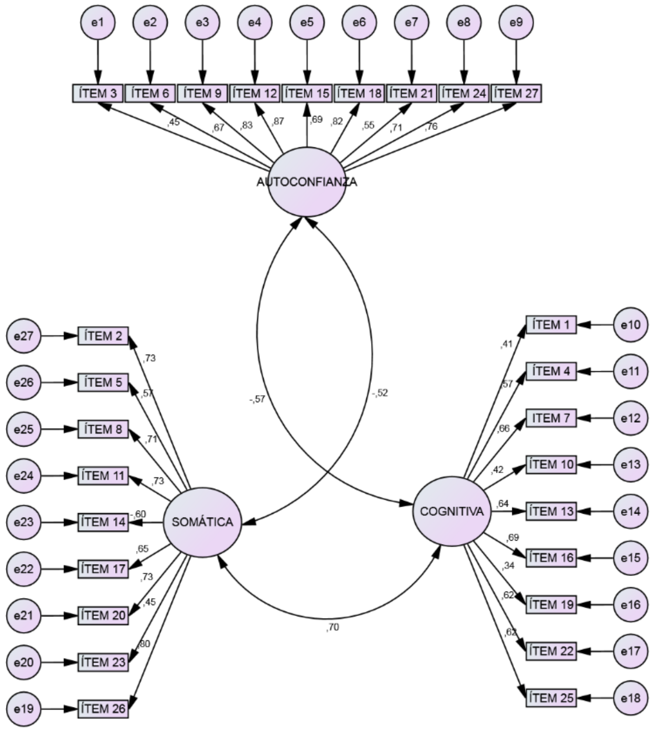

Figure 1. Structural equation model for the intensity factor of the CTAI-2D (N=421)

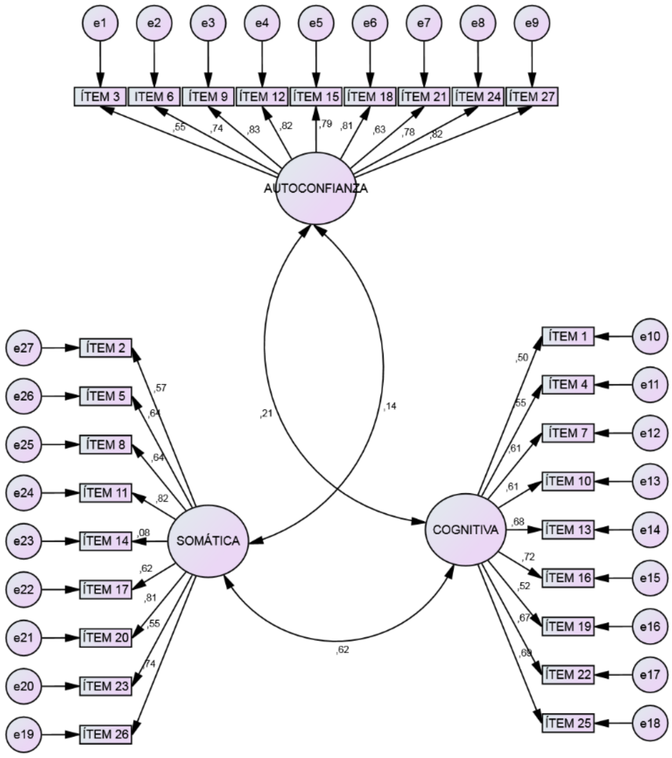

Figure 2. Structural equation model for the valence/direction factor of the CTAI-2D (N=421)

3.5 CONFIRMATORY FACTOR ANALYSIS

With the aim of examining the internal structure, confirmatory factor analysis was conducted, in this way evaluating the validity and reliability of each item. This enable better direction of the translation and adaptation process of the questionnaire (Figure 3). In order to generate this new reduced 15-item model, exclusion criteria were applied. According to this criteria, original items with the lowest regression weights were excluded, eliminating the following items: 1, 3, 4, 5, 6, 10, 14, 15, 19, 20, 21 and 23 (Arruza-Gabilondo, González-Rodríguez, Palacios-Moreno, Arribas-Galarraga and Cecchini-Estrada, 2010).

Figure 3 shows confirmatory factor analysis outcomes for the reduced model (intensity and valence/direction) generated in the exploratory analysis via structural equations. Following application of the maximum likelihood extraction method and perusal of fit indices, appropriateness of the model composed of three factors and 15 items was confirmed.

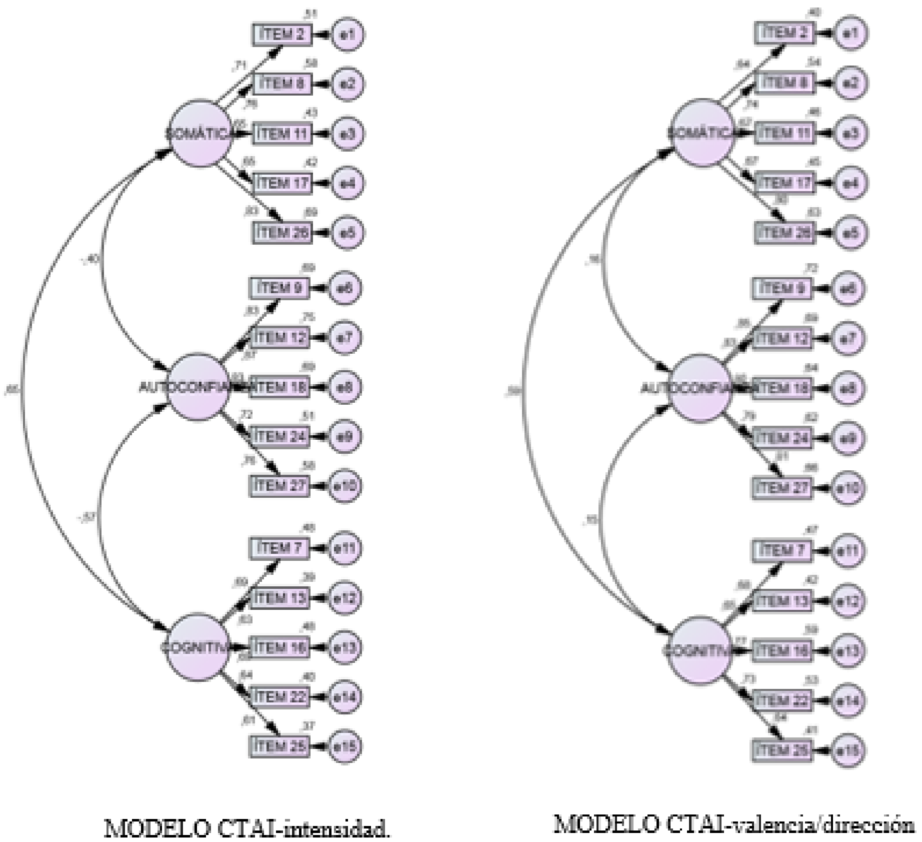

Figure 3. Corrected structural equation models for the intensity and valence/direction components of the CTAI-2D (N=421).

With regards to the different goodness of fit indicators (Table 5), results were significant and suggested appropriateness of the model (Hu and Bentler, 1999). Both the normed fit index (NFI) and the comparative fit index (CFI) improved for both dimensions (intensity and direction/valence) in the reduced model compared with the original. In the same way, the parsimony-based indices of normed fit index (PNFI) and comparative fit index (PCFI) were larger in the reduced model, for both intensity and valence/direction, suggesting a greater level of parsimony relative to the original model.

Table 5. Goodness of fit indices for the analysed models relating to the CTAI-2D.

		Absolute fit index		Incremental fit index		Parsimony-based index	
		X^2(B-S)	RMSEA	NFI	CFI	PNFI	PCFI
Original CTAI-2D	Intensity	1555.76; df = 321; p = 0.00	0.09	0.74	0.78	0.67	0.71
	Direction	1576.11; df = 321; p = 0.00	0.09	0.75	0.79	0.68	0.72
Reduced CTAI-2D	Intensity	234.91; df = 87; p = 0.00	0.06	0.91	0.94	0.76	0.78
	Direction	286.77; df = 87; p = 0.00	0.07	0.90	0.93	0.75	0.77

4. DISCUSSION

The aim of the present work was to translate and validate the Competitive Trait Anxiety Inventory (CTAI-2D) within a sample of Spanish sports people. Validation was carried out of both the factor structure of the translated instrument and of the relationships between anxiety and other related variables, namely, coping and affect (convergent validity).

With regards to the factor structure, in accordance with previously reported findings (Jones and Swain, 1992; Martens et al., 1990), the present analysis confirmed the existence of a three-factor model (cognitive anxiety, somatic anxiety and self-confidence) and found it to predict sport performance. Results demonstrated that, the factors of the CTAI-2D explain 52.95% and 55.55% of variance, respectively, in the first (intensity) and second models (valence/direction). In addition to this, further evidence of validity was uncovered when relating the developed models with other affective variables. The values produced demonstrated very good internal consistency of scale elements. At the same time, it is notable that the incorporation of other complementary scales, such as that of valence/direction, alongside that of intensity, added to the experience of the examined psychological constructs in the sporting context. The control scale is also useful in the evaluation of other constructs, such as mood state, related with sporting performance (De la Vega, Ruiz-Barquín, Borges and Tejero, 2014).

From the point of view of convergent validity, anxiety was seen to be a secondary emotion, whilst the results provide evidence of its relationship with affect. In this sense, as indicated in previously conducted research, present results show inverse relationships between the direction of anxiety and positive affect (Jones et al., 1996), in addition to positive relationships between the intensity of anxiety and negative affect (Cantón et al., 2015; Jones et al., 1996).

In the same way, as was expected from a theoretical perspective, direct relationships were found between inadequate coping styles and anxiety. Similarly, indirect associations were found between adequate coping styles and anxiety (Dias et al., 2011; Ivaskevych et al., 2020; Pons et al., 2018; Sepúlveda-Páez et al., 2019).

Both of the reduced models proposed in the present study are acceptable according to confirmatory analysis of their factor structure. Both intensity and valence/direction models had three determined factors and fifteen items in total. Taking these results together with the indices evaluated, it can be concluded that the reduced models present higher values for parsimony-related indices than the original models. Incremental indices and absolute fit also indicate that the reduced model is better, with fewer elements improving model fit relative to the original model.

Further, following confirmatory factor analysis, items with the lowest regression weights were eliminated. According to this criterion, the items mentioned in the results section were eliminated (1, 3, 4, 5, 6, 10, 14, 15, 19, 20, 21 and 23). Once the definitive item structure (2, 7, 8, 9, 11, 12, 13, 16, 17, 18, 22, 24, 25, 26 and 27) was concluded, goodness of fit indices improved relative to the first translated version, enabling the usefulness of the instrument for evaluation with sports people to be deduced.

5 CONCLUSIONS

Examination of the validity of the CTAI-2D as a measure of trait anxiety in sport people will enable appropriate and relevant information to be made available from both a scientific and applied standpoint. Useful knowledge pertains to both the most stable response of sports people to anxiety and its relation with other intervening variables to target better performance or psychological health.

Effectively, validation of this instrument is a valuable and novel contribution with regards to the CSAI-2 (Arruza-Gabilondo, et al., 2010). Firstly, because the way in which sports people interpret feelings of anxiety is evaluated (Jones and Swain, 1992; 1995). Secondly, because trait anxiety is a more stable measure than state anxiety. This makes it more precise and consistent when predicting the emotional state of athletes (Dias et al., 2011; Ries, et al., 2012), and the cognitive, emotional and behavioural repercussions on psychological functioning.

Nonetheless, the translation and validation of this instrument requires a continuous evaluation process, making it necessary to analyse its psychometric properties other similar sporting contexts (for example, early development or physical activity). Thus, new studies should recruit more females and re-examine validity. Invariance should be examined according to gender and age, whilst also correlating with other dispositional variables (coping styles, personality dimensions etc.) or convergent aspects such as state anxiety. Further, use of other methodologies, such as repetitive measures (test-retest), would broaden the reach of results and enable the stability of trait anxiety to be examined.

In conclusion, the present research suggests that trait anxiety in sports people can be evaluated using the CTAI-2D. This was shown to be effective and have adequate internal consistency and good factor validity. Further, it is an appropriate and effective tool for use by sports psychologists with sports people for both identifying feelings of anxiety and interpreting the implications of this for sport performance. It may also be useful for work in other ambits in which performance takes a backseat. Such ambits include early learning and other educational settings.

6 REFERENCES

Arruza-Gabilondo, J.A., González-Rodríguez, O., Palacios-Moreno, M., Arribas-Galarraga, S., y Cecchini-Estrada, J.A. (2010). Validación del Competitive State Anxiety Inventory 2 Reducido (CSAI-2RE) mediante una aplicación web. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el deporte, 12*(47), 539-556. http://cdeporte.rediris.es/revista/revista46/artvalidacion300.htm

Balyan, K. Y., Tok, S., Tatar, A., Binboga, E., y Balyan, M. (2016). The relationship among personality, cognitive anxiety, somatic anxiety, physiological arousal, and performance in male athletes. *Journal of Clinical Sport Psychology*, *10*(1), 48-58. https://doi.org/10.1123/jcsp.2015-0013

Barlow, D. y Durand, V. (2005). *Psicopatología*. International Thomson Editores, Madrid

Cano, F.J., Rodríguez, L., y García, J. (2007). Adaptación española del Inventario de Estrategias de afrontamiento. *Actas Españoles de Psiquiatría, 35*(1), 29-39.

Cantón, E., Checa, I., y Espejo, B. (2015). Evidencias de validez convergente y test-criterio en la aplicación del instrumento de evaluación de emociones en la competición deportiva. *Revista de Psicología del deporte, 24*(2), 311-316.

Cerin, E. (2004). Predictors of competitive anxiety direction in male Taekwondo practitioners: a multilevel mixed idiographic/nomothetic interactional approach. *Psychology of Sport and Exercise*, *5*, 497-516.

Cremades, J. G., y Wiggins, M. S. (2008). Direction and intensity of trait anxiety as predictors of burnout among collegiate athletes. *Athletic Insight: The Online Journal of Sport Psychology*, *10*(2).

Cremades, J. G., Wated, G., y Wiggins, M. S. (2011). Multiplicative measurements of a trait anxiety scale as predictors of burnout. *Measurement in Physical Education and Exercise Science*, *15*(3), 220-233.

De la Vega, R., Ruiz-Barquín, R., Borges, P. y Tejero, C. (2014). Una nueva medida tridimensional del estado de ánimo deportivo: el POMS VIC. *Cuadernos de Psicología del Deporte, 14*(2), 37-46.

Dias, C., Cruz, J.F., y Fonseca, A.M. (2011) Ansiedad, percepción de amenaza y estrategias de afrontamiento en el deporte: diferencias individuales en el rasgo de ansiedad. *Ansiedad y estrés, 17*(1), 1-13.

Ford, J. L., Ildefonso, K., Jones, M. L. y Arvinen-Barrow, M. (2017). Sport-related anxiety: current insights. *Open Access Journal of Sport Medicine, 8*, 205-212. http://dx.doi.org/10.2147/OAJSM.S125845

Gantiva Díaz, C.A., Luna Viveros, A., Dávila, A.M. y Salgado, M.J. (2010). Estrategias de afrontamiento en personas con ansiedad. *Psychologia: Avances de la disciplina*, *4*(1), 63-70.

Geukes, K., Harvey, J. T., Trezise, A., y Mesagno, C. (2017). Personality and performance in real-world competitions: Testing trait activation of fear of negative evaluation, dispositional reinvestment, and athletic identity in the field. *Psychology of Sport and Exercise*, *30*, 101-109. http://doi.org/10.1016/j.psychsport.2017.02.008

Gutiérrez-García, A.G., y Contreras, C.M. (2013) Anxiety: an adaptive emotion.

Gustafsson, H., Sagar, S.S. y Stenling, A. (2016) Fear of failure, psychological stress, and burnout among adolescent athletes competing in high level sport. *Scandinavian Journal of Medicine and Science in sports, 27*, 2091-2102. https://doi.org/10.1111/sms.12797

Hu, L.-t., y Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55. http://dx.doi.org/10.1080/10705519909540118

Ivaskevych, D., Fedorchuk, S., Petrushevskyi, Y., Borysova, O., Ivaskevych, O., Kohut, I., Marynych, V., y Tukaiev, S. (2020). Association between competitive anxiety, hardiness, and coping strategies: a study of the national handball team. *Journal of Physical Education and Sport, 20*(1), 359-365.

Jones, G y Hanton, S. (2001). Pre-competitive feeling states and directional anxiety interpretations. *Journal of Sports Sciences, 19*(6)*, 385-395.*

Jones, G., y Swain, A. (1995). Predisposition to experience debilitative and facilitative anxiety in elite and non-elite performers. *The Sport Psychologist, 9*, 201-211.

Jones, G., Swain, A., y Harwood, C. (1996). Positive and negative affect as predictors of competitive anxiety. *Personality and Individual differences, 20*(1), 109-114. https://doi.org/10.1016/0191-8869(95)00140-2

Jones, G., y Swain, A. B. J. (1992). Intensity and direction dimensions of competitive state anxiety and relationships with competitiveness. *Perceptual and Motor Skills*, 74, 467-472. https://doi.org/10.2466/pms.1992.74.2.467

Lazarus R. S. (2000). Toward better research on stress and coping. *American Psychologist, 55*, 665-73.

López-Gómez, I., Hervas, G., y Vázquez, C. (2015). Adaptación de la escala de afecto positivo y negativo (PANAS) en una muestra general española. *Psicología conductual, 23*(3), 529-548.

Martens, R. (1977). *Sport Competition Anxiety Test*. Champaign, IL: Human Kinetics

Martens, R., Burton, D., Vealey, R. S., Bump, L. A. y Smith, D. E. (1990). The Competitive State Anxiety Inventory-2 (CSAI-2). En R. Martens, R.S.

Vealey y D. Burton (Eds), *Competitive Anxiety in Sport*. Champaign IL: Human Kinetics.

Mellalieu, S.D., Hanton, S. y Fletcher, D., (2006). A competitive anxiety review: recent directions in sport psychology research. In *Literature reviews in sport psychology*, S. Hanton and S.D. Mellalieu (Eds), Hauppage, NY: Nova Science, pp. 1 45.

Mellalieu, S.D., Hanton, S., y O'Brien, M. (2004). Intensity and direction dimensions of competitive anxiety as a function of sport type and experience. *Scandinavian Journal of Science and Medicine in Sport*, *14*, 326-334.

Miguel-Tobal, J.J. y Cano-Vindel, A. (2002) *Inventario de situaciones y respuestas de ansiedad (ISRA): Manual*. Madrid: TEA

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

Olefir, V. (2018). Personality resources as a mediator of the relationship between antecedents of stress and pre-competitive anxiety. *Journal of Physical Education and Sport*, *18*(6), 2230-2234. https://doi.org/10.7752/jpes.2018.04335

Patel, D. R., Omar, H., y Terry, M. (2010). Sport-related Performance Anxiety in Young Female Athletes. *Journal of Pediatric and Adolescent Gynecology*, *23*(6), 325–335. https://doi.org/10.1016/j.jpag.2010.04.004

Patridge, J.A., y Wiggins, M.S. (2008) Coping styles for trait shame and anxiety and direction in competitive athletes. *Psychological Reports, 103,* 703-712. https://doi.org/10.2466/pr0.103.3.703-712

Peñaloza Gómez, R., Jaenes Sánchez, J.C., Méndez-Sánchez, M.P., y Jaenes-Amarillo, P. (2016) El poder explicativo de la ansiedad en los estados de ánimo de deportistas españoles. *Retos, 30,* 207-210.

Perusini, J. N., y Fanselow, M. S. (2015). Neurobehavioral perspectives on the distinction between fear and anxiety. *Learning and Memory*, 22, 417–425. http://dx.doi.org/10.1101/lm.039180.115

Pinto, M.F., y Vázquez, N. (2013). Ansiedad estado competitiva y estrategias de afrontamiento: su relación con el rendimiento en una muestra argentina de jugadores amateurs de golf. *Revista de Psicología del deporte, 22*(1), 47-52.

Pons, J., Viladrich, C., Ramis, Y., y Polman, R. (2018). The Mediating Role of Coping between Competitive Anxiety and Sport Commitment in Adolescent Athletes. *The Spanish Journal of Psychology*, *21,* 1-8. https://doi.org/10.1017/sjp.2018.8

Ramada-Rodilla, J.M., Serra-Pujadas, C., y Delclos, G.L. (2013) Adaptación cultural y validación de cuestionarios de salud: revisión y recomendaciones metodológicas. *Salud pública de Mexico, 55*(1), 57-66.

Ries, F., Castañeda, C., Campos, M.C., y Del Castillo, O. (2012). Relaciones entre la ansiedad-rasgo y ansiedad-estado en competiciones deportivas. *Cuadernos de Psicología del Deporte, 12*(2), 9-16.

Rowland, D.L. y van Lankveld, J.J.D.M. (2019) Anxiety and performance in sex, sport, and stage: identifying common ground. *Frontiers in Psychology, 10*, 1-21. https://doi.org/10.3389/fpsyg.2019.01615

Sepúlveda-Páez, G., Díaz-Karmelic, Y., y Ferrer-Urbina, R. (2019) Ansiedad pre-competitiva y estrategias de afrontamiento deportivo, en disciplinas acuáticas individuales y colectivas en deportistas juveniles de alto nivel. *Revista Interdisciplinaria de Filosofia y Psicología, 14,* 1-10. http://dx.doi.org/10.4067/s0718-50652019000100216.

Smith, R. E., Smoll, F. L. y Schutz, R. W. (1990). Measurement and correlates of sport-specific cognitive and somatic trait-anxiety: The Sport Anxiety Scale. *Anxiety Research*, *2*, 263-280.

Simon, J.A. y Martens. R. (1979). Children's anxiety in sport and nonsport evaluative activities. *Journal of Sport Psychology*, *1*, 160-169

Spielberger, C. D. (2010). State-Trait Anxiety Inventory. *The Corsini Encyclopedia of Psychology*. https://doi.org/10.1002/9780470479216.corpsy0943

Spielberger, C.D. (1989). *State-Trait Anxiety Inventory: A comprehensive bibliography* (2ª ed.). Palo Alto, CA: Consulting Psychologists Press.

Swettenham, L., Eubank, M., Won, D., y Whitehead, A. E. (2018). Investigating stress and coping during practice and competition in tennis using think aloud. *International Journal of Sport and Exercise Psychology*, 1-21. https://doi.org/10.1080/1612197X.2018.1511622

Spence, J.T., y Spence, K.W. (1966). The motivational components of manifest anxiety: Drive and drive stimuli. In C.D. Spielberger (Ed.), *Anxiety and behavior*. New York: Academic Press.

Wiggins, M. S., Lai, C., y Deiters, J.A, (2005). Anxiety and burnout in females collegiate ice hockey and soccer athletes. *Perceptual and Motor Skills,* 101, 519-524. https://doi.org/10.2466/pms.101.2.519-524

Wilson, G.S., Raglin, J.S., y Harger, G.J. (2000). A comparison of the STAI and CSAI-2 in five-day recalls of precompetition anxiety in collegiate track and field athletes. *Scandinavian Journal of Medicine and Science in sports, 10,* 51-54. https://doi.org/10.1034/j.1600-0838.2000.010001051.x

Yerkes, R. M., y Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Neurology and Psychology, 18*(5), 459–482. https://doi.org/10.1002/cne.920180503

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