2022, *Retos, 45,* 651-659

Precompetitive anxiety in young swimmers: analysis of perceived competition difficulty
Ansiedad precompetitiva en nadadores juveniles: análisis desde la percepción del nivel de dificultad competitivo

*Sergio Barbosa-Granados **Jaime Arenas-Granada, ***Héctor Urrea ****Alexandre García-Mas *****Mario Reyes-Bossio ******Diana Herrera-Velásquez, ******Jonathan Nanez, ******Haney Aguirre-Loaiza

*Universidad Cooperativa de Colombia (Colombia), **Politécnico Colombiano Jaime Isaza Cadavid (Colombia) ***Institución Universitaria de Envigado (Colombia), ****Universidad Islas Baleares (España), *****Universidad Peruana de Ciencias Aplicadas (Perú) ******Universidad de los Andes (Colombia) *******Universidad Católica de Pereira (Colombia)

Abstract: Anxiety in sports has been widely studied by professionals in sports sciences. However, the effect of perceived difficulty and Trait-anxiety on precompetitive State-anxiety is unknown. Through a non-experimental and longitudinal design, this article studied: (i)the effect of perceived competition difficulty (easy, moderate, and hard) on State-anxiety and, (ii)the effect of Trait-anxiety, sex, and age on the behavior of State-anxiety. Seventy-nine young swimmers (M_{age} = 13.3, *SD*= 1.9) male (*n*= 58, 73.4%) and female (*n*= 21, 26.6%) were assessed via the State-Trait Anxiety Inventory (STAI). The Anova and Manova indicated that the perceived difficulty of the competition affects State-anxiety. Therefore, a higher perception of task difficulty is associated with higher State-anxiety. Additionally, the interaction of sex, age and Trait-anxiety did not show an effect on State-anxiety (*p*> .05). The interaction of age and Trait-anxiety showed an effect (*p*> .05). A main effect of Trait-Anxiety on State-anxiety was observed in the perception of easy and hard difficulty. In conclusion, the perceived difficulty of the competition affects the athlete's State-anxiety.

Keywords: Sport psychology; anxiety performance; athletes; swimming; difficulty level.

Resumen: La ansiedad en el deporte ha sido ampliamente estudiada por profesionales de las ciencias del deporte. Sin embargo, se desconoce el efecto de la dificultad percibida y el rasgo de ansiedad sobre el estado de ansiedad precompetitivo. Mediante un diseño no experimental y longitudinal, este artículo estudió: (i) el efecto de la percepción del nivel de dificultad competitivo (fácil, moderado y difícil) sobre la Ansiedad-Estado y (ii)el efecto de la Ansiedad-Rasgo, sexo y edad sobre el comportamiento de la Ansiedad-Estado. Setenta y nueve nadadores juveniles (M_{edad} *= 13.3, SD = 1,9*) hombres (n = 58, 73,4%) y mujeres (n= 21, 26,6%) fueron evaluados a través del Inventario de Ansiedad Estado y Rasgo (STAI). El Anova y Manova indicaron que la percepción del nivel de dificultad afecta la Ansiedad Estado. Por tanto, una mayor percepción del nivel de dificultad de la competencia se asocia con una mayor Ansiedad-Estado. Además, la interacción entre sexo, edad y Ansiedad Rasgo no mostró efecto sobre la Ansiedad-Estado (p> .05). La interacción de la edad y el Ansiedad-Rasgo mostró un efecto significativo (p> .05). En cambio, se observó un efecto principal de la Ansiedad-Rasgo sobre la Ansiedad-Estado en la percepción de dificultad fácil y difícil. En conclusión, la percepción del nivel de dificultad de competencia afecta la Ansiedad-Estado del nadador.

Palabras Clave: Psicología del deporte; Ansiedad rendimiento; Atletas, Natación; Nivel de dificultad.

Introduction

Anxiety is defined as an emotional state with diverse symptoms perceived individually. Usually, the symptoms are related to physical tension and apprehension about the future (Barlow & Durand, 2016). While anxiety is not pleasant and we seem to be programmed to experience it at the time we do something important, it is thought to be adaptive for humans in moderate amounts (Barlow & Durand, 2016; Ford et al., 2017). Sports is not an exception within the performance domain where anxiety is present.

To understand the concept of anxiety, Spielberger (1966) proposed a dimensional model with State-anxiety and Trait-anxiety. State-anxiety refers to a sudden emotional change, which depends on the context in which the athlete is, reflecting a transitory emotional state characterized by subjective feelings, consciously perceiving tension and greater activity of the autonomic nervous system (Acebes-Sánchez et al., 2021; Hui, 2020). Sports anxiety research mainly focuses on State-anxiety. On the other hand, Trait-anxiety is explained as a component of personality, in response to a stressful situation, being a stable characteristic of the individual (Patsiaouras et al., 2017; Peñaloza Gómez et al., 2016). Regarding Trait-anxiety, this has been shown to affect symptoms of State-anxiety (Hanton et al., 2002; Horikawa & Yagi, 2012b).

Regarding sports anxiety, competitive anxiety has been widely studied (Ong & Chua, 2021). During competition, anxiety is experienced moments prior to participation, when athletes present diverse sensations and emotions (Salom Martorell et al., 2021). As mentioned before, anxiety has been perceived as negative, nonetheless, it has been suggested that not all anxiety symptoms are negative (Mellalieu et al., 2006).

Fecha recepción: 30-08-21. Fecha de aceptación: 02-04-22
Sergio Barbosa-Granados
sergio.barbosag@campusucc.edu.co

For this reason, The study of anxiety deserves the interest of sport science professionals and researchers (Barreto Marques et al., 2019; Martens et al., 1990; Silva et al., 2018).

There are many explanations of why a competition could increase anxiety levels (Ford et al., 2017; Rice et al., 2019). One rarely explored factor is the perception of the difficulty of the task to perform. Task difficulty is an important aspect when making judgments about control as athletes assess the task to perform and the resources and skills they must meet in order to fulfil the demand; this analysis will lead to emotional outcomes such as anxiety (England et al., 2019). Perception of difficulty is a variable that sports science professionals, including psychologists, must consider as part of athletes' training. Easy tasks are more likely to be associated with the expectation of success, fewer attention demands, and enhanced by arousal because the athlete has a limited number of cues to process (Panayiotou & Vrana, 2004). On the other hand, when tasks are perceived as high-performance, resources may be limited (Salom Martorell et al., 2021), low self-confidence, and the athlete's background will play a role (Rocha & Osório, 2018). Nonetheless, there is not enough research exploring the implication of perceived difficulty of a task on athletes' competition anxiety levels, as there is research about age (Rice et al., 2019), level of competence (Han et al., 2014), sociodemographic variables (Aguirre-Loaiza & Ramos, 2011), recognition (Ford et al., 2017), positive emotions (Yang et al., 2020), type of sport and its impact on anxiety (Rocha & Osório, 2018).

Research has been carried out to reduce and control anxiety in sports, using the methodological paradigm of assessing pre-competition anxiety (González Hernández & González Reyes, 2017; Horikawa & Yagi, 2012; Trigueros et al., 2020a), but there are still more aspects to comprehend. Regarding anxiety in swimmers, a high level of anxiety has been evidenced in female athletes, noting that women present greater anxiety compared to men (Abrahamsen et al., 2008; Correia & Rosado, 2019). It has also been reported that synchronized swimming athletes who have reported high anxiety are associated with lack of emotional regulation, higher tension, nervousness, and confusion prior to competition (Mendes-dos Santos et al., 2013). This leads researchers to think that there is an influence of personality traits, task difficulty and competitive experience in relation to swimmers' anxiety levels (Branco Silva et al., 2019; Lazarus, 2000).

According to our review, previous studies have assessed anxiety using cross-sectional methodological designs, except for some studies on college volleyball that have in fact implemented longitudinal designs (Arenas et al., 2016; Arenas & Aguirre-Loaiza, 2014). Therefore, more studies that include longitudinal approaches are required within applied sport psychology. There is a wide variety of non-conclusive research findings. Thus, it is necessary that the body of knowledge in this field of sport psychology be strengthened, and more insightful results can be obtained via more encompassing experimental designs. It is then necessary to further explore the hypothesis that the positive and negative effects of precompetitive anxiety in sports performance may be related to how athletes assess the difficulty of sports competition, and its effects on State-anxiety. This hypothesis does not have robust empirical evidence so far. Swimming, relative to many other sports, can prove an excellent experimental sport model, mainly due to its physical characteristics and demands. It is a sport that requires physical, technical, and psychological skills. As a result, swimmers reach sport specialization age in this discipline by the end of their adolescence.

This study's findings will be on the one hand, useful to continue to build the body of knowledge regarding the comprehension of variables like pre-competitive anxiety. On the other hand, it might contribute so that psychologists and physical trainers may identify that perception of the competition difficulty level is a relevant variable. Therefore, this article aims 1) to study the effect and differences in the perception of competition difficulty (easy, moderate, and hard) on State-anxiety; 2) to analyse the effect of Trait-anxiety, sex, and age on State-anxiety according to the athlete's perceptions of difficulty (easy, moderate and hard).

Method

Design and Participants

Non-experimental and longitudinal design. Intentional sample of seventy-nine juvenile swimmers between 11 and 18 years old (M_{age} = 13.3, SD= 1.9), 73.4% male (n=58; M_{age} = 13.6, SD= 1.9) and 26% female (n=21; M_{age} = 12.6, SD= 1.7), from three cities of Colombia: Armenia, Manizales and Pereira. The inclusion criteria included being part of a sports club and competing in the juvenile swimming league (see figure 1). Significant differences between ages were found (U=392.0, Z= -2.451, p= .014), female

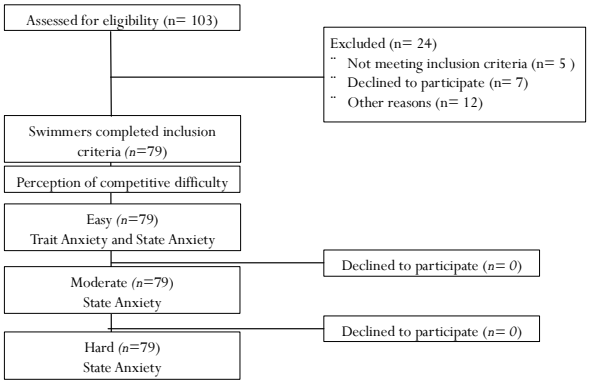

Figure 1. Participant Flow Chart

swimmers were younger ($Mdn_{women=}$ 12) than male swimmers ($Mdn_{men=}$ 13).

Measure

State-Trait Anxiety Inventory – STAI (Spielberger, 1966) consists of two dimensions: State and Trait anxiety. State-Anxiety contains 20 items, and it requires participants to indicate how they are feeling at a specific time, e.g. «*I feel calm*», «*I feel confident in myself*». Trait-Anxiety consists of 20 items, assessed individuals describe how they generally feel with statements like: e.g.: «*I get tired quickly*», «*I am a calm, serene and calm person*». The statements evaluate the degree through a Likert-type scale. For the State-Anxiety (1 = *Not at all*; 2 = *A little*, 3 = *Quite a bit*; 4 = *A lot*). While for TA (1 = *Almost never*; 2 = *Sometimes*; 3 = *Frequently*; 4 = *Almost always*). The direct scores for both scales range between 20 and 80. The psychometric properties have been reported in the Spanish version by (Buela-Casal et al., 2011). McDonald's Omega coefficient (ω) was reported satisfactory for both dimensions: State-Anxiety (ω=.88, 95%CI ω= .85, ω= .92), and Trait-Anxiety (ω= .80, 95% CI ω= .73, ω= .86).

Procedure and ethical considerations

The data were collected in two phases. The first phase was on September 30, 2017 in the city of Armenia, Colombia. The second phase was on October 8, 2017 in the city of Pereira, Colombia. Before completing the test, swimmers were asked to classify their three competitions by difficulty levels (Easy, Moderate, and Hard), this categorical variable was introduced to analyse their competitive anxiety levels throughout the competition. Before starting the competition, the Trait-Anxiety dimension was assessed only once, while State-Anxiety was assessed three moments before each competition according to the perception of the competitive difficulty level. The data were collected by one of the authors supported by two senior psychology students, trained for this purpose.

The endorsement of the coach of the sports clubs was obtained. Likewise, the informed consent of the parent was obtained. The research process was conducted in accordance with the Declaration of Helsinki (World Medical Association, 2013) and Law 1090 which regulates the psychological practice in Colombia and the Bioethics code of Psychological Practice in Colombia (Colegio Colombiano de Psicólogos, 2016). The methodology was approved by the National Research Coordination of the Cooperative University of Colombia (code INV-1963).

StatisticalAnalysis

A data matrix was designed in Excel to order and group the information. An exploratory data analysis was carried out to track missing and atypical values based on the technical recommendations (Aldás & Uriel, 2017); no missing values or outliers were identified. In the repeated-measures ANOVA, we assumed Mauchly's test of sphericity (W= .932, p= .67). The multivariate analysis has as a dependent variable the perception of the difficulty of the competence State-Anxiety: Easy, Moderate and Hard, respectively. The independent variables were: Sex, age group, and Trait-Anxiety. The age groups (years-old) were classified in: <12, 13-14, and> 15. Age differences among groups were calculated through Mann Whitney. Trait-Anxiety was divided into two levels: Low and High; the considered cut-point was Mdn= 18.8 for the whole sample. The equality of covariance was assumed (Box's = 47.3, p = .613). Also, we checked Levene's Test of equality of error variances to each dependent variable based on the mean (p> .05). In both analyses, the pairwise comparison was adjusted with Sidak and reported Confidence Interval (CI 95%). The internal consistency was calculated through Omega McDonald Coefficient. We used SPSS-IBM v.24 and JASP v.0.13.1 (Jasp Team, 2020).

Results

The descriptive data are reported by sex, age group and Trait-anxiety levels in the table 1.

Table 1.
Descriptive data *M(SD)* of the perceived competition difficulty by sex, age group, and trait-anxiety levels

State	Sex		Age group (year old)			Trait-Anxiety		
Anxiety	*Men*	*Women*	*< 12*	*13-14*	*> 15*	*Low*	*High*	*All*
	n= 58	*n*= 21	*n*= 32	*n*= 29	*n*= 18	*n*= 43	*n*= 36	*n*= 79
Levels of the perception of competitive								
Easy	18.9(9.9)	20.9(10.1)	19.7(9.4)	18.9(8.9)	19.7(12.5)	15.9(9.1)	23.5(9.4)	19.4(9.9)
Moderate	23.1(10.9)	26.1(11.5)	23.9(11.0)	21.8(10.4)	27.3(12.0)	19.8(10.7)	28.7(10.4)	23.9(11.1)
Hard	27.7(11.9)	28.9(13.0)	28.8(11.7)	24.7(11.3)	31.9(13.3)	23.4(10.8)	33.5(11.3)	28.0(12.1)

Repeated-Measures Analysis

The results of the repeated-measures showed an effect between the levels of the perception of competitive difficulty, *Pillai's Trace*= 0.446, *F (2,77)= 30.95, p< .001, ηp^2= 0.446*. The between-subjects analysis indicate a main effect of the levels of the perceived difficulty on State-Anxiety score, *F (2, 156)= 35.75, MS=1460,13, p< .001, ηp^2= 0.314*. Therefore, the perceived task difficulty affects State-anxiety scores. Sidak-adjustment pairwise comparison was computed (see figure 2).

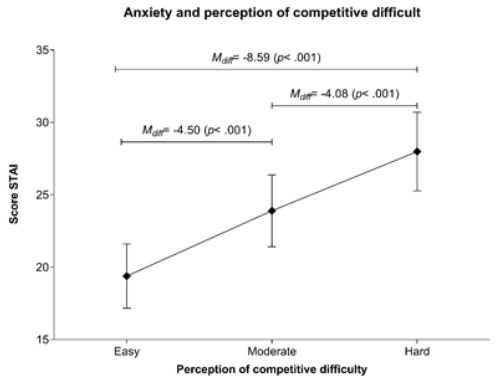

Figure 2. Pairwise comparisons among pre-competitive Sate-Anxiety and perceived levels of competitive difficulty. CI 95% for difference. Adjustment for Bonferroni

Multivariate Analysis

The interaction sex*age-group*Trait-Anxiety levels was not significant [*Pillai's Trace* = 0.446, *F(6, 130)= 2.10, p= .057, ηp^2= .087*]. Also, sex*age-group was not significant [*Pillai's Trace* = 0.077, *F(6, 132)= 0.866, p= .507, ηp^2= 0.039*], neither was the interaction sex*Trait-Anxiety levels [*Pillai's Trace* = 0.446, *F(3, 65)= 2.10, p= .057, ηp^2= 0.087*]. However, there was a significant interaction among age-group*Trait-Anxiety levels [*Pillai's Trace* = 0.185, *F(6, 132)= 2.24, p= .043, ηp^2= 0.092*].

The main effect is observed in table 2. Only Trait-Anxiety levels showed a main effect on the competitive perception of State-Anxiety: Easy, [*F(1,78)= 9.89, p= .002, ηp^2= 0.012*], and Hard, [*F(1,78)= 4.25, p= .043, ηp^2= 0.06*]. The comparison was adjusted by Sidak, and it showed that when the task difficulty is perceived as easy, Trait-Anxiety is low, relative to high perception of difficulty (M_{diff}= -9.45, *p*= .002, CI 95%[-15.4, -3.45]).

Table 2.
Analysis of between-subject effects by sex, age-group and Trait-anxiety levels on the perceived difficulty perception (easy, moderate and high)

	SA-Easy				*SA-Moderate*				*SA-Hard*			
Source	*MS*	*F*	*p*	ηp^2	*MS*	*F*	*p*	ηp^2	*MS*	*F*	*p*	ηp^2
sex[a]	47.8	0.56	.457	0.00	110.2	1.03	.313	0.01	10.1	0.08	.781	0.00
age[b]	17.4	0.20	.816	0.00	252.2	2.36	.102	0.06	117.1	0.907	.409	0.02
TA[c]	843.8	9.89	.002*	0.12	402.6	3.77	.056	0.05	549.2	4.25	.043*	0.06
sex*age	52.5	0.62	.543	0.01	150.9	1.41	.250	0.04	13.5	0.11	.900	0.00
age*TA	222.7	2.61	.081	0.07	59.9	0.56	.573	0.01	109.9	0.85	.432	0.02
sex*TA	18.4	0.22	.643	0.00	42.7	0.40	.529	0.00	85.3	0.66	.419	0.01
sex*age*TA	202.1	2.37	.101	0.06	94.6	0.89	.417	0.02	91.9	0.71	.495	0.02

Note: a= men-women, b= age-group (<12, 13-14, >15), c= Trait-Anxiety (Low-High), SA= State-

Likewise, when difficulty is perceived as high, there is also an observed difference (M_{diff}= -7.62, p= .043, CI 95% [-15.0, -0.24]). However, when competitive perception is assessed as moderate, it did not show differences (*p*>.05). The other interactions (e.g., sex*age) were not significant.

Discussion

The relationship between anxiety and performance remains a topic of interest to researchers. Sport is an important ecological model that enables researchers to understand anxiety and sports competition. The aims of this article were to study the effect and differences of the perceived task difficulty of the competition on State-anxiety and to analyse the effect of Trait-anxiety, sex and age on State-anxiety according to the athlete's perceptions of competition difficulty (easy, moderate and hard).

The results mainly indicate that (i) the perceived difficulty levels affect State-Anxiety. Differences were observed between the levels of perceived difficulty when faced with the competition (easy vs moderate, easy vs hard, and moderate vs hard. See Figure 1). The more difficult the perception in the face of the competition, the greater State-Anxiety. (ii) The interaction of sex, age and Trait-Anxiety did not show an effect on State-Anxiety in any of the levels of perception of difficulty in the face of competition (easy, moderate and hard). The interaction of age and Trait-Anxiety showed an effect; however, these data should be analysed with caution due to their small effect size. On the other hand, a main effect of Trait-Anxiety on State-anxiety was observed in the perception of easy and hard difficulty.

Anxiety was thought to have negative effects on sports performance (Ford et al., 2017; Molina et al., 2017; Rowland & van Lankveld, 2019). However, these pre-concepts have been under discussion during the last years (Martens et al., 1990; Stephen Mellalieu et al., 2009). Human performance, and above all, sports performance is complex and so is its analysis. Consequently, multiple personal and environmental variables constantly interact, affecting sports performance. Our data support the thesis that swimmers' perception of difficulty in the face of competition affects State-anxiety (Mabweazara et al., 2017). Several studies have reported that variables such as positive emotions (Yang et al., 2020), coping styles (Pons et al., 2020) influence State-anxiety before competition.

The role of sports variables (e.g. sports experience,

sports discipline, type of sport, etc.) (Horikawa & Yagi, 2012), sociodemographic (e.g. sex, age, education, socio-economic status, etc.) (Ponseti Verdaguer et al., 2016) and individual variables (e.g. personality traits) (Laborde et al., 2019) seem to be associated with the behaviour of pre-competition State-anxiety. However, few studies have addressed the effect of the interaction of these variables on State-anxiety. The results show that the interaction of sex, age, and trait-anxiety have no effect on State-anxiety. Yet, there is research that estimates possible differences and associations between sex (Borges et al., 2019; Englert & Seiler, 2020; Haddera, 2015) and age (Espada & Fradejas, 2019; Serrano et al., 2019). Recent meta-analyses have found associations between competitive anxiety and female gender, lower age, and less experience time (Rocha & Osório, 2018), higher anxiety in females, for injured athletes, and for younger athletes (Rice et al., 2019). Moreover, no differences have been found between anxiety levels relative to high and low performance (Martorell et al., 2021). Other studies have reported that football players from lower divisions show high levels of both State-Anxiety and Trait-Anxiety compared to players from higher divisions (Castro-Sánchez et al., 2019). For this reason, it is necessary to further study the effect of these variables and other relevant contributing effects as part of the field of sport psychology and sports performance.

Moreover, the interaction between age and Trait-anxiety influences State-anxiety. Swimmers over 15 years scored higher State-anxiety than the younger swimmers (<12, 13-14 years). Systematic reviews have indicated that the youngest athletes have greater anxiety compared to older athletes (Rice et al., 2019; Rocha & Osório, 2018). Apparently, the reported data is inconsistent with our findings. However, the age that has been considered the youngest is <25 years (Rice et al., 2019). Thus, the average age of our athletes would be in the group of young people in the review by Rice et al., (2019). It is important to highlight that the age group> 15 years corresponds to a sensible age for the sport's improvement in swimming; even sports competitions close to the debut in sports professionalism. In sports initiation (M_{age} = 10.4, SD = 2.4) in ball sports, age is independent from anxiety (Bohórquez & Checa, 2017). Among the same lines, it has been reported that children who are swimmers (10-11, 12-13 years) are independent of anxiety effects (Asghar et al., 2017). In summary, the interaction between age and trait-anxiety, as suggested by our data, is that Trait-anxiety in young ages influences the perception of the difficulty of State-anxiety, and of course, it has an effect on sports performance, which it is relevant for transitions to professionalism in sports such as swimming. In addition, higher levels of competitive anxiety have been observed in individual sports compared to team sports (Rocha & Osório, 2018). Comparing and studying the effects of these data in other sports and these age groups constitutes a promising line of research.

Perceived task difficulty is a variable that sports science professionals including psychologists, must consider as part of athletes' training. As our findings suggest, athletes have physical, technical, tactical, and psychological resources according to the perceived difficulty level. State-anxiety is higher when competition is perceived more difficult. When tasks are perceived as difficult athletes' performance may be limited (Salom Martorell et al., 2021). Several factors are listed when the athlete interprets the task difficulty of the competition: low sports performance, low self-confidence, athlete's background (Rocha & Osório, 2018). However, clarifying the association among these factors regarding anxiety and sports performance requires more research.

Similarly, perception of competition difficulty level and State-anxiety can be favourable as long as athletes take into account the objectives of sports competition, the psychological resources available and the possible results. Therefore, the perceived difficulty level of the competition can be studied in conjunction with the factors associated with precompetitive anxiety, such as, self-confidence (Hernández García et al., 2012; Ong & Chua, 2021), age (Rice et al., 2019), level of competence (Han et al., 2014), sociodemographic variables (Aguirre-Loaiza & Ramos, 2011; Ruiz-Juan & Sancho, 2014), recognition (Ford et al., 2017), positive emotions (Yang et al., 2020), type of sport, e.g. individual vs team (Rice et al., 2019; Silva Rocha & de Lima Osório, 2018).

Our results show that Trait-anxiety has an effect on State-anxiety, these findings are consistent with previous studies (Hanton et al., 2002; Horikawa & Yagi, 2012b). Additionally, high Trait-anxiety affects State-anxiety in terms of the perceived difficulty levels of the competition: easy and difficult. Preliminary work warns about the importance of Trait-anxiety over State-anxiety and other variables (Han et al., 2014; Ivarsson et al., 2013; Judge et al., 2016). Trait-anxiety influences the appearance of sports injuries in elite football players (Ivarsson et al., 2013), elite athletes have shown lower scores in Trait-anxiety, compared with competitive levels of a lower competition category (Han et al., 2014) and

may have a negative impact on performance (Judge et al., 2016). It is also another variable that requires further investigation.

Although this work has several implications to highlight, namely a methodology with a longitudinal scope, theoretical advances, a focus on the perception of perceived competition difficulty and Trait-anxiety over State-anxiety, we consider that sports science professionals should continue to consider anxiety in sports competition as an important factor in the athlete's preparation and training phase.

Nonetheless, this research also presents a number of limitations. Namely, the anxiety measure has been used with a general instrument (STAI) therefore, it is necessary to replicate this study with a specific instrument for sports pre-competition and add relevant physiological variables (e.g SCAI-2R or SAS or a Battery). Additionally, this study did not consider athletic performance and its relation to athletes' self-perception of athletic performance. This study did not include sports experience and competitive level. Even though the sample seems to be homogeneous in terms of age, it is still interesting to compare the level of competence of elite athletes' vs lower competition categories (Junge & Prinz, 2019). This study did not assess anxiety as a possible diagnosis of mental disorder, mainly because it was not the focus of the study. Nonetheless, future research could include a screening process that considers psychopathological symptoms to recognise how clinical aspects may influence athletes' performance and mental skills. Similarly, another relevant research area for future studies is the perception of competition difficulty and pre-competitive anxiety in athletes with physical disabilities. Some of the published studies in sport psychology have highlighted the need to further explore this area (Roldan et al., 2021). Furthermore, it is necessary to include morphological variables that might be predictive of sports talent and performance and their relation to anxiety (Ramos et al., 2021)

Finally, we have approached athletes of a specific sports discipline, so these findings should be assumed with caution, explored in other sports, and even in activities that involve human performance (e.g., music). Analysis of sports subgroups in early-ages would make the application and training strategies in sports psychology possible.

Conclusions

The literature has reported that there are several factors associated with precompetitive anxiety. We conclude that (i) the perception of the competition difficulty level (easy-moderate and hard) influences pre-competitive state anxiety. (ii) Trait-anxiety and age have an interaction effect on State-anxiety regarding the levels of the perception of the competition difficulty level. Specifically, a main effect of Trait-anxiety on State-anxiety.

Funding

Funding: This research was funded by Universidad Cooperativa de Colombia (Code: INV-1963).

Acknowledgments

We are grateful with the athletes, parents, coaches and managers of the swimming leagues who participated in this study.

Conflicts of Interest

The authors declare no conflicts of interest.

References

Abrahamsen, F. E., Roberts, G. C., & Pensgaard, A. M. (2008). Achievement goals and gender effects on multidimensional anxiety in national elite sport. *Psychology of Sport and Exercise*, *9*(4), 449–464. https://doi.org/10.1016/j.psychsport.2007.06.005

Acebes-Sánchez, J., Granado-Peinado, M., & Giráldez, C. M. (2021). Relación entre inteligencia emocional y ansiedad en un club de fútbol sala de Madrid . *Retos*, *39*(39), 643–648. https://doi.org/10.47197/retos.v0i39.81975

Aguirre-Loaiza, H., & Ramos, S. (2011). Ansiedad-estado y variables sociodemográficas en futbolistas juveniles colombianos durante competencia. *Diversitas*, *7*(2), 239. https://doi.org/10.15332/s1794-9998.2011.0002.03

Aldás, J., & Uriel, E. (2017). Análisis previo de los datos. In *Análisis multivariante aplicado con R* (2nd ed., pp. 31–74). Paraninfo.

Arenas, J., & Aguirre-Loaiza, H. (2014). Ansiedad-Estado a lo largo de las fases de competencia deportiva. *Lúdica Pedagógica*, *1*(19), 111–121.

Arenas, J., Castellanos, V., Aguirre-Loaiza, H., Trujillo, C., & Núñez, A. (2016). La ansiedad en voleibolistas universitarios: análisis de la competencia deportiva en la educación superior. *Guillermo de Ockham: Revista Científica*, *14*(2), 111–120. https://doi.org/10.21500/22563202.2612

Armas Alejo, A., Aidar, F., de Matos Gama, D., dos Santos, M., dos Santos Silva, D., de Souza, R., Lopes dos Santos, J.,

Vieira Souza, L., Tavares Costa, C., & Nunes da Silva, A. (2020). Does pre-competitive anxiety interfere in the performance of boxing athletes in brazil? A pilot study. *Revista Brasileira de Medicina Do Esporte*, *26*(2), 139–142. https://doi.org/10.1590/1517-869220202602218943

Arruda, A. F. S., Aoki, M. S., Paludo, A. C., & Moreira, A. (2017). Salivary steroid response and competitive anxiety in elite basketball players: Effect of opponent level. *Physiology and Behavior*, *177*, 291–296. https://doi.org/10.1016/j.physbeh.2017.05.017

Asghar, N., Amir-Abbas, Y., Karamatollah, R., & Abdolreza, J. (2017). Pre-competition anxiety score among Elite Boy Swimmers in Iran. *World Familiy Medicine Journal* , *15*(6), 65–70. http://www.mejfm.com/August2017/Anxiety.htm

Barlow, D., & Durand, V. (2016). *Abnormal Psychology: An Integrative Approach* (7th ed.). Ceneage learning.

Barreto Marques, P., Lopes Verardi, C., Pessôa Filho, D., & Cassiano Merussi, N. (2019). Analysis of mood states, trait anxiety, and state anxiety: a study with athletes before artistic gymnastics competitions. *Journal of Physical Education and Sport ® (JPES)*, *19*, 2234–2240. https://doi.org/10.7752/jpes.2019.s6336

Bohórquez, M., & Checa, I. (2017). Factores psicosociales relacionados con la ansiedad competitiva de los deportistas en etapas de formación. *Cultura, Ciencia y Deporte*, *12*(36), 205–210. https://www.redalyc.org/articulo.oa?id=163053355008

Borges, P., Argudo Iturriaga, F., Ruiz-Barquín, R., & Ruiz Lara, E. (2019). Análisis de la ansiedad competitiva en jugadores jóvenes de waterpolo en función del género y rendimiento . *Retos*, *38*, 20–25. https://doi.org/10.47197/retos.v38i38.73450

Branco Silva, G., Leal Cortez, A., do Nascimento Júnior, J., Laranjeira Granja, C., Quintas Conde, E., & Ferreira de Melo, G. (2019). Analysis of pre-competitive anxiety of Brazilian young swimmers. *Acta Scientiarum - Health Sciences*, *41*(1), e45475. https://doi.org/10.4025/actascihealthsci.v41i1.45475

Buela-Casal, G., Guillén-Riquelme, A., & Seisdedos, N. (2011). *STAI: Cuestionario de Ansiedad Estado-Rasgo. Adaptación española* (8th ed.). TEA editores.

Castro-Sánchez, M., Zurita-Ortega, F., Chacón-Cuberos, R., & Lozano-Sánchez, A. (2019). Clima motivacional y niveles de ansiedad en futbolistas de categorías inferiores (Motivational climate and levels of anxiety in soccer players of lower divisions). *Retos*, *35*(164–169). https://doi.org/10.47197/retos.v0i35.63308

Colegio Colombiano de Psicólogos. (2016). *Deontología y bioética del ejercicio de la psicología en Colombia*. Manual Moderno.

Correia, M., & Rosado, A. (2019). Anxiety in athletes: Gender and type of sport differences. *International Journal of Psychological Research*, *12*(1), 9–17. https://doi.org/10.21500/20112084.3552

England, B. J., Brigati, J. R., Schussler, E. E., & Chen, M. M. (2019). Student Anxiety and Perception of Difficulty Impact Performance and Persistence in Introductory Biology Courses. *CBE—Life Sciences Education*, *18*(2), ar21. https://doi.org/10.1187/cbe.17-12-0284

Englert, C., & Seiler, R. (2020). Anxiety and volleyball performance in a real testing situation: gender differences in competitive environments. *Educational Psychology*, *40*(6), 735–749. https://doi.org/10.1080/01443410.2019.1706723

Espada, M., & Fradejas, E. (2019). Evaluation of anxiety control in school-age sports. *International Journal of Cognitive Research in Science, Engineering and Education*, *7*(3), 27–35. https://doi.org/10.5937/IJCRSEE1903027E

Ford, J., Ildefonso, K., Jones, M., & Arvinen-Barrow, M. (2017a). Sport-related anxiety: current insights. *Open Access Journal of Sports Medicine*, *Volume 8*, 205–212. https://doi.org/10.2147/oajsm.s125845

Gimenes Fernandes, M., Neves Nunes, S., Vasconcelos Raposo, J., & Fernandes, H. (2014). Efeitos da experiência nas dimensões de intensidade, direção e frequência da ansiedade e autoconfiança competitiva: Um estudo em atletas de desportos individuais e coletivos. *Motricidade*, *10*(2), 81–89. https://doi.org/10.6063/motricidade.10(2).2930

González-Hernández, J., Gomariz-Gea, M., Valero-Valenzuela, A., & Gómez-López, M. (2020). Resilient Resources in Youth Athletes and Their Relationship with Anxiety in Different Team Sports. *International Journal of Environmental Research and Public Health*, *17*(15), 5569. https://doi.org/10.3390/ijerph17155569

González Hernández, J., & González Reyes, A. (2017). Perfectionism and «adaptative alarm» to anxiety in sports figthing | Perfeccionismo y «alarma adaptativa» a la ansiedad en deportes de combate. *Revista de Psicologia Del Deporte*, *26*, 15–23.

Guerra-Santiesteban, J. R., Gutiérrez-Cruz, M., Zavala-Plaza, M., Singre-Alvarez, J., Goosdenovich-Campoverde, D., & Romero-Frómeta, E. (2017). Relación entre ansiedad y ejercicio fisico. *Revista Cubana de Investigaciones Biomedicas*, *36*(2), 169–177.

Haddera, T. (2015). Assessing the Relationships between Competitive Trait Anxiety, Self-Efficacy and Task Cohesion in Male and Female University Team Sports. *CLEAR International Journal of Research in Management, Sciences & Technology*, *5*(10), 1–11.

Han, D. H., Kim, B. N., Cheong, J. H., Kang, K. D., & Renshaw, P. F. (2014). Anxiety and attention shifting in professional baseball players. *International Journal of Sports Medicine*, *35*(8), 708–713. https://doi.org/10.1055/s-0033-1363235

Hanton, S., Mellalieu, S., & Hall, R. (2002). Re-examining

the competitive anxiety trait-state relationship. *Personality and Individual Differences*, *33*(7), 1125–1136. https://doi.org/10.1016/S0191-8869(02)00003-X

Hernández García, R., Olmedilla Zafra, A., & Ortego Toro, E. (2012). Ansiedad y autoconfianza de jóvenes judokas en situaciones competitivas de alta presión. *Análise Psicológica*, *26*(4), 689–696. https://doi.org/10.14417/ap.531

Horikawa, M., & Yagi, A. (2012a). The Relationships among Trait Anxiety, State Anxiety and the Goal Performance of Penalty Shoot-Out by University Soccer Players. *PLoS ONE*, *7*(4), e35727. https://doi.org/10.1371/journal.pone.0035727

Horikawa, M., & Yagi, A. (2012b). The Relationships among Trait Anxiety, State Anxiety and the Goal Performance of Penalty Shoot-Out by University Soccer Players. *PLoS ONE*, *7*(4), e35727. https://doi.org/10.1371/journal.pone.0035727

Hui, J. (2020). Correlation between sports activities and anxiety states of college students. *Revista Argentina de Clinica Psicologica*, *29*(2), 301–306. https://doi.org/10.24205/03276716.2020.240

Ivarsson, A., Johnson, U., & Podlog, L. (2013). Psychological predictors of injury occurrence: A prospective investigation of professional Swedish soccer players. *Journal of Sport Rehabilitation*, *22*(1), 19–26. https://doi.org/10.1123/jsr.22.1.19

Jasp Team. (2020). *JASP (Version 0.14.1) [Computer software]*.

Judge, L. W., Urbina, L. J., Hoover, D. L., Craig, B. W., Judge, L. M., Leitzelar, B. M., Pearson, D. R., Holtzclaw, K. A., & Bellar, D. M. (2016). The Impact of Competitive Trait Anxiety on Collegiate Powerlifting Performance. *Journal of Strength and Conditioning Research*, *30*(9), 2399–2405. https://doi.org/10.1519/JSC.0000000000001363

Junge, A., & Prinz, B. (2019). Depression and anxiety symptoms in 17 teams of female football players including 10 German first league teams. *British Journal of Sports Medicine*, *53*(8), 471–477. https://doi.org/10.1136/bjsports-2017-098033

Kaplánová, A. (2020). Financial Awards and Their Effect on Football Players' Anxiety and Coping Skills. *Frontiers in Psychology*, *11*, 1148. https://doi.org/10.3389/fpsyg.2020.01148

Kim, T., Lee, C.-H., Hong, S. K., & Choi, Y. A. (2019). The Effect of State Anxiety and Self-Confidence on Olympic Performance in Korean Athletes. *Research Journal of Pharmacy and Technology*, *12*(2), 750. https://doi.org/10.5958/0974-360x.2019.00133.1

Laborde, S., Allen, M. S., Katschak, K., Mattonet, K., & Lachner, N. (2019). Trait personality in sport and exercise psychology: A mapping review and research agenda. *International Journal of Sport and Exercise Psychology*, 1–16. https://doi.org/10.1080/1612197x.2019.1570536

Lazarus, R. S. (2000). How emotions influence performance in competitive sports. *Sport Psychologist*, *14*(3), 229–252. https://doi.org/10.1123/tsp.14.3.229

Mabweazara, S. Z., Leach, L., & Andrews, B. S. (2017). Predicting swimming performance using state anxiety. *South African Journal of Psychology*, *47*(1), 110–120. https://doi.org/10.1177/0081246316645060

Martens, R., Burton, D., & Vealey, R. S. (1990). *Competitive anxiety in sport* (Christie Drews (ed.); 1era ed.). Human Kinetics.

Martorell, M., Ponseti, F., Bosch, B., Ferragut, G. S., García-Mas, A., & Prats, A. (2021). Ansiedad competitiva y rendimiento en deportistas de vela (Competitive anxiety and performance in competing sailors). *Retos*, *39*(187–191). https://doi.org/10.47197/retos.v0i39.75356

Mellalieu, S, Hanton, S., & Fletcher, D. (2006). A competitive anxiety review: Recent directions in sport psychology research. In S. Hanton & S. Mellalieu (Eds.), *Literature reviews in sport psychology* (pp. 1–45). Nova Science Publishers, Inc.

Mellalieu, Stephen, Hanton, S., & Fletcher, D. (2009). *A competitive anxiety review: recent directions in sport psychology research*. Nova Science Publishers, Inc.

Mendes-dos Santos, A. R., Lofrano-Prado, M. C., Venceslau de Moura, P., Pinto-Costa da Silva, E. A., Carneiro-Leão, A. C., & Silvestre-Monteiro de Freitas, C. M. (2013). Ansiedade pré-competitiva em jovens atletas de nado sincronizado: uma análise à luz dos aspectos emocionais. *Revista Da Educação Física / UEM*, *24*(2), 207–214. https://doi.org/10.4025/reveducfis.v24.2.16024

Messina, G., Chieffi, S., Viggiano, A., Tafuri, D., Cibelli, G., Valenzano, A., Triggiani, A. I., Messina, A., De Luca, V., & Monda, M. (2016). Parachute jumping induces more sympathetic activation than cortisol secretion in first-time parachutists. *Asian Journal of Sports Medicine*, *7*(1). https://doi.org/10.5812/asjsm.26841

Molina, J., Chorot, P., & Sandín, B. (2017). Miedo a la evaluación negativa y autoestima como factores predictivos del rendimiento deportivo: Papel mediador de los estados de ansiedad y autoconfianza. *Revista Internacional de Ciencias Del Deporte*, *50*(13), 381–396. https://doi.org/10.5232/ricyde

Ong, N. C. H., & Chua, J. H. E. (2021). Effects of psychological interventions on competitive anxiety in sport: A meta-analysis. In *Psychology of Sport and Exercise* (Vol. 52, p. 101836). Elsevier Ltd. https://doi.org/10.1016/j.psychsport.2020.101836

Ortigosa-Márquez, J. M., Reigal, R., Portell, M., Morales-Sánchez, V., & Hernández-Mendo, A. (2017). Observación automatizada: La variabilidad de la frecuencia cardíaca y su relación con las variables psicológicas determinantes del rendimiento en nadadores jóvenes. *Anales de Psicologia*, *33*(3), 436–441. https://doi.org/10.6018/analesps.33.3.270991

Panayiotou, G., & Vrana, S. R. (2004). The role of self-focus, task difficulty, task self-relevance, and evaluation anxiety

in reaction time performance. *Motivation and Emotion*, *28*(2), 171–196. https://doi.org/10.1023/B:MOEM.0000032313.69675.0d

Patsiaouras, A., Chatzidimitriou, M., Charitonidis, K., Giota, A., & Kokaridas, D. (2017). The Relationship of personality and trait anxiety between male and female volleyball players. *Annals of Applied Sport Science*, *5*(3), 39–47. https://doi.org/10.29252/acadpub.aassjournal.5.3.39

Peñaloza Gómez, R., Jaenes Sánchez, J., Méndez Sánchez, M., & Jaenes Amarillo, P. (2016). El poder explicativo de la ansiedad en los estados de ánimo de deportistas españoles. *Retos*, *30*, 207–210. https://dialnet.unirioja.es/servlet/articulo?codigo=5529627

Pereira de Souza, M., Bonoto Teixeira, R., & Lanes Lobato, P. (2012). Manifestação da ansiedade pré-competitiva em nadadores amadores. *Revista Da Educação Fisica*, *23*(2), 195–203. https://doi.org/10.4025/reveducfis.v23i2.14737

Pineda-Espejel, H. A., Trejo, M., García, K., Garza, K., Vázquez-Jiménez, G., Machado-Contreras, J., Mejía-León, M., & Rodríguez, S. (2019). Respuesta de cortisol salival y ansiedad precompetitiva en nadadores (Salivary cortisol response and precompetitive anxiety in swimmers). *Retos*, *38*, 1–7. https://doi.org/10.47197/retos.v38i38.72229

Pons, J., Ramis, Y., Viladrich, C., & Checa, I. (2020). Anxiety levels and coping styles depending on the perceptual-motor skills of the sport . *Revista de Psicología Del Deporte*, *29*(2), 105–115. https://www.rpd-online.com/index.php/rpd/article/view/19

Ponseti Verdaguer, F. J., García Más, A., Cantallops Ramón, J., & Vidal Conti, J. (2016). Diferencias de sexo respecto de la ansiedad asociada a la competición deportiva . *Retos*, *31*, 193–196. https://doi.org/10.47197/retos.v0i31.40325

Ramos, S., García, A., Ayala, C., & Aguirre-Loaiza, H. (2021). Índice de longitud digital 2D:4D en deportes de pelota. *Retos*, *39*, 284–288. https://doi.org/10.47197/retos.v0i39.78257

Rice, S., Gwyther, K., Santesteban-Echarri, O., Baron, D., Gorczynski, P., Gouttebarge, V., Reardon, C., Hitchcock, M., Hainline, B., & Purcell, R. (2019). Determinants of anxiety in elite athletes: a systematic review and meta-analysis. *British Journal of Sports Medicine*, *53*(11), 722–730. https://doi.org/10.1136/bjsports-2019-100620

Rocha, V., & Osório, F. (2018). Associations between competitive anxiety, athlete characteristics and sport context: Evidence from a systematic review and meta-analysis. *Revista de Psiquiatria Clinica*, *45*(3), 67–74. https://doi.org/10.1590/0101-60830000000160

Roldan, R. H., Quiñonez, J. A., Arenas, J., Urrea, A. M., Barbosa-Granados, S., & Loaiza, H. A. (2021). Características Psicológicas en Deportistas con Discapacidad Física (Psychological Characteristics in athletes with physical disability). *Retos*, *40*(0 SE-Artículos de carácter científico: trabajos de investigaciones básicas y/o aplicadas). https://doi.org/10.47197/retos.v1i40.83079

Rowland, D. L., & van Lankveld, J. (2019). Anxiety and performance in sex, sport, and stage: Identifying common ground. In *Frontiers in Psychology* (Vol. 10, Issue JULY, p. 1615). Frontiers Media S.A. https://doi.org/10.3389/fpsyg.2019.01615

Ruiz-Juan, F., & Sancho, A. (2014). Ansiedad en maratonianos en función de variables socio-demográficas (Anxiety in marathoners based on socio-demographic variables). *Retos*, *25*(28–31). https://doi.org/10.47197/retos.v0i25.34470

Salom Martorell, M., Ponseti, F., Contestí Bosch, B., Salom Ferragut, G., García-Mas, A., & Núñez Prats, A. (2021). Ansiedad competitiva y rendimiento en deportistas de vela. *Retos*, *39*(39), 187–191. https://doi.org/10.47197/retos.v0i39.75356

Serrano, J., Reis, R., Fonseca, T., Paulo, R., Honório, S., & Batista, M. (2019). Pre-Competitive Anxiety: A comparative study between «Under 12» and Senior teams in football. *Retos*, *36*(36), 318–326. https://doi.org/10.47197/RETOS.V36I36.67129

Silva, G., De Araújo, D., Cunha Arantes, A., De Almeida Neto, S., & De Melo, G. (2018). Avaliação psicométrica da ansiedade traço em jovens nadadores brasileiros. *Revista Brasileira de Psicologia Do Esporte*, *7*(1). https://doi.org/10.31501/rbpe.v7i1.6836

Silva Rocha, V., & de Lima Osório, F. (2018). Associations between competitive anxiety, athlete characteristics and sport context: Evidence from a systematic review and meta-analysis. *Revista de Psiquiatria Clinica*, *45*(3), 67–74. https://doi.org/10.1590/0101-60830000000160

Spielberger, C. (1966). *Anxiety and behavior*. Academic Press.

Trigueros, R., Aguilar-Parra, J., Álvarez, J. F., Cangas, A. J., & López-Liria, R. (2020a). El efecto de la motivación sobre la resiliencia y la ansiedad del deportista. *Revista Internacional de Medicina y Ciencias de La Actividad Fisica y Del Deporte*, *20*(77), 73–86. https://doi.org/10.15366/rimcafd2020.77.005

Trigueros, R., Aguilar-Parra, J., Álvarez, J. F., Cangas, A. J., & López-Liria, R. (2020b). El efecto de la motivación sobre la resiliencia y la ansiedad del deportista. *Revista Internacional de Medicina y Ciencias de La Actividad Fisica y Del Deporte*, *20*(77), 73–86. https://doi.org/10.15366/rimcafd2020.77.005

World Medical Association. (2013). World Medical Association declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA - Journal of the American Medical Association*, *310*(20), 2191–2194. https://doi.org/10.1001/jama.2013.281053

Yang, H., Wen, X., & Xu, F. (2020). The Influence of Positive Emotion and Sports Hope on Pre-competition State Anxiety in Martial Arts Players. *Frontiers in Psychology*, *11*, 1460. https://doi.org/10.3389/fpsyg.2020.01460