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Pandemic Impacts on Athlete Competitive Anxiety and Its Relationship with Sex, Competitive Level and Emotional Self-Control: A Cohort Study before and after COVID-19

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Abstract: The COVID-19 pandemic caused a great emotional impact on the general population, with specific consequences in the field of sport and physical activity. The present study was conducted to meet two objectives: (1) to investigate if the pandemic had an impact on competitive anxiety and if the sex and competitive level played a mediating role, and (2) to investigate if the relationship between emotional self-control and anxiety was affected by the pandemic. An amount of 608 Spanish athletes participated, divided into two cohorts, before and after the pandemic. Measurements of competitive anxiety and emotional self-control were made at both time points, which were processed by combining analysis of variance and regression models. Differences were found in competitive anxiety before and after COVID-19, with athlete's competitive level acting as a mediating variable. For high-level athletes, there was an increase in anxiety, while for lower-level athletes, there was a decrease in anxiety. The pandemic seems to have led to higher levels of anxiety in elite athletes, compared to amateur athletes. There was no interaction between the sex of the participants and the cohort. Emotional self-control remained a significant predictor of low competitive anxiety levels.

Keywords: COVID-19; cohorts; competitive anxiety; emotional self-control; sport

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1. Introduction

The COVID-19 pandemic caused a global crisis with severe consequences in various spheres of society such as politics or the economy, but above all, it had a great impact on people's physical and mental health [1]. Since the start of the pandemic, multiple scientific studies have collected evidence on how the mental health of citizens has suffered. Systematic reviews and meta-analyses that synthesize what has been evaluated during these years show an increased risk of suffering from mental health problems globally during the pandemic [2]. The first reviews of longitudinal cohort studies during the pandemic showed that there was an increase in the characteristic symptoms of mental health problems at the beginning of the extraordinary measures of restrictions and lockdown (March–April 2020). These symptoms decreased until they were comparable to pre-pandemic levels, by mid-2020, in most population groups [3].

In the Spanish context, Zhang et al. [4] reviewed 28 studies with 38 representative samples (86,323 participants in total) which revealed a high prevalence of symptoms of anxiety (34%), depression (36%), and insomnia (52%) in the general population. These levels were higher than those found in other countries with similar restrictions such as China, India, Japan, Italy, or the United Kingdom. The high anxiety markers in the Spanish population significantly exceeded the previous average prevalence of this symptomatology (7.3%), being up to four times higher during the COVID-19 pandemic [5]. The longitudinal study carried out by Ausín et al. [6] concluded that the negative effects of the pandemic on

mental health were worse when measured one year later, compared to three other previous moments in time.

During the pandemic, numerous investigations considered the sports or physical activity component to assess the impact of restrictions and preventive measures on mental health, even establishing an optimal range of weekly physical activity [7]. Throughout this crisis, it became clear that those people who were physically active showed better general levels of mental health [8], both in the case of adults and children and adolescents [9]. In fact, those people who reduced their levels of physical activity during the initial restrictions of the pandemic showed poorer mental health and well-being compared to those who maintained or increased their levels of exercise, and compared to the levels they had before the pandemic [10].

However, when considering regulated sports, carried out by athletes, the evidence of these years has documented how sport has been greatly affected by the pandemic, increasing anxiety among athletes of all levels [11]. Due to the restrictive measures imposed by the state authorities as a strategy to reduce the transmission of the virus, not only was there a global decrease in the level of physical activity and an increase in sedentary behaviour [12], but also numerous sporting events were cancelled or postponed at professional, amateur, and community levels in order to avoid gatherings of crowds of athletes and spectators, causing the restructuring of sports training routines and hugely disrupting sports calendars [13–15]. These modifications greatly restricted the possibility of carrying out sporting activity, and had a significant impact on young and adult athletes not only in terms of professional progression, but also regarding their mental health, potentially increasing their vulnerability to mental health symptoms [16]. Being a woman and competing to more elite levels were associated factors with an increased risk for mental health outcomes [17].

Although this context increased athletes' anxiety, this group had fewer consequences than the general population thanks to adequate emotional regulation and coping strategies [11]. In fact, one of the key variables in anxiety regulation, and with greater empirical evidence, is self-control, which is understood as the ability of an individual to stop impulses in order to achieve a specific goal, encompassing attentional and emotional regulation and behavioural persistence [18]. Self-control allows individuals to master stressful or perceived threatening situations, regulating their own behaviour through the inhibition of intrusive thoughts and emotions [18]. This makes it one of the most beneficial and adaptive personality traits, and it is strongly related to academic and work success [19]. A comprehensive meta-analysis, which identified 150 studies with more than 200,000 participants, concluded that a good self-regulation capacity, developed since childhood, is positively associated with good social competence and the prevention of behavioural, depressive, and anxiety problems in adulthood [20]. Analysis of self-control and affect regulation through longitudinal cohort studies pointed to self-control as a key predictor of low levels of anxiety, and this relationship would be mediated by affect regulation styles (adaptive or maladaptive) [21].

Research on self-control and its associated benefits for the regulation of intrusive emotions such as anxiety has a long tradition in the sporting context. Athletes have to control their impulses and behavioural tendencies, such as the desire to reduce effort to relieve momentary discomfort, or to optimize their competitive performance [22]. Anxiety has a detrimental impact on sports performance, affecting attentional control and triggering athletes to focus on stimuli considered threatening but irrelevant to competition (e.g., spectators), instead of focusing on the relevant stimuli for the sports task success [23,24]. Anxiety causes athletes to go from executing trained actions that lead to good competitive performance, to focusing solely on avoiding mistakes, which is counterproductive for sporting success. However, this bias can be redirected by the self-regulatory capacity of athletes (their competitive self-control), which makes it possible to neutralize these negative effects of anxiety [23,24].

Studies conducted during the COVID-19 pandemic regarding self-control and anxiety revealed that adults who were able to maintain good levels of self-control showed milder symptoms of stress and psychological distress [25]. On the one hand, there is evidence showing that good self-control helped counteract the impact of this crisis on mental health, since those individuals with less self-regulation capacity were more vulnerable and required more help to maintain good mental health during the pandemic [26]. On the other hand, emotional self-control was key as a moderator variable of perceived loneliness and well-being levels [27], mitigating the negative consequences on family and work life [28].

Therefore, research in the framework of physical activity and sport may prove essential to understand the influence of self-control on anxiety, allowing researchers to determine if the COVID-19 pandemic has had an impact on this self-regulatory mechanism. Consequently, the present study was carried out within the Spanish contest, one of the countries with the highest increases in anxiety [5] and with large restrictive confinement measures. More specifically, this research set two objectives:

(1) Investigating if the pandemic had an impact on competitive anxiety and if the sociodemographic variables of sex and competitive level played a mediating role. As shown in the previous literature review, the pandemic context led to an increase in the prevalence of anxiety in the general population, but being a woman and competing to more elite levels increased the risk in athletes. The first hypothesis was that the pandemic has increased levels of competitive anxiety in athletes, with differences based on sex (women will have higher levels of competitive anxiety than men) and competitive level (athletes who compete at higher levels will present greater levels of anxiety than amateur levels);
(2) Examining if the relationship between emotional self-control and anxiety was affected by the pandemic. The hypothesis of this second objective was that, in line with the strong existing evidence in the sports field, emotional self-control will continue to be a predictor of low levels of competitive anxiety.

To evaluate these assumptions, we investigate the effect of athletes' cohorts (depending on whether the data were collected before or after the start of the pandemic), the sex of the participants, and their competitive level, on the variables of anxiety (cognitive, somatic) and emotional self-control. In addition, regression models for cognitive and somatic anxiety were estimated, using emotional self-control as a predictor variable.

2. Materials and Methods

2.1. Design

The research design has an evolutionary nature (retrospective and sequential), where the differences based on the time elapsed in two cohorts of subjects were analysed [29]. Cohort studies have been widely used in the epidemiological field to demonstrate differences between two moments in time, comparing subjects who were exposed to events of interest for the investigation [30]. In the case of this investigation, the event of interest that marked the difference between the two cohorts of participants was the onset of the COVID-19 pandemic.

2.2. Participants and Procedure

The simple random sampling formula [31] was used for a population of 281,561 athletes who were federated in the region of Galicia (Spain). Although the minimum representative sample, using a 5% margin of error, was 384 participants, an accidental sample of 608 athletes with a federation license, over 18 years of age, was selected.

The sample was distributed in two cohorts, one before and one after the declaration of the state of alarm for COVID-19 by the Government of Spain on 14 March 2020. Cohort 1 consisted of 278 pre-COVID-19 participants, from whom data were collected in 2019; and Cohort 2 of 330 post-COVID-19 participants, from whom data were collected during the years 2020 (52.4% of the Cohort), 2021 (32.4%), and 2022 (15.2%). Appendix A contains

Tables A1 and A2, which show the sociodemographic characteristics of the total sample, and each cohort.

In order to be part of the sample, the following inclusion criteria were considered:

(1) Be 18 years of age or older.
(2) Be in possession of a federation license for a sport modality from the region of Galicia (Spain).

In order to collect data, numerous sports clubs were contacted to inform them of the research objectives and request their collaboration. Athletes were informed that participation was anonymous and voluntary. The fact that the athletes refused to participate in the investigation was considered as an exclusion criterion. Although the data collection was conducted in sports teams, each participant was able to access the questions individually, ensuring at all times that no one but them and the researchers could access the answers. In case of any questions about the questionnaire, participants could contact the researchers anonymously.

The study was carried out according to the regulations of the Bioethics Committee of the University of Santiago de Compostela and the Declaration of Helsinki. The processing of the data followed current Spanish and European regulations regarding the protection of personal data. In this regard, participants had the right to withdraw their responses from the research, as well as to be informed of the use of their data.

2.3. Instruments

A sociodemographic questionnaire was designed to record the variables of age, sports experience (measured in years), sex, sport modality, competitive level, and weekly sports activity (calculated from the number of weekly training sessions and the average duration of each one).

Competitive anxiety was assessed through the Spanish adaptation [32] of two subscales from the Revised Competitive Anxiety Inventory-2 (CSAI-2R) by Cox et al. [33]. One subscale measures cognitive state anxiety, with 5 items, and the other subscale measures somatic state anxiety (6 items). The response scale is a Likert-type with four alternatives (1 = Not at all; 2 = Somewhat; 3 = Moderately; 4 = A lot). The original reliability of each of these subscales, considering Cronbach's α coefficient, was greater than 0.8. The model fit indicators, referring to the complete questionnaire, were also satisfactory (*CFI* = 0.97; *RMSEA* = 0.045). In this study, Cronbach's α values for the two subscales were greater than 0.7 in both cohorts.

Finally, emotional self-control was measured with the emotional control subscale of the Spanish adaptation of the Test of Performance Strategies-3 questionnaire (TOPS-3) [34], which consists of 4 items and allows knowing the ability to regulate emotions, such as anxiety, during sports competition. The response scale is a Likert-type with five alternatives (1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Always). This subscale also presented good original internal consistency data (Cronbach's α coefficient of 0.86) and a good fit considering the entire questionnaire (*CFI* = 0.934; *RMSEA* = 0.043). Cronbach's α values in both cohorts of this study were greater than 0.8.

2.4. Data Analysis

The data recording and analysis was carried out with the IBM SPSS Statistics software, version 25. First, two different 2 $\times$ 2 multivariate analyses of variance (MANOVA) were performed using cognitive anxiety, somatic anxiety, and emotional self-control as dependent variables. In both MANOVAs, the cohort was taken as the first factor (1: before vs. 2: after), varying sex (man vs. woman), and the competitive level (local and regional vs. national and international) as the second factor. Finally, the relationships between the dependent variables in each of the cohorts were analysed using regression analysis. For all analyses, the confidence level was set at $\alpha = 0.05$.

3. Results

3.1. Comparisons Based on Cohort and Sex

Table 1 shows the descriptive statistics of the three dependent variables as a function of the cohort (before vs. after the pandemic) and the sex (man vs. woman). Table 2 shows the F values, the statistical significance (p) of the comparisons, and the effect size (η^2).

Table 1. Descriptive statistics based on the cohort and the sex.

Variable	Cohort 1		Cohort 2	
	M	***SD***	***M***	***SD***
Cognitive anxiety				
Man	2.38	0.66	2.14	0.66
Woman	2.75	0.66	2.64	0.74
Somatic anxiety				
Man	1.89	0.7	1.9	0.62
Woman	2.08	0.69	2.26	0.77
Emotional self-control				
Man	3.74	0.98	3.86	0.96
Woman	3.35	1.14	3.26	1.07

Table 2. Analysis of variance depending on the cohort and the sex.

Variable	F	*p*	η^2
Cohort			
Cognitive anxiety	8.405	<0.05	0.014
Somatic anxiety	2.361	0.125	0.004
Emotional self-control	0.027	0.869	0.001
Sex			
Cognitive anxiety	50.834	<0.01	0.081
Somatic anxiety	19.223	<0.01	0.032
Emotional self-control	30.428	<0.01	0.05
Cohort × Sex			
Cognitive anxiety	1.254	0.263	0.002
Somatic anxiety	1.8	0.18	0.003
Emotional self-control	1.301	0.254	0.002

Note. $df_1 = 3$; $df_2 = 575$.

Although there are statistically significant differences between men and women, with men presenting higher scores in emotional control and women higher indicators of cognitive and somatic anxiety, the interaction between the cohort factors and sex was not significant for each of the dependent variables.

3.2. Comparisons Based on Cohort and Competitive Level

Table 3 shows the descriptive statistics (means and standard deviations) of the three dependent variables as a function of the cohort (before vs. after the pandemic) and the competitive level (local and regional vs. national and international). For local and regional athletes, all the means decrease when going from Cohort 1 to Cohort 2, with the exception of emotional self-control, which increases; while for the national and international athletes, the behaviour of the means is inverse, as they increase when going from Cohort 1 to 2 in all measures, except emotional self-control, which decreases.

Table 4 provides the F values, the statistical significance (p) of the comparisons, and the effect size (η^2).

The results revealed that both the levels of cognitive anxiety and somatic anxiety change depending on the cohort considered ($p < 0.05$). In addition, the interaction of the cohort and competitive level factors reached statistical significance in the variables of cognitive anxiety and somatic anxiety.

Table 3. Descriptive statistics based on the cohort and the competitive level.

Variable	Cohort 1		Cohort 2	
	M	*SD*	*M*	*SD*
Cognitive anxiety				
Local and regional	2.51	0.66	2.24	0.72
National and international	2.45	0.72	2.54	0.74
Somatic anxiety				
Local and regional	2.02	0.73	1.95	0.67
National and international	1.78	0.6	2.14	0.73
Emotional self-control				
Local and regional	3.54	1.09	3.65	1.06
National and international	3.84	0.88	3.61	1.02

Table 4. Analysis of variance depending on the cohort and the competitive level.

Variable	F	*p*	η^2
Cohort			
Cognitive anxiety	4.844	<0.05	0.008
Somatic anxiety	5.666	<0.05	0.01
Emotional self-control	0.418	0.518	0.001
Competitive level			
Cognitive anxiety	1.141	0.286	0.002
Somatic anxiety	0.155	0.693	0.001
Emotional self-control	2.050	0.153	0.004
Cohort × competitive level			
Cognitive anxiety	4.265	<0.05	0.007
Somatic anxiety	11.835	<0.01	0.02
Emotional self-control	3.408	0.065	0.006

Note. $df_1 = 3$; $df_2 = 572$.

This interaction can be seen in Figure 1, illustrating that when comparing Cohort 2 with Cohort 1, cognitive anxiety decreased in athletes at the local and regional levels, while it increased slightly for athletes who competed nationally and internationally. For somatic anxiety, there was the same pattern but more accentuated, since there was a slight decrease from Cohort 1 to Cohort 2 in athletes at local and regional levels, which contrasts with a marked increase in their levels for athletes with a higher competitive level. There were no statistically significant differences in anxiety levels considering only the competitive level.

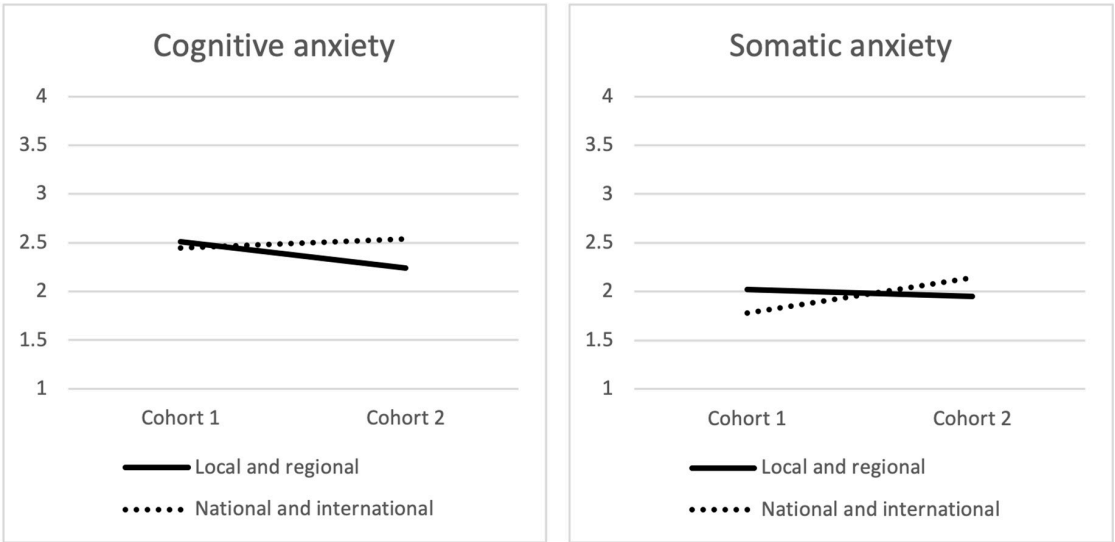

Figure 1. Competitive anxiety (cognitive, somatic) means depending on the competitive for both cohorts.

3.3. Relationships between Variables

Finally, regression analyses were performed, taking cognitive anxiety as the dependent variable in one of them, somatic anxiety in the other, and emotional self-control as the predictor variable for both cases. The results for Cohort 1 and Cohort 2 can be seen in Table 5. In addition, Figure 2 visually represents the final regression models for each Cohort.

Table 5. Regression coefficients for cognitive and somatic anxiety.

	Variables	Cognitive Anxiety [a]		Somatic Anxiety [b]	
		β	*p*	β	*p*
Cohort 1	Emotional self-control	−0.5	<0.001	−0.489	<0.001
	Adjusted R^2	0.248		0.236	
Cohort 2	Emotional self-control	−0.5	<0.001	−0.489	<0.001
	Adjusted R^2	0.248		0.236	

[a] Cohort 1: $F_{(1,259)} = 86.554$; $p < 0.001$; Cohort 2: $F_{(1,324)} = 56.877$; $p < 0.001$; [b] Cohort 1: $F_{(1,256)} = 80.366$; $p < 0.001$; Cohort 2: $F_{(1,325)} = 74.314$; $p < 0.001$.

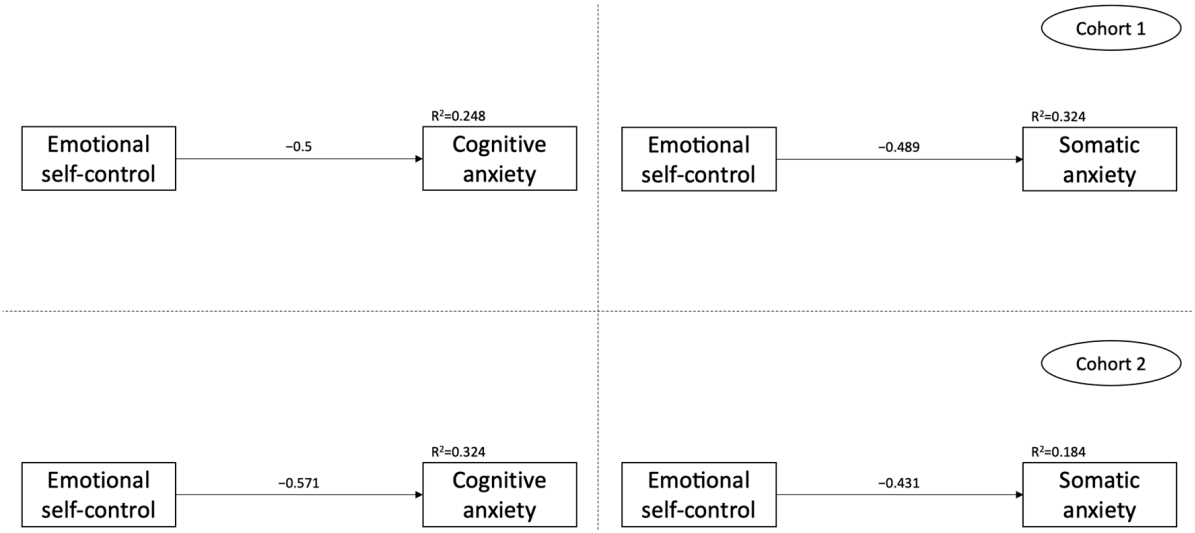

Figure 2. Regression models for the prediction of cognitive and somatic anxiety.

The four regression analyses revealed the same trend: emotional self-control predicts both types of anxiety with a negative effect, suggesting that higher self-control leads to lower anxiety. The explained variance of the models, indicated by the adjusted R^2 statistic, is in an interval of 0.184 to 0.324. The inclusion in these models of other sociodemographic variables, such as sports experience, did not change these relationships or the explained variance, since they were not statistically significant predictors.

4. Discussion

The present study was conducted with the fundamental objective of verifying if athletes' competitive anxiety was affected by the COVID-19 pandemic, considering the mediating role of the participants' sex and competitive level, as well as investigating if there were differences in the relationship between anxiety and emotional self-control, before and after the pandemic. The results indicate: (1) higher scores in competitive anxiety in women, but without interaction with the cohort; (2) a change in trend between before and after the pandemic in relation to competitive anxiety in athletes who competed at high levels; (3) a persistence in the role of emotional self-control as a predictor of lower levels of competitive

anxiety. These results can be considered in prevention and intervention programmes on competitive anxiety that seek to enhance athletes' self-regulatory strategies.

The first hypothesis, which stated that the pandemic has increased levels of competitive anxiety in athletes, with differences based on sex and competitive level, has been partially corroborated. Starting with sex differences, women scored higher on cognitive anxiety and somatic anxiety, while men scored higher on emotional self-control. These results concur with data from the systematic review by [17], where 14 studies found higher rates of anxiety or stress in female athletes, as well as a greater tendency for emotional regulation in male athletes. Furthermore, in the scientific literature, female athletes usually report higher anxiety scores compared with male athletes [3].

By contrast, there were differences in the competitive anxiety levels between the participants of Cohort 1 and Cohort 2, when the competitive level is considered. The pandemic could have caused higher levels of anxiety in elite athletes, compared to amateur athletes. Those athletes who competed nationally and internationally, and whose data were collected once the pandemic began, showed higher indicators of cognitive anxiety and somatic anxiety, compared to athletes at the local and regional levels. Furthermore, these differences are not due exclusively to the competitive level, but rather, there is a change in trend between before and after the pandemic. The differences of Cohort 2 with respect to Cohort 1 stand out, where the athletes who competed at the local and regional level decreased their levels of cognitive anxiety, while the athletes at the national and international levels remained stable. Still, there was a more emphasised trend with respect to somatic anxiety, since the differences between both competitive levels were caused by a significant increase in anxiety levels in athletes who competed nationally and internationally.

These results partially agree with other investigations of temporal comparisons carried out in the field of physical activity and sport, such as a study by Demarie et al. [35], where the post-pandemic competitive anxiety levels of horse riding athletes were higher when compared to the levels evaluated before the pandemic; or the research with adolescent athletes by McGuine et al. [36], where the post-pandemic levels of mental health in athletes were worse when compared to the previous levels. However, the fact that somatic anxiety levels have increased significantly in athletes who compete at a national and international level implies a change in the established scientific consensus, where it is usually assumed that elite athletes who compete at the most demanding levels tend to report fewer anxiety symptoms and outcomes than athletes at lower competitive levels [3]. In the context of this non-experimental study, this change in trend seems to point to the event of the COVID-19 pandemic, since the isolated effect of the cohort does establish significant differences in terms of competitive anxiety, but this is not the case for the isolated effect of the competitive level. This change in trend can be explained by the fact that in the Spanish context, due to the restrictions that prevented citizens from leaving their homes for months, many athletes competing at higher levels had serious difficulties in training, had to change a large part of their routines, and were affected by cancellations of events and competitions that put their sporting and professional careers at risk.

Regarding the second hypothesis, which postulated that emotional self-control would continue to be a predictor of low levels of competitive anxiety, the results found in both cohorts confirmed this assumption. The models for the prediction of cognitive anxiety and somatic anxiety showed persistence in the role of emotional self-control as a predictor of lower levels of cognitive and somatic anxiety. These results are in line with previous research that evaluated these variables in the sports context, since self-control remains a fundamental variable to regulate the anxiety levels of athletes, facilitating competitive performance [23,24]. Emotional regulation is related to the achievement of athletes' objectives and may occur more frequently and have a greater impact during competition [37].

The main limitations of this research reside in the fact that the methodology implemented does not enable establishing causal inferences. Obtaining data through self-reporting may provide socially accepted responses, which could lead to underreporting of anxiety or higher indicators of self-control. Although groups were compared over time through cohorts, the unpredictability of the COVID-19 pandemic and its associated restrictive measures prevented conducting randomized controlled trials with repeated measures, which would have guaranteed greater causal validity.

For all these reasons, it is essential to continue investigating whether the findings of this research have continuity over time, since they may indicate a change in trend as a result of the COVID-19 pandemic. As a future line of research, it would be of great interest to analyse whether the relationships between anxiety and self-control would also be maintained in the general population and to what degree this would be the case. Similarly, studies could be conducted that consider more objective indicators of competitive anxiety such as heart rate variability, which has recently been related to emotional self-control, as a psychophysiological biomarker used to assess whether athletes can cope efficiently with competition [38].

The importance of this research lies in the fact that it is the first study in Spain to analyse the differences in competitive anxiety and self-regulation in two cohorts of participants, with data obtained before and after the onset of the COVID-19 pandemic. The results obtained have implications for the work of sport psychology professionals when carrying out prevention and intervention programmes for competitive anxiety. In this sense, special consideration should be given to female athletes and those who compete at higher levels. For any intervention, emotional self-control continues to point to being a key variable to be enhanced, as it has been shown to be a predictor of low levels of competitive anxiety over time.

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Appendix A

Table A1. Age, sports experience (measured in years), and volume of weekly sports activity (measured in hours).

Variable	Statistic	Total Sample	Cohort 1	Cohort 2
Age	Minimum	18	18	18
	Maximum	70	46	70
	M	25.61	23.44	27.44
	SD	9.21	5.26	11.22
Sports experience	Minimum	0	0	0
	Maximum	38	32	38
	M	11.98	12.24	11.77
	SD	6.3	5.83	6.66
Weekly sports activity	Minimum	0	0	0
	Maximum	23.33	21	23.33
	M	5.96	5.69	6.19
	SD	3.63	3.9	3.36

Table A2. Number and percentage of participants based on sex, sport modality, and competitive level.

Variable	Total Sample		Cohort 1		Cohort 2	
	n	**%**	**n**	**%**	**n**	**%**
Sex						
Man	402	66.1	196	70.5	206	62.4
Woman	204	33.6	82	29.5	122	37
Sport modality						
Basketball	171	28.1	52	18.7	119	36.1
Indoor soccer	149	24.5	102	36.7	47	14.2
Martial Arts	111	18.3	0	0	111	33.6
Golf	53	8.7	0	0	53	16.1
Soccer referees	49	8.1	49	17.6	0	0
Swimming	40	6.6	40	14.4	0	0
Soccer	35	5.8	35	12.6	0	0
Competitive level						
Local and regional	380	62.5	194	69.8	186	56.4
National and international	228	37.5	84	30.2	144	43.6

Note. The percentages may not add up to 100 due to missing values.

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