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Keywords

aquatic athletes; psychological distress; lockdown; training conditions; mental health

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The impact of home confinement by COVID-19 on mood state and adaptive behaviors in Spanish swimmers

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Abstract: Introduction: This study aimed to assess the mental condition of aquatic athletes during COVID-19 lockdowns and identify factors that could predict changes in their emotions and mood disturbances. Materials and Methods: The sample was composed of 506 competitive swimmers (ages 15–36) in four aquatic specializations, with 82.4% of them competing at the national level. Data was collected through questionnaires between April 10th and May 1st, 2020. Results: Female athletes had higher levels of unpleasant mood states and were generally more vulnerable to the lockdown's harmful effects. Team athletes had higher levels of friendliness, which may be a coping strategy for difficult situations. Training conditions played a significant role in mental health, with athletes who trained more having fewer mood disturbances. Lack of training negatively impacted fitness and mental health. Conclusions: The study emphasizes the importance of providing support to athletes during pandemics and reducing stigmatization around seeking psychological support.

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1. Introduction

Without a doubt, sports have been heavily negatively affected by the pandemic, as some authors announced at the beginning of the infections [1]. An international study by Washif et al. [2] with more than 12,500 athletes revealed that COVID-19 mediated lockdown compromised nearly all aspects of practical training prescription and periodization in a manner disadvantageous to athletes. The confinement elicited a change in their training behaviors, with more training alone to promote general health and well-being rather than with to be sport or discipline specific; in fact, in Brazilian swimmers [3] the lockdown had a substantial impact on the daily routines reducing both training hours and weekly training frequency with a reduction in the physical training levels from vigorous to moderate intensity. The lack of resource (e.g., space, equipment, facilities, and multidisciplinary support teams) reduced motivation in over half the athletes surveyed and likely affected mental health in many more [4].

Therefore, swimming has been one of the sports with a negative COVID-19 impact due to the difficulty of maintaining daily training because swimming pool facilities were closed. In fact, we can consider lockdown as a non-normative transition, a crisis-transition which is the outcome of ineffective coping, and associate it with negative consequences,

such as depression and others [5]. Swimmers are one of the many athletic populations that have found themselves entangled in the obstacles of navigating through the pandemic. Costa et al. [6] found that the lockdown impaired the performance in swimming, and they concluded that world-ranked swimmers' performance was impaired by 1–2% due to the COVID-19 lockdown, returning to levels that had been reached two years earlier, which can be consider a long period considering athlete's career. Moreover, the overall performance improvement in swimming during an Olympic cycle is around 3–4%, and we can assume that it was a crucial factor that swimmers were not allowed to train regularly in their natural or normal environment, and the practice of dry-land strength training, plyometrics, or the use of several home-work machines were suggested as valuable alternatives to avoid a complete training cessation. On the other hand, the new conditions have created a myriad of challenges for swimmers and athletes in general around the world, including maintaining their fitness level and preparing to return optimally and safely to training and competitions [7]. Moreover, the in-water training cessation would compromise the swimmers' total capacity of training, and understandably, as a consequence, this affected their performance as well their emotional stability [8,9]. Haddad et al. [7] point out such consequences as increased body weight and body fat, decreased peak oxygen consumption, and a decreased resting metabolic rate despite the preservation of lean mass.

In terms of psychological consequences, Clemente-Suárez et al. [10] analyzed the effects of the pandemic on 136 Olympic and Paralympic swimmers. The study found that Paralympic athletes perceived a higher negative threat impact than Olympic athletes due to physical confinement. This threat was a result of the established quarantine regulations. Additionally, the study concluded that the quarantine period negatively affected a greater number of females than of male athletes with the females presenting higher levels of psychological inflexibility. In analyzing their psychological inflexibility, it became apparent that this affected swimming performance through mental blocks that hindered them from being able to physically perform at their optimal levels from before the pan-demic. Quarantine as the main form of physical confinement showed to increase levels of anxiety as a result of the perception of lack of control, which has been identified as a negative consequence, resulted in poor mental health, avoidance behaviors, boredom, and poor nutrition as a large umbrella under poor personal care. The conclusion of the described study was that swimmers require copious amounts of both physical and psychological effort.

The current study paid special attention to aqua sports, which were particularly affected by the lockdown condition. In Spain, since the beginning, different institutions like the Andalusian Center of Sports Medicine (CAMD in Spanish), the Spanish Rowing Federation, and the Spanish Royal Swimming Federation (RFEN in Spanish) were highly concerned about the consequences of the pandemic in sports, and how to help their athletes to deal with the situation, especially that there have been no specific research data about the situation. The COVID-19 pandemic accentuated the need for a comprehensive understanding of risk and protective factors and made promoting athlete well-being a priority in elite sport. However, the existing research is still searching for the answer whether specific environmental factors (coach support, living conditions, sport performance and training possibilities) or cognitive factors (dispositional mindfulness, executive functions) may protect against psychological distress [8,11]. Therefore, the current study aims to investigate the mental condition of elite aquatic athletes and the protective factors against mental breakdown. The general objective of the study was to analyze the personal and contextual predictors (age, sex, living conditions, training conditions, sleep quality, physical condition) of mood disturbance.

2. Materials and Methods

2.1. Partcicipants

The sample comprised 506 competitive swimmers, age range 15–36 (Mage 19.46; SD_{age} 4.89), 82.40% of them competing at the national and 17.60% at the international level in four different aquatic specializations, (227 male, 44.90% and 279 females, 55.10%). 306 practice swimming (60.50%), 61 synchronized or artistic swimming (12.00%), 134 water polo (26.50%) and 5 compete in diving (1.00%). The questionnaires were collected from the 10th of April – two weeks after the national lockdown – until the 1st of May, 2020. The online ad hoc questionnaire was sent by the Royal Spanish Swimming Federation (RFEA) database to Spanish Swimming Clubs and coaches regarding information about the research.

2.2. Procedure

The study was conducted using a descriptive quantitative methodology based on random nonpurposive sampling and the snow-ball effect. An online ad hoc questionnaire was designed to assess competitive Spanish swimmers. The questionnaire included an introduction with the aims of the research, specific instructions on how to fill it out, and the aims of the survey, ethics information for participants, as well an informed consent form for adults and parent permission for athletes under 18. It was necessary to use the Internet and mainstream media, including WhatsApp™, because of the mobility and personal access limitation imposed during the testing period by the pandemic control efforts. These research methods have been reported as valid and reliable [12].

The questionnaire was initially tested on a sample of 10 people to determine that it was appropriate and easily understandable. Four swimming coaches, four sport psychologists and two swimmers, blind in review to the study objectives, were recruited for validation as recommended by Osterling [13] with a Likert scale to assess the comprehension and adequacy of the information and items.

2.3. Measures

The questionnaire contains sociodemographic variables regarding information about age, gender, origin, educational level, competitive level and on the type of sport (collective or individual), about characteristics of the confinement space, training conditions during confinement (number of training hours per week, seeking psychological support, availability of equipment at home to train properly, training organization on one's own and their opinion on the ability to keep physically fit) and about sleep difficulties.

The Mood States Scale was also used – a short and validated Spanish version of the Profile of Mood States (POMS) [14]. This version has 30 items and six subscales: anger, fatigue, vigor, friendship, tension, and depression, with five answer options from 0 (Not at all) to 5 (Extremely). As in previous studies, total mood disturbance (TMD) was calculated by adding the tension, depression, anger and fatigue scores and subtracting the vigor score [15].

2.4. Statistical Analysis

Statistical analyses were performed with version 1.8 of the Jamovi software [16]. Proportion tests were performed to describe the indicators concerning the physical characteristics of the confinement space, the number of hours of weekly training, aspects concerning training conditions and sleep disturbances. The dimensions of the POMS instrument and total mood disturbance (TMD) were calculated, and multivariate analyses were per-formed between groups to determine the differences between men and women according to the type of sport (group or individual). Pearson's r correlations were used to find associations between age, square meters of housing, hours of training per week, availability of training material, organization of training, loss of fitness, sleep difficulties and TMD. Finally, a linear regression model was used to explain the relation between the predictor variables (age, sex,

type of sport, surface of the dwelling in square meters, hours of training per week, having a garden or terrace at home, having training material, organization of training, loss of physical fitness and sleep difficulties) and total mood disturbance.

3. Results

3.1. Descriptive Analysis

Tests of proportions were performed to describe the physical characteristics of the space of the swimmers' confinement (see Table 1): 8.71% indicated that they were confined to an apartment of less than 70 m^2, 31.12% declared having spent the confinement in a dwelling of 70–90 m^2, 31.95% did it in a dwelling of 90–120 m^2, while 28.22% did it in dwelling larger than 120 m^2. Likewise, 37.60% did not have access to a garden or terrace, while 62.24% reported having access to a garden or terrace. In no case were they able to use a swimming pool that allowed them to practice swimming, and outdoor practice was prohibited. With reference to the number of hours they trained on average per week, 14.73% of the swimmers reported training less than 5 hours per week, 38.38% trained between 5 and 7 hours, 21.99% trained between 8 and 10 hours, 12.03% trained between 11 and 13 hours, 6.64% trained between 14 and 16 hours, and only 6.22% trained more than 16 hours. The 94.3% of the sample did not seek psychological support ($X^2 = 40$, $p < .001$).

Table 1. Test of proportions of the physical characteristics of the confinement space

Variables		*n*	% of total	X^2
Living space				69.7***
	Less than 70 m^2	42	8.71	
	Between 70 m^2 and 90 m^2	150	31.12	
	Between 90 m^2 and 120 m^2	154	31.95	
	More than 120 m^2	136	28.22	
Access to garden or terrace				29.8***
	Yes	302	62.24	
	No	182	37.60	
Hours of weekly training				212***
	Less than 5 hours	71	14.73	
	From 5 to 7 hours	185	38.38	
	8 to 10 hours	106	21.99	
	11 to 13 hours	58	12.03	
	14 to 16 hours	32	6.64	
	16 or more hours	30	6.22	

*** $p < .001$

Table 2 provides information on the training conditions. 70.74% of the participants considered that they had only little or no material to train. However, the majority responded that they had been able to organize themselves to train between quite a bit and a lot (81.01%). As for their perception of their loss of fitness, 48.86% responded that they had lost none or little fitness, while 51.14% responded that they had lost quite a bit or a lot of physical fitness.

Table 2. Test of proportions for training conditions

Variable	N	Levels (% of total)				X^2
		1	2	3	4	
Did you have the material to train properly?	482	11.20	59.54	23.86	5.39	341***
Have you been able to organize your training?	479	3.13	15.87	48.02	32.99	221***
Have you lost fitness?	483	6.42	42.44	32.92	18.22	146***

1: Not at all. 2: A little. 3: Quite a bit. 4: A lot. 5: Very much. *** $p < .001$

Regarding sleep disturbances or difficulties, it was observed that 23.30% of the participants presented quite a bit of disturbances or difficulties, 14.00% a lot and 11.80% many sleep disturbances or difficulties, while 32.20% presented little disturbance and 18.60% of the participants did not present any sleep disturbances (see Table 3).

Table 3. Test of proportions for participants' sleep disturbances-difficulties

Variable	N	Levels (% of total)					X^2
		1	2	3	4	5	
Have you had sleep disturbances/difficulties?	484	18.6	32.2	23.3	14.0	11.8	64.3***

1: Not at all. 2: A little. 3: Quite a bit. 4: A lot. 5: Very much. *** $p < .001$

3.2. Differences by Gender and Type of Sport

Multivariate analyses were performed to determine if there were significant differences by type of sport and sex in the POMS and TMD dimensions (see Table 4). Significant differences by sex were found, with higher scores for women in the dimension of anger ($F = 11.78$; $p < .001$), fatigue ($F = 9.38$; $p < .01$), tension ($F = 8.79$; $p < .01$) and depressed state ($F = 9.07$; $p < .01$). In addition, the effect of the interaction type of sport by sex was found in the friendship dimension ($F = 5.03$; $p < .05$), with higher scores in the groups of female swimmers. The TMD score varied significantly by sex ($F = 12.93$; $p < .001$), with the total mood disturbance score being higher in women than in men.

Table 4. Multivariate tests of mean differences by type of sport and sex

Dimension	Collective sports				Individual sports				*F*
	Men ($n = 70$)		Women ($n = 121$)		Men ($n = 146$)		Women ($n = 147$)		
	Media	D. T.	Media	D. T.	Media	D. T.	Media	D. T.	
Anger	2.04	.80	2.18	0.70	2.00	0.79	2.31	0.86	11.78[a]***
Fatigue	1.96	.95	2.18	0.81	1.98	0.86	2.25	0.93	9.38[a]**
Vigor	2.36	0.88	2.49	0.86	2.52	0.94	2.42	0.79	n.s.
Friendship	2.78	0.86	3.12	0.82	2.92	0.91	2.94	0.80	5.03[b]*
Tension	2.22	0.97	2.45	0.96	2.31	1.02	2.62	1.09	8.79[a]**
Depressed state	2.02	0.95	2.09	0.86	1.95	0.89	2.32	0.95	9.07[a]**
TMD	5.88	3.16	6.41	2.78	5.73	3.23	7.07	3.29	12.93[a]***

* $p < .05$, ** $p < .01$, *** $p < .001$. TDM, Total Mood Disturbance. [a] Main effect of sex, and [b] Sport-by-sex interaction effect.

3.3. Correlation Analysis

Pearson's r correlations were performed to find the different associations between the analyzed variables (see Table 5). Different significant associations were found; specifically, sleep difficulties negatively correlated with square footage of housing ($r = -.12$; $p < .01$), training material availability ($r = -.10$; $p < .05$), and training organization ($r = -.17$; $p < .001$) and positively correlated with loss of fitness ($r = .16$; $p < .001$). Total mood disturbance negatively correlated with the square meters of the dwelling ($r = -.13$; $p < .01$), the hours of weekly training ($r = -.10$; $p < .05$), material available for training ($r = -.14$; $p < .01$) and train-ing organization ($r = -.22$; $p < .001$), whereas it positively correlated with loss of fitness ($r = .26$; $p < .001$) and sleep difficulties ($r = .44$; $p < .001$).

Loss of fitness also negatively correlated with square footage of housing ($r = -.09$; $p < .05$), hours of weekly training ($r = -.21$; $p < .001$), availability of training material ($r = -.23$; $p < .001$), and with training organization ($r = -.35$; $p < .001$). Training organization was positively associated with weekly training hours ($r = .35$; $p < .001$) and training material availability ($r = .27$; $p < .001$). Training material readiness negatively correlated with age ($r = -.15$; $p < .01$), and positively with housing square footage ($r = .14$; $p < .01$) and weekly training hours (r = .23; $p < .001$). Age also negatively correlated with square footage of housing ($r = -.12$; $p < .05$).

Table 5. Matrix of correlations

	1	2	3	4	5	6	7	8
1. Age in years	—							
2. Square meters of the dwelling	-.12*	—						
3. Hours of training per week	-.02	-.01	—					
4. Training material	-.15**	.14**	.23***	—				
5. Training organization	-.09	.04	.35***	.27***	—			
6. Loss of fitness	.08	-.09*	-.21***	-.23***	-.35***	—		
7. Sleep difficulties	.03	-.12**	-.08	-.10*	-.17***	.16***	—	
8. TMD	.01	-.13**	-.10*	-.14**	-.22***	.26***	.44***	—

* $p < .05$, ** $p < .01$, *** $p < .001$. TDM, Total Mood Disturbance

3.4. Linear Regression Model

A linear regression model was used to analyze the contribution of each of the variables introduced as predictor variables of total mood disturbance. Table 6 shows that, con-trolling for the variable age, sex ($\beta = 0.32$; $t = 3.82$; $p < .001$) significantly influenced TMD, with women having higher scores than men on total mood disturbance. The variables loss of fitness ($\beta = 0.16$; $t = 3.59$; $p < .001$) and sleep difficulties ($\beta = 0.37$; $t = 9.06$; $p < .001$) positively and significantly predicted total mood disturbance. Whereas, the variable training organization ($\beta = -0.09$; $t = -2.00$; $p < .05$) negatively and significantly predicted TMD, i.e., the greater the training organization the lower the total mood disturbance. The construct-ed regression model explained 26% of the variance of total mood disturbance ($R^2 = .26$; $F = 16.4$; $p < .001$).

Table 6. Linear regression model for predictor variables of TMD

TMD	Estimator	SE	*t*	*p*	Standard Estimator
Age	-0.01	0.03	-0.28	.78	-0.01
Sex: Female – Male[a]	1.01	0.26	3.82	< .001	0.32
Sport: Collective – Individual[a]	-0.17	0.26	-0.63	.53	-0.05
Square footage of living quarters	-0.23	0.14	-1.73	.09	-0.07
Hours of training per week	-0.05	0.10	-0.54	.59	-0.02
Have a garden at home: Yes – No	-0.15	0.29	-0.52	.60	-0.04
Training material	-0.13	0.19	-0.71	.48	-0.03
Organization of training	-0.37	0.19	-2.00	< .05	-0.09
Loss of physical fitness	0.58	0.16	3.59	< .001	0.16
Sleep difficulties	0.94	0.10	9.06	< .001	0.37
Global Model Test					

4. Discussion

The COVID-19 pandemic has greatly disrupted high-performance sports and international competition, particularly in aquatic disciplines, the practice of which is almost entirely dependent on access to specialized facilities. Therefore, our study aimed to assess the mental condition of aqua athletes during the lockdown and the factors that may predict changes in their emotionality and help to cope with similar situations in the future. The analysis of the study showed a few significant results. Firstly, concerning sex, the female aqua athletes scored higher in unpleasant mood states, such as anger, fatigue, tension, and depressed state. The difference in vigor was insignificant, which could help better cope with the situation independently of gender.

On the other hand, the aqua athletes of team disciplines such as synchronized swimming and water polo and women were characterized with significantly higher levels of friendliness compared with individual aqua athletes. While experiencing difficult situations, the team players presumably express more supportive behaviors toward each other, which could be a common strategy to cope with obstacles and dramas. Additionally, females generally are characterized by a higher level of emotional competencies, such as empathy, and affective expressions; therefore, they can be more compassionate towards their sports environment, giving more support, compassion, and kindness to others suffering from the pandemic. Furthermore, that could be the female way to self-regulate better [17]. Mon-López et. al [18], in the analysis of football players, revealed that female athletes' appraisal of others' emotions predicted the number of training days in women, high-lighting the importance of emotional stability in the sports context.

Also, the sex variable significantly influenced the TMD score in the current study, meaning that female athletes generally cope worse with the lockdown. This fact is explained in studies by female tendency towards emotional instability, which is a consequence of biological (hormone system and pre-menstrual syndrome) and personality (neuroticism) factors inter-relation [19]. Moreover, women, even athletes, are threatened with stereotypes regarding themselves as less able than the man in areas related to various domains [20, 21]. The studies of Üngür and Karagözoğlu [22] on young swimmers during the first 30 days of home confinement revealed that young female swimmers had significantly higher anxiety levels than males. Females also reported an adverse change in their relationship with their close ones and expected more profound help from their parents. The authors conclude that the lack of pool training was associated with the swimmers' anxiety. Therefore, improving athlete-coach/parent interaction and providing coping programs for young athletes may help to reduce anxiety and other harmful effects of home confinement during COVID-19. The results of the current study suggest that in similar future pandemic situations, special attention and support should be given to female athletes, who may be more vulnerable to lockdown.

The training conditions of analyzed aqua athletics played a substantial role in their quality of mental condition. We see from our results that the athletes who had been able to organize themselves to train were those who had lost little or relatively little physical fit-ness and had fewer sleep difficulties. While athletes had more favorable conditions to train their bodies, they seemed less worried and disturbed. Furthermore, the training organization negatively predicted the TMD, high levels of mood disturbance characterized those athletes who had fewer possibilities of training on their own. The loss of fitness and sleep disturbance were also predictors of mood disturbance, and while athletes experienced high levels of those two, they struggled with mood disturbance.

These results emphasize how emotional states are crucial for sports performance and the general condition of athletes, which is in line with many studies. Saw et al. [23] associated subjective well-being with the training loads establishing how affective variables responded to changes induced in training. Leguizamo et al. [24] underline that the state in confinement is similar to the state of injury with all the psychological and emotional reactions that most athletes suffer throughout their sports career injuries. There can be a lot of common denominators between the state of injury and the state of athletes during the lockdown and how these can deteriorate fitness and mental condition. The abovementioned problems and the lack of regular, high-quality training can negatively impact the athlete's further positive development. According to the study of Costa et al. [6] on the progression and performance stability of world-ranked swimmers from 2015 to 2020, a substantial improvement in performance was found in most of the strokes and race distances until the 2018–2019 season. However, the 2020 lockdown impaired the performance by 1–2%. Therefore, the world-ranked swimmers' efficiency returned to the levels reached two years earlier.

In the current study, the total mood disturbance was generally associated with all the measured variables apart from age. The better the living and training conditions and sleep

quality, the higher the respondents' positive affect. In the cross-country study of Wilczyńska et al. [25], the Spanish participants who possessed substantially bigger apartments and houses with gardens and terraces than Polish athletes maintained better mental and physical condition during the lockdown. In the current survey, the same as in the mentioned investigation of Wilczyńska et al. [25], the studied athletes barely asked for psychological support. This trend which we have been noticing in our studies is alarming. Presumably, the lack of openness of athletes to psychological support results from the still-existing stigmatization of therapy as associated with mental illness. However, as psychologists, we follow the statement that, particularly in difficult times, personal resources are sometimes not enough, and professional support in the times of crisis (crisis intervention) can bring relief both to athletes and their coaches and parents and all the personnel involved in the training process. Unfortunately, there is still an existing stereotype of the athlete as mentally tough and immune to all adversities and difficulties. New epidemiological studies suggest that athletes are at an increased risk of developing mental health problems compared to the general population. A recent meta-analysis shows that approximately 34% of current athletes experience symptoms of anxiety or depression [26, 27]. In addition, Basiaga-Pasternak and Cichosz-Dziadura [28], when studying the phenomenon of depressiveness in young athletes, emphasize that it is independent of both gender and the type of practiced discipline, while it is strongly correlated with, among others, a low level of life satisfaction. Therefore, worldwide programs of cognitive interventions and psychological support should be created for athletes after the COVID-19 pandemic as part of the training process to let young as well as experienced athletes grow and thrive in their life in general.

Like in other research, due to COVID-19, one of the main limitations of this study is the lack of follow-up of the initial survey findings over the confinement and post-confinement periods, due to the lack of access to the same group of swimmers.

5. Conclusions

The results of this study should not be interpreted in causal terms, but this cross-sectional analytical study can provide information on the association between risk factors and psychological health outcomes, and also can help coaches, sport psychologists, and federations to help athletes in future crises. The effects of lockdown on burnout experiences and swimming performance could be investigated in future research. Moreover, this research opens avenues for further investigation into the impacts of lockdown measures on athlete burnout and swimming performance. Such studies can provide a deeper understanding of the intricate interplay between external factors and athletic outcomes, potentially leading to targeted interventions for enhancing athlete well-being and performance.

In essence, while not establishing causation, this study acts as a stepping stone toward improving athletes' mental and physical health. It holds the potential to inform evidence-based strategies in sports coaching, psychology, and athlete support systems, contributing significantly to our broader comprehension of athlete well-being and performance.

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