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Effects of COVID-19 Confinement on the Health and Perspectives of Exercise Practice in Portugal

Nuno Loureiro [1,2,3], Luís Murta [1], Pedro Bento [1], Vânia Loureiro[1,3] *
[1] Department of Arts, Humanities and Sports, Polytechnic Institute of Beja, School of Education, 7800-295 Beja, Portugal;
[2] Project Aventura Social, Faculty of Human Motricity, University of Lisbon, Estrada da Costa, 1499-002 Cruz Quebrada, Portugal;
[3] ISAMB Research Centre, Faculty of Medicine, University of Lisbon, 1649-028 Lisbon, Portugal.

Correspondence: Vânia Loureiro (vloureiro@ipbeja.pt)

Abstract:
Introduction: Social confinement, imposed by the SARS-CoV-2 coronavirus, was an extraordinary situation and implied several consequences on people's health, which are still not fully understood. This study aimed to understand the changes in mental health and to determine the probability of returning to sports practice during the period of generalized confinement and lockdown due to COVID-19, between January and March 2021. **Methods:** A self-administered on online survey (PEF-COVID19) was applied to the general Portuguese population, aged ≥ 18 years. The t-test for paired samples and the chi-square test were used to analyze the variables, $p < 0.05$. **Results:** 811 participants filled the questionnaire and 666 were included. Our study showed that during confinement: (i) there was an increase of anxiety (before - M= 3.1 ± 2.1; during – M= 4.3 ± 2.7) and stress (before – M = 3.1 ± 2.5; during – M= 4.1 ± 3) and (ii) a greater probability of dropping out sports practice (before – M = 1.1 ± 2; during – M= 7.5 ± 3.3). **Conclusions:** The results demonstrate that the period of confinement and lockdown, significantly influenced health and the intention to remain practicing sports. These

indicators demonstrate the need to develop quality sports/exercise programs, adjusted to different target groups, especially the most vulnerable, to keep the population active, reduce sedentary time and the consequent impacts on mental and physical health.

Keywords: SARS-COV-2; Exercise; Anxiety; Stress; isolation

Introduction

The World Health Organization (OMT, 2020), on March 11, 2020, declared the existence of a pandemic due to SARS-CoV-2 (*Severe Acute Respiratory Distress Syndrome Coronavirus-2*), responsible for the disease COVID-19. The government of Portugal, faced with the exponential increase in contagions, imposed second general confinement and lockdown on January 13, 2021 (Presidency of the Council of Ministers, 2021), which lasted for 9 weeks. This measure was implemented by most countries, by regulating the obligation to remain at home and restricting population movements in their different contexts (work, education, meetings, and general activities) in an attempt to "flatten the curve" of cases of COVID-19. The public health objective of this measure was to save the population from cases and deaths from COVID-19 and to prevent the collapse of the national health system (Kumar et al., 2020). The opinion of this measure, despite being widely replicated, is not consensual. Joffe (2021) states that we are facing difficult choices since confinement can cause much more harm to the population's well-being than COVID-19 itself. However, there were projections that without mandatory confinement there would be 7.0 billion infections and 40 million deaths globally by 2020 (Walker et al., 2020). However, we were faced with a measure that could involve dangerous side effects, mainly in prolonged confinement (Joffe, 2021). While health systems around the world were concentrated, almost exclusively, to combat COVID-19 outbreaks, the management of other diseases, including mental health, which usually worsens during the pandemic, was drastically affected (Correia, 2020).

Some of the consequences identified in economically strongest countries were changes in medical treatment, increased violence against women, implications for mental and physical health (Moser et al., 2020; Roesch et al., 2020; Rosenbaum, 2020). The negative health consequences can be attributed to the emotional and physiological effects of the risk posed by the virus and the reduction in physical activity, social and human physical contact (Kerr et al., 2019). Studies of previous pandemics, such as severe acute respiratory syndrome (SARS), reveal that the duration of quarantine was assumed to be an important predictor of post-traumatic stress disorder (Hawryluck et al., 2004), depression, and anxiety (Reynolds et al., 2008). From a psychopathological point of view, this context is a relatively new form of stress or trauma for health professionals (Kang et al., 2020) and can even be comparable to natural disasters, such as earthquakes or tsunamis (Morganstein & Ursano, 2020). Psychosocial stressors within families and the loneliness, for those living alone, can also increase in confinement and have adverse effects on physical and mental health (Fiorillo & Gorwood, 2020; Smith, 2020). Concerns about their health and that of their loved ones (particularly the elderly or those who suffer from any physical illness), as well as uncertainty about the future, can generate or exacerbate fear, depression, and anxiety (Fiorillo & Gorwood, 2020). This situation is evident in the analysis of a well-being study, carried out in the United Kingdom during COVID-19, where there was an average reduction of 8.1% in mental health indicators (Banks and Xu (2020), particularly among young women. There is also evidence of an increased incidence of depression and anxiety (Qiu et al., 2020) and financial worry (Tull et al., 2020). The negative psychological effects of being confined during quarantine have recently been reviewed (Brooks et al., 2020) and include symptoms of post-traumatic stress, confusion, anger, emotional upset, depression, stress, irritability, insomnia, anxiety, and irritability.

These forced lifestyle changes have left many people with additional free time for leisure, or any voluntary activity performed during free time, such as painting or exercising (Paggi et al., 2016). However, this increase in leisure time coincided with restricted

access to popular leisure facilities such as gyms and restaurants (Courtemanche et al., 2020) causing many to seek available activities at home or nearby (Morse et al., 2021). The need to adapt and find leisure activities compatible with the restrictions of confinement may have generated additional stressful situations. It is recognized that well-being is associated with the frequency and variety of participation in enjoyable leisure activities (Pressman et al., 2009). The psychological benefits related to the practice of physical activity are also documented in a situation of confinement (Carriedo et al., 2020). Interestingly, a study carried out in Belgium demonstrated that during confinement, physical activities decreased among those who were highly active but increased among those who were previously inactive (Constandt et al., 2020). However, in general, physical activities are less likely to increase, as indicated in the study by Duncan et al. (2020), where only 27% of individuals increased the time spent in this type of activity as well as increased concerns due to increased sedentary behavior and associated consequences (i.e., glucose homeostasis, aerobic capacity, fat deposition, increased systemic inflammation and loss of muscle mass (Narici et al., 2021).

For most of the population, confinement is an extraordinary event that implies strong restriction of movement and social isolation. This situation leads to the need to understand the changes in mental health and the probability of returning to sports, that occurred during the period of confinement due to COVID-19.

Methods

This is an observational cross-sectional study using an online questionnaire. The self-administered questionnaire was made available through the internet. Data collection took place in mainland Portugal and the islands (Azores and Madeira), from February 22 to May 23, 2021. The investigation was carried out and approved by the guidelines of the Ethics Committee of IPBeja under case number 14/021 All the principles enshrined in the Helsinki Dec-

laration were respected. Participation was voluntary, guaranteeing confidentiality for each participant.

Sample

A total of 666 subjects, aged 18 years or older, who practiced regular sports, with a mean age of 46.9 years (±19.4 years), participated in this study. We included only the endear ones who agreed to participate in this study, who after reading the consent form that was presented at the beginning of the questionnaire marked the answer that confirmed their agreement. At any time, the respondent could renounce from filling out the questionnaire, without any restriction.

Questionnaire

The PEF-COVID19 questionnaire (Physical exercise level before and during social isolation) was designed to assess levels of physical exercise and the psychological impact of the general population, before and during social isolation due to the COVID-19 pandemic (Sá-Caputo et al. al., 2020). The psychometric properties of this instrument are described in the study by Sá-Caputo et al (2020), which reports the validity and test-retest reliability indices, being considered a valid and reliable instrument.

The instrument was divided into four sections: (I) Demographic, anthropometric, and health status characterization; (II) Physical exercise performed or not, pain, anxiety, and stress before COVID-19; (III) Update of the confinement situation; (IV) Physical exercise performed or not, pain, anxiety, and stress during COVID-19.

The questionnaire was designed in the *Forms Google* platform, to be self-administered and automatically hosted through a unique URL. The confidentiality of the study was guaranteed through a unique ID, protected by a password, of all author data reported

through a "Cloud" database type. The survey was carried out anonymously. The questionnaire consists of open, closed, yes/no questions, and a scale from 0 (minimum) to 10 (maximum), which was used to assess the level of pain, anxiety, stress, and probability of dropping out of sports.

The age variable was categorized into 4 categories: 1- Young people (18-24 years old); 2- Young adults (25-44 years old); 3- adults (45-59 years old) and 4 - elderly (60 years old).

Regarding the Body Mass Index (BMI) it was calculated according to the classic formula – weight/height x 2 and used the following categorization (Garrow & Webster, 1985): 1- underweight (< 18.5 m/kg2); 2 - healthy weight (18.5 to < 25 m/kg2); 3 – overweight (25.0 to <30 m/kg2); 4 - obesity (≥ 30 m/kg2).

Regarding the perception of health status, was used the following codification: 1 – cardiovascular or predisposing diseases; 2- musculoskeletal diseases; 3- neurological diseases; 4- diseases that affect mental health; 5- respiratory diseases; 6 – no disease. It was asked if they used any type of medication (0 - No and 1 - Yes). It was asked if they were smokers (0 - No and 1 – Yes) and if they have ever had COVID-19 (0-No and 1 – Yes).

Procedures

The questionnaire was sent by e-mail to members and collaborators of institutions that stimulated sports, through which practitioners and athletes were invited to participate in the study, with the shared link (https://forms.gle/EQCLbL5HhrE6AfD89) of the questionnaire. Participants' responses were protected, data were recorded, scaled, and scored with Excel software, using customized formulas for further statistical analysis.

Data Collecting and Statistical analyses

All data were exported to an Excel sheet. Nominal data were coded for statistical purposes. Statistical analyzes were performed

using IBM Statistics® for Windows (version 24.0., IBM Corp., Armonk, NY, USA). Descriptive statistical analyzes (% and no.) and the independent chi-square test, were performed.

Gender comparisons of categorical variables (age, BMI, education level, professional status, perception of health status, medication use, smoking, and COVID infection) were performed using the chi-square test ($p<0.05$). For variables related to perception and health (tiredness during exercise, anxiety, and stress) and the probability of dropping out, the means were compared by performing a t-test for paired samples ($p<0.05$).

Results

A total of 811 individuals responded, but 145 subjects (18%) were excluded for not accepting to participate in the study or for report an age below 18 years. Six hundred and sixty-six participants were included in final analyses. Table 1 describes characteristics of participants according to gender.

It is possible to observe that most participants are female (61%) and 36.3% are aged 60 years or over (elderly). In this age group, we found that there are significant differences between genders (female - 28.5%, male - 7.8%, X2 = 70,238; $p<0.0001$). No significant differences were found in BMI classification, smoking habit, and COVID infection. Regarding education, 23.4% of women have completed basic education (X2 = 57,118; $p<0.0001$) and 24.6% of women (X2 = 57.310; $p<0.0001$) reported that they were already retired.

Most subjects (54%) did not report diseases, but the most reported diseases were cardiovascular diseases, especially among women (female - 21.9%, male - 8%; X2 = 35.806; $p<0.0001$). About taking medication, 60.1% do not take medication, but of those who reported taking medication, women reported using the most (female - 21.9%, male - 8%; X2 = 50.796; $p<0.0001$).

Table 1

Sociodemographic and health characteristics of the study sample (n = 666), aged from 18 years and divided by gender. Values are presented in percentage (%) and number.

Characteristics of participants	General (%, n) (n=666)	Female (%, n) (n=407)	Male (%, n) (n=259)
Age (years) *			
Adolescents	14.6 (97)	**4.5** (30)	**10.1** (67)
Young adults	29 (193)	16.4 (109)	84 (12.6)
Adults	20.1 (134)	11.7 (78)	8.4 (56)
Older Adults	36.3 (242)	**28.5** (190)	**7.8** (52)
BMI (m/kg^2)			
Underweight	2 (13)	1.5 (10)	0.5 (3)
Normal weight	50.2 (334)	31.7 (207)	19.4 (127)
Overweight	32.4 (216)	18.4 (120)	14.7 (96)
Obesity	13.5 (90)	9.3 (61)	4.4 (29)
Education level *			
Primary	28.7 (185)	**23.4** (151)	**5.3** (34)
Secondary	28.7 (185)	**12.7** (82)	**16** (103)
Higher education	29.6 (191)	16.6 (107)	13 (84)
Postgraduate	13 (84)	7,1 (46)	5.9 (38)
Professional situation *			
Retiree	31.6 (208)	**24.6** (162)	**7** (46)
Unemployed	3.6 (24)	2.9 (19)	0.7 (5)
Student	12.6 (83)	**4.5** (30)	**8.1** (53)
Private sector employee	24.6 (162)	12.6 (83)	12 (79)
Public sector employee	26.7 (176)	16 (105)	10.7 (71)
Salary reduction or unemployed due to COVID-19	0.8 (5)	0.6 (4)	0.2 (1)
Perception of health status *			
Cardiovascular diseases or predisposing	30 (198)	**21.9** (145)	**8** (53)
Musculoskeletal disorders	7.3 (48)	**5.4** (36)	**1.8** (12)
Neurological diseases	0.5 (3)	0.3 (2)	0.2 (1)
Diseases that affect mental health	2.9 (19)	**2.4** (16)	**0.5** (3)
Respiratory diseases	5.4 (36)	3.3 (22)	2.1 (14)
No disease	54 (357)	**27.5** (182)	**26.5** (175)
Medication use *			
No	60.1 (391)	**30** (195)	**30.1** (196)

Yes	39.9 (260)	**31** (202)	**8.9** (58)
Smoker			
No	91.3 (597)	56.6 (370)	34.7 (227)
Yes	8.7 (8.6)	4.3 (28)	4.4 (29)
Infected with COVID			
No	92.4 (606)	55.8 (366)	36.6 (240)
Yes	7.6 (50)	4.9 (32)	2.7 (18)

Legend: age - Young (18-24 years old); Young Adults (25-44 years old); adults (45-59 years) and seniors (60 years and over); *Chi-square test with adjusted residuals ≥ |1.9| are considered significant (in bold) $p < .05$. BMI: 1- underweight (< 18.5 m/kg2); 2 – normal weight (18.5 to < 25 m/kg2); 3 – overweight (25.0 to <30 m/kg2); 4 - obesity (≥ 30 m/kg2).

In table 2, we can compare the average results of health indicators and the probability of returning to sports practice before and during confinement. Regarding the parameter about anxiety, we found a significant increase during the pandemic (before - M= 3.1 ± 2.1; during – M= 4.3 ± 2.7) and in both genders (female before - M= 2.9 ± 2.3; during – M= 4.5 ± 2.8; male, before - M= 2.9 ± 2.9; during – M= 4 ± 2.5). The analysis of the stress level demonstrates an increase during confinement in general (before – M = 3.1 ± 2.5; during – M = 4.1 ± 3) and with a higher incidence in the female population (before - M = 3.2 ± 2.6; during – M= 4.2 ± 3.1).

The level of perceived tiredness during exercise showed a decrease compared to the period before confinement (before – M = 5.3 ± 2.2; during – M = 5 ± 2.3) and especially in men (before – M = 5.6 ± 2.1; during – M= 5 ± 2.2).

The probability of participants dropping out of their sport was very low before confinement (M = 1.1 ± 2) but there was a strong probability of dropping out during confinement (M = 7.5 ± 3.3). This trend is equally registered in both genders, but especially in women (before – M = 1 ± 2; during – M= 7.8 ± 3.1).

Table 2

Perception of symptoms and probability of dropping out of sports practice, of the study sample (n = 666), aged 18 years and over and according to gender before and after mandatory confinement. The values shown are the means ± SD

Variable	Before confinement Mean ± SD			During confinement Mean ± SD		
	General	Female	Male	General	Female	Male
Anxiety level	*3.1±2.1	*3.2±2.3	*2.9±1.9	*4.3±2.7	*4.5±2.8	*4±2.5
Stress level	*3.1±2.5	*3.2±2.6	*3±2.3	*4.1±3	*4.2±3.1	*3.9±2.7
Level of tiredness during exercise	*5.3±2.2	*5.1±2.2	*5.6±2.1	*5±2.3	*4.9±2.4	*5±2.2
Probability of dropping out of sports practice	*1.1±2.0	*1±2.1	*1.2±1.9	*7.5±3.3	*7.8±3.1	*7±3.5

Legend: *T-test for paired samples; $p<0.05$.; in the variables level of anxiety, stress, tiredness, and probability of dropping out of sports, a scale from 0 (zero) to 10 (ten) was used, where 0 represents the absence of the indicator and 10 represents the maximum

Discussion

The results of this study confirm and expand the limited knowledge about the impact of confinement in increasing levels of anxiety and stress and the high probability of abandoning the sports practice they performed before confinement.

The participants reported not taking any type of medication (60%) and had no diseases. The main diseases are cardiovascular (54%). These results agree with investigations carried out by Sonza et al. (2021).

The data obtained indicate an increase in emotional discomfort, either in general or by gender analysis, both in terms of anxiety (before - M= 3.1 ± 2.1; during – M= 4.3 ± 2.7) and stress (before - M = 3.1 ± 2.5; during - M= 4.1 ± 3). These results are in line with those reported by Stanton et al. (2020), who scored significantly higher in various states of psychological distress and particularly in women. However, we would like to emphasize that the present study was carried out during the second confinement applied in Portugal and some adaptation to this reality may have been verified. In this line, Gouveia et al. (2021) mentioned that 60% of participants considered that the second confinement was easier or equal to the first. This adaptation may have mitigated the rise in anxiety and stress values. Data from an investigation by Duncan et al. (2020) show that a perceived decrease in physical activity or exercise was associated with higher levels of stress and anxiety. This evidence indicates that increasing the level of physical activity can be a good strategy to mitigate the negative impacts on mental health in a situation of confinement. This aspect becomes even more relevant, as the health problems arising from confinement may disappear. However, an important part of this damage may be difficult or even impossible to reverse and affected individuals may experience continuous suffering (Moser et al., 2020). Also as a way to mitigate the negative impacts, in addition to the aforementioned increase in the practice of physical activity, it seems to be equally important to limit the sources that generate stress (such as limiting the time spent watching news about the theme or even restricting those that come from unofficial channels and uncontrolled sources), interrupt isolation (increase the frequency of communication by various means with their loved ones), maintain the usual rhythm and daily routines, focus on positive aspects of isolation (for being transitional and that allows the performance of other activities) and request professional help whenever necessary (Fiorillo & Gorwood, 2020). For some people, abrupt changes in the work structure may have helped to promote a healthier work-life balance, allowing additional time for meaningful leisure activities (Morse et al., 2021).

Our data, point to a reduction in the level of fatigue perceived during exercise in the confinement period (before – M = 5.3 ± 2.2; during – M = 5 ± 2.3) and especially in men (before – M = 5.6 ±

2.1; during – M= 5 ± 2.2). This situation can be explained by the greater availability of time to practice sports or due to difficulties in exercising at home or close to home (Morse et al., 2021).

The reviewed literature suggests that the practice of physical activity is linked to the mental health of individuals (Maugeri et al., 2020). The strong increase we recorded in the probability of participants abandoning the sport they practiced before confinement and especially among women is perturbing (before – M = 1 ± 2; during – M = 7.8 ± 3.1). These data are not in line with the study by Morse et al. (2021) which states that participants claim to have an intention to continue with more than 85% of all activities in post-pandemic life. However, the authors report that it will be relevant to understand if the continued involvement in these activities will bring extensible benefits to mental health or whether activities will be interrupted as time and motivation decrease when returning to normality.

Organized exercise is very important to help people achieve their goals and maintain their levels of physical activity and important gains for physical and mental health (Constandt et al., 2020). Organized sport (for example, in sports clubs, gyms, and other institutions) is essential and plays a decisive role in promoting the practice of physical activity, especially in a part of the population that would otherwise hardly be active (Kokko et al., 2019). Thus, it seems to us that it is essential that institutions, sports, and physical activity promoters, can announce their services with an emphasis on health promotion (Meganck et al., 2017).

There are several limitations in this study that should be highlighted. No information was collected on socio-economic details, such as financial level and type of residence, which could be useful in planning future interventions related to future confinement. The study was conducted over 3 months and may have found people in different states of confinement, which could affect the responses obtained. It should be noted that this study presents a large sample and adds new information about an unusual situation and therefore with limited evidence. In terms of future investigations, we believe that it would be important to study the evolution of people's health status after confinement and what are their decisions related

to adoption of healthy behaviors, such as compliance with the recommendations of physical activity and healthy eating.

Conclusions

This study allows identifying and understanding the effects of confinement on stress and anxiety in a sample of the Portuguese population. It also allows to verify the high risk of abandoning the previous sports practice.

Confinement was for most people a novelty and its impact on health is quite unknown. Regarding the results presented, we consider it is important to highlight the role that health and exercise professionals can play to mitigate the negative impacts resulting from confinement, particularly on the most vulnerable and dependent people. Thus, it is essential that professionals and decision-makers can continue to develop means to consolidate the habits of regular physical activity and ways to implement them, even in contexts where people are limited in their movements and isolated. We believe that policymakers must consider the cost-effectiveness of early adopting measures to promote physical activity and mental health and taking them on as strategies to mitigate the impact of current and future confinements.

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Conflicts of Interest: The authors declare no conflict of interest.

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