



## Research Article

# A Comparative Study on Sports Participation during and following Confinement due to COVID-19 in Spanish and Austrian Exercise Science Students

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## Abstract

**Background:** The implementation of various policies aiming to contain the COVID-19 pandemic has led in many countries to lockdowns that potentially affect various behaviors, including physical activity (PA). **Aim:** The aim of this study was to examine the PA and exercise levels in exercise science students during and after the first COVID-19 lockdown in Spain and Austria. **Methods:** Data was collected via an online questionnaire that was based on the International Physical Activity Questionnaire and Active-Q Physical Activity Questionnaire during the initial COVID-19 lockdown in spring 2020 and after some restrictions were lifted in fall 2020. Change in PA and exercise was examined via paired-sample t-tests for normally distributed data and Wilcoxon-signed rank test for non-normally distributed data. **Results:** Valid data was provided by a total of 57 Spanish and 65 Austrian exercise science students. Participants in both countries reported significantly lower sport and exercise participation during the lockdown. In addition walking time was reduced and sitting time increased ( $p < 0.05$ ). A cross-country comparison further showed higher sports participation and walking time along with lower sitting time in Austrian students at either time point compared to their Spanish peers. **Conclusion:** These results highlight the impact of COVID-19 policies on PA and exercise behaviors and emphasize the importance to promote an active lifestyle even in times of home confinement.

**Keywords:** Sports; Exercise; Lockdown; Students; Health behavior

## Introduction

Physical activity (PA) and recreational sports are key aspects of a healthy lifestyle and the detrimental effects of insufficient physical activity, which range from poor cardiorespiratory fitness to obesity, type 2 diabetes, high blood pressure or coronary heart disease, have been well documented [1-4]. In addition, PA has been shown to improve the immune response to infections [5] and regular exercise has been associated with a reduction in the susceptibility and severity of acute respiratory infections [6]. Insufficient PA, on the other hand, increases the risk for various diseases and premature mortality [7,8]. With the emergence of the coronavirus disease 2019 (COVID-19) pandemic, many countries implemented policies that emphasize social distancing and self-isolation in order to slow the spread of COVID-19 and avoid overwhelming health systems, which ultimately resulted in nationwide lockdowns in order to contain the spread of COVID-19. As a result universities, schools, clubs and sports facilities, among other facilities, have been closed. These changes can also have an impact on common health behaviors, including PA [9]. Accordingly, there may be considerable health consequences of social distancing and self-isolation, despite the benefits regarding the containment of COVID-19 [10].

In Austria the initial lockdown lasted from March 13, 2020 to Mai 1, 2020. During this time-span people were not allowed to leave their home except for life-threatening situations, providing help for family members, covering basic needs of daily life (e.g. grocery shopping, education, job) and activities for physical and psychological recreation, such as walking [11]. Other European countries implemented even more severe restrictions over a longer period of time. In Spain, for example, people were only allowed to leave their homes to cover basic needs, such as shopping foods or pharmacological supplies or performing specific professional activities, between March 15, 2020 and Mai 2, 2020 [12]. Most studies examining the impact of these policies on health behaviors showed a reduction in overall PA and PA intensity along with an increase in sedentary activities and sleep disorders [13-18]. On the other hand, there are isolated reports of an increase in physical activity during a COVID-19 lockdown in specific subpopulations [19]. These studies, however, predominantly examined quantitative changes in PA and exercise. Accordingly, there remains limited information on qualitative aspects such as the type of exercise performed during and following COVID-19 restrictions. The present study, therefore, provides additional information on potential differences in the effects of lockdown policies in a relatively

homogenous sample of exercise science students in Spain and Austria.

## Materials and Methods

The study was conducted among exercise science students from the Department of Sport Science at the University of Innsbruck, Austria and from the Facultad de Ciencias del Deporte y la Educación Física at the University A Coruña, Spain. Data was collected via an online questionnaire (SoSci Survey GmbH, Munich, Germany) during the first COVID-19 lockdown in the spring of 2020 and after some restrictions were lifted towards the end of 2020. The questionnaire was provided in German and Spanish based on the country of data collection. In addition to demographic information (e.g., age, sex), participants were asked to report their engagement in sports, exercise and PA. Questions were based on the International Physical Activity Questionnaire - short form (IPAQ-SF) [20] and the Active-Q Physical Activity Questionnaire [21].

### Statistical analysis

Data are reported as absolute and relative frequencies, as well as means with standard deviations. Significance was determined via chi-square tests for nominal data. Interval-scaled data were checked for normality using the Shapiro-Wilk test and t-tests for paired samples (in case of normal distribution) or Wilcoxon signed rank tests (for non-normally distributed data) were used to determine change in physical activity between points in time (during and after lockdown). Effect size was calculated for normally distributed data ( $r = z / \sqrt{N}$ ) and classified as weak ( $r \leq 0.30$ ), moderate ( $0.30 < r < 0.50$ ) or large ( $\geq 0.50$ ) (22). Sports-specific frequencies were tested for a significant change during and after the first Covid-19 lockdown using the McNemar test. All statistical analyses

were performed with SPSS 26.0 (Armonk, NY, USA) and the significance level was set at  $p \leq 0.05$ .

## Results

A total of 122 exercise science students (46.7% from Spain and 53.3% from Austria) provided valid data. There was a higher prevalence of male responders ( $p < 0.05$ ). Average age of the participants was  $23.1 \pm 0.3$  years with Austrian participants being significantly older than their Spanish peers ( $p < 0.01$ ) (Table 1).

University	sample size N / %	age [years]	male N / %	female N / %
<b>A Coruña (UDC)</b>	57 / 46.7%	$21.5 \pm 0.3$	40 / 70.2%	17 / 29.8%
<b>Innsbruck (ISW)</b>	65 / 53.3%	$24.6 \pm 0.3$	36 / 55.4%	29 / 44.6%
<b>total</b>	122 / 100%	$23.1 \pm 0.3$	76 / 62.3%	46 / 37.7%

**Table 1:** Demographic data of the participants. Data are reported as absolute values [N] and prevalence [%] as well as mean with standard deviation for age.

Change in physical activity during and following the initial lockdown is reported in Table 2. Across the entire sample exercise science students reported significantly lower moderate and vigorous physical activity during the first Covid-19 lockdown compared to after the lockdown ( $p < 0.05$ ). Walking time was also significantly lower during the lockdown by 157 [95% CI: 74; 241] min/week compared to the time after lockdown ( $p < 0.001$ ). Country specific analyses, however, showed that the difference in vigorous physical activity was only significant in Austrian students, while the difference in walking time was only significant in Spanish students. Across both countries sitting time was significantly higher during the lockdown as compared to after the lockdown ( $p < 0.001$ ).

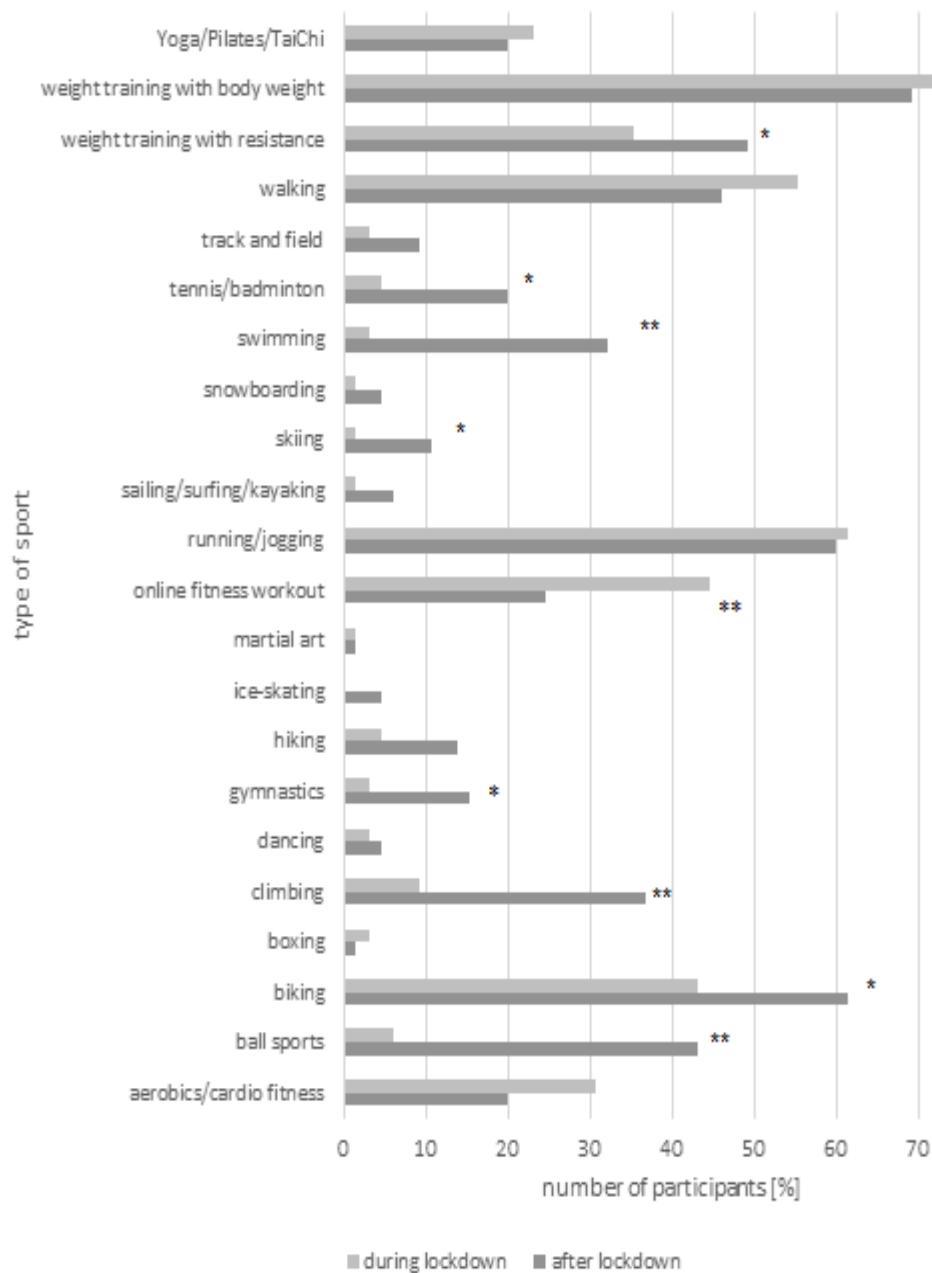
Group	During lockdown [minutes/week]	After lockdown [minutes/week]	p -value	Effect size[r]
Vigorous activity				
A Coruña	$388.95 \pm 34.29$	$471.40 \pm 47.82$	0.098	0.336 <sup>b</sup>
Innsbruck	$317.00 \pm 26.34$	$446.15 \pm 36.66$	<0.001	0.332 <sup>b</sup>
total	$350.61 \pm 236.00$	$457.95 \pm 326.64$	<0.001	0.150 <sup>a</sup>
Moderate activity				
A Coruña	$314.21 \pm 67.68$	$357.46 \pm 59.05$	<0.05	0.210 <sup>a</sup>
Innsbruck	$344.08 \pm 32.08$	$451.92 \pm 47.43$	<0.05	0.226 <sup>a</sup>
total	$330.12 \pm 395.53$	$407.79 \pm 414.18$	<0.05	0.066 <sup>a</sup>
Walking time				
A Coruña	$139.47 \pm 26.82$	$401.28 \pm 66.10$	<0.001	0.413 <sup>b</sup>
Innsbruck	$314.62 \pm 47.98$	$380.69 \pm 55.81$	0.084	0.156 <sup>a</sup>
total	$232.79 \pm 325.29$	$390.31 \pm 471.66$	<0.001	0.429 <sup>b</sup>
Sitting time				
A Coruña	$3165.96 \pm 175.25$	$1858.68 \pm 115.97$	<0.001	0.501 <sup>c</sup>
Innsbruck	$2721.92 \pm 143.19$	$2041.85 \pm 123.92$	<0.001	0.445 <sup>b</sup>
total	$2929.39 \pm 123.92$	$1956.27 \pm 944.02$	<0.001	0.676 <sup>c</sup>

<sup>a</sup>weak effect ( $\leq 0.30$ ), <sup>b</sup>moderate effect (0.30 - 0.50) and <sup>c</sup>large effect ( $\geq 0.50$ )

**Table 2:** Time in vigorous and moderate physical activity as well as walking and sitting time [minutes/week] during and after the first lockdown for the total sample and by country (A Coruña, Spain/Innsbruck, Austria). Data is reported as mean with standard deviation along with significance (p) and effect size (r).

The lockdown also had a significant impact on sports participation. Austrian students reported a significantly lower participation in ball sports (-36.9%), climbing (-27.7%) and swimming (-29.2%) during the lockdown ( $p<0.001$ ). In addition, machine-based fitness training, strength training,

cycling, skiing and tennis were significantly lower ( $p<0.05$ ), while participation in online fitness workouts was higher (+20.0%;  $p<0.01$ ) during the lockdown compared to after the lockdown (Figure 1).

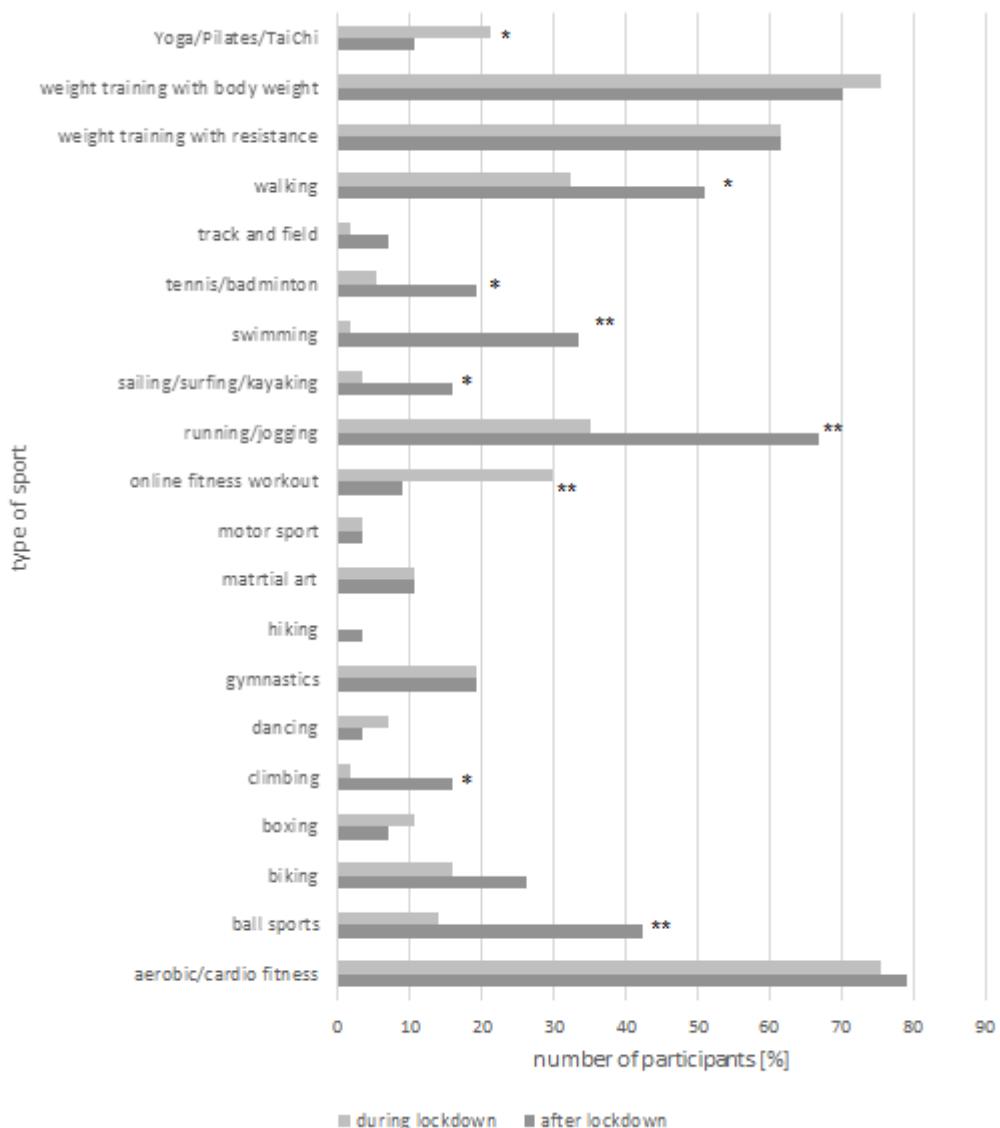


\* $p<0.05$ ; \*\* $p<0.01$

**Figure 1:** Difference in sports participation during and after the first Covid-19 lockdown in Austrian students (N=65). Values are prevalences of students [%].

Figure 2 shows differences in sports participation between lockdown and post-lockdown in Spanish exercise science students (N=57). Participation in ball sports (-18.2%), running/jogging (-31.6%) and swimming (-31.5%) was significantly lower during the lockdown as compared to following the lockdown ( $p<0.01$ ). Further, exercise science

students reported lower participation in climbing sailing/surfing/kayaking and tennis/badminton during the lockdown ( $p<0.05$ ). Higher participation rates, on the other hand, were reported for Yoga/Pilates/TaiChi (+21%) and online fitness workouts (+21.0%) during the lockdown as compared to after lockdown.



\*p<0.05; \*\*p<0.01

**Figure 2:** Difference in sports participation during and after the first Covid-19 lockdown in Spanish students (N=65). Values are prevalences of students [%].

## Discussion

The present study provides information on the impact of policies that target the spread of COVID-19 on PA and exercise in Spanish and Austrian exercise science students. The results show lower PA levels and increased sedentary behaviors during the lockdown in both countries. These results are consistent with other studies that examined behavioral changes during COVID-19 restrictions [13,15-17,23-25] as well as studies that were carried out during other lockdown situations (eg. confinement due to adverse weather) [26]. Further it was shown that young people, including students and very active men, showed a particularly pronounced decline in PA while their sedentary time increased during COVID-19 confinement [15]. This also lead to an increase in participants who did not meet recommendations for vigorous physical activity, with the

decline being most pronounced in the most active individuals [15]. Students have also been shown to increase sedentary time due to forced distance-learning activities, which also encourages excessive screen time [27]. Another study, however, reported an increase in PA during lockdown in Spanish students [19]. This may be due to the lower PA levels prior to the lockdown as people who engaged in sports occasionally prior to the lockdown have been shown to increase their PA levels [28], which was attributed to more time being available for PA. Given the high activity level of exercise science students, it would, however, have been very difficult to increase engagement in sports in this population. In addition, the majority of exercise science students, most likely, engages in some form of club sports, which may not have been accessible during the lockdown. Another reason may have been the lack of competition as the competitive

aspect of sports was one of the major reasons for lower exercise and PA during the lockdown in active people [29].

Taken together, this study highlights the detrimental effect of COVID-19 restrictions on sports participation in addition to PA. The decline in various sports is not surprising as the implemented policies also restricted access to sports facilities and the emphasis on self-isolation put a restriction on team sports. Even though the participants in this study found alternatives for engaging in physical activity due to their interest in sports, which was reflected by an increase in online sports participation, these changes could not offset the loss of opportunities for other sports. Similar changes in exercise pattern were also shown in non-exercise science students, who reported higher engagement in high-intensity interval training (HIIT) and mind-body activities (e.g., yoga) [30]. The increase in HIIT may also explain the lack of difference in vigorous PA between the two measurement times in Spanish students. Despite the increased utilization of online fitness programs during home confinement due to COVID-19 policies [30-33], a German study, nevertheless, showed that only 30% of the study population were able to fully compensate for their lost sports opportunities via indoor activities such as yoga or fitness workouts [32]. The fact that these activities declined once the lockdown was lifted also shows that such activities were no longer a priority once other sports became available. It should also be pointed out that virtual exercise opportunities were only explored by participants who have been active prior to the lockdown while participants who were generally engaging in a less healthy lifestyle did not engage in any alternative opportunities to ensure sufficient PA [19,28]. Club sports, therefore, have been shown to be an important contributor in the promotion of PA [34]. Accordingly, club sports should highlight their potential in health promotion once restrictions are lifted [35].

The results of the present study further indicate a possible dose-response relationship. There was a significantly lower walking time in Spanish students compared to Austrian students, which may be attributed to the more severe restrictions implemented by the Spanish government. Another study in the Spanish population also reported a decrease in walking time of 60% during lockdown [15], while no significant change in walking was observed in Austrian students. Given the considerable health risks of insufficient physical activity (e.g. coronary heart disease, obesity, diabetes, high blood pressure etc.), such rigid movement restrictions, therefore, should be viewed with caution and skepticism against the background of a holistic health picture.

## Limitations

There are also some limitations of this study that should be considered when interpreting the results. The utilization of a self-administered questionnaire may have contributed to reporting bias. In addition, the sample size is relatively small and the utilization of a select group of participants does not allow extrapolating insights gained from this study to other populations. The focus on a specific group of students, which, most likely, have comparable exercise habits and are highly motivated to engage in diverse forms of exercise and physical activity along with the comparative nature across two

countries with different restrictions, on the other hand, do provide additional insights into the role of home confinement on PA in young adults.

## Conclusions

The present study highlights the impact of COVID-19 confinement on PA levels due to modifications in individual, interpersonal and environmental factors. While the containment of the virus is an urgent public health policy these lockdowns limited possibilities for exercise and PA. Accordingly, there may be unintended negative consequences, such as excessive sedentary time and insufficient PA that can increase the risk for and potentially worsen chronic health conditions [10,36]. University students may have been particularly affected from the confinement and closure of sports facilities in addition to a high risk for sedentary behaviors due to the implementation of online classes [30]. The fact that various lifestyle habits are established during the transition from adolescence into adulthood, which coincides with university life [37], also warrants particular attention for this age group as even highly active and motivated participants were unable to maintain their PA levels and increased their sedentary behavior. In order to ensure future health and well-being it is, therefore, critical to promote PA while reducing sedentary behavior when healthy people are mandated to stay at home for public health reasons such as mitigating the spread of a viral disease.

## Disclosure

No relevant financial affiliations

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