

# Social distancing and injuries in students during physical exercise and/or sport

## Distanciamiento social y lesiones en estudiantes durante el ejercicio físico y/o deporte

Leandro Álvarez-Kurogi<sup>1</sup> 

Jesús Salas Sánchez<sup>1,2</sup> 

Javier Tierno Cordón<sup>1</sup> 

Rosario Castro López<sup>1</sup> 

Joel Manuel Prieto Andreu<sup>1</sup> 

<sup>1</sup> Facultad de Educación, Universidad Internacional de La Rioja (UNIR), Spain

<sup>2</sup> Universidad Autónoma de Chile, Chile

### Correspondence:

Rosario Castro López  
[rosario.castro@unir.net](mailto:rosario.castro@unir.net)

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## Abstract

In the last two years, the scientific literature has revealed the negative physical, psychological and affective-social repercussions of confinement and social distancing measures, being the sports field, in particular, the one analyzed in this study. The purpose of this research is to relate the frequency and severity of the injury in physical exercise and/or sport with the population's perception of the importance of social distancing and the use of masks to reduce Covid-19 infections. The study sample is made up of 203 participants (95 men and 108 women), with a mean age of 16 years (SD= 6), belonging to schools in the province of Alicante and Spanish universities. A cross-sectional and correlational design was acquired with a selective data collection strategy using self-report measures. To evaluate the injuries, a self-report record was developed and for the population's perception of the usefulness of social distancing measures, the Perception Questionnaire on Causal Factors of COVID-19 (CPFC-COVID-19) was used. The results indicate that those subjects who perceive more important the maintenance of a safety distance and the use of masks to stop infections, present high levels in the dimension of social distancing for mild and moderate sports injuries, while those that give less relevance are seriously or very seriously injured. The relationships of these variables are discussed, as well as the applicability of the results.

**Keywords:** Social distancing, injuries, covid-19, physical exercise, sport.

## Resumen

En los últimos dos años, la literatura científica ha revelado las repercusiones físicas, psicológicas y afectivo-sociales negativas del confinamiento y de las medidas de distanciamiento social, siendo el ámbito deportivo, en particular, el analizado en este estudio. El propósito de la presente investigación es relacionar la frecuencia y gravedad de la lesión en el ejercicio físico y/o deporte con la percepción de la población sobre la importancia del distanciamiento social y el uso de mascarillas para reducir contagios por Covid-19. La muestra de estudio está compuesta por 203 participantes (95 hombres y 108 mujeres), con una media de edad de 16 años (DT= 6), pertenecientes a centros escolares de la provincia de Alicante y de centros universitarios españoles. Se utilizó un diseño transversal y correlacional con una estrategia de recogida de datos selectiva mediante medidas de autoreporte. Para evaluar las lesiones, se elaboró un registro de auto-informe y para la percepción de la población acerca de la utilidad de las medidas de distanciamiento social, se empleó el Cuestionario de Percepción sobre los Factores Causales de la COVID-19 (CPFC-COVID-19). Los resultados indican que, aquellos sujetos que perciben más importante el mantenimiento de una distancia de seguridad y el uso de mascarillas para frenar contagios, presentan niveles altos en la dimensión de distanciamiento social para las lesiones deportivas leves y moderadas, en tanto los que otorgan menor relevancia se lesionan de forma grave o muy grave. Se discute sobre las relaciones de estas variables, así como la aplicabilidad de los resultados.

**Palabras clave:** Distanciamiento social, lesiones, covid-19, ejercicio físico, deporte.



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## Introduction

As a part of the restrictions established by the World Health Organisation (WHO), confinement, mask wearing and social distancing measures were implemented, leading to a sudden change in the daily habits of the population and having an impact on engagement in physical exercise and sport (Li, 2023; Prieto, 2021; Saavedra & Otero, 2022). A number of studies have closely examined the physiological repercussions of confinement (Burgos et al., 2020; De la Torre Ortega et al., 2022; Villaquirán et al., 2020), however, very few have focused on repercussions related with social distancing measures. Both confinement and social distancing measures increase exposure to sedentary behaviour (Li, 2023; Saavedra & Otero, 2022), which may drive towards a partial loss of physical activity, reduced quality of life (Bustamante-Ara et al., 2022; Castillo-Retamal et al., 2023) and reduced muscle strength and functional performance, above all in older adults (Villaquirán et al., 2020). In this sense, De la Torre Ortega et al. (2022) indicate that confinement and social distancing can lead individuals to get out of certain routines, increasing their risk of suffering falls and musculoskeletal injuries. In accordance with Burgos et al. (2020), social distancing can end up having diverse effects for many individuals. In sport, specifically, social distancing is seen to affect confidence in athletes, leading to anxiety and demotivation. In the educational setting, increased and more prolonged sadness, understood as an unpleasant emotion, was found to be present in students throughout social distancing measures and confinement, demonstrating their harmful effects on the educational community (Montaño & Robles, 2022). In a similar sense, Cobo et al. (2020) noted that young university students presented symptoms coherent with sadness, depression, anxiety and posttraumatic stress, with the reporting of this revolving around the consequences of social distancing and closure of educational institutions, which caused huge changes to students' way of living. Further, Castillo Retamal et al. (2023) and Bustamante-Ara et al. (2022) revealed that sleep quality in young people worsened due to confinement, with this being related with a subsequent worsening of academic performance.

The consequences outlined above are related with the perceptive mechanism. In this sense, Burgos et al. (2020) concluded that emotions perceived during social distancing had an effect on the sport performance of cyclists. Finally,

a number of studies have found that emotions born out of the pandemic have affected mental and physical health in diverse ways (Burgos et al., 2020; Ceballos & Sevilla, 2020; De la Torre Ortega et al., 2022; Johnson et al. 2020; Montaño et al., 2022; Villaquirán et al., 2020). This being said, it appears that few studies have examined the relationship between social distancing and the frequency or severity of injuries sustained during physical exercise and/or sport. This is an issue given that, the most similar scenario in sport prior to the pandemic was the American Football League (NFL) lockout, which lasted for more than four months. Following resumption of competition, it was brought to light that 10 patellar tendon ruptures were suffered during a 17-day training camp, starting two days after the end of confinement, when, in previous years, only five were typically recorded all year (Myer et al., 2011). This makes patent, from an injury prevention standpoint, the need for adequate and personalised training plans, in addition to anxiety management and guidance when it comes to resuming physical exercise and sport in children, adolescents and university students (Kalazich et al., 2020)

To this end, the present study sought to examine the relationship of social distancing with the frequency and severity of injuries sustained during physical exercise and/or sport. Here, social distancing is understood as factors perceived by the population that are related with maintaining a safe distance and mask wearing as protective steps. The injuries to most commonly occur during sport engagement or physical exercise were considered to be sport injuries.

## Materials and methods

The present study was experimental and descriptive-correlational in nature. A cross-sectional design was used in which all variables were measure at the same time. Data was gathered using a survey approach, which sought to examine the realities and characteristics pertaining to the target population in an objective way.

### Participants

The sample was composed of 203 participants (95 males and 108 females) attending schools in the province of Alicante or Spanish universities. The average age of the sample was 16 years (SD= 6, range: 6 to 30 years). Table 1 presents the age of the study sample as a function of gender.

**Table 1.** Descriptive statistics of the study sample for age according to gender

		Media	Mínimum	Máximo	Standard deviation
Gender	Woman	15	6	26	6
	Men	17	6	30	7

### Instruments

An ad hoc questionnaire was developed to gather data given that this is an easily applicable tool (Thomas & Nelson, 2007). The questionnaire comprised items that collected

data on sociodemographic variables such as age and gender, engagement in physical exercise and/or sport, and the frequency and severity of injuries. With regards to the latter, firstly, respondents were asked whether they suffered any

injury during the previous season (injury presence). Next, they were asked to report the number of times that had been injured during the previous season (injury frequency). Finally, respondents rated whether the injury suffered had been mild, moderate, serious or very serious (injury severity). The questionnaire described the four potential levels of injury severity in accordance with the National Athletic Injury Recording System (NAIRS) (Prieto et al., 2014a), as follows:

- Mild injury: requires treatment and interrupts at least one day of training.
- Moderate injury: requires treatment and forces the individual to miss training sessions for at least one week, potentially, even, missing a match.
- Serious injury: leads to one or more months away from sport. In some cases, a hospital stay is required or, even, surgical intervention.
- Very serious injury: causes a permanent reduction in sport performance, necessitating ongoing rehabilitation to prevent further deterioration.

In order to evaluate participant perceptions of the utility of social distancing measures, the present study used the Perception of the Causal Factors of COVID-19 Questionnaire (CPFC-COVID-19). This questionnaire comprises 20 items that are rated along a Likert scale. Possible responses range between 1 and 4, with 1 corresponding to totally disagree and 4 corresponding to totally agree. The CPFC-COVID-19 assesses four dimensions. Firstly, Social Distancing and Protection (DSP) is assessed using six items (3, 5, 7, 11, 18 and 20). Secondly, Perceived Psychological Impact (IPP) is evaluated with five items (2, 4, 6, 9 and 17). Thirdly, Scepticism (ES) was measured according to four items (1, 13, 14 and 15) and, finally, Credibility of Perceived Information (CIP) was rated using five items (8, 10, 12, 16 and 19). To aid interpretation, scores given to these dimensions were summed to produce an overall score that represented participant perceptions of the causal factor behind COVID-19. Prior validation analysis of the instrument produced a Cronbach alpha coefficient of .861 for all 20 items and .829 for the DSP dimension. In the present study, the Cronbach alpha for the overall questionnaire was .791, whilst .714 was the alpha produced

for the IPP dimension, .489 for the ES dimension, .619 for the CIP dimension and .604 for the DSP dimension, individually.

### Procedure

Prior to beginning the process of questionnaire administration, permission was requested from educational institutions and either potential participants parents/legal guardians or the students themselves (depending on whether they were of legal age) via the signing of a written informed consent form. All educational institutions, regardless of educational level (primary, secondary or higher education), were informed that all data was to be kept confidential and anonymous. Questionnaires were administered individually via a Google forms link.

### Statistical Analysis

The statistical package SPSS 21.0 was used. Descriptive analyses and normality checks were conducted. On the other hand, hypothesis testing was carried out, via bivariate correlations, in order to determine the relationship of sports injuries with sociodemographic variables, such as gender and age, and social distancing. All statistical analyses were conducted at a significance level of  $p < .05$  and 95% confidence intervals were calculated.

## Results

The aim proposed by the present study was to examine the relationship of the frequency and severity of injuries sustained during physical exercise and/or sport with perceptions of the importance of social distancing and mask wearing for reducing the spread of Covid-19.

Firstly, descriptive analyses was performed of CPFC-COVID-19 constructs as a function of age. Table 2 presents the relationships found between CPFC-COVID-19 constructs and age. The correlation coefficient produced between the constructs and age was .167 ( $p = .018$ ) for DSP, .261 ( $p = .000$ ) for CIP and  $-.152$  ( $p = .030$ ) for ES, with no significant relationship emerging for the IPP construct.

In table 2, means pertaining to the four dimensions of the CPFC-COVID-19 can be observed, with these reflecting participant perceptions regarding the causal factors of Covid-19, according to age.

**Table 2.** Perception of the study population regarding the causal factors of Covid-19 according to age

		CIP	ES	IPP	DSP
Age	6-11 years	10.07	7.29	9.47	19.14
	12-18 years	10.79	8.68	10.05	16.42
	19-24 years	12.08	6.71	9.25	20.29
	25-30 years	11.18	6.35	9.29	20.29

CIP: Credibility of Perceived Information; ES: Scepticism; IPP: Perceptive Psychological Impact; DSP: Distancing and Protection

Participants aged between 12 and 18 years old are less sceptical than remaining participants and less likely to perceive risk from scenarios involving restrictions,

personal actions or social distancing as risk preventions measures for infection control. In contrast, 25-30-year-old participants are more sceptical with regards to this type of

measures. With regards to CIP, 19-24-year-old participants reported greater uncertainty regarding COVID-19-related content distributed by the government and mass media, whilst participants aged between six and 11 years old are the most disbelieving. With regards to DSP, 19-30-year-old participants are more likely to perceive the maintenance of a safe distance and mask wearing as effective protective steps, with 12-18-year-olds being the individuals who least perceive these to be effective safety steps for reducing spread. On the other hand, no statistically significant relationship was found between age and the frequency or severity of injuries sustained during physical exercise and/or sport.

Secondly, correlations were established between sports injury severity and the only CPFC-COVID-19 construct to produce statistically significant outcomes, namely, social distancing. As can be observed in table 3, participants who deemed maintaining a safe distance and mask wearing to be more highly important for slowing the spread of COVID-19 reported higher DSP construct scores for both mild (19.43) and moderate injuries (20.22). In contrast, individuals who reported sustaining serious (16.12) or very serious (15.50) injuries also reported lower DSP scores ( $p = .037$ ). A correlation coefficient of .266 ( $p = .24$ ) was produced for these data.

**Table 3.** Injury severity and perception of the effectiveness of social distancing and mask use

	Minor injury	Moderate injury	Serious injury	Very serious injury
DSP	19.43	20.22	16.12	15.50

Moving on, it can be seen in table 4 that females perceived social distancing measures and mask wearing to be of more use than men, with this perception prevailing more amongst individuals who sustained mild or moderate

injuries in the case of both females and males, as can be seen in table 5. These outcomes tended towards statistical significance ( $p > .05$ ).

**Table 4.** Analysis of means in the dimension of social distancing according to gender

		Media	Mínimum	Máximo	Standard deviation
Gender	Mujer	19.78	11.00	24.00	2.85
	Hombre	19.00	8.00	24.00	3.82

**Table 5.** Analysis of percentages for the severity of sports injuries according to gender

		Very serious injury	Serious injury	Moderate injury	Minor injury
Gender	Woman	2.95%	2.95%	32.35%	61.75%
	Man	2.63%	18.42%	42.10%	36.84%

## Discussion

The aim of the present study was to examine the relationship of the frequency and severity of injuries sustained through physical exercise and/or sport with perceptions of safe distancing and mask wearing for reducing the spread of Covid-19. As shown by present findings, no significant differences emerged between any of the questionnaire constructs and injury frequency, whilst participants with serious or very serious injuries reported lower scores for the DSP construct.

Individuals tend not to tackle the uncertainty caused by a crisis in an effective or functional way, least of all when such crises lead to unexpected circumstances such as social distancing. This, as seen in the case of COVID-19, altered day-to-day activities and led to lifestyle changes in the population.

With regards to injury frequency, a retrospective analysis performed by Ninokawa et al. (2020) examined the effect of social distancing measures on the frequency of traumatic injuries. This study analysed the effect of

these public health measures on the rate of traumatic injuries. After comparing the number of daily admissions recorded in 2020 prior to and after the introduction of social distancing measures, a significant reduction was seen in the daily average number of patients admitted with trauma following the implementation of social distancing measures. This finding was potentially due to the fact the social distancing and mask wearing was deemed to be important, leading to a reduction in inter-personal closeness and consequent trauma. Similar findings were reported in studies conducted by Matthay et al. (2021) and Murrett et al. (2021) who also found significant reductions in traumatic injuries following the implementation of social distancing measures. In this sense, Olmedilla et al. (2010) highlighted that:

Perceptions that are more aligned with reality may act as a form of prevention against injury, in which perceptions of factors that impact upon sport injuries may be of great importance from a preventative standpoint (p. 332).

In the present study, no significant differences emerged between any of the questionnaire constructs and injury

frequency, in the case of both males and females. Potentially, the small study sample to report having sustained an injury was insufficient in size for significant outcomes to emerge when examining the relationships between variables. Thus, it is possible that injury frequency could be related with CPFC-COVID-19 constructs in larger samples from epidemiological studies, such as those conducted by Ninokawa et al. (2020), Matthey et al. (2021) and Murrett et al. (2021). In addition, it would appear that the causal factors explaining injury frequency, which may also be related with social distancing, did not have a significant impact. Such factors include physical activity and consequent quality of life, muscle strength and functional performance (Villaquirán et al., 2020), falling out of routines (De la Torre Ortega et al., 2022), impinged confidence, causing anxiety and demotivation (Burgos et al., 2020), sadness (Cobo et al., 2020; Montaña & Robles, 2022), depression, anxiety and posttraumatic stress (Cobo et al., 2020) and perceived emotions (Burgos et al., 2020; Ceballos & Sevilla, 2020; De la Torre Ortega et al., 2022; Johnson et al. 2020; Montaña et al., 2022; Villaquirán et al., 2020). In other studies, training and anxiety was appropriately managed, informed by understanding of what had worked during confinement (Kalazich et al., 2020).

With regards to injury severity, participants in the present study who perceived keeping a safe distance and mask wearing to be of greater importance for stopping the spread of COVID-19 also reported high DSP scores, indicating mild and moderate injuries. In contrast, participants with serious or very serious injuries reported lower DSP scores. In the context of physical exercise and/or sport, individuals who deem social distancing and mask wearing, alongside other disease control measures, to be of little importance for reducing COVID-19 infections may, potentially, sustain more serious or very serious injuries because, generally speaking, they have a general lack of awareness about other persistent deficiencies. This may limit their potential to engage in safe physical activity, as highlighted by Myer et al. (2011). In this sense, it is also crucial for perceived sport planning to be as similar as possible to reality and for it to be oriented by competent professionals from the field of physical activity and sport science, and sport medicine, as suggested by Ross et al. (2002). Taking a more in-depth look, participants aged between 19 and 30 provided the highest ratings regarding the effectiveness of keeping a safe distance and mask wearing to as protective elements, with 12-18-year-old participants providing the lowest ratings regarding the utility of such measures for protecting against infection. As outlined by Prieto et al. (2014b), injuries are multifactorial and it is within our reach to identify the factors that increase vulnerability to injury. Nonetheless, managing to identify individuals with high-risk profiles based on perceptions alone is a complicated task.

Finally, few studies have been conducted to examine injury severity and/or frequency in individual and team sports (Pujals et al., 2016). In accordance with Pascual et al. (2008),

Prieto (2016) and Pujals et al. (2016), injuries are sustained to a lesser extent in the former (swimming, athletics and tennis) than in other team sports (football, handball and basketball). Frisch et al. (2009) reported slightly different outcomes, although the general relative trend was similar. In addition, eventually, cooperation-opposition team sports carry higher risk (Pujals et al., 2016), potentially due to the higher number of participants engaged simultaneously. In this sense, it would be interesting to examine such aspects in light of injury frequency and severity and CPFC-COVID-19 constructs.-

Findings reported in the present study reveal the effects brought about by social distancing measures on physical exercise and sport. It is recommended that physical activity and sport science professionals raise awareness in their students and athletes of the importance of keeping a safe distance and mask wearing as appropriate protective measures. This is crucial given that high risk perceptions regarding this construct protects individuals against serious and very serious injury. Indeed, in athletes with serious injuries, subjective ratings do not often correlate with achieved scores for function and strength (Ross et al., 2002). In this sense, personal perceptions do not always correspond to the profile of having a serious injury, potentially also conditioning a general lack of self-perception regarding limitations (Myer et al., 2011). Further, the multifactorial nature of an injury makes it difficult to characterise an individual with a high injury risk based on their perceptions (Prieto et al., 2014b).

## Conclusions

The present study set out to examine the relationship of physical exercise and/sport injury frequency and severity with perceptions of the importance of social distancing and mask wearing for reducing the spread of Covid-19. To this end, the following conclusions are reached:

- Individuals who perceive keeping a safe distance and mask wearing to be more important for slowing down the spread of COVID-19 report high DSP scores and tend to sustain mild and moderate injuries.
- Individuals presenting with serious or very serious injuries report low DSP scores.
- Individuals aged between 19 and 30 years are the group to most highly rate social distancing and mask wearing as protective, whilst 12-18-year-olds provide the lowest effectiveness scores.

More studies are needed to determine the long-term effects of social distancing measures on different aspects, whether physiological, or physical, sporting, psychological and affective-social.

## Limitations and future lines of research

The present study is based on a representative sample of the target population. It was well-balanced according to

gender and covered a broad range of ages. Nonetheless, the main limitation of the present study was that sampling took place at a single time-point during the pandemic. A more convenient approach would have been to conduct a longitudinal study capable of examining whether identified relationships between injury frequency and severity and social distancing differed prior to or following the end of the pandemic. As a future line of research, on the one hand, it is proposed that the CPFC-COVID-19 be administered to samples from different individual and team sports with the aim of establishing whether differences exist with respect to the variables measured in the present study, as a function of sport type. Another proposal is to administer the same questionnaire to samples who engage in different types of physical exercise, with a view to examining, for example, one or more characteristics, such as individual participation or in pairs, and the presence of opposition (whether in a group, with cooperation, or with cooperation-opposition). Likewise, it would be interesting to examine that described above alongside the causal and relational factors pertaining to injuries.

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