

# The Impact of the COVID-19 Pandemic on Training and Motivational Behavior: A Survey of Children and Adolescents

*Die Auswirkungen der Corona-Pandemie auf das Trainings- und Motivationsverhalten bei Kindern und Jugendlichen*

## Summary

- › **Purpose:** The COVID-19 pandemic affects society on a global scale in many ways. In Germany, various social and leisure facilities such as schools, sports clubs and gyms had to be closed due to lockdowns. The impact of these closures on sports behavior in children and adolescents is still insufficiently explored.
- › **Methods:** To address that, we conducted a survey among 51 athletes, asking them retrospectively about their training, their competitions, their training motivation, and their concerns about the future.
- › **Results:** The athletes, aged 9-20 years, (66.7% female, 43.1% performance sports) reported the lowest hours of exercise during the first lockdown: 5 (9.8%) children mentioned 0h per week and 31 (60.8%), 1-5h per week. Recreational athletes were more affected than performance athletes. Before the COVID-19 pandemic, 8 (15.7%) of all athletes had motivational problems regarding their training in contrast to 25 (49.0%) during the lockdowns. 19 (37.3%) of the athletes reported that the pandemic will have an impact on their career regardless of a COVID-19 infection.
- › **Conclusion:** Sport faded into the background during this challenging time, athletes' sports behavior has been affected in many ways. It is important that children and adolescents are quickly enabled to return to sport, as the health benefits speak for themselves.

## Zusammenfassung

- › **Hintergrund:** Die COVID-19-Pandemie zieht weitreichende Folgen nach sich. In Deutschland waren zeitweise diverse soziale Einrichtungen wie Schulen und Sportstätten aufgrund der Lockdowns von Schließungen betroffen. Derzeit sind die Auswirkungen auf das Sportverhalten und das Befinden von Kindern und Jugendlichen nicht hinreichend untersucht.
- › **Methode:** In der vorliegenden Studie wurden 51 Athleten retrospektiv zu ihren Trainingszeiten, Wettkämpfen, Ängsten und ihrer Motivation befragt, um die Auswirkungen der Pandemie visualisieren zu können.
- › **Ergebnisse:** Die 51 Athleten im Alter von 9-20 Jahren (66,7% weiblich, 43,1% Leistungssportler) gaben an, während des ersten Lockdowns am wenigsten Sport betrieben zu haben. 5 (9,8%) trainierten 0 Stunden pro Woche und 31 (60,8%) trainierten 1-5 Stunden pro Woche. Breitensportler waren stärker betroffen als Leistungssportler. Vor der Pandemie hatten 8 (15,7%) aller Athleten Schwierigkeiten sich für ihr Training zu motivieren. Während des Lockdowns lag der Wert bei 25 (49,0%). 19 (37,3%) der Leistungssportler glauben, dass die Pandemie unabhängig von einer COVID-19 Infektion Auswirkungen auf ihre Karriere haben wird.
- › **Fazit:** Der Sport ist in dieser schweren Zeit in den Hintergrund getreten, sodass das Sportverhalten der Athleten in vielerlei Hinsicht beeinflusst wurde. Es ist notwendig, dass Kinder und Jugendliche auch in Krisenzeiten so schnell wie möglich wieder zum Sport zurückkehren können, da die Vorteile körperlicher Aktivität unumstritten sind.

## KEY WORDS:

SARS-CoV-2, Questionnaire, Young Athletes, Competitive Sports, Physical Activity, Training Motivation

## SCHLÜSSELWÖRTER:

SARS-CoV-2, Fragebogen, Nachwuchsleistungssportler, Leistungssport, körperliche Aktivität, Trainingsmotivation

## Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic, which was declared on March 11th, 2020, impacts all aspects of our society. With the spread of the virus around the world, the federal states in Germany imposed various restrictions, e.g., stay-at-home orders, social restrictions, etc., which also highly affected the sports sector with closed schools, sports clubs, gyms, and other leisure facilities as well as the cancellation

and postponement of sports events and competitions (15, 20, 21). The first lockdown started on 24th March 2020 and lasted nearly seven weeks with a complete shutdown of the recreational sports (RS) sector for organized physical activities. Only performance sports (PS) athletes belonging to the national squad (NS) in preparation for the Olympic Games 2020 were allowed to continue training (22). It was not >

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Table 1

Demographic Characteristics. Notes. sd=standard deviation; n=10 participants (no national squad) are training on performance sports level.

PARAMETER	N (%)
<b>AGE</b>	
mean (sd)	16.04 (5.72)
Min – Max	9-20 years
<b>GENDER</b>	
Female	34 (66.7)
Male	17 (33.3)
<b>SPORTS STATUS</b>	
Recreational Sports	29 (56.9)
Performance Sports	22 (43.1)
<b>NATIONAL SQUAD</b>	
National Squad	12 (23.5)
No National Squad	10 (76.5)
<b>KIND OF SPORT</b>	
Team	23 (45.1)
Individual	28 (54.9)

until 2<sup>nd</sup> April 2020, that organized physical activity was possible for NS athletes (including up-coming youth athletes in a NS), but not for PS athletes not belonging to a NS (23). The second lockdown started on 2<sup>nd</sup> of November 2020 and lasted for almost six months, with lighter restrictions regarding the sports sector.

The effects of the COVID-19 pandemic are multi-sectorial, affecting physical, psychological, social as well as other variables regarding Quality of Life (QOL). Existing literature shows, that COVID-19-related restrictions, including lockdowns, decreased the physical performance, mental health, sleep quality, health-related QOL, and increased screen time, varying across gender, type of sport, and competitive level (6, 10, 21). Especially in elite athletes – comparable to PS athletes belonging to a NS – an increase in worrying about the career, anxiety and depression variables, as well as alteration in training motivation was shown (6, 9, 14). Training related differences between RS and PS athletes and different outcomes for named variables are not yet sufficiently investigated. Lautenbach et al., 2020 display, that RS athletes felt not sufficiently supported, even though alternative training methods were used. It is undisputed, that absence of organized physical activity affects physical determinants like body composition, aerobic capacity, and neuromuscular performance, therefore overall performance in sports (1).

Athletic development especially in a professional context is reliant on structured training of the youth and adolescent's athletes (16). Physical activity is essential to maintain cardiorespiratory and muscular fitness, bone health, and has mental and psychosocial benefits. Even without the COVID-19 pandemic and related restrictions affecting physical activity of youth and adolescents in PS and RS, ensuring sufficient physical activity is one of the most challenging public-health issue, in which especially for children and adolescents sports clubs play an important role (13). Ensuring the development of health and physical fitness, promotion of participation in physical activity is important for life-long well-being and also reduced injury and risk for health problems (16). These shown developments during the COVID-19 pandemic will affect athletic careers and physical activity in an altered sports world (8).

The aim of the present study was to address the information gap of the consequences of the Covid-19 pandemic and the related lockdowns in March 2020 to Mai 2020 as well as November 2020 to February 2021 in Berlin, Germany, on training and exercise behavior in children and adolescents in RS and PS.

Therefore, following explorative questions were examined: 1) Did the COVID-19 pandemic affect RS and PS (belonging to/not belonging to a NS) athletes differently regarding physical activity and exercise behavior? 2) Did the COVID-19 pandemic restrictions (e.g., lockdown), affect motivation, and did training motivation vary between groups (RS, PS, belonging to/not belonging to a NS)? 3) Did the COVID-19 pandemic impact future-oriented thoughts and worries differently for the subgroups RS, PS (belonging to/not belonging to a NS)?

## Methods

### Study Details and Sample

The cross-sectional study was conducted with 51 athletes from various sports schools as well as up-and-coming athletes from triathlon clubs and PS groups in Berlin, Germany. Participation in the survey was voluntary and anonymous. The data assessment took place from December 2021 to February 2022. The demographic variables of the sample are presented in table 1.

### Measures

In the present study, data was assessed using a newly invented paper-and-pencil questionnaire (14 questions, formulated in German, with English translations; see supplemental material online), which was filled in by the participants. The questions were chosen according to an existing online questionnaire from C. Burgstahler (2020, unpublished) regarding the topic "COVID-19 and Sport".

The demographic variables age, gender, sports status (PS vs. RS), NS, and type of sport (team or individual sport) were assessed. The remaining questions refer to participants' subjective perception of their experiences during the pandemic. Regarding the training, questions 1-4 assess the training volume in hours per week before, during lockdowns, and current training with the response options "0", "1-5", "6-10", "11-14", and "more than 14" hours. The influence of the COVID-19 pandemic on training, alternative exercise and motivation for training were assessed with questions 5-8 (question 5 with the response options ranging from "not at all" to "very much" on a 5-point-likert scale). Regarding a COVID-19 infection questions 9-11 assess, if athletes had been affected by an infection – symptoms and their duration were asked to provide information about possible late- and long-term health consequences, and general effects of the COVID-19 pandemic were asked. Questions 12 asks about competitive sport events during the COVID-19 pandemic measures. Impact on career and worries (about family, health, friends, sport, or school) are assessed with questions 13-14.

### Data Analysis

The questionnaire was manually digitalized, values were double-checked to counteract transmission errors. Due to the explorative nature of this study, all variables were analyzed descriptively. Demographic characteristics were summarized using mean and standard deviation for continuous variables and absolute and relative frequencies for categorical variables. For skewed continuous variables, additionally the minimal and maximal values are presented. Questions 1-5, asking about the amount of time invested in exercises was analyzed using exploratory data analysis. The answers to questions 1-4 are also

illustrated with stacked bar plots divided by the sports status of the athletes and within a second figure for PS athletes divided in NS and no NS. In order to illustrate the motivational differences between RS and PS athletes, before and during the lockdown, the answers to questions 7 and 8 are summarized in a bar plot. Answers to question 13 and 14 regarding the worries of the athletes are also illustrated with bar plots. For all remaining questions, absolute and relative frequencies are given. Data analyses were conducted using SPSS software (released 2017, version 28.0, Armonk, NY: IBM Corp.). The descriptive statistics of the data were analyzed. All figures were computed with R software (version 4.2.1).

**Results**

**Covid-19 Infection and Symptoms**

8 (15.7%) participants stated they had been infected by a COVID-19 infection (Q9), of which 2 had no symptoms, 6 had symptoms (Q10). 25 (49.0%) of the athletes stated they noticed effects from the COVID-19 pandemic on their body (Q11).

**Exercise Hours per Week before, during the Lockdowns, and after Second Lockdown**

Exercise hours per week changed in all groups (RS, PS and PS belonging to/not belonging to a NS) for the different time periods. The differences in exercise hours divided by groups are presented in figure 1 and 2. The count and percentages divided by subgroups for Q1-Q4 are presented in table 2 (see supplemental material online).

With 18 (35.3%) most of all athletes described that the training was affected “much” by the COVID-19 protection measures (Q5), PS athletes 7 (31.8%) answered with “somewhat”, whereas RS athletes mostly 12 (41.4%) answered with “much”, counts and percentages divided by subgroups are supplied in table 3 (see supplemental material online).

**Motivation and Alternative Training**

Overall, 47 (92.2%) of all athletes tried alternative sports during the COVID-19 pandemic. Outdoor activities, hiking, and bicycle were mostly chosen, as well as other activities. PS athletes were less engaged in alternative activities, which is shown in figure 3 (see supplemental material online). Descriptive Data of Q7-Q8 and Q13-Q14 is presented in table 4.

Overall, 8 (15.7%) of all athletes had trouble motivating themselves for training before the pandemic (Q7). For RS athletes the percentage is higher with 24.1% (7) than for PS athletes

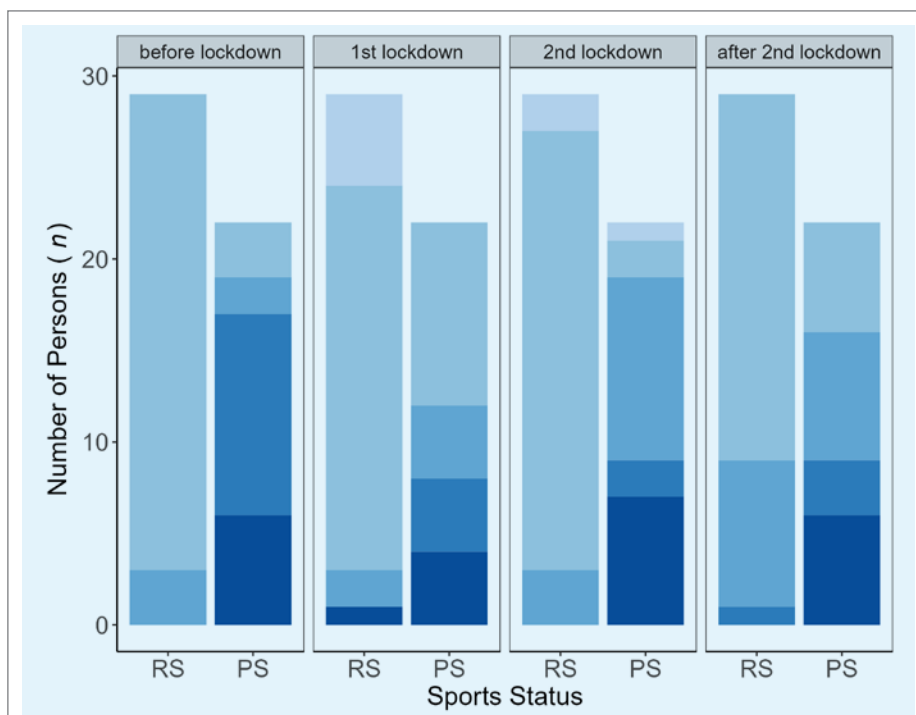


Figure 1

Hours of Exercise per week – Performance Sports (PS) in relation to Recreational Sports (RS) (Q1-Q4). Blue shades from light to dark: 0 hours, 1-5 hours, 6-10 hours, 11-14 hours, more than 14 hours.

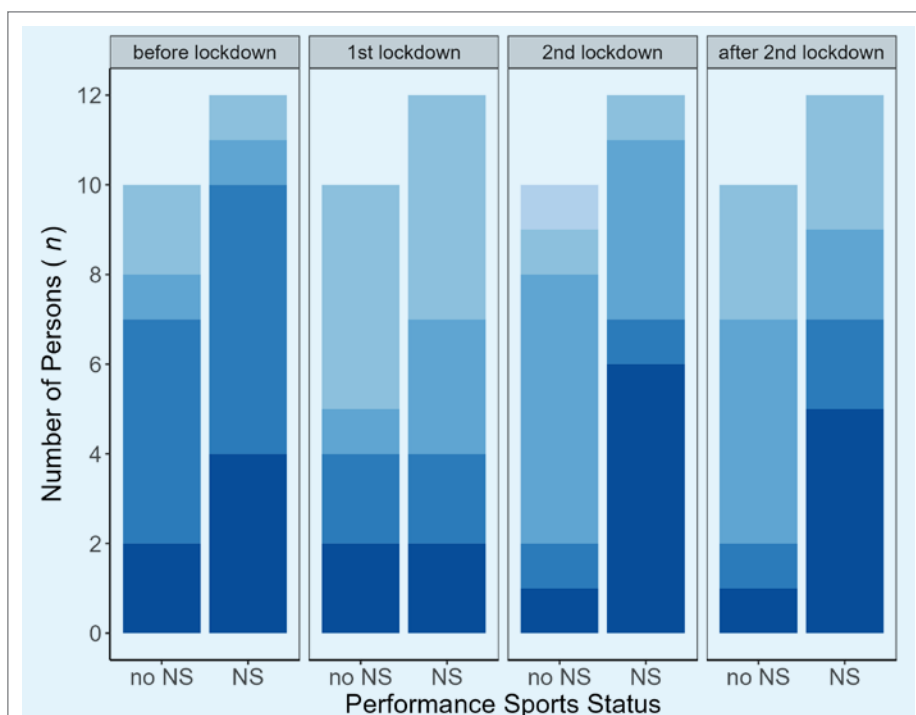


Figure 2

Hours of exercise per week – Performance Sports athletes belonging to or not belonging to the national squad (Q1-Q4). Blue shades from light to dark: 0 hours, 1-5 hours, 6-10 hours, 11-14 hours, more than 14 hours.

with 4.5% (1). Of PS athletes not belonging to a NS no one had trouble motivating themselves for training. During lockdowns (Q8) more athletes, 25 (49.0%), had trouble motivating themselves for training. The percentage for PS athletes was higher with 59.1% (13) than for RS athletes with 41.4% (12) and even higher for PS athletes belonging to a NS with 83.3% (10). In figure 4 (see supplemental material online) motivation before and during a lockdown for PS and RS athletes is presented. ➔

Table 4

Effects of the COVID-19 pandemic on motivation, alternative activities, future impact. RS=recreational sports, PS=performance sports, NS=national squad; percentages for NS and no NS are referring only to PS athletes.

PARAMETER	NUMBER OF "YES" (%)				
	OVERALL (n=51)	RS (n=29)	PS (n=22)	NS (n=12)	NO NS (n=10)
Motivation before pandemic (Q7)	8 (15.7)	7 (24.1)	1 (4.5)	0 (0.0)	1 (10.0)
Motivation during a lockdown (Q8)	25 (49.0)	12 (41.4)	13 (59.1)	10 (83.3)	3 (30.0)
Career impact (Q13)	19 (37.3)	7 (24.1)	12 (54.5)	7 (58.3)	5 (50.0)
Worries (Q14)	40 (78.4)	24 (82.8)	16 (72.7)	8 (66.7)	8 (80.0)

### Worries and Impact on Career

Absolute and relative frequencies for Q13 and Q14 are presented in table 4. 12 (54.5%) of the PS athletes think the covid pandemic will have an impact on their career, compared to only 7 (24.1%) of the RS athletes. 16 (72.7%) of PS athletes worry due to the COVID-19 pandemic, compared to 24 (82.8%) of RS athletes. The most common answers were health, family, and friends. 19 athletes mentioned athletic career only to a moderate extent. Figure 5 (see supplemental material online) presents career impact and worries for RS and PS athletes.

### Discussion

The COVID-19 pandemic introduced completely new challenges for society and sports (18). The sports association Berlin (Landessportbund Berlin (LSB)) reported a significant decrease (-33,117) in youth and adults' memberships in 2021 compared to 2020 even though there was a steady increase in the previous four years (LSB, Membership statistics 2021). Due to changing restrictions, the sports clubs were not able to offer members certainty about whether and how guided training could take place. This might explain the decrease in weekly hours of exercise during the first lockdown, which can be seen in our results (24). During the second lockdown, a slight increase or recovery of the low was recorded. This could be due to an increased desire to get back into physical activities and relaxations of contact restrictions.

The COVID-19 pandemic has also led many people to trying alternative sports. We can observe this in our results as 92.2% of athletes reported trying new sports (primarily outdoor sports or bicycle) (4). On a positive note, athletes are searching creative solutions to still engage in physical activity, which we cannot confirm in the general population (17, 20, 25). It is interesting that the positive effect was only visible for a short time. During the second lockdown, physical activity among children and adolescents dropped dramatically, falling below pre-pandemic levels. Athletes belonging to a NS were allowed to continue using the training centre in April 2020 in preparation for national and international competitions. Nevertheless, a sharp decline in training hours was also observed here, as shown in the results.

It is problematic that competitive athletes train at an elevated level, so that a resumption of training does not succeed as usual. Training should be resumed in the context of sensitive load control. Increasing the intensity too quickly would unnecessarily increase the risk of injury (2). However, breaks in training lead to performance drop. Promotion at an early age is crucial in PS for further opportunities. If this is not possible because of the COVID-19 pandemic, athletes may have more anxiety about the future.

One plausible reason for the motivational problems could be that social contacts were missing, which are especially important during puberty (7, 19). Young people suffer from the COVID-19 restrictions and suffered more often from depression, anxiety, and loneliness (3, 5). Also fewer competitions took place during this period, 76.5% stated that there were no competitions. Increased motivation to exercise through competitions could be one possible assumption.

Only eight out of 51 athletes (15.7%) reported a COVID-19 infection. Despite the small number of infected persons, the majority showed a change in their sports behaviour, indicating that the change was related generally to the COVID-19 pandemic, not to an infection of the subject. The majority of athletes were concerned about the COVID-19 pandemic but mentioned their career only to a moderate extent. One approach to this could be that they are already PS athletes belonging to a NS and have received sufficient support so that their athletic careers are not threatened. Those who are concerned may have been on the verge of making the leap to NS or PS, which is no longer achievable/at risk due to limitations.

### Selection Bias

Unfortunately, the study does not include a representative sample, as it is more difficult to conduct a survey during the COVID-19 pandemic. Cancellations from other sport schools regarding conducting a survey may be due to the higher workload of teachers during the COVID-19 pandemic (11, 12). More female athletes (66.7%) than male athletes (33.4%) participated in this survey, although according to the sports association Berlin (Landessportbund Berlin=LSB), more males (63.0%) are members of a sports club. However, it can be assumed that a similar result can be presented with a different distribution of respondents, since all persons were affected by the COVID-19 preventive measures.

### Conclusion

The results have shown how the COVID-19 pandemic affects sports behavior in PS and RS in many ways. Sport took a back seat due to preventive measures during this challenging time. The impact will only be seen after a few months or years (18, 19). It is important that children and young people are able to return to sport quickly, even in times of pandemic, as the benefits of physical activity speak for themselves (4). In conclusion, COVID-19 offers an interesting wide-ranging set of research approaches with respect to the impact of children and adolescents participating in sports. ■

### Conflict of Interest

The authors have no conflict of interest.



**Author Contributions**

LK and LJ developed the questionnaire for the survey. LJ collected the data. The manuscript was written and edited by LK and ILB and conceptualized and edited by BW. LK, ILB and LJ analyzed the data. LH plotted the results of the statistical analysis. All authors revised the manuscript.

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