

## Impact of the Covid-19 pandemic on the performance of amateur and professional players in swimming

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### Abstract

**Background:** The overarching aim of the study in this thesis was to collect and use the answers of the respondents, which were designed to inspect opinions about the pandemic situation, that had occurred, and whether the pandemic had affected their sense of mental state. The paper is exploratory in nature and includes analysis of research on swimmer training during the Covid-19 pandemic. **Material and methods:** 30 primary school students in Toruń participated in the study. An online questionnaire was used in which students were asked about their involvement in physical activity classes such as swimming and psychological and pedagogical behavior of young people during the Covid-19 pandemic. **Results:** 53.3% (n=16) respondents believe the pandemic has had an impact on their athletic performance. The Corona virus had a significant impact on their starts in competitions. Fortunately, most of them have no fear of returning to activity after the pandemic period. Especially due to active participation in organized on-line activities. The students also lack interpersonal contacts, which were significantly limited during the epidemic. **Conclusion:** The COVID-19 pandemic has wreaked havoc on the swimming environment. Some young players thought about ending their careers, fortunately the vast majority are still willing to train. According to most of the students' responses, the epidemic did not increase the stress. On the other hand, the lack of contact with friends from the club had a negative impact on the emotional state of young swimmers.

**Keywords:** Covid-19 pandemic, swimmers, competitions, players, physical activity.

### Introduction

The ability to swim has been known for generations, just like the ability to walk or run. Swimming is one of the primal human reflexes. Formed in the womb, it is further reproduced in infancy because the original swimming reflex has not changed and the baby is much easier to move in the water.

Human already used such an important skill as swimming in ancient times, and the proof of this are drawings (hieroglyphs), even from four thousand years ago, from Egypt, Assyria or even Libya.

In Japan, in the 1st century BCE (exactly 35 BCE), the first spectacular swimming competition was organized (<https://www.britannica.com/sports/swimming-sport>).

In Sweden, in 1796, the first Upsala Simsällskap swimming club was established in Uppsala, which is still popular and boasts the title of the oldest swimming club in the world ([https://pl.wikipedia.org/wiki/Pływanie\\_\(sport\)](https://pl.wikipedia.org/wiki/Pływanie_(sport))). Swimming is a sport that does not force us to buy countless equipment. However, to hone your abilities, you should equip yourself with a few things. We are talking about swimming boards, clothes and accessories, such as: a cap, glasses, flip-flops and a towel (Drewett, J., Sharron, D.). Swimming as a sport is recognized as the best form of physical enhancement of the human body. The primary component of swimming training is the widely understood technique training. John Leonard from the American Association of Swimming Coaches admitted that sports swimming is primarily a technical sport, and poor technical skills make it impossible to improve the result (Karpiński, R. 2008).

Proponents of professional swimming technique training to increase the speed of competitive swimmers in the water work to minimize the resistance that the body has to overcome in the water, while trying to increase the efficiency of propulsion movements. Why is technique so important? It is of great importance at every stage of learning to swim, but it is most important in developmental age. Then up to 80% of the total training volume is covered by technical training (Hannula, D., Thornton, N.).

The success of a player is influenced by many factors, e.g. mental state, training, diet, as well as important genetic characteristics. It has long been found that training is a kind of stressor for the body (Ostreġa, W. 2017). COVID-19 pandemic an infectious disease caused by SARS-CO-V-2 (corona virus). Its origins date back to the November 17, 2019 epidemic in the city of Wuhan, Hubei province in central China. It was declared a global pandemic by the World Health Organization (WHO) on March 11, 2020. From March 20, 2020, the

state of epidemic in our country is in force in accordance with the regulation of the Minister of Health. The psycho-physical condition of the citizens of our country has definitely decreased

(<https://pl.wikipedia.org/wiki/COVID-19>).

Training methods have not changed with the outbreak, they remain the same. The training environment has changed. Most swimmers tried to train at home at least initially. Swimming is probably the best form of sports activity that develops many motor features and improves the figure. Core muscle training, very necessary to keep the body familiar with each phase. I am talking mainly about the muscles of the abdomen and back. Swimmers use virtually all muscles, so it is important to diversify your training with exercises that are responsible for the overall development of the swimmer's muscles. General development training forces our body to use respiratory muscles, and their mechanics are very important (<https://go.decathlon.pl/blog/trening-plywania-w-domu>). In the era of the corona virus epidemic, a group of people did not have the opportunity to train in the swimming pool.

The Polish Swimming Association (PZP) informs that resolution no. 131 / E / 2020 of December 22, 2020, absolutely ALL players entered in the PZP Player Register System (with PZP licenses) from 2011 and older to the national team of the PZP. Thanks to this, players born in 2011 and older can freely use the swimming pool to attend swimming training (<https://sportowefakty.wp.pl/plywanie/916071/koronawirus-polski-zwiazek-plywacki>, Dz. U. Rzeczpospolitej Polskiej z 2020, poz. 2316 s.8.).

When recovering from corona virus disease, the best thing you can do for your body is to listen to it. These are the words of Dr. Rafał Buryta. He presented a form of breathing exercises and proposed a form of light training. First of all, dr. Rafał Buryta emphasized the importance of an individual approach and thoughtful return to training after an illness in working with professionals - most often you can encounter light training (on a stationary bike, or strength training with light loads)

(<https://www.mp.pl/pacjent/rehabilitacja/aktualnosci/272343,powrot-do-formy-po-covid>).

**The aim of the study** is to check to what extent the COVID-19 pandemic influenced the players not only in terms of the decline in their form, but also in their mental state.

## Material and methods

*Participants.* Thirty people from primary school No. 8 in Toruń participated in the study. Girls constituted the majority 56.7%, the remaining group comprising 43.4% of the entire group were boys. Subjects aged 10 to 17 years. Most often with 7 years of swimming experience.

*Procedure / Test protocol / Skill test trial / Measure / Instruments.* The study used an online survey in which questions were asked about the involvement in physical activity such as swimming and psychological and pedagogical behavior of young people during the Covid-19 pandemic. The study was conducted from March 14, 2022 to May 30, 2022. Athletes received the questionnaires via e-mail via the club's coach. Everyone had the opportunity to fill in the questionnaire, but only one approach at any time.

Second research method: (retrospective) the times of competitors for their crown starts, times during the pandemic, and times from their last competition were analyzed. On the basis of these results, it will be possible to observe whether their form has improved or deteriorated, of course they look at it in terms of the pandemic should deteriorate.

*Data collection and analysis / Statistical analysis.* The statistical analysis of the material gathered was carried out using the PS IMAGO PRO 6.0 / IBM SPSS 26, corporate licensee Nicolaus Copernicus University, Torun, Poland, and Microsoft Excel. For statistical analysis, the Pearson's chi-square test was employed to assess whether the research sample's dependencies were an effect of a more general regularity in the general population or a random output only. The test is applied when variables of qualitative and not quantitative character are used for the analysis. In statistics, V Cramer (sometimes referred to as Cramer's phi and denoted as  $\phi_c$ ) is a measure of association between two nominal variables, giving a value between 0 and +1 (inclusive). The statistical test result was the so-called test probability (p), whose low values proved the statistical significance of considered differences. The statistical significance in this analysis was assumed  $p < 0.05$ .

## Results

Table 1 focuses on analyzing the recorded results, from which it can be seen that the average of the results in 2019 was  $37.88 \pm 4.98$  s, while in 2021 it was already  $33.43 \pm 3.10$  s. Not less than half of the surveyed swimmers, achieved a result of no more than 36.79 seconds in 2019 and 33.16 seconds in 2021.

However, measurements at the last competition (2022) showed that the surveyed swimmers obtained average results at the level of  $32.98 \pm 3.19$  seconds, no less than half of them achieved a time of no more than 32.61 s. The average difference between 2019 and 2021 was  $4.45 \pm 3.26$  s and was statistically significant at the level of  $p > 0.05$  (estimated using the Chi2 test). In turn, the difference between 2019 and the last competition (2022) was  $5.00 \pm 3.44$  s and also turned out to be statistically significant at the level of  $p > 0.01$ . In 2021, no less than half of the surveyed swimmers improved their time by no more than 4.14 seconds, while in the last competition it was already 4.28 seconds.

Table 1. Analysis of the differences in the achieved times of the surveyed swimmers in the period 2019-2022.

Examined variables	Time before the Pandemic December 2019 [s]	Time during the November 2021 pandemic [s]	Time from the last checking Competition [s]	The difference between 2019 and 2021 [s]	The difference between 2019 and the last checking Competition [s]
mean	37,88	33,43	32,89	4,45	5,00
standard deviation	4,98	3,10	3,19	3,26	3,44
median	36,79	33,16	32,61	4,14	4,28
statistical significance				p>0,05	p>0,01

Table 2 presents the measurements that were made among the surveyed population of swimmers over the years 2019, 2021 and the last measurement made, i.e. the year 2022. This is an illustrative comparison of the best times achieved.

Table 2. Retrospection of the surveyed competitors and their best times measured during the competition.

Players	Yearbook	Player style and distance At 25 m pool	Time before the Pandemic December 2019 [s]	Time during the November 2021 pandemic [s]	Time from the last checking Competition [s]
Player 1	2009r.	50 free	34,47	30,28	30,81
Player 2	2008r.	50 free	34,29	34,21	33,98
Player 3	2010r.	50 free	38,32	33,96	32,56
Player 4	2008r.	50 free	30,48	29,64	29,42
Player 5	2011r.	50 free	44,78	43,11	42,82
Player 6	2010r.	50 free	32,47	32,02	31,85
Player 7	2010r.	50 free	52,94	39,63	39,04
Player 8	2008r.	50 free	41,17	35,45	34,87
Player 9	2009r.	50 free	39,25	32,82	31,45
Player 10	2010r.	50 free	36,64	32,34	32,84
Player 11	2009r.	50 free	44,76	32,66	33,75
Player 12	2008r.	50 free	33,39	29,32	29,18
Player 13	2010r.	50 free	36,77	32,40	30,88
Player 14	2010r.	50 free	38,24	33,24	34,32
Player 15	2009r.	50 free	36,47	32,68	32,40
Player 16	2010r.	50 free	40,85	35,43	32,75
Player 17	2010r.	50 free	47,83	37,46	37,54
Player 18	2008r.	50 free	32,33	28,24	26,79
Player 19	2009r.	50 free	37,84	34,85	33,83
Player 20	2008r.	50 free	36,80	33,44	30,53
Player 21	2010r.	50 free	36,17	34,61	34,43
Player 22	2010r.	50 free	40,34	35,32	34,98
Player 23	2011r.	50 free	37,00	33,06	32,66
Player 24	2008r.	50 free	36,06	33,07	30,70
Player 25	2008r.	50 free	38,43	31,70	30,32
Player 26	2010r.	50 free	42,62	33,91	32,14
Player 27	2010r.	50 free	36,45	34,53	35,97
Player 28	2009r.	50 free	32,38	31,91	31,52
Player 29	2008r.	50 free	34,78	33,90	33,45
Player 30	2008r.	50 free	32,20	27,69	28,78

During the study, an attempt was made to answer the question of whether the time of the pandemic had an impact on sports results. According to the chart, the majority, more than half of 16 people (53.3%) said yes and it affects them very much. 9 people (30%) answered no, and 6 people (16.7%) do not know whether their results have deteriorated or improved.

Competitor starts are a key test to check their hard work in the run-up to the competition. Starting in the competition is the most important for a competitor, he has a chance to compare himself with his rivals. Analyzing the players' responses, 22 people (73.3%) answered: Yes, 3 people (10%) answered definitely yes, also 3 people (10%) did not respond, while 2 people (6.7%) answered that they did not. noticed the difference between their previous starts.

Opinions are divided on the issue of ending a career. The vast majority do not intend to end their swimming career. The smallest group of 8 people (which constitutes 26.7% of the entire group) answering this question is thinking about the end of their swimming adventure. Two other identical groups of 11 people

(36.7%) answered no (with possible resignation) and "There is no such option, swimming is the most important." Answers to the question: "Are you worried about the pandemic returning to training? Are encouraging." Children at this age know that they need to take care of their health. Only 4 people (13.3%) answered, "They are so afraid for their careers." The vast majority, as many as 19 people (63.3%) answered, "There is nothing to be afraid of." And 7 people (23.3%) replied that "They don't care, there's no point in worrying about it."

The vast majority of the respondents, 26 people (86.7%) replied: "yes, I was diligent about my classes". The person who replied I did not apply was not there, which may cause pride. Unfortunately, there were 4 people (13.3%) who "just logged in and then I went / went to sleep. The problem with online classes is that it is hard to know who is really paying attention to the class.

It's very hard to judge yourself, you know everyone wants to judge themselves as best they can. The responses of the respondents are as follows: 6 people (20%) said that their results had improved, 12 people (40%) said that their starting opportunities had deteriorated. Six people (20%) among the respondents did not notice any changes in relation to their results. One person more, i.e. 7 people (23.3%) replied that their contact with their family had definitely improved. Four people (13.3%) declared deterioration of family relations. It is surprising that as many as 10 people (33.3%) began to look at the sport of swimming from a completely different angle, they longed to return to their previous training. Quite a large group of people, because as many as half of the respondents (50%) missed contact with colleagues. One person, on the other hand, gave his own answer: "we were lucky and we were only affected by the first lockdown at the turn of March and May".

Table 3. Assessing yourself, what happened during or after an online class?

I corrected myself	20%
I got worse	40%
Nothing happened. I am what I was	20%
I have better contact with my family	23,30%
I have worse contact with my family	13,30%
Now I look at swimming lessons from a different perspective	33,30%
I missed contact with colleagues	50%
We were lucky and we were only affected by the first lockdown at the turn of March and May	3,30%

According to more than half of the Covid-19 pandemic, as many as 16 people (55.2%) did not increase the stress of the respondents. According to the answers, 9 out of 9 people (31%) contributed to the deterioration of their mental health. And 4 people (13.8% of the entire group) are not sure if the pandemic caused their stress to worsen or something else.

During the COVID-19 pandemic, it is very difficult to stay in touch with friends. Compulsory quarantine does not make the task of acquaintance easier. Yes, you can try to contact your friends over the Internet, but of course it's not the same. Group of 28 (93.3%) of the surveyed swimmers had contact with their peers and still do. One person (3.3%) had no contact with friends. Another person (3.3%) tried to get in touch but failed to do so.

## Discussion

Training for players during the pandemic was very difficult. A new situation, accepting it and adjusting it is not always easy and pleasant. There will be supporters of on-line training, but are you sure they want to apply to training? Are you sure they want to reach the top? Many different factors are of great importance in training, such as: motivation to work on your skills (getting better and better results), systematicity, and a commitment to fight until the very end in difficult moments.

The majority of people with higher education in the Polish population practice cold water immersion. Men more often take up this activity than women. The age range is larger in the group of men who winter swim than in the group of women. The older the respondents are, the more frequently they practice cold water immersion. The factors which motivated people to take up cold water immersion included: improvement of mood and general health improvement (Trylińska-Tekielska E. et al., 2022).

An increase in the number of used vaccines leads to a decrease in the country's place in the ranking in terms of the number of infected. Vaccination is an effective measure to stop the spread of infection in the world (Shynkaryk, O., et al., 2022).

Expressed unfavorable perceptions of online teaching during the COVID-19 pandemic. The results of this study revealed that all of the participants looked forward to teaching face-to-face physical education because they missed in-person relationships and interactions with their students (Kim, M., et al., 2021).

The outdoor training proposal in this study did not have a high level of participation for various reasons, both subjective and objective, which led the subjects to choose other training methods or decide not to perform any motor or sports activity (Raiola, G., Di Domenico, F., 2021).

To our surprise, the players did not deteriorate as much as we assumed at the beginning of the study. It cannot be denied that the Covid-19 pandemic created a huge confusion in the minds of players and the organization of training, because before the outbreak of the pandemic, training looked completely different. It is comforting to involve young people who are aware of the importance of taking care of their health, promoting involvement in sport, and encouraging them to undertake any type of physical activity.

If you go deeper into this topic, you can consult: A research paper on a similar subject, more specifically The model of motor action structure and the technique of designing individual models should be used in the period of swimming technique formation and in the process of improving the technical skills of swimmers (Kovalchuk, V., et al., 2021).

Stroke rate did not show significant correlations with swimming speed, whereas stroke length was associated with performance time during competition. Short-term increase of training volume in camp conditions may be beneficial in improvement of swimming technique and increase the swimming speed among age-group swimmers. Impact on the development of children and adolescents in selected surveys will also increase knowledge in this topic and encourage all kinds of physical activity (Bielec G. et al., 2020).

### Conclusion

The COVID-19 pandemic has wreaked havoc on the swimming environment. Competitors need to put a lot of effort into training to make up for lost time and get back into shape before the epidemic. Some young players thought about ending their careers, fortunately the vast majority are still willing to train. According to most of the students' responses, the epidemic did not increase the stress. On the other hand, the lack of contact with friends from the club had a negative impact on the emotional state of young swimmers.

### Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Conformity to ethical standards.** All procedures performed in studies involving human participants were in accordance with the institutional and/or national research committee's ethical standards and the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study. All subjects of the institutional survey gave consent for anonymized data to be used for publication purposes.

**Experiments on animals** have been carried out in accordance with the provisions of the Helsinki Declaration of 1975, revised and supplemented in 2002 by the Directives of the National Committees for Ethics in Scientific Research. The carry out of experiments was approved by the Ethics Committee of the University. The modern rules for the maintenance and use of laboratory animals complying with the principles of the European Convention for the Protection of Vertebrate Animals used for scientific experiments and needs are observed (Strasbourg, 1985).

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