

# The COVID-19 Global Pandemic and Changes in Preference and Behaviour Regarding Selected Anabolic Androgenic Substances and Steroids – A Comparative Study

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**BACKGROUND:** The SARS-CoV-2 virus (COVID-19) and the ensuing global public health emergency situation have led to restrictions, changes, and measures in the daily life of society as a whole. The situation culminated in a global pandemic. A number of strict restrictions were adopted to curb the spread of COVID-19. These also affected athletes. After their return to regular strength and endurance training, there may be changes in preferences and behaviour regarding anabolic androgens and steroids (AAS) in this population segment. **AIM:** The aim of the study was to determine whether there is a relationship between the potential interest in information retrieval and a possible subsequent change in preferences and behaviour regarding banned AAS before and after COVID-19 and the country of the respondent. **METHODS:** The Web of Science and Scopus

databases were used to work with the secondary data. The primary data was processed using the technique of quantitative research and selected mathematical-statistical methods. The total number of respondents was 220, with 127 from the Czech Republic and 93 from the Slovak Republic. The snowball method was used for data collection. **RESULTS:** The results showed that there could be a relationship between the change in respondents' preferences and behaviour in relation to banned AAS before and after COVID-19 and the country of the respondents. **CONCLUSIONS:** The most common motive for a change in behaviour and preferences regarding banned AAS was the same for both countries, the Czech Republic and the Slovak Republic. The other motives differed for each country despite the fact that both countries share similar characteristics otherwise.

**Keywords** | Czech Republic – Fitness Centre – COVID-19 Global Pandemic – Slovak Republic – Selected Anabolic Androgenic Substances and Steroids

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## 1 INTRODUCTION

On March 11, 2020, the World Health Organization declared coronavirus 2019 (SARS-CoV-2 virus, COVID-19), first identified in December 2019 in Wuhan, China, an international global pandemic (Zu et al., 2020). The Covid-19 pandemic caused the greatest disruption of people's lives in modern human history (Babečka & Gulášová, 2021). Seniors and people with severe disabilities were considered the most vulnerable group, with a high risk of death (Barkasi, 2021).

This event disrupted the routine life of the population in the area of public health. In response to the outbreak of the COVID-19 pandemic, states introduced interventions to reduce and minimize population mobility in order to contain the spread of the virus and prevent the collapse of medical facilities (Hunter et al., 2021). The pandemic crisis, which most of us could not even have imagined until recently, has become part of our daily life. The crisis affected us in all areas and caused fear, frustration, and depression, and a sense of uncertainty about the future deepened (Popovičová, 2021).

Pastucha et al. (2022), Lau et al. (2020), and Urbański et al. (2021) remark that cultural, leisure, and sports activities were limited and training preparation disrupted. The impact of COVID-19 on sport cannot yet be determined (Wong et al., 2020). Andreato et al. (2020) and Jagim et al. (2020) argue that population isolation, lockdown, and restrictions on physical activity will adversely affect the health and performance of non-professional as well as elite or professional athletes, for whom this could mean a loss of competitiveness when returning to competition.

Once the COVID-19 pandemic subsides and sports facilities reopen, both elite and non-professional athletes will want to return to their pre-pandemic form in the shortest possible time (Popovičová, 2022). However, such a return may not be simple and immediately effective, as some individuals may have increased body fat and obesity, decreased muscle mass, decreased speed, strength, endurance, energy, etc. (Halabchi et al., 2020; Lesser et al., 2020).

When striving to improve one's performance and aesthetic, visual, or physical appearance, there could be a demand for various supportive AAS substances (Kanayama et al., 2018; Murray et al., 2016). In general, such demand is associated with improving an individual's sports performance, increasing self-confidence and muscle mass, endurance, and strength, and with a better perception of the aesthetic, visual, and physical appearance of an individual (Cohen et al., 2007; Ip et al., 2011).

However, the use of AAS may lead to serious, sometimes irreversible health issues and complications, including the risk of death (Albano et al., 2021; Patanè et al., 2020).

In the Czech Republic, legal regulations and other matters related to the use of AAS are resolved by the New Criminal Code (Act No. 40/2009 Coll.) In Slovakia, Act No. 397/2015 Coll. (an Act which, for the purposes of the Criminal Code, provides

a list of substances with anabolic or other hormonal effects; an Act amending certain laws) is in effect.

## 2 OBJECTIVES AND METHODS

This comparative study focuses on the field of sports, specifically on the issue of banned and harmful AAS in the Czech and Slovak Republics. It is obvious that COVID-19 has affected all areas of life around the world, including sports, training, even the Olympic Games, and other sporting events.

The study thus opens up a sensitive issue. However, the authors in no way advocate, promote, or in any other way support the manipulation or use of these prohibited AASs. The present research is viewed merely hypothetically, and the study participants were acquainted with this fact. The situation is viewed as follows: if these banned substances were allowed, how would the preferences and behaviour of the participants in this study change? At the beginning of the survey, the participants were acquainted with the fact that their participation was voluntary and that the manipulation or use of banned AASs is prohibited and punishable by imprisonment in the Czech and Slovak Republics according to the valid legal norms and regulations.

The research itself was more extensive, but this study presents only selected results. The main objective of this comparative study was to determine whether there is a relationship between the participants' potential interest in information retrieval and a subsequent possible change in their preferences and behaviour regarding selected AAS before and after COVID-19 in the context of the country where the respondents live. Using the geographical segmentation criterion, a partial goal was set: to characterize the significance of motives, i.e. why there could be a change in preferences and behaviour regarding selected AAS.

**Research Question 1:** Is there a statistically significant relationship between the participants' potential interest in information retrieval and a subsequent possible change in their preferences and behaviour regarding selected AAS before and after the COVID-19 pandemic and the country where the respondents live?

**Research Question 2:** What are the real motives for a possible change in the participants' preferences and behaviour regarding selected AAS before and after the COVID-19 pandemic in the Czech Republic and the Slovak Republic?

The research was conducted in the Czech and Slovak Republics in May and June 2021 through an online questionnaire survey, which was structured and anonymous.

Because of the sensitivity of the issue being researched, the snowball method was used to select the respondents. People who consented to participation and were of a biological age  $\geq 15$  years were enrolled in the study. These were participants who go to fitness centres in the Czech or Slovak Republics. Furthermore, the participants were asked to share the questionnaire survey, especially among people who they knew who regularly exercised in fitness centres. The online questionnaire

survey focused on several areas. The behaviour of the participants was monitored using a five-point Likert scale of agreement. The maximum disagreement with the statement was indicated by the number 1 and the maximum agreement by the number 5.

The total number of respondents was 220, of whom 127 were from the Czech Republic and 93 from the Slovak Republic. Verification of the research hypothesis was performed using Pearson's chi-square test, which verifies whether there is a relationship between the selected features. If the p-value is lower than the selected level of significance (usually 0.05, i.e., 5%), the null hypothesis is rejected. The Microsoft Excel 2013 spreadsheet processor and IBM SPSS Statistics 23 statistical software were used to analyse the primary data.

### 3 RESULTS AND DISCUSSION

Table 1 presents the structure of the respondents who were involved in the study. The table shows that 96% of the respondents from the Czech Republic and 97% of those from the Slovak Republic were men. On the basis of the age structure, it can be stated that most of the respondents in the Czech Republic were aged 20–29 (70.08%), and most of those from the Slovak Republic were of the same age (60.22%). 98% of the respondents from the Czech Republic and 96% from the Slovak

Republic attended fitness centres regularly before COVID-19, while after COVID-19, there was a slight decrease in training in fitness centres. Training at a frequency of at least three times a week is considered regular training.

Pearson's chi-square test was used to verify Research Question 1. The survey showed that the p-value is lower than the usually defined significance value of 0.05. It can be concluded that there is a relationship between the participants' potential interest in information retrieval and a subsequent possible change in the participants' behaviour regarding selected AAS before and after COVID-19 and the country where the respondents live ( $X^2 = 148.884$ ,  $df = 3$ ,  $p < .001$ ). The strength was then examined using Cramer's V, which was found to be 0.582. We can talk about a medium-strong relationship.

The comparative study further examined possible motives as to why there could be a change in the behaviour of the participants regarding banned AAS on the territory of the Czech and Slovak Republics. In the survey, the respondents had a choice of options that were identified by processing a literature search. It was possible to select only one of the options (shortening the time required for body regeneration after training; increasing an individual's self-confidence; improving fitness, performance, and endurance; growth of muscle mass and strength, and improved perception of the aesthetic, visual, and physical appearance of an individual).

**Table 1** | Structure of the respondents

Czech Republic			Slovak Republic		
Gender	Absolute frequency	Relative frequency (%)	Gender	Absolute frequency	Relative frequency (%)
female	5	3.94	female	2	2.15
male	122	96.06	male	91	97.85
Total	127	100.00	Total	93	100.00
Age	Absolute frequency	Relative frequency (%)	Age	Absolute frequency	Relative frequency (%)
15–19	5	3.94	15–19	6	6.45
20–29	89	70.08	20–29	56	60.22
30–39	17	13.39	30–39	17	18.28
40-plus	16	12.60	40-plus	14	15.05
Total	127	100.00	Total	93	100.00
Training before COVID-19	Absolute frequency	Relative frequency (%)	Training before COVID-19	Absolute frequency	Relative frequency (%)
Yes	125	98.43	Yes	90	96.77
No	2	1.57	No	3	3.23
Total	127	100.00	Total	93	100.00
Training after COVID-19	Absolute frequency	Relative frequency (%)	Training after COVID-19	Absolute frequency	Relative frequency (%)
Yes	122	96.06	Yes	89	95.70
No	5	3.94	No	4	4.30
Total	127	100.00	Total	93	100.00

Table 2 lists the options as to why there could be a change in the behaviour of the participants regarding selected AAS before and after COVID-19. These were selected separately by the respondents from the Czech and Slovak Republics. The table presents possible motives for changes in behaviour and preferences regarding selected AAS before and after COVID-19 in those respondents who participated in the study in the Czech and Slovak Republics. The most represented motive among the respondents in the Czech Republic was identified as rapid growth and increase in muscle mass and strength (51.18%). The same motive was also marked as the most significant one by the respondents in the Slovak Republic. There, the value of the relative frequency was 52.69%. The second most frequent motive for the Czech respondents was an improved perception of the aesthetic, visual, and physical appearance of an individual (40.16%). On the contrary, for the Slovak respondents the second most frequent motive was the motive of improving fitness, performance, and endurance (22.58%). The third motive in the Czech respondents, according to frequency, was improving fitness, performance, and endurance (4.72%). For the Slovak respondents, the third motive, based on frequency, was improving the perception of the aesthetic, visual, and physical appearance of an individual (19.35%). The penultimate and last motives for a possible change in behaviour and preference also showed differences between the two countries.

Given the fact that both the countries that were analysed share numerous characteristics, it was rather likely that the motives for changes in behaviour and preferences regarding selected AAS before and after COVID-19 in the respondents would be identical in the Czech and Slovak Republics. However, on the basis of the relative frequency, a match was identified only in the first motive, namely a rapid growth and increase in muscle

mass and strength. In the other motives that were mentioned, the two countries that were analysed manifested differences.

This study focuses on a possible change in behaviour and preferences regarding selected AAS before and after COVID-19 in the context of geographical segmentation, in the Czech and Slovak Republics. In general, it can be said, and not only in connection with our research, that the interest of the population in their aesthetic, visual, and physical appearance is increasing as COVID-19 subsides. The question is what alternative each individual will choose to improve their appearance.

The results of our study confirm those of Uddin et al. (2019), who conducted a study in fitness centres in Pakistan, where 60% out of the 841 respondents stated that the motive for behaviour change regarding selected AAS is a rapid growth and increase in muscle mass and strength. 59.4% of the respondents claimed their motive to be improved perception of the aesthetic, visual, and physical appearance of the individual.

Nilsson et al. (2004) concluded in their study that the preferences and behaviours associated with selected AAS in adolescents in Sweden depend on their place of birth. Adolescent men who were not born in Sweden showed more positive preferences and behaviour.

**Table 2 |** Possible motives for changes in behaviour and preferences regarding selected anabolic androgenic substances and steroids before and after the COVID-19 global pandemic in the Czech Republic and the Slovak Republic

Czech Republic			Slovak Republic		
Possible motives for change in behaviour and preference	Absolute frequency	Relative frequency (%)	Possible motives for change in behaviour and preference	Absolute frequency	Relative frequency (%)
Rapid growth and increase in muscle mass and strength	65	51.18	Rapid growth and increase in muscle mass and strength	49	52.69
Improved perception of aesthetic, visual, and physical appearance of the individual	51	40.16	Improving fitness, performance, and endurance	21	22.58
Improving fitness, performance, and endurance	6	4.72	Improved perception of aesthetic, visual, and physical appearance of the individual	18	19.35
Increasing the self-confidence of an individual	4	3.15	Reducing the time needed to regenerate the body after training	3	3.23
Reducing the time needed to regenerate the body after training	1	0.79	Increasing the self-confidence of an individual	2	2.15
<b>Total</b>	<b>127</b>	<b>100.00</b>	<b>Total</b>	<b>93</b>	<b>100.00</b>

## 4 CONCLUSIONS

The comparative study aims to determine whether the global COVID-19 pandemic, which, among other things, curbed most sports activities, could affect the potential interest in information retrieval and a subsequent possible change in preferences and behaviour regarding selected anabolic androgens and steroids.

Despite the fact that some of these substances are banned in the Czech and Slovak Republics and have negative effects on human health, there could be a change in the preferences, interest, and behaviour of an individual connected with the rapid growth of muscle mass and subsequent positive perception of their aesthetic, visual, and physical appearance.

The aim of the study was to determine whether there is a relationship between the potential interest in information retrieval and a subsequent possible change in preferences and behaviour regarding selected AAS before and after the COVID-19 pandemic in the context of the country where the respondents live. The partial goal was to compare the significance of motives in the selected sample of respondents as to why there could be a change in preferences and behaviour regarding selected AAS.

On the evidence of the literature search performed on the issue of the COVID-19 pandemic and selected AAS, two research questions were defined. The verification of the research questions on the basis of the questionnaire survey revealed that there may be a statistically significant relationship between potential interest in information retrieval and a subsequent possible change in preferences and behaviour regarding selected AAS before and after the COVID-19 pandemic and the country where the respondents live. This dependence was evaluated as moderate through the research. Furthermore, it was found that the most common motive for changes in behaviour and preferences regarding selected AAS before and after COVID-19 in the Czech and Slovak Republics was identical for both countries. It was a rapid growth and increase in muscle mass and strength. The order of the other motives differed, despite the fact that the two countries display similar characteristics otherwise.

The limitations of this study include the fact that the study used its own questionnaire survey, which limited the possibility of fully comparing the results of this study with existing studies or research; the study is prone to sampling bias as a result of its reliance on the respondents' willingness to share the questionnaire survey further; the questionnaire survey was conducted online only; the research sample of respondents could be larger. Despite these limitations, it can be stated that the study that was conducted presents interesting, new facts and information.

**Declaration of interest:** No conflict of interest to declare.

**Authors' contributions:** Conceptualization: JB, PS; Introduction and Theoretical background: PS, JB; Methodology and Results: JB, PS; Final edition: PS, JB. Both authors contributed to the article and approved the final version of the manuscript.

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