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[Piotr Gabryjończyk](#)*, [Anna Jęczmyk](#), [Monika Wojcieszak-Zbierska](#), [Jarosław Ugliś](#), [Jan Zawadka](#)

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Article

Physical Activity of University Students Faced with Access Restrictions - An Evidence from Poland

Piotr Gabryjńczyk ^{1,*}, Anna Jęczmyk ², Monika Wojcieszak-Zbierska ², Jarosław Ugliś ² and Jan Zawadka ¹

¹ Warsaw University of Life Sciences – SGGW, Poland

² Poznań University of Life Sciences, Poland

* Correspondence: piotr_gabryjarczyk@sggw.edu.pl

Highlights

Public health relevance—How does this work relate to a public health issue?

- The study bridges a gap in research on how students behave when faced with a number of restrictions and related barriers to being physically active.
- Students will face the future consequences of their choices regarding physical activity while at the same time becoming responsible for shaping role models for future generations.

Public health significance—Why is this work of significance to public health?

- Passive attitude towards consistent physical activity is often explained by a lack of strong role models and habits of spending leisure time actively.
- Greater support of physical education among younger generations is necessary.

Public health implications—What are the key implications or messages for practitioners, policy makers and/or researchers in public health?

- Restricted access to sports facilities is the key problem when engaging in physical activity in crises.
- Even in crises the availability of sports infrastructure should be maintained.

Abstract

Humans need physical effort in order keep a mental and physical balance. Today, it usually takes the form of physical activities they perform in their free time which, however, faced considerable limitations caused by COVID-19. Therefore, the authors decided to see the way university students exercised physical activity when dealing with multiple restrictions entailed by the pandemic. This topic was explored through a Web-based survey administered to 1260 students of several tens of Polish universities. The analysis used the t-test and the chi-square independence test. As shown by the results, consistent physical activity was more frequently exercised by men. Usually, the interviewees opted for moderate-intensity activities. Walking and simple fitness exercises, i.e. something they could perform in their everyday environment and could continue when in the lockdown, were the most popular forms of recreation. Rather than health risks related to being directly exposed to COVID-19, restricted access to sports facilities and lack of time proved to be the key problems. The most interesting conclusion is that the pandemic turned out to be an incentive for an even greater activity for those students who had already been engaged in consistent physical exercises.

Keywords: physical effort; Polish students; pandemic; COVID-19

1. Introduction

Insufficient levels of physical activity in the society have become widely discussed over the recent years. It has resulted in the emergence of many media programs and broadcasts, but has also triggered a number of reports, research projects and accompanying scientific papers, mostly focusing on the positive impacts of physical activity on mental and physical health [1].

Nowadays, staying healthy and exercising is viewed as a condition for basic professional and social competencies, and as a way of improving one's quality of living [2–4]. This is what makes it so important to engage in different kinds of physical activity as it constitutes an integral part of human daily lifecycle. As confirmed by scientific research, regular physical activity has a determinant impact on how long and how well people live. An adequate mix of activities has an enriching effect on human intellect and allows to keep a mind and body balance [5].

Physical activity is defined as a fair, barrier-free, feasible and adaptable strategy for supporting mental health [6] (p. 2), which brings ample benefits in terms of health and the way people feel, including a reduced risk of chronic diseases and improved mental and social health [7] (p. 2). It is part of every stage of human life and, importantly, can be exercised at home or outside.

Physical activity is essential for humans, has a beneficial impact on their minds, contributes to general fitness and efficiency of body systems, improves metabolism, and is a condition for proper somatic development [8]. Thus, there are reasonable grounds for believing that physical activity is among the basic aspects of a healthy lifestyle and is largely responsible for human health [9,10]. Human body is naturally built to be in motion, and therefore requires regular physical activity in order to ensure optimum performance and avoid diseases [11,12]. Also, being physically active is essential for proper human development, especially as today's society is exposed to a sedentary lifestyle and various threats posed by lifestyle diseases [13,14].

However, during the COVID-19 pandemic, the societies faced an unprecedented situation caused by restrictions generally imposed on different aspects of life (rather than by their inner motivation), which also made it more difficult to be physically active [15] (p. 7). Leksy pointed out to the dramatically low levels of sports activity among children and youth caused by the pandemic, and stated that measures needed to be taken across multiples sectors with a view to support physical activity [16]. This seems to be fully justified because insufficient exercising translates into higher costs of healthcare in the general population [17]. Indeed, according to research, if the frequency of physical inactivity does not change, by 2030, the world will witness 499.2 million of new cases of serious non-contagious diseases which could be prevented with an adequate amount of physical exercise [18] (p. 36).

This paper tries to empirically explore the kinds of physical activity engaged into by students of Polish universities during the COVID-19 pandemic. All social groups were subject to numerous restrictions and limitations, especially including young adults such as students.

The study was carried out between December 2020 and May 2022 as a questionnaire-based diagnostic survey. The questionnaire was administered by e-mail to students of several tens of Polish universities by persons in charge of remote teaching. Replies were retrieved from 1260 respondents.

This study bridges a gap in research on how students behave when faced with a number of restrictions and related barriers to being physically active. The barriers were due to an extraordinary situation, the COVID-19 pandemic, which occurred for the first time in their lives, and imposed legal regulations enforced by competent authorities. In the future, the lack or considerable reduction of physical activity can lead to broad consequences not only for that very group, but for the society as a whole.

2. Literature Review

2.1. Definition and Meaning of Physical Activity

Physical activity is necessary for proper development not only in physical but also in emotional, intellectual and social terms; it is a sine qua non condition for proper health [8] (p. 44) [19] (p. 154) and for optimum mobility of the human body [20] (p. 54). It also represents one of the fundamental conditions for health and wellbeing, and forms an inherent part of health promotion efforts with respect to all age groups. As demonstrated by research, a positive correlation exists between the individuals' physical activity level and their view of their own health condition [21] (p. 1).

Indeed, regular physical activity and fitness have a beneficial impact on human health [22] (p. 64) [23] (p. 126) [24]. This is one of the lifestyle components which largely depends on the environment where people grow up, i.e. the surrounding natural, social and cultural structure. The impacts exerted on them in that environment are either continuous (or long-term) or short but intense [25] (p. 429). Schools and sports clubs are an important factor in supporting that activity, as they make young people increasingly interested in areas of their choice [26] (p. 250).

The World Health Organization (WHO) defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure [27]. This high-level definition includes not only sport exercises but any physical effort involved in active commuting, e.g. to work or school (referred to as commuting physical activity), in professional activities (professional physical activity), in housekeeping, and leisure time physical activity (referred to as non-professional physical activity) [5] (p. 32). Note however that the Polish scientific literature uses two terms referring to that topic, namely bodily movement activity (*aktywność ruchowa*) and physical activity (*aktywność fizyczna*). Bodily movement activity means any and all behaviors related to different ways of moving in the environment, or to moving different parts of one's body with respect to each other [28]. This can be done as part of professional activities, house chores, rehabilitation or leisure [29]. Thus, the definition of bodily movement activity is very ample, and refers to any and all kinds of motion and physical efforts, irrespective of what motivates them and what purpose they serve. The second term is physical activity which should be viewed as leisure, and something people do in their free time. This includes different kinds of exercises and sports (games where people move, tourism, walking etc.) in which individuals willingly engage in their free time to relax, have fun, improve their health and develop their personalities.

Being physically active is related to social, economic and environmental factors such as land relief and development, the presence or absence of sports infrastructure, and the way people move from one location to another. Also, it is driven by cultural traditions [19] (p. 153).

2.2. Physical Activity of Students

University students are a specific social group who find themselves at the last stage of education [30] (p. 58). Their lifestyle is conditioned by multiple factors: timetables, the need to work and learn, the fatigue it causes, the university's location and distance from where they live, and habits learned at home. These young people make their own lifestyle decisions, and somehow deny the fact that delaying the process of aging and staying fit at an older age is one of the conditions for living longer. Moreover, they ignore the message that being physically inactive will have adverse consequences for their bodies in the future [20] (p. 54). Students' lifestyles are highly diversified in function of the stage of education, timetable, amount of things to learn and financial resources. Although most students are knowledgeable and aware of the positive health impacts of physical activity, they often do not engage in it because the way they live their lives makes it impossible [31] (p. 405).

Young adults are exposed to numerous physical, emotional and social changes which can affect their key health behaviors. Note also that upon starting their university studies, they become less physically active and shift to a mostly sedentary lifestyle, which was even more evident during the COVID-19 pandemic [32] (p. 1). A study by Pilecka et al. indicates the importance of providing university students with adequate information on mental and body hygiene, appropriate amount of

sleep, and how to control the time spent sitting [33]. Also emphasized are incentives and encouragement for specific physical activities. Pilecka et al. point to the fact that such measures should be first targeted at students with anxiety, irritation and depression symptoms [33]. Their study also confirms that students of Universities of Physical Education restricted their physical activity during the COVID-19 pandemic. Similar findings were presented by Aslan et al. who revealed a considerable decline in physical activity levels among Turkish students (from 188.08 to 75.53 minutes per week) [34]. As Rogowska et al., Srivastav et al., Gallo et al., Dinler et al. rightly noted, for some people (those who exercised at home), the pandemic proved to be beneficial in terms of maintaining or improving their fitness [35–38]. Others, however, lost their willingness and motivation to be active and therefore saw their fitness and health condition decline. In turn, Ghrouz et al. showed in their study that a relation exists between physical activity levels, the quality of sleep, and mental health among students [39]. It means that low levels or absence of physical activity often cause anxiety or stress which has a negative impact on the students' health and sleep quality. As Badicu emphasized, physical activity is beneficial to students when performed regularly, because this is the only way it can affect their quality of sleep and mental and physical condition [40]. He also pointed to some important differences in levels of physical activity between students depending on the year of studies, gender and academic specialization [40]. Authors who presented similar results include Pelletier [41], and Sepehr [42]. According to them, the lack of physical activity among young people can lead to psychosomatic disorders.

2.3. Impact of COVID-19 on the Ability to Engage in Physical Activity

Recently, the worldwide COVID-19 pandemic has had a major impact on every aspect of social life. SARS-CoV-2 is a severe acute respiratory syndrome coronavirus that causes COVID-19, a respiratory illness. It emerged in late 2019 in the Chinese city of Wuhan, and triggered the global pandemic in 2020 [43]. The virus confined societies to homes, and made life harder not only to individuals but to whole economies at nation level. This unprecedented situation had numerous consequences for the everyday life of consumers, and radically changed the way enterprises operate [44]. Modern quarantine strategies were put in place across the globe, such as short- and medium-term lockouts, voluntary curfew, restriction of the right to assemble, cancellation of planned social events, restriction of sports activity, and prohibition on traveling. Also, the governments closed the air space and state borders [45]. The pandemic, isolation and restrictions resulted in the societies becoming less mobile. The increased amount of time spent passively, restricted peer contacts, and lack of access to organized physical activity had a strong impact on the mindset of societies, making people feel lonely and depressed [46] (p. 166). It meant keeping a physical distance which involved a decline in the sense of wellbeing, plus symptoms of post-traumatic stress disorder, anxiety and anger. Staying home for prolonged periods also restricted the ability to engage in physical activity or made people change the way they engage in it [22] (p. 65). The outbreak of the COVID-19 pandemic exacerbated the problem of insufficient physical activity, including among students. The introduction of online classes made them change their lifestyles; most of them reduced, if not discontinued, physical activity they had been engaged in previously (including as part of physical education classes) [47] (p. 68).

3. Materials and Methods

3.1. Data and Methods

This paper investigates the physical activity of Polish university students during the COVID-19 pandemic. The specific goals of the study include exploring:

- what young university students think of the impact of physical activity on humans;
- whether the interviewees are engaged in consistent physical activity during the pandemic, and how they self-assess their level of physical fitness;
- the reasons for not engaging in consistent physical activity during the pandemic;

- obstacles and difficulties faced by students when engaging in physical activity during that period;
- the frequency of performing specific kinds of exercises during the COVID-19 pandemic;
- young university students’ preferred forms and locations of physical activity;
- the way the students’ physical activity changed during the pandemic.

The research relied on a questionnaire-based diagnostic survey. Composed of 19 closed and semi-closed questions, the questionnaire was administered by e-mail to students of several tens of Polish universities by persons in charge of remote teaching, upon request by the authors. The study was conducted from December 2020 to May 2022, and used the Webankieta.pl website. Valid questionnaires were retrieved from 1260 students.

Data collected during the study was subject to a statistical analysis with the use of STATISTICA 13.3. The t-test and the chi square independence test were employed in order to assess the differences in the characteristics considered between women and men. The results are deemed significant at $p < 0.05$.

3.2. Characteristics of the Respondents

The survey was administered to 1260 students of Polish tertiary education establishments. Most of them were women (68.3%). Although the members of the sample differed in age (from 17 to 48 years), people aged up to 20 prevailed and the mean age was 21.7 (because the sample was composed of students). The vast majority of the interviewees were students of public universities (over 90%) enrolled in full-time programs (nearly ¾ of the sample). Students of first-cycle programs formed the largest group (a total of 83%). Although the respondents included representatives of many fields of study, the largest groups were tourism and recreation and hospitality students as well as economy students (in both cases with a much greater share among women). Most respondents originated from a city (almost 60%) and lived in a city when the study was carried out (nearly 70%). Nearly 93% of respondents were Poles (with Ukrainians and Belarusians being the other largest national groups). The interviewees viewed their financial situation as quite satisfactory. Most of them (nearly 56%) believed it to be good or very good (slightly more frequently by men). Over one third considered it to be average. Table 1 presents the details for the sample as a whole and split by gender.

Table 1. Characteristics of the respondents.

	Total N=1260	Women N=861	Men N=399
Age			
min	17	17	17
max	48	48	47
mean	21.7	21.6	21.9
dominant	20	20	20
University type (%)			
public	90.5	89.6	92.5
non-public	9.5	10.4	7.5
Year of studies (%)			
1 st year of first-cycle studies	37.1	33.7	44.6
2 nd year of first-cycle studies	26.0	27.8	22.3
3 rd year of first-cycle studies	18.3	20.6	13.5
1 st year of second-cycle studies	4.2	4.1	4.5
2 nd year of second-cycle studies	8.0	8.5	7.0
other	6.4	5.3	8.1
Program type (%)			
full-time	73.3	75.5	68.4
extramural	26.7	24.5	31.6

Field of study (%)			
tourism and recreation; hospitality	38.1	42.7	28.1
economics	34.6	36.0	31.6
exact sciences	6.8	2.4	16.0
technology and engineering	5.6	3.6	10.0
agriculture, forestry, veterinary medicine	3.7	3.6	3.8
natural sciences	3.1	3.4	2.5
other	8.1	8.3	8.0
Place of origin (%)			
village	42.1	45.1	35.8
city with a population of up to 50,000	21.1	19.8	24.1
city with a population of 50,000–100,000	9.0	9.2	8.5
city with a population over 100,000	27.8	26.0	31.6
Current place of residence (%)			
village	30.3	30.0	31.1
city with a population of up to 50,000	15.1	13.7	18.0
city with a population of 50,000–100,000	7.1	7.7	5.8
city with a population over 100,000	47.5	48.6	45.1
Nationality (%)			
Polish	92.5	92.1	93.5
other	7.5	7.9	6.5
How do individuals view their own financial situation (%)			
very good	12.1	12.4	11.5
good	43.6	41.8	47.4
average	36.6	38.1	33.3
poor	6.9	7.0	6.8
extremely poor	0.8	0.7	1.0

Source: own study.

The respondents represented nearly 40 academic centers located in all 16 Polish voivodeships.

4. Results and Discussion

As shown by the study, more than half of the students covered by it (55.8%) did not engage in any consistent physical activity during the pandemic (consistent physical activity was defined as performing an aerobic activity for no less than 20 minutes, strength training of large muscle groups, or gymnastics and stretching at least twice a week during the last month). These results do not differ much from what was established by Lipošek et al. even before the pandemic in a sample of Slovenian students of which 54.2% engaged in physical activity 2–3 times a week or more frequently [48] (p. 93). In turn, Italian students declared a very similar level of activity (44,7%) in the lockdown period caused by the pandemic [15]. A similar pattern was discovered by Busque et al. in a group of almost 2,000 Canadian students; according to their study, even before the pandemic, as much as 55.2% of respondents declared not to engage in any physical activity [49] (p. 108). However, importantly, in the Polish sample, women were much more passive in that respect than men (59.2% vs. 48.4%). Note also that the group of interviewees ranked their own physical fitness at 3.3 on a scale from 1 (extremely weak) to 5 (extremely good). Women ranked it at 3.2, whereas the rank given by men was slightly higher (3.5). The t-test confirmed that gender had a statistically significant impact on it (t=4.80; p=0.000). It is also worth noting that the fact of female students being less physically active was already acknowledged by Haase et al. who analyzed data from 23 countries across the globe, and proved that the gap between genders varied between 3 and 18 percentage points depending on the group of countries concerned [50] (p. 185). The above is consistent with what this study found. Similar observations were made by Bergier, Bergier and Tsos in a group of 2125 Ukrainian students [51] (pp. 705–706). However, it may seem worrying that inactivity rates recorded in Central and Eastern

European countries (Bulgaria, Poland, Romania, Slovakia and Hungary) 20 years ago were considerably lower, with barely 25% for men and 33% for women [50] (p. 185), i.e. half the scores obtained in this study. This could reflect a highly disquieting trend of a general decline in interest in regular physical activity in Poland, which is likely exacerbated by the time this study took place. In this context, it is small consolation that the same phenomenon was witnessed already in the late 1990s / early 2000s in other countries, such as China [52].

The reasons referred to by the respondents in justifying their lack of consistent physical activity during the pandemic include unwillingness, laziness, shortage of energy, fatigue and lack of determination. Importantly, all of these reasons were far more frequently cited by women. Also, as regards the whole sample, these reasons are consistent with what was indicated by students in studies carried out in 2012 and 2013 [20]. However, what seems interesting is that according to the abovementioned study by Lipošek et al., the key causes for being passive are the lack of free time and the overwhelming burden of learning [48] (p. 94). In turn, Ferreira Silva et al., based on a review of 22 papers on barriers to physical activity of young university students, found the following to be the key problems: lack of time; lack of motivation; lack of appropriate locations [53]. It can therefore be inferred that the particularities of the period of this study (the pandemic) did not have any major impact on the reasons for physical inactivity of Polish young university students. It was less common for them to indicate restrictions caused by the outbreak of the pandemic, i.e. restricted access to fitness centers and clubs, swimming pools and similar facilities, having no one to exercise with (due to the general COVID-related isolation and social distancing), and strict compliance with isolation principles. All of the above reasons were slightly more frequently cited by men (Figure 1).

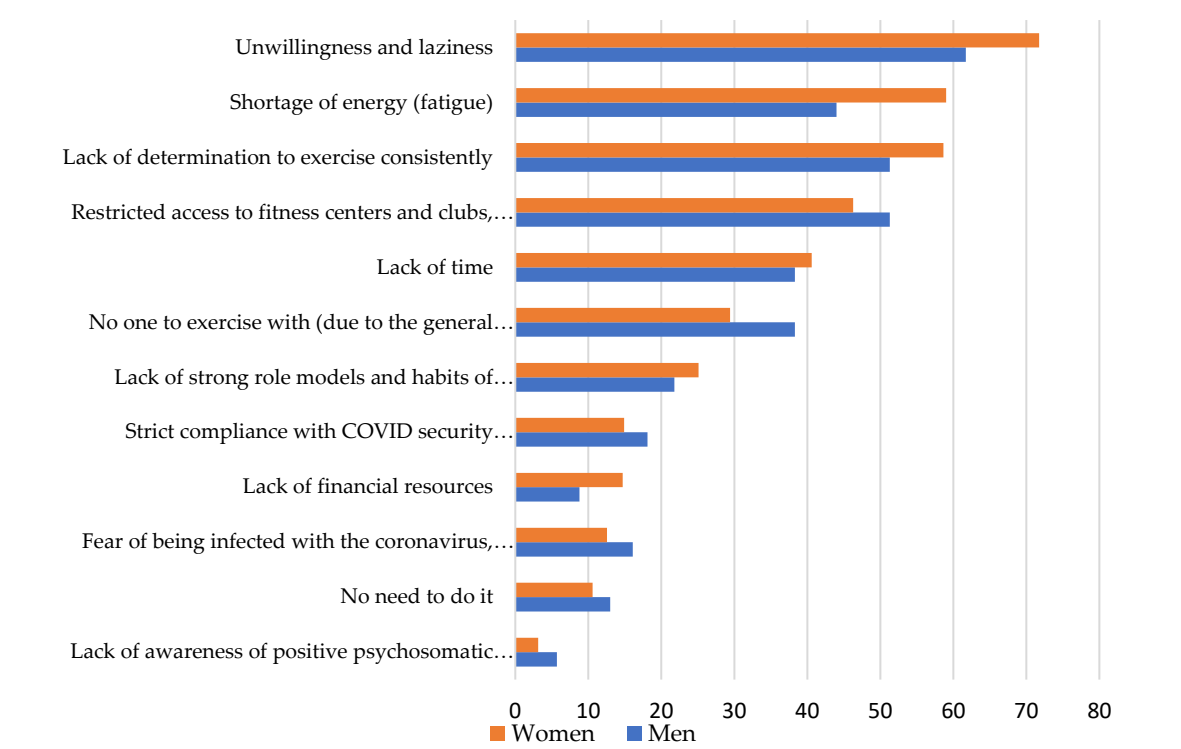


Figure 1. Reasons for not engaging in consistent physical activity during the COVID-19 pandemic among the respondents (%). The respondents could pick more than one answer, N=703. Source: own study.

Note that the fear of being infected with the coronavirus (slightly more frequently indicated by men) had a relatively minor importance. This could be explained by the respondents’ age and the fact that the infection had a quite mild course in young people, which made them less afraid of it. Conversely, it is worrying that ca. 25% of respondents (mostly women) explained their passive attitude towards consistent physical activity by a lack of strong role models and habits of spending

leisure time actively. This might result from high school physical education classes being inefficient or poorly organized. In addition to exercising, their goal and outcome should also be to instill in the young generation a habit to engage in consistent physical activity and make them perceive it as a must. The above can also explain the lack of awareness of positive effects of regular physical activity, which was more common in men.

In the sample, 44.2% of the respondents declared to have been physically active on a regular basis during the pandemic. This may seem to be quite high compared to what was found in Slovenia, Italy and Canada, as mentioned earlier. However, it needs to be emphasized that the ratios recorded in some countries were by far higher: in Malaysia and Indonesia, as much as 79.6% and 77.6% of students, respectively, declared to have been physically active during the lockdown [54]. In turn, in a study carried out by Gallo et al. with a group of Australian students, that percentage was even higher, reaching as much as 80% [37]. It should be noted, however, that the sample was composed of students enrolled in biomedical science programs [37]. Similar conclusions were drawn by Romero-Blanco et al. from a study carried out in a group of 213 Spanish health science students which became increasingly physically active during the pandemic [55]. This was particularly noticeable in women who accounted for as much as 80% of the sample. Interestingly, such a pattern was not observed by Talapko et al.; in their study, during the pandemic, physical activity of 823 Croatian students of health sciences proved to be at a level similar to that established in this study, reaching barely 40.8% [56]. In the Polish sample, men demonstrated a considerable advantage over women (with 51.6% and 40.8%, respectively); a similar relationship was discovered in the study by Talapko et al., in which the respective ratios were 53.6% and 37.9% [56]. The chi-square test confirmed the statistically significant impact of gender on being engaged in physical activity ($\chi^2 = 13.04$; $p=0.003$). That group of interviewees usually opted for moderate-intensity activities, and exercised 2 to 5 times a week. Intense physical activity was also a popular option. Note that both moderate and intense activities were slightly more frequently chosen by women. Strength training of large muscle groups (preferred more often by men) was usually performed 2–3 times a week (Table 2). Note also that physically active students rated their level of physical fitness much higher (3.8 on a scale of 1 to 5, with 3.8 for women and 3.9 for men) than those who did not engage in physical activity on a consistent basis. Simple gymnastics, such as pilates or stretching, were slightly less popular, but much more common in women.

Table 2. Frequency of engaging in specific types of physical activity among the interviewees (times per week) during the COVID-19 pandemic (%).

Activity type	Gender	Number of activities per week									
		0	1	2	3	4	5	6	7	more than 7	
Moderate physical activity (30 minutes or more)	women	2.3	5.7	18.8	26.8	17.9	14.2	7.7	4.0	2.6	
	men	8.3	4.9	14.1	20.9	19.4	17.5	2.9	6.8	5.3	
Intense physical activity (20 minutes or more)	women	7.1	12.0	21.1	27.9	12.5	8.3	5.4	1.7	4.0	
	men	7.8	12.6	18.4	20.4	12.6	12.6	4.4	4.4	6.8	
Strength training of large muscle groups	women	20.5	15.1	21.4	23.9	9.4	4.3	2.3	2.6	0.6	
	men	14.1	10.7	17.5	28.2	15.0	6.8	4.4	1.5	1.9	
Simple gymnastics, pilates, stretching	women	9.7	19.7	17.7	19.9	15.4	10.3	3.7	3.7	0.0	
	men	30.6	18.9	13.6	12.1	9.7	5.3	3.4	3.4	2.9	

Source: own study.

The interviewees largely differed in their preferred forms of physical activity during the pandemic. However, only 5 of them were consistently practiced by at least 30% of respondents (on average for both genders), namely: walking (61,6%) and simple gymnastics (43.1%, both much more preferred by women), strength training with equipment at home or in a fitness center (35.0%, much

more often indicated by men), biking (34.5%) and calisthenics, i.e. strength training that utilizes an individual’s body weight (30.2%). For details, see Table 3. Note that these results are similar to what was discovered by Pietsch, Linder and Jansen in a group of German students. In their study, the most popular activities during the pandemic proved to be different kinds of strength training practiced solely at home, whether based on online training programs (67.7%) or self-organized (52.5%), jogging (57.4%), walking (43.5%) and biking (41.3%) [57] (p. 54). Similar forms of activity, even in the pre-pandemic period, were also declared by Ukrainian students. In that group, the activities most frequently practiced by women were walking (as much as 74.8%), running (55.2%) and dancing (46.1%), whereas men mostly opted for running (62.4%), football (58.3%) and walking (51.6%) [58] (p. 219).

Table 3. The interviewees’ preferred forms of physical activity during the COVID-19 pandemic (%).

Activity type	Practiced on a regular basis (unless the season, weather or COVID restrictions make it impossible)		Practiced sporadically		I would like to try/practice but I am unable to do so for various reasons		Not interested in it	
	W	M	W	M	W	M	W	M
Walking	71.2	45.1	25.1	40.8	2.3	3.9	1.4	10.2
Simple gymnastics, stretching, pilates	53.6	25.2	34.2	30.6	5.4	13.1	6.8	31.1
Strength training with equipment at home or in a fitness center	30.2	43.2	27.4	27.2	12.5	12.6	29.9	17.0
Biking	33.6	35.9	42.2	37.4	12.8	14.6	11.4	12.1
Calisthenics (training that utilizes an individual’s body weight)	29.1	32.0	32.5	31.6	11.1	15.5	27.4	20.9
Exercising at home with the use of an elliptical trainer, rowing machine, treadmill etc.	22.5	16.5	25.9	23.3	16.8	14.6	34.8	45.6
Dancing	22.5	4.9	29.6	13.1	14.2	14.6	33.6	67.5
Running	14.0	18.4	35.6	38.3	21.4	16.5	29.1	26.7
Team sports (football, handball, volleyball, basketball)	6.8	25.7	23.1	33.0	16.5	15.0	53.6	26.2
Yoga	17.1	5.3	28.8	7.3	13.1	11.2	41.0	76.2
Aerobics	15.4	2.4	25.1	12.6	15.4	9.2	44.2	75.7
Downhill skiing and snowboard	7.4	12.1	14.8	11.7	17.1	19.4	60.7	56.8
Scooter riding, roller skating, skateboarding	8.5	5.3	29.3	20.4	14.2	10.2	47.9	64.1
Group exercising in a fitness club	9.1	3.9	13.7	6.8	21.9	9.7	55.3	79.6
Swimming	6.3	6.3	31.3	35.0	29.3	30.1	33.0	28.6
Ice skating (on indoor rinks)	6.3	5.8	25.9	12.1	15.4	10.7	52.4	71.4
Martial sports	2.8	9.7	5.4	9.2	22.2	22.8	69.5	58.3
Crossfit	5.1	4.4	16.5	12.6	16.8	12.6	61.5	70.4
Badminton	4.3	4.4	26.8	13.1	12.0	14.6	57.0	68.0
Nordic walking	4.3	3.9	11.7	3.9	10.8	6.3	73.2	85.9
Horse riding	4.3	3.9	6.6	3.9	19.9	9.7	69.2	82.5
Table tennis	2.0	6.8	12.8	21.4	13.1	16.0	72.1	55.8

Canoeing, rowing	2.3	5.8	13.7	12.6	14.8	15.5	69.2	66.0
Tennis	1.1	6.3	6.3	10.2	21.7	21.4	70.9	62.1
Cross-country skiing	2.0	4.4	3.4	4.4	12.3	8.7	82.3	82.5

Source: own study.

Running (36.6%), swimming (32.7%), team sports (26.8%, significantly more for men), scooter riding, roller skating, skateboarding (26.0%, significantly more for women), as well as exercising at home with the use of an elliptical trainer, rowing machine, treadmill etc. (25.0%) proved to be the most popular activities performed sporadically (i.e. indicated by ¼ of the respondents, except for those discussed above).

Note also that nearly all forms of physical recreation (whether performed consistently or sporadically) preferred by the interviewees could be performed individually and did not require using sports facilities. This can be largely explained by the particularities of the study period in which it was inadvisable to attend crowded places and contact other people. Such behaviors were restricted to a minimum due to the risk of coronavirus infection.

During the pandemic, the vast majority of students (81.3%) exercised at home (significantly more frequently for women) or in its immediate vicinity (33.4%, slightly more frequently for women). For details, see Figure 2.

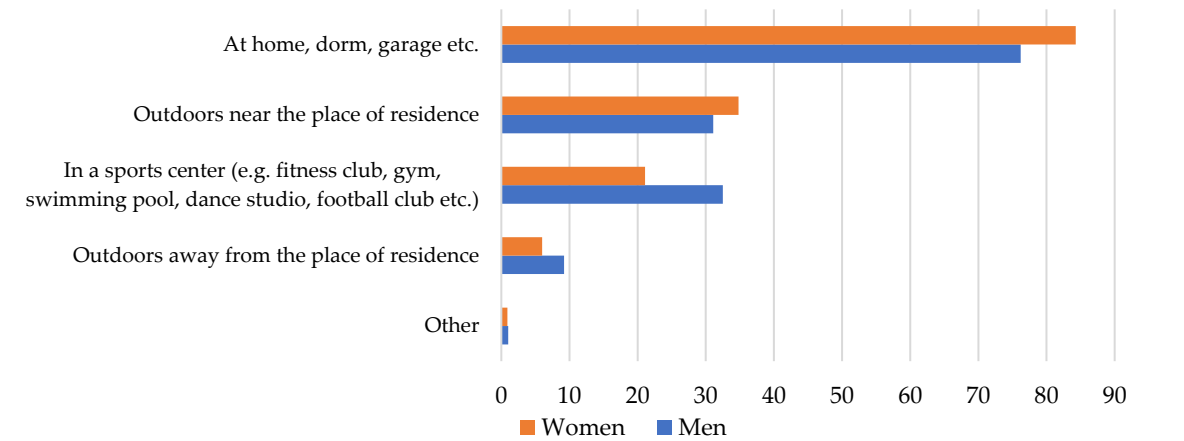


Figure 2. Places where the respondents performed physical activity during the pandemic (%). The respondents could pick more than one answer, N=557. Source: own study.

A total of 25.3% of interviewees performed physical activity in different kinds of sports facilities. Men clearly dominated this group, which is likely due to them much more frequently choosing strength training (usually practiced in fitness centers).

An important issue explored as part of this study were the obstacles and restrictions faced by the respondents when engaging in physical activity. The most frequently cited issues were the consequences of the pandemic, i.e. access to fitness centers and clubs, swimming pools and similar facilities being partly or (in some periods) totally restricted (over 59.1%). Another frequent cause indicated by the students were time restrictions resulting from studying, working or private life (nearly 44.7%, much more for women). Not enough determination, drop in motivation to consistently engage in physical activity, and insufficient energy and fatigue were indicated by 32.0% and 30.9% of respondents (in both cases, women prevailed). The replies given by representatives of both voivodeships are presented in Figure 3.

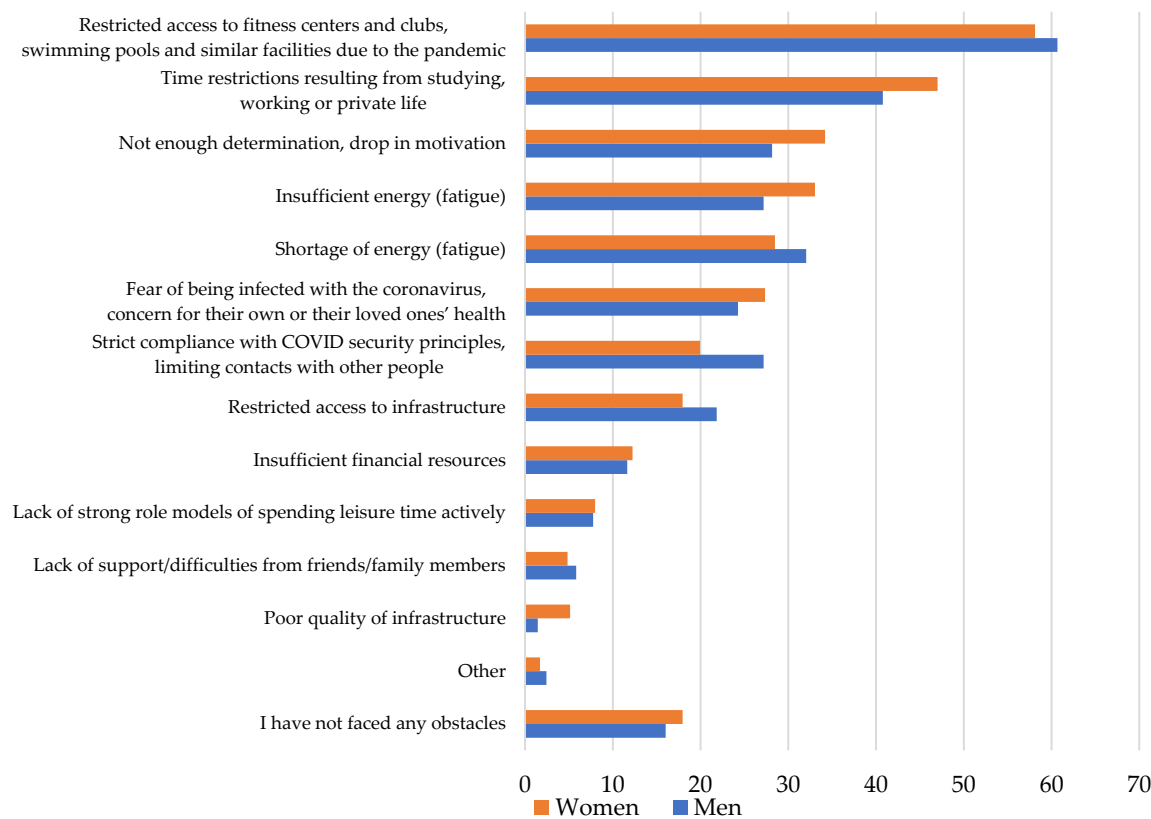


Figure 3. Obstacles and difficulties faced by respondents when engaging in consistent physical activity during the COVID-19 pandemic (%). The respondents could pick more than one answer, N=703. Source: own study.

In addition to restricted access to sports and reaction facilities, the interviewees also indicated other consequences of the pandemic which made it difficult for them to exercise on a regular basis. These were the fear of being infected with coronavirus, concern for their own or their loved ones' health (29.8%, slightly more for men), strict compliance with COVID security principles, including limiting contacts with other people (26.2%, slightly more for women), and having no one to exercise with because of the general isolation and the intent to minimize contacts with other people (22.6%, much more for men). It needs to be emphasized that according to 7.9% of respondents, there is lack of generally available, widespread patterns of active leisure. Interestingly, 17.2% of interviewees (slightly more for women) declared not to have encountered any obstacles or difficulties when engaging in physical activity during the pandemic. In their large-scale research project carried out with a group of almost 14,000 Spanish students, Rodríguez-Larrad et al. proved that the key reason for restricting their physical activity was the inability to go out and do the usual exercises; note however that this barrier was indicated by only 9.3% of respondents [59]. Lack of time (7.6%) was the second most frequent cause whereas limited space at home (7.2%) was the third one [59]. It can therefore be concluded that, although worded in a different way, these reasons are similar to what was established in this study. However, these barriers were indicated by a clearly smaller percentage of interviewees than in the Polish sample.

The respondents were also asked to indicate the way their physical activity changed during the pandemic. When averaged, the results are somehow similar to what was discovered by Talapko et al. [56]. In their study, 56.6% of Croatian students declared to have reduced their physical activity during the pandemic, 28.3% maintained it at the same level, whereas only 15.1% increased its intensity. In turn, there are huge noticeable differences between persons who exercised on a consistent basis and those who lacked consistency, i.e. who exercised sporadically or spontaneously (Table 4). Note however that both groups had a similar percentage (ca. ¼) of persons who did not make any essential change in their approach towards physical recreation during the pandemic. Another important remark is that in the group of regular exercisers, over 43% declared to have

increased their activity in the pandemic. A drop in physical activity was reported by only 1/3 of representatives of that group. Conversely, a vast majority (almost 70%) of those who lacked consistency said that their physical activity dropped during the pandemic (an increase was reported by barely 7.5% of respondents in that group). Having in mind the abovementioned main barrier to consistent physical activity during the COVID-19 pandemic (limited access to sports and recreation facilities), it is worth referring to a study by Mutz and Gerke. They demonstrated that people who exercised mostly at home or practiced outdoor endurance sports before the pandemic reduced their activity during the lockdown to a much smaller degree than those who just could not find an adequate replacement for their preferred team sports or exercises based on a more sophisticated infrastructure [60] (pp. 313–314). Moreover, the latter expressed fear of going out nearly five times more frequently [60] (p. 313).

Table 4. Changes in the respondents’ physical activity caused by the outbreak of the COVID-19 pandemic (%).

Changes in individuals’ physical activity	Consistent exercisers			Non-consistent exercisers		
	Total (N=557)	Women (N=351)	Men N=206)	Total (N=703)	Women (N=510)	Men (N=193)
Strong increase	20.5	22.8	16.5	1.1	1.2	1.0
Small increase	22.8	24.5	19.9	6.4	6.3	6.7
Same as before the COVID-19 pandemic	25.3	27.4	21.9	23.8	23.4	24.4
Slight drop	22.6	16.7	32.5	31.3	32.2	29.0
Strong drop	8.8	8.6	9.2	37.4	36.9	38.9

Source: own study.

Hence, it is reasonable to assert that physically passive students viewed the pandemic as a kind of excuse and a justification for reducing their (already small) physical activity. In that group, there were no considerable differences in statements between women and men. Conversely, as regards active people, the changes in lifestyle, work and education triggered by the pandemic (including online classes, limitation of human contacts) provided them with inspiration and motivation to increase their levels of physical activity. Similar relationships were observed by Gallè et al. in a group of Italian students; those who had been active prior to the pandemic maintained the recommended level of physical activity even when confined to their homes [15]. When it comes to Polish students, that phenomenon was particularly noticeable in women. In turn, consistent male exercisers reduced their physical activity much more than women. A similar pattern was found by Ferrara et al. in Italian students; their study found women to be less active than men both before and during the pandemic (which is also consistent with what was established in this paper), and discovered that isolation and quarantine had a much stronger impact on the physical activity of men [61]. Gallo et al., too, stated that the closure of sports facilities probably had a stronger effect on male activity levels, since men are more inclined to rivalry, among other aspects [37]. In this context note also that Rodríguez-Larrad et al. corroborated these findings, and added that women were the ones who found it more enjoyable to be physically active during the pandemic, whereas men viewed the home confinement as the biggest barrier to being active in that period [59]. Interestingly, the patterns discovered by Bertrand et al. were totally different. In their study, conducted with a sample of 125 university students in Regina, Saskatchewan, as much as 90% of those who had been active prior to the pandemic became less active after its outbreak (others increased their activity) [62]. In turn, in the group at insufficient activity levels, only 55% became even less active whereas as much as 45% intensified their physical activity [62] (p. 268). That study also discovered that both before and during the pandemic women were surprisingly more engaged in intense physical activity than men [62] (pp. 268, 270). The authors believe it to be caused by an extremely high share of women in the sample (76%).

Note that these results—obtained in a group of consistent exercisers—clearly differ from what was established in another study carried out with 168 persons who regularly practiced physical

activity in Lower Silesia [63] (p. 395). In this case, the percentage of respondents who declared either an increase or a decline in activity levels was much more similar to that reported by non-regular exercisers covered by this study. This could be caused by greater age differences between the respondents (in the study by Mucha and Mucha, only one out of 4 interviewees was of a typical age for university students). In the new pandemic reality, they often faced much more health and family-related problems than students, and could feel being at a greater risk of infection than young people, of which the university population are is largely composed.

5. Conclusions

Adequate intensity levels of physical activity play an extremely important role in human life, and bring about a multitude of benefits for both physical and mental health, as well as for the economy and the society. The importance of exercising is crucial at any age, but it is especially true for childhood and early adult years when human body is formed, and so are some good habits which may affect the way individuals behave in their adult lives, and might even be passed on to the next generations as part of the upbringing process.

The COVID-19 pandemic and related restrictions had an impact on many aspects of life, including engaging in different kinds of physical activity. As it turns out, more than half of Polish university students covered by the study did not engage in physical activity on a consistent basis during that period (with women being much more passive). However, this situation is not much different from what was observed in other countries. According to what the respondents declared, it was mainly driven by their unwillingness to exercise, fatigue and lack of determination, rather than by pandemic restrictions.

The group of students who exercised on a regular basis was mostly composed of men, and their activity was usually of a moderate intensity. The prevailing forms of exercising were walking and simple gymnastics, i.e. something the respondents could relatively easily do in their day-to-day environment (and could keep doing it during the lockdown). These findings, too, are convergent with what researchers established in other countries. Restricted access to sports facilities and lack of time were the key problems faced by the respondents when engaging in physical activity, whereas health risks related to being directly exposed to COVID-19 proved to be of secondary importance.

The most interesting finding is that for regular exercisers, the pandemic provided strong motivation for even bigger efforts; it was the opposite for non-regular exercisers who viewed the lockdown period as a kind of excuse for being even less physically active. The differences in activity rates between those two groups reached as much as 30–40 percentage points. Moreover, regular female exercisers demonstrated much more motivation to exercise more; that level of determination was not observed in men. The above phenomenon was also discovered in a study carried out with Australian, Spanish and Italian students, and was explained by different approaches to sports and rivalry.

This study is subject to certain limitations, primarily including the size of the sample and the sampling process. Conducting it with more respondents and with a wider variety of universities could contribute to reducing the maximum measurement error and could enable a generalization of its findings. Another problem could be the closed questions and the resulting possibility of missing reply options. As the authors would like to carry out a similar research project in an international context, they seek collaboration with researchers from other countries who investigate similar scientific topics.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original data presented in the study are openly available in OneDrive at https://sggwpl-my.sharepoint.com/:x/g/personal/p616376_sggw_edu_pl/EXE6GovgtPJHIQM-haSnHtsBU3RVxg-vPy0bioOLJ5uwuw?CID=e9c062ff-06a7-4985-87af-af36c5c860f0&e=MamScx.

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References

1. Gabryjończyk, P., Zawadka, J. Polityka samorządu województwa mazowieckiego w zakresie wspierania aktywności fizycznej jego mieszkańców (Policy of the Mazowieckie voivodeship local government for supporting physical activity of local residents). *Turystyka i Rozwój Regionalny* (Tourism and Regional Development) 2023, 20, 51–61. doi:10.22630/TIRR.2023.20.18.
2. Skalski, D.W., Grygus, I., Skalska, E., Rybak, L. Współczesna kultura fizyczna a styl życia (Modern physical culture vs. lifestyle). In: *Spektrum peregrynacji po kulturze fizycznej dla mistrzów wychowania fizycznego* (A review of approaches to physical culture for masters of physical education). Białas M., Skalski D.W., Eds.; Publisher: Gdansk University of Physical Education and Sport, Gdańsk, Poland, 2022; pp. 21–34.
3. Di Renzo, L., Gualtieri, P., Pivari, F., Soldati, L., Attina, A., Cinelli, G., Leggeri, C., Caparello, G., Barrea, L., Scerbo, F., Esposito, E., De Lorenzo A. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *Journal of Translation Medicine* 2020, 18, 1-15. doi:10.1186/s12967-020-02399-5.
4. Biernat, E. *Aktywność fizyczna w życiu współczesnego człowieka* (Physical activity in the life of modern humans); Publisher: e-Publishing House of the National Center for Examining the Physical Condition, Warszawa, Poland, 2014.
5. Drygas, W., Gajewska, M., Zdrojewski, T. (Eds.). *Niedostateczny poziom aktywności fizycznej w Polsce jako zagrożenie i wyzwanie dla zdrowia publicznego* (Insufficient levels of physical activity in Poland as a threat and challenge to public health). Report by the Public Health Committee of the Polish Academy of Sciences. Publisher: National Public Health Institute – National Institute of Hygiene, Warsaw, Poland, 2021.
6. Halladay, J., Ogrodnik, M., Farag Alla, J., Sunderland, M., Gardner, L.A., Georgiades, K. Playing for more than winning: Exploring sports participation, physical activity, and belongingness and their relationship with patterns of adolescent substance use and mental health. *Drug and Alcohol Dependence* 2024, 254, 111039.
7. Brennan, A.M., Green, J.F. Occupational and leisure-time physical activity and associated factors among shift-working registered nurses: A cross-sectional study. *International Journal of Nursing Studies Advances* 2023, 5, 100157.
8. Krzyżanowska, A. Formy aktywności ruchowej preferowane przez studentów uczelni warszawskich (Forms of physical activity preferred by students of Warsaw universities). *Turystyka i Rozwój Regionalny* (Tourism and Regional Development) 2018, 10, 43–51. doi:10.22630/TIRR.2018.10.19.
9. Ogłodziński, O., Parzonko, A. Rekreacja ruchowa jako forma spędzania czasu wolnego studentów (Physical recreation as a way of spending leisure time for students). *Turystyka i Rozwój Regionalny* (Tourism and Regional Development) 2023, 20, 117–127. doi:10.22630/TIRR.2023.20.24.
10. Baj-Korpak, J., Zaworski, K., Shpakou, A., Szymczuk, E. Physical activity and mental health of students from Poland and Belarus in the context of the covid-19 pandemic: reflections on the purpose of a research project. *Health Problems of Civilization* 2022, 16(2), 140-146.
11. Czarnecki, D., Skalski, D.W., Rybak, L., Kindzer, B., Graczyk, M., Davybida, N., Levandovska, L. Aktywność fizyczna oraz formy spędzania czasu wolnego dzieci (Physical activity and ways of spending free time among children). *Rehabilitation and Recreation* 2022, 13, 133–139. doi:10.32782/2522-1795.2022.13.13.

12. Leger, D., Beck, F., Richard, J.B., Godeau, E. Total sleep time severely drops during adolescence. *PLoS ONE* 2012, 7, e45204.
13. Aguilar-Farias, N., Toledo-Vargas, M., Miranda-Marquez, S., Cortinez-O’Ryan, A., Cristi-Montero, C., Rodriguez-Rodriguez, F., Martino-Fuentealba, P., Okely, A. D., del Pozo Cruz, B. Sociodemographic Predictors of Changes in Physical Activity, Screen Time, and Sleep among Toddlers and Preschoolers in Chile during the COVID-19 Pandemic. *Int J Environ Res Public Health* 2021, 18, 2-13. doi:10.3390/ijerph18010176.
14. Marelli, S., Castelnuevo, A., Somma, A., Castronovo, V., Mombelli, S., Bottoni, D., Leitner, C., Fossati, A., Ferini-Strambi, L. Impact of COVID-19 lockdown on sleep quality in university students and administration staff. *Journal of Neurology* 2021, 268(1), 8-15. doi: 10.1007/s00415-020-10056-6.
15. Gallè, F., Sabella, E.A., Ferracuti, S., De Giglio, O., Caggiano, G., Protano, C., Valeriani, F., Parisi, E.A., Valerio, G., Liguori, G., Montagna, M.T., Romano Spica, V., Da Molin, G., Orsi, G.B., Napoli, C. Sedentary Behaviors and Physical Activity of Italian Undergraduate Students during Lockdown at the Time of COVID-19 Pandemic. *Int J Environ Res Public Health* 2020, 17,7 6171. doi:10.3390/ijerph17176171.
16. Leksy, K. Aktywność fizyczna dzieci i adolescentów w czasie pandemii COVID-19 – przegląd badań i rekomendacje dla praktyki pedagogicznej (Physical activity of children and teenagers during the COVID-19 pandemic: research review and recommendations for pedagogic practices). *Problemy Opiekuńczo-Wychowawcze* (Caretaking and Upbringing Problems) 2022, 606(1), 41–53. doi:10.5604/01.3001.0015.7165.
17. Duijvestijn, M., de Wit, G.A., van Gils, P.F., Wendel-Vos G.C. W. Impact of physical activity on healthcare costs: a systematic review. *BMC Health Services Research* 2023, 3; 23(1), 572. doi:10.1186/s12913-023-09556-8.
18. Santos, A.C., Willumsen, J., Meheus, F., Ilbawi, A., Bull F.C. The cost of inaction on physical inactivity to public healthcare systems: a population-attributable fraction analysis. *Lancet Glob Health* 2023, 11, 32–39. doi:10.1016/S2214-109X(22)00464-8.
19. Gieroba, B. Wpływ aktywności fizycznej na zdrowie psychiczne i funkcje poznawcze (Impact of physical activity on mental health and cognitive functions). *General Medicine and Health Science* 2019, 25, 153–161.
20. Sochocka, L., Wojtyłko, A. Aktywność fizyczna studentów studiów stacjonarnych kierunków medycznych i niemedycznych (Physical activity of full-time students enrolled in medical and other programs). *Medycyna Środowiskowa* (Environmental Medicine) 2013, 16 (2), 53–58.
21. Ibsen, B., Elmose-Østerlund, K., Høyer-Kruse, J. Associations of types of physical activity with self-rated physical and mental health in Denmark. *Preventive Medicine Reports* 2024, 37, 102557.
22. Sochacka, M., Zdziarski, K. Physical activity and well-being of students of faculties medical and non-medical services during the Covid-19 pandemic. *Journal of Education, Health and Sport* 2022, 12(5): 63-80. doi:10.12775/JEHS.2022.12.05.004.
23. Winiarska-Mieczan, A., Dymek, T. Ocena aktywności fizycznej wśród młodzieży akademickiej lubelskich uczelni (Assessing the physical activity of students of Lublin universities). *Polish Journal of Sports Medicine* 2009, 2(6), 125–131.
24. Kasperska, K., Smolis-Bąk, E., Białoszewski, D. *Metodyka nauczania ruchu. Usprawnienia pacjentów na zajęciach grupowych* (Methodology for teaching how to move. Improving the patients’ performance in group classes); Publisher: Publishing House of the Medical University of Warsaw, Warsaw, Poland, 2014.
25. Winiarski, M. (Ed.). *Encyklopedia Pedagogiczna XXI w.* (Encyclopedia of Pedagogy of the 21st century), vol. VI; Publisher: Wydawnictwo Akademickie Żak, Warszawa, Poland, 2007.
26. Grabowska, B., Jakubowska, L. Aktywność fizyczna młodych osób – znaczenie tradycji rodzinnych (Physical activity of young people: the importance of family traditions), *Wychowanie w Rodzinie* (Family Upbringing) 2019, XXI(2), 249–256.
27. WHO Global status report on physical activity 2022. Available online: <https://www.who.int/publications/i/item/9789240059153> (accessed on April 5, 2025).
28. Drabik, J. Ruch i wysiłek fizyczny (Exercises and physical activity). *Antropomotoryka* (Anthropomotrics) 2006, 34, 117-119.
29. Drozdowski, Z. W sprawie podziału motoryczności i człowieka uwag kilka (Several remarks on the kinds of human motor skills). *Kultura Fizyczna* (Physical Culture) 1992, 9–10, 29.

30. Dybińska, E., Kwiatkowska-Skwara, A. Poziom aktywności fizycznej młodzieży akademickiej Krakowa a stan wiedzy z zakresu kultury fizycznej z uwzględnieniem płci, kierunku kształcenia oraz miejsca pochodzenia (Levels of physical activity of university students in Krakow vs. how much they know of physical culture, grouped by gender, field of study and place of origin). In: *Dobrostan a edukacja* (Wellbeing and education); Dybińska E., Zboina B., Eds.; Publisher: NeuroCentrum Scientific Publishing House, Lublin, Poland, 2016; pp. 55–78.
31. Sadłowska, S., Zera, A., Krupienicz, A. Poziom aktywności fizycznej studentów pielęgniarstwa Warszawskiego Uniwersytetu Medycznego (Levels of physical activity of nursing students at the Medical University of Warsaw), *Pielęgniarstwo polskie* (Polish nursing science) 2017, 3(65), 404–408.
32. Goncalves, A., Deshayes, M., Gisclard, B., Philippe, A.G., Bernal, C., Krawczyk, S., Korch, K., Nogrette, M., Charbonnier, E. Exploring the Health Effectiveness of a Physical Activity Program Co-Constructed with Students after the COVID-19 Pandemic. *Nutrients* 2023, 15, 2913. doi:10.3390/nu15132913.
33. Pilecka, D., Trzeciak, J., Różycka, I., Kulik, A. Wpływ pandemii COVID-19 na aktywność fizyczną i stan psychiczny studentów AWF (Impact of the COVID-19 pandemic on the physical activity and mental condition of students of Universities of Physical Education). *General Medicine and Health Science* 2023, 29(2), 118–122. doi:10.26444/monz/166768.
34. Aslan, I., Ochnik, D., Çınar, O. Exploring Perceived Stress among Students in Turkey during the COVID-19 Pandemic. *Int J Environ Res Public Health* 2020, 17(23), 8961. doi:10.3390/ijerph17238961.
35. Rogowska, A.M., Pavlova, I., Kuśnierz, C., Ochnik, D., Bodnar, I., Petrytsa, P. Does Physical Activity Matter for the Mental Health of University Students during the COVID-19 Pandemic?. *J Clin Med.* 2020, 9(11), 3494. doi:10.3390/jcm9113494.
36. Srivastav, A.K., Sharma, N., Samuel, A.J. Impact of Coronavirus disease-19 (COVID-19) lockdown on physical activity and energy expenditure among physiotherapy professionals and students using web-based open E-survey sent through WhatsApp, Facebook and Instagram messengers. *Clin Epidemiol Glob Health* 2021, 9, 78–84. doi:10.1016/j. ceqh.2020.07.003.
37. Gallo, L.A., Gallo, T.F., Young, S.L., Moritz, K.M., Akison, L.K. The Impact of Isolation Measures Due to COVID-19 on Energy Intake and Physical Activity Levels in Australian University Students. *Nutrients* 2020, 12(6), 1865. doi:10.3390/nu12061865.
38. Dinler, E., Badat, T., Kocamaz, D., Yakut Y. Evaluation of the physical activity, sleep quality, depression, and life satisfaction of university students during the COVID-19. *International Journal of Disabilities Sports and Health Sciences* 2020, 3(2), 128–139. doi:10.33438/ ijdshs.770346.
39. Ghrouz, A.K., Noohu, M.M., Dilshad Manzar, M., Spence, D.W., BaHammam, A.S., Pandi-Perumal. S.R. Physical activity and sleep quality in relation to mental health among college students. *Sleep Breath* 2019, 23, 627–634. doi:10.1007/s11325-019-01780-z.
40. Badicu, G. Physical Activity and Sleep Quality in Students of the Faculty of Physical Education and Sport of Braşov, Romania. *Sustainability* 2018, 10, 2410. doi:10.3390/su10072410.
41. Pelletier, J.E., Graham, D.J., Laska, M.N. Social norms and dietary behaviors among young adults. *Am. J. Health Behav.* 2014, 38, 144–152.
42. Sepehr, R., Fazilat, P.A., Afsoon, P. Effects of Sleep Quality on the Academic Performance of Undergraduate Medical Students. *Health Scope* 2016, 5, 1–7.
43. Kasozi, K.I., Niedbała, G., Alqarni, M., Zirintunda, G., Ssempijja, F., Musinguzi, S.P., Usman, I.M., Matama, K., Hetta, H.F., Mbiydzanyuy, N.E., Batiha, G.E-S., Beshbishy, A.M., Welburn, S.Ch. Bee Venom - A Potential Complementary Medicine Candidate for SARS-CoV-2 Infections. *Front. Public Heal.* 2020, 8.
44. Eger, L., Komarkova, L., Egerova, D., Micík, M. The effect of COVID-19 on consumer shopping behaviour: Generational cohort perspective. *Journal of Retailing and Consumer Services* 2021, 61(C), 102542.
45. Sokół-Szawłowska, M. Wpływ kwarantanny na zdrowie psychiczne podczas pandemii COVID-19 (Mental health impact of the COVID-19 quarantine). *Psychiatria* (Psychiatrics) 2021, 18(1), 57–62.
46. Maszorek-Szymala, A. Zachowania zdrowotne młodzieży akademickiej w czasie pandemii COVID-19 (Health-related behaviors of University students during the COVID-19 pandemic). In: *Współczesne problemy kultury fizycznej i zdrowotnej* (Today's problems of physical and health culture). Kowalska J.E., Makarczuk

- A., Maszorek-Szymala A., Kaźmierczak A., Eds.; Publisher: Publishing House of the University of Łódź, Łódź, Poland, 2022; pp. 165–173.
47. Kopańska, M., Ochojska, D., Pietluch, K., Półtorak, S., Banaś-Ząbczyk, A. Assessment of physical activity and quality of life of students in the day of COVID-19 pandemic. *Przegląd Epidemiologiczny* (Epidemiological Review) 2022, 74(1), 67-78. doi:10.32394/pe.76.08.
 48. Lipošek, S., Planinšek, J., Leskosek, B., Pajtler, A. Physical activity of University students and its relation to physical fitness and academic success. *Annales Kinesiologiae* 2018, 9(2), 89-104. doi:10.35469/ak.2018.171.
 49. Busque, A., Yao, P.L., Miquelon, P., Lachance, É., Rivard, M.C. Lifestyle and health habits of a Canadian university community. *Journal of Physical Activity Research* 2017, 2(2), 107–111. doi:10.12691/jpar-2-2-7.
 50. Haase, A., Steptoe, A., Sallis, J., Wardle, J. Leisure-time physical activity in university students from 23 countries: Associations with health beliefs, risk awareness, and national economic development. *Preventive medicine* 2004, 39, 182-90. doi:10.1016/j.ypmed.2004.01.028.
 51. Bergier, J., Bergier, B., Tsos, A. Variations in Physical Activity of Male and Female Students from Different Countries. *Iranian journal of public health* 2016, 45(5), 705–707.
 52. Ng, S.W., Norton, E.C., Popkin, B.M. Why have physical activity levels declined among Chinese adults? Findings from the 1991-2006 China Health and Nutrition Surveys. *Social science & medicine* 2009, 68(7), 1305–1314. doi:10.1016/j.socscimed.2009.01.035.
 53. Ferreira Silva, R.M., Mendonça, C.R., Azevedo, V.D., Raoof Memon, A., Noll, P.R., Noll, M. Barriers to high school and university students' physical activity: A systematic review. *PLoS ONE* 2022, 17(4), e0265913. doi:10.1371/journal.pone.0265913.
 54. Tan, S.T., Tan, C.X., Tan, S.S. Physical Activity, Sedentary Behavior, and Weight Status of University Students during the COVID-19 Lockdown: A Cross-National Comparative Study. *Int J Environ Res Public Health* 2021, 18(13), 7125. doi:10.3390/ijerph18137125.
 55. Romero-Blanco, C., Rodríguez-Almagro, J., Onieva-Zafra, M.D., Parra-Fernández, M.L., Prado-Laguna, M.D., Hernández-Martínez, A. Physical Activity and Sedentary Lifestyle in University Students: Changes during Confinement Due to the COVID-19 Pandemic. *Int J Environ Res Public Health* 2020, 17(18), 6567. doi:10.3390/ijerph17186567.
 56. Talapko, J., Perić, I., Vulić, P., Pustijanac, E., Jukić, M., Bekic, S., Meštrović, T., Škrlec, I. Mental Health and Physical Activity in Health-Related University Students during the COVID-19 Pandemic. *Healthcare* 2021, 9(7), 801. doi:10.3390/healthcare9070801.
 57. Pietsch, S., Linder, S., Jansen, P. Well-being and its relationship with sports and physical activity of students during the coronavirus pandemic. *German Journal of Exercise and Sport Research* 2022, 52, 50–57. doi:10.1007/s12662-021-00750-6.
 58. Bergier, J., Bergier, B., Tsos, A. Variations in physical activity of male and female students from the Ukraine in health-promoting life style. *Annals of Agricultural and Environmental Medicine* 2017, 24(2), 217–221. doi:10.5604/12321966.1230674.
 59. Rodríguez-Larrad, A., Mañas, A., Labayen, I., González-Gross, M., Espin, A., Aznar, S., Serrano-Sanchez, J.A., Vera-Garcia, F.J., González-Lamuño, D., Ara, I., Carrasco-Páez, L., Castro-Piñero, J., Gómez-Cabrera, M.C., Márquez, S., Tur, J.A., Gusi, N., Benito, P.J., Moliner-Urdiales, D., Ruiz, J.R., Ortega, F.B., Jiménez-Pavón, D., Casajús, J.A., Irazusta, J. Impact of COVID-19 Confinement on Physical Activity and Sedentary Behaviour in Spanish University Students: Role of Gender. *Int J Environ Res Public Health* 2021, 18(2), 369. doi:10.3390/ijerph18020369.
 60. Mutz, M., Gerke, M. Sport and exercise in times of self-quarantine: How Germans changed their behaviour at the beginning of the Covid-19 pandemic. *International Review for the Sociology of Sport* 2021, 56(3), 305-316. doi:10.1177/1012690220934335.
 61. Ferrara, M., Langiano, E., Falese, L., Diotaiuti, P., Cortis, C., De Vito, E. Changes in Physical Activity Levels and Eating Behaviours during the COVID-19 Pandemic: Sociodemographic Analysis in University Students. *Int J Environ Res Public Health* 2022, 19, 5550. doi:10.3390/ijerph19095550.

62. Bertrand, L., Shaw, K.A., Ko, J., Deprez, D., Chilibeck, P.D., Zello, G.A. The impact of the coronavirus disease 2019 (COVID-19) pandemic on university students' dietary intake, physical activity, and sedentary behaviour. *Applied Physiology, Nutrition, and Metabolism* 2021, 46(3), 265-272. doi:10.1139/apnm-2020-0990.
63. Mucha, B., Mucha, M. (2021). Aktywność fizyczna w dobie pandemii COVID-19 (Physical activity during the COVID-19 pandemic). In: *Zdrowie i style życia: ekonomiczne, społeczne i zdrowotne skutki pandemii* (Health and lifestyles: the economic, social and health consequences of the pandemic). Nowak W., Szalonka K., Eds.; Publisher: University of Wrocław, Wrocław, 2021; pp. 385–397. doi:10.34616/142108.

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