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MENTAL STATE AND MOTIVATION TO PHYSICAL EXERCISE IN UNIVERSITY STUDENTS DURING COVID-19 PANDEMIC IN POLAND

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Abstract The COVID-19 pandemic brought consequences for many aspects of people's lives all over the world, such as lockdown, social distancing and reduced accessibility to sports and recreational facilities. The aim of this study was to assess mental state, physical well-being, and motivation to exercise among Polish students of Physical Education and other fields of study, considering their gender, place of living and financial situation. The study involved 1424 students from different universities in Poland. Two questionnaires were used – the EMI-2 to measure motivation to exercise and an original questionnaire to assess daily physical activity, physical and mental well-being. While 31.7% of the students assessed their access to recreational facilities as very

poor, 71.8% of them rated their financial situation to be average or quite good. Over one-third of the students declared that both their physical and mental well-being (nearly 37% and 33% respectively) were very poor. Among all analyzed motivating factors to exercise, positive health, appearance and strength and endurance were classified as the most important. The importance of different motivating factors differed between the Physical Education students and those of other faculties. To conclude, physical and mental well-being of Polish students during the pandemic was poor. The main reasons were very poor access to recreational facilities, too much time spent in a sitting or lying position daily and insufficient physical activity.

Key words: COVID-19, lockdown, motivation, physical exercise, student, recreation, pandemic

Introduction

Background

The SARS-CoV-2 causes a severe respiratory syndrome disease (COVID-19) and was first encountered in Wuhan, China, in January 2020 (Zhou et al., 2020). After a few weeks, despite the lockdown ordered in Wuhan, the COVID-19 cases were detected in many countries all over the world and a global pandemic started (Spina et al., 2020). On 11 March 2020 The World Health Organization announced the global COVID-19 pandemic. The coronavirus and its variants have caused serious consequences all over the world – health problems, such as psychological and mental disorders, an increase in the number of deaths, including suicides, health care failure, economic and educational crisis (Ahmad et al., 2020; Bashir et al., 2020; Devoe et al., 2023; Pokhrel & Chhetri, 2021; Sher, 2020). One of the major implications of the pandemic was lockdown introduced in many countries worldwide, though the lockdown policy differed in its character, duration and limitations between different countries. The closure of educational institutions was one of the most serious restrictions, although universities and high schools adopted online methods to continue teaching-learning process (Fernández Cruz et al., 2020). In Poland the lockdown started on 13 March 2020 and stronger limitations were introduced during following months. After the most critical period of the pandemic the restrictions were successively taken off. Stationary education at universities and higher schools was stopped on 13 March 2020 and shortly afterwards it was transferred to online conditions. The detailed chronology of the lockdown in Poland is presented in the fig.1.

Due to the pandemic restrictions introduced between 13 March 2020 and 30 August 2021 Polish students were obliged to study online, were allowed to leave their homes for essential reasons only, such as going to work or to pharmacy, were not able to meet outside, sports and recreational facilities, including sports clubs, swimming pools, gyms and fitness clubs were closed. During a part of that period entrance to parks, beaches and even forests was prohibited. The restrictions were taken off during the second wave of the COVID-19 pandemic, but financial problems of the society were getting worse. Though gyms, swimming pools, fitness clubs were allowed to reopen – lots of them stayed closed due to various reasons (e.g. too few customers, incomplete staff, increasing costs of energy). The Polish government offered help to sports entrepreneurs hit by the COVID-19 pandemic and provided them with financial support during the period of suspension of their business activity – in some cases it was the main reason why they did not reinitiate their functioning. Moreover, despite the fact that stationary education was reopened for toddlers, kids and teenagers on 19 April 2020, most universities decided to continue online learning and complete the academic term via online conditions. Therefore, distance education actually lasted till the end of September 2021 (including examined universities) or even longer in some cases.

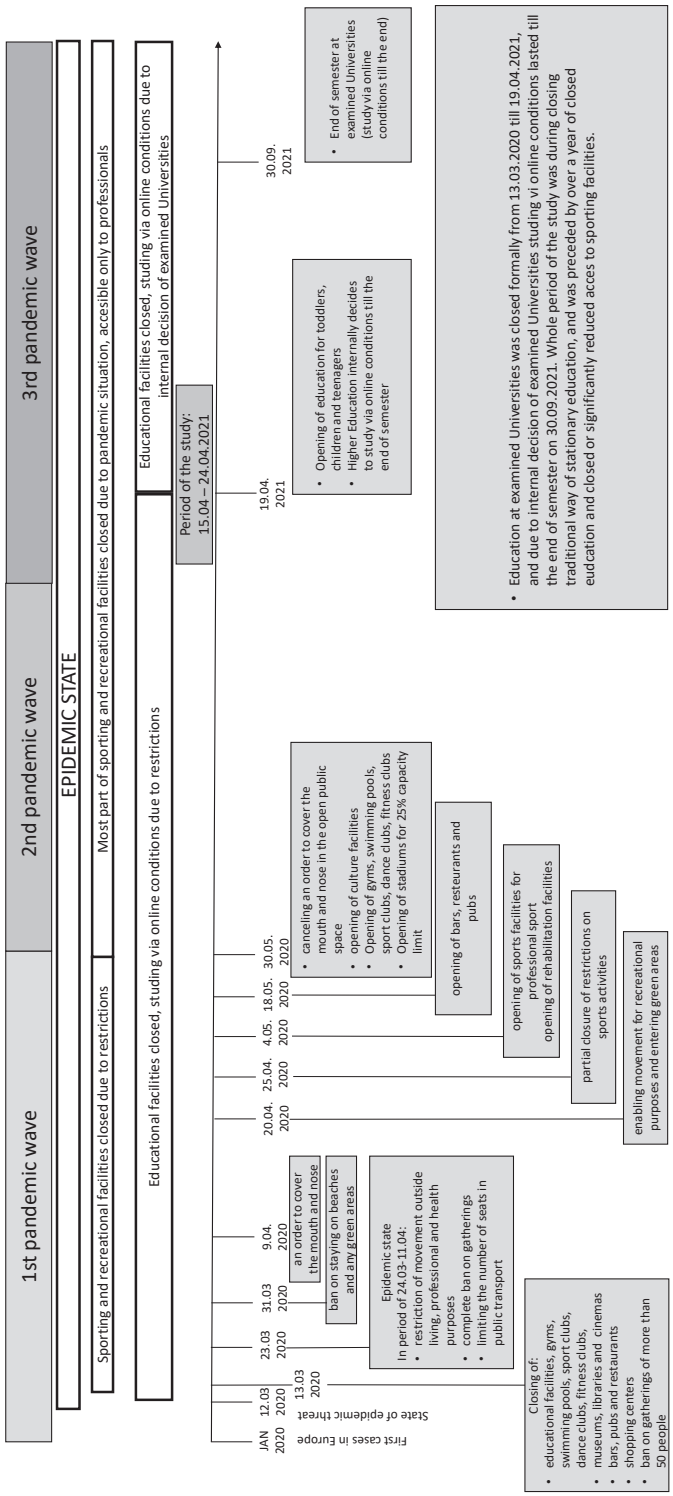

Figure 1. Chronological scheme of the pandemic situation and its consequences as restrictions and lockdowns

Social isolation was reported to have significant consequences for many aspects of people's health, including their mental health (Fernández Cruz et al., 2020; Xiong et al., 2020). The psychological well-being of societies in many countries has deteriorated in recent years also due to the COVID-19 pandemic. This is confirmed, among others, by research on depression which has remarkably strong impact on motivation. There is a correlation between a person's mental well-being, motivation and their functioning in many aspects of everyday life (Deci & Ryan, 2000). A negative impact of the COVID-19 pandemic on daily physical activity, time spent in a sitting position and unhealthy food consumption was observed among people in different parts of the world (Ammar et al., 2020). The same was confirmed among students from many countries (López-Valenciano et al., 2021), including neighboring countries of Poland, such as Hungary (Ács et al., 2020), southwestern countries which were the most affected by pandemic, such as Spain (Sañudo et al., 2020) and Italy (Gallè et al., 2020), as well as countries located far from Poland, e.g. Australia (Gallo et al., 2020).

Although there are many articles describing the impact of the COVID-19 pandemic on Polish students, most of them concentrate on investigating a decrease in physical activity, general or mental health. However, they do not offer an insight into students' motivation and do not take different fields of study or students' financial situation into account.

The aim of this study was to assess the mental state of Polish students and their motivation to exercise during the COVID-19 pandemic lockdown conditions, considering the students' gender, financial situation and place of living. We hypothesized that students of Physical Education would differ in the examined aspects from students of other faculties.

Materials and Methods

There were 1424 participants involved in the study: 925 females (65%) and 499 males (35%). They were students of four polish universities, including 318 Physical Education (PE) students (22.3%) and 1106 (77.7%) students of other fields of study (non-PE). Over half of the students lived in rural areas (55.8%) and 44.2% in urban areas. All the participants agreed to take part in the study of their own free will, signed a written consent and were informed about the purpose of the study. The participant anonymity was assured and all of them were informed that they can resign at any time without any consequences. The study was conducted according to the Declaration of Helsinki.

The data were acquired in stationary conditions from 15 April 2021 and 24 April 2021. The participants were filling two questionnaires - the first was the Exercise Motivations Inventory – 2 (EMI-2, University of Wales, Bangor) introduced by Markland in 1997 (Markland & Ingledew, 1997). The EMI-2 consists of 51 items and is a widely used, reliable and validated tool for assessing motivation to exercise. The data had been fully anonymized before the researcher obtained them. The respondents were choosing their answers on a 0-5 scale. For the purpose of this study the Polish version of the questionnaire was used (originally provided by the authors of the EMI-2). The second questionnaire was an original questionnaire prepared for this study and consisted of 17 questions about basic demographic data (age, gender, career, place of living), daily time spent on physical activity, access to recreational facilities, health self-assessment, financial situation, daily time spent sitting or lying down, physical well-being, mental well-being, changes in consumption of alcohol, changes in smoking cigarettes, changes in body mass. The questionnaire was originally prepared in Polish language.

The data acquired from these two tools were digitalized with the use of Microsoft Excel to build a database and then processed with statistical analysis.

Statistical analysis

Since the survey responses were structured in a discrete, ordinal manner, we used the Likert scale to obtain the estimates of expected values and standard deviations. The former was calculated as:

$$E(A) = \sum_{i=1}^{m} V_i \frac{v_i}{T}$$

where $E(A)$ was the expected value (mean value) of the response, V_i was the Likert-scale value (from 1 to m-th answer) for the i-th answer, and n_i/T was the observed frequency for the i-th answer. Standard deviation was calculated as the square root of:

$$var(A) = \sum_{i=1}^{m} \left(V_i - E(A)\right)^2 \frac{v_i}{T}.$$

The differences between examined parameters were tested with Welsh paired t-test, the level of significance was $p > 0.005$. All the results are presented as mean ±standard deviation (SD).

Results

The respondents' answers to the original questionnaire were assigned numbers on a scale from 1-5, where 1 means very poor, 2 – poor, 3 average, 4 – quite good and 5 – very good. Most of the respondents (528) stated that their access to recreational facilities was very poor. Only 62 of them declared it to be very good. The average response was 2.114 ±1.127. Two hundred forty three students assessed their financial situation as very good, 160 of them as poor and very poor, while most of the participants (1021) declared average or quite good financial situation. The average response was 3.606 ±0.956. A large number of respondents (526) evaluated their physical well-being as very poor. Similarly, as many as 469 students stated that their mental well-being was very poor. The average response amounted to 2.274 ±1.151 for physical well-being and 2.488 ±1.293 for mental well-being. Only 43 respondents, i.e. 3.0% of all, declared their physical well-being to be very good and only 102, i.e. 7.2%, described their mental well-being as very good (table 1).

Question	Accessibility of recreational facilities		Financial situation		Physical well-being		Mental well-being	
response	n	%	n	%	n	%	n	%
1 (very poor)	528	37.1%	38	2.7%	526	36.9%	469	32.9%
2 (poor)	446	31.3%	122	8.6%	216	15.2%	234	16.4%
3 (average)	272	19.1%	445	31.2%	491	34.5%	383	26.9%
4 (quite good)	116	8.1%	576	40.4%	148	10.4%	236	16.6%
5 (very good)	62	4.4%	243	17.1%	43	3.0%	102	7.2%

Table 1. Accessibility of recreational facilities, financial situation, physical and mental well-being declared by respondents

The largest number of respondents (24.9%) stated that they spent daily between 20–40 (min) doing physical activity. 24.7% of them declared that they performed 40–50 (min) of physical activity per day, while only 10.7% reported that they were physically active for over 90 (min) every day (7.9% females and 15.8% males). Out of the total respondents, 8.1% (116) declared not doing any physical activity at all (8.6% females and 7.2% males). The greatest number of respondents (33%) declared that they spent 5-6 (h) sitting or lying down, none of the respondents declared not spending any time in these positions during the day. Out of women 24.1% and 19.8% of men reported that they spent over 8 (h) in a sitting or lying position every day (table 2).

Table 2. Daily time spend on physical activity and in sitting or lying positions

question	Time daily spent on physical activity						question	Time daily spent in a sitting or lying position					
	female		male		total			female		male		total	
response	n	%	n	%	n	%	response	n	%	n	%	n	%
none	80	8.6%	36	7.2%	116	8.1%	none	0	0.0%	0	0%	0	0.0%
0–20 (min)	148	16.0%	56	11.2%	204	14.3%	1–2 (h)	28	3.0%	34	6.8%	62	4.4%
20–40 (min)	245	26.5%	109	21.8%	354	24.9%	3–4 (h)	118	12.8%	98	19.6%	216	15.2%
40–60 (min)	241	26.1%	111	22.2%	352	24.7%	5–6 (h)	305	32.9%	166	33.3%	470	33.0%
60–90 (min)	138	14.9%	108	21.6%	246	17.3%	7–8 (h)	251	27.2%	102	20.4%	354	24.9%
Over 90 (min)	73	7.9%	79	15.8%	152	10.7%	Over 8 (h)	223	24.1%	99	19.8%	322	22.6%

Nearly half of the respondents (49.7% of women and 51.3% of men) declared they did not notice an increase in their body mass. The results were similar when the participants were divided into two groups according to their place of living, i.e those living in rural areas and those living in urban areas, and amounted to 49.7% and 51% respectively. Out of the Physical Education students 48.6% and 56.3% of the students of other faculties did not observe an increase in their body mass. Out of the non-PE students 36.8% participants, 39.9% of females, 40.4% of those living rural, 40.5% those living urban, 41.5% males and 41.5% PE students declared higher body mass (table 3).

Table 3. Increase in the body mass

Question	Have you noticed increase of your body mass?					
response	female	male	rural	urban	PE	Non-PE
no	49.7%	51.3%	49.7%	51.0%	48.6%	56.3%
I do not know	10.4%	7.2%	9.9%	8.4%	9.9%	6.9%
yes	39.9%	41.5%	40.4%	40.5%	41.5%	36.8%

PE – Physical Education students, Non-PE – students of other faculties.

Table 4 (below) presents the mean values of the EMI-2 questionnaire and p-values of the means between different motivating factors to exercise among all of the examined students. There were significant differences between most of the compared aspects except for: stress management and challenge ($p > 0.652$), revitalization and weight management ($p > 0.126$), enjoyment and nimbleness ($p > 0.075$), ill-health avoidance and strength and endurance ($p > 0.068$), appearance and strength and endurance ($p > 0.840$).

Table 4. EMI-2 scores for motivating factors, mean and Welch t-test p-values. In case there are statistically significant differences between most of the motivators, we put p-values over 0.005 in bold meaning that between them there were no statistically significant differences

Motivating factors		Stress Management	Revitalisation	Enjoyment	Challenge	Social Recognition	Affiliation	Competition	Health Pressures	Ill-Health Avoidance	Positive Health	Appearance	Weight Management	Strength & Endurance	Nimbleness
	mean	3.100	3.382	3.188	3.113	2.257	2.394	2.169	1.821	3.616	4.004	3.673	3.333	3.668	3.243
Stress Management	3.100		0.000	0.003	**0.652**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Revitalisation	3.382	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.126**	0.000	0.000
Enjoyment	3.188	0.003	0.000		0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.075**
Challenge	3.113	**0.652**	0.000	0.011		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Social Recognition	2.257	0.000	0.000	0.000	0.000		0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Affiliation	2.394	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Competition	2.169	0.000	0.000	0.000	0.000	0.006	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000
Health Pressures	1.821	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
Ill-Health Avoidance	3.616	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.049	0.000	**0.068**	0.000
Positive Health	4.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000
Appearance	3.673	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	0.000		0.000	**0.840**	0.000
Weight Management	3.333	0.000	**0.126**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.003
Strength & Endurance	3.668	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.068**	0.000	**0.840**	0.000		0.000
Nimbleness	3.243	0.000	0.000	**0.075**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	

The female participants (average 4.035 ±1.172), those living in both rural (3.977 ±1.193) and urban areas (4.038 ±1.158), PE (4.324 ±0.916) and the non-PE students (3.911 ±1.1228), those declaring very poor (3.298 ±1.420) and good or very good financial situation (4.178 ±1.204) as well as all the respondents in total (4.004 ±1.178) declared that positive health was the top motivating factor for them. The highest average for this motivator was reported among a subgroup of the Physical Education students (4.324 ±0.916). For the male participants the aspect of strength and endurance (3.977 ±1.167) was more important than positive health (3.946 ±1.186) which they ranked in the second place. Two other motivating factors classified in the second and the third place by all the respondents were appearance (3.673 ±1.432 for total and from 3.263 ±1.605 to 3.895 ±1.303 for subgroups) and strength and endurance (3.668 ±1.355 for total and from 2.941 ±1.488 to 4.185 ±1.022 for subgroups). All the respondents in total (1.821 ±1.870) and five subgroups: males (1.665 ±1.828), those living both in rural (1.822 ±1.867) and urban areas (1.821 ±1.873), the PE students (1.809 ±1.894) and those declaring good or very good financial situation (1.916 ±1.892) stated that they were the least motivated by health pressures. The aspect of competition was the least important for females (1.735 ±1.674), the non-PE students (1.819 ±1.691), and for those who declared very poor financial situation and achieved the lowest average note of all (1.342 ±1.643) (tables 5 and 6).

Table 7. (below) presents the motivating factors ranked from the greatest to the smallest difference between the subgroups of the respondents. The female and male students reported the most significant difference in the aspect of competition (–1.237) which was much more important for men. Similarly, the largest difference between the PE and non-PE students (1.566) and between the participants living in rural and urban areas (0.262) related to this motivating factor – for both the PE students and the students living in rural conditions competition was more important. The slightest differences, thus the greatest accordance in the responses, were noted for health pressures (–0.016, 0.001 and 0.0434 for the PE, and non-PE students, rural-urban and very poor-good or very good financial situation respectively). There was no difference between females and males regarding the average responses about nimbleness (0.000).

Table 5. Mean score in 0–5 scale for different motivating factors to exercise among female, male, rural and urban living Polish students. The motivators were ranked from the highest to the lowest average for each category

Total	mean±SD	female	mean±SD	male	mean±SD	rural	mean±SD	urban	mean±SD
Positive Health	4.004 ±1.178	Positive Health	4.035 ±1.172	Strength & Endurance	3.977 ±1.167	Positive Health	3.977 ±1.193	Positive Health	4.038±1.158
Appearance	3.673 ±1.432	Appearance	3.772 ±1.391	Positive Health	3.946 ±1.186	Appearance	3.678 ±1.408	Strength & Endurance	3.791±1.326
Strength & Endurance	3.668 ±1.355	Ill-Health Avoidance	3.669 ±1.420	Ill-Health Avoidance	3.519 ±1.469	Ill-Health Avoidance	3.605 ±1.420	Appearance	3.668±1.462
Ill-Health Avoidance	3.616 ±1.439	Weight Management	3.525 ±1.528	Appearance	3.490 ±1.489	Strength & Endurance	3.571 ±1.370	Ill-Health Avoidance	3.631±1.463
Revitalisation	3.382 ±1.524	Strength & Endurance	3.501 ±1.419	Revitalisation	3.476 ±1.475	Weight Management	3.360 ±1.562	Revitalisation	3.459±1.550
Weight Management	3.333 ±1.605	Revitalisation	3.330 ±1.547	Challenge	3.363 ±1.491	Revitalisation	3.320 ±1.500	Nimbleness	3.323±1.505
Nimbleness	3.243 ±1.463	Nimbleness	3.243 ±1.483	Nimbleness	3.243 ±1.427	Nimbleness	3.179 ±1.426	Weight Management	3.299±1.659
Enjoyment	3.188 ±1.578	Enjoyment	3.082 ±1.583	Enjoyment	3.133 ±1.552	Enjoyment	3.089 ±1.541	Challenge	3.221±1.597
Challenge	3.113 ±1.583	Stress Management	3.055 ±1.500	Stress Management	3.100 ±1.510	Stress Management	3.038 ±1.541	Enjoyment	3.314±1.608
Stress Management	3.100 ±1.572	Challenge	2.979 ±1.615	Weight Management	2.977 ±1.682	Challenge	3.029 ±1.568	Stress Management	3.179±1.608
Affiliation	2.394 ±1.705	Affiliation	2.192 ±1.701	Competition	2.972 ±1.669	Affiliation	2.330 ±1.680	Affiliation	2.475±1.733
Social Recognition	2.257 ±1.695	Social Recognition	2.048 ±1.677	Affiliation	2.769 ±1.649	Social Recognition	2.208 ±1.658	Social Recognition	2.319±1.738
Competition	2.169 ±1.774	Health Pressures	1.906 ±1.887	Social Recognition	2.644 ±1.658	Competition	2.053 ±1.719	Competition	2.315±1.829
Health Pressures	1.821 ±1.870	Competition	1.735 ±1.674	Health Pressures	1.665 ±1.828	Health Pressures	1.822 ±1.867	Health Pressures	1.821±1.873

Table 6. Average points in 0–5 scale for different motivating factors to exercise among Physical Education and non-Physical Education students, and students with poor and very poor or very good economic situation. The motivators were ranked from the highest to the lowest average for each category

PE	mean ±SD	Non-PE	mean ±SD	Eco-1	mean ±SD	Eco-4/5	mean ±SD
Positive Health	4.324 ±0.916	Positive Health	3.911 ±1.228	Positive Health	3.298 ±1.420	Positive Health	4.178 ±1.204
Strength & Endurance	4.185 ±1.022	Appearance	3.610 ±1.461	Appearance	3.263 ±1.605	Strength & Endurance	3.783 ±1.404
Revitalisation	4.041 ±1.177	Ill-Health Avoidance	3.549 ±1.448	Strength & Endurance	2.941 ±1.488	Appearance	3.773 ±1.347
Appearance	3.895 ±1.303	Strength & Endurance	3.520 ±1.402	Ill-Health Avoidance	2.842 ±1.641	Ill-Health Avoidance	3.748 ±1.372
Ill-Health Avoidance	3.850 ±1.382	Weight Management	3.343 ±1.595	Weight Management	2.783 ±1.686	Revitalisation	3.545 ±1.568
Challenge	3.843 ±1.202	Revitalisation	3.192 ±1.559	Enjoyment	2.704 ±1.769	Weight Management	3.425 ±1.571
Nimbleness	3.727 ±1.250	Nimbleness	3.104 ±1.490	Stress Management	2.700 ±1.799	Nimbleness	3.380 ±1.354
Enjoyment	3.687 ±1.322	Enjoyment	2.960 ±1.607	Revitalisation	2.570 ±1.811	Challenge	3.240 ±1.514
Stress Management	3.627 ±1.314	Stress Management	2.949 ±1.607	Nimbleness	2.184 ±1.750	Enjoyment	3.229 ±1.691
Competition	3.385 ±1.495	Challenge	2.904 ±1.617	Challenge	2.039 ±1.758	Stress Management	3.229 ±1.691
Weight Management	3.298 ±1.642	Affiliation	2.205 ±1.700	Affiliation	2.039 ±1.795	Affiliation	2.499 ±1.675
Affiliation	3.053 ±1.553	Social Recognition	2.035 ±1.658	Social Recognition	1.743 ±1.760	Social Recognition	2.324 ±1.657
Social Recognition	3.030 ±1.590	Health Pressures	1.825 ±1.862	Health Pressures	1.482 ±1.687	Competition	2.282 ±1.945
Health Pressures	1.809 ±1.894	Competition	1.819 ±1.691	Competition	1.342 ±1.643	Health Pressures	1.916 ±1.892

Table 7. Differences between females and males, Physical Education students and students of other faculties, those living rural and urban, those declaring poor and good or very good financial situation. Number with "–" sign means that the second mentioned subgroup had higher average, the number without "–" sign mean that the first mentioned subgroup had higher average Statistically significant differences were marked with * ($p > 0.005$).

Average difference between female and male		Average difference between PE and non-PE students		Average difference between those living urban and rural		Average difference between those declaring poor and good or very good financial situation	
Competition	–1.237*	Competition	1.566*	Competition	0.262*	Challenge	–1.201*
Social Recognition	–0.596*	Social Recognition	0.995*	Enjoyment	0.225*	Nimbleness	–1.196*
Affiliation	–0.577*	Challenge	0.939*	Strength & Endurance	0.220*	Revitalisation	–0.975*
Weight Management	0.548*	Revitalisation	0.849*	Challenge	0.192*	Competition	–0.940*
Strength & Endurance	–0.476*	Affiliation	0.848*	Affiliation	0.145*	Ill-Health Avoidance	–0.906*
Challenge	–0.384*	Enjoyment	0.727*	Nimbleness	0.144*	Positive Health	–0.880*
Appearance	0.282*	Stress Management	0.678*	Stress Management	0.141*	Strength & Endurance	–0.842*
Health Pressures	0.241*	Strength & Endurance	0.665*	Revitalisation	0.139*	Weight Management	–0.642*

Average difference between female and male		Average difference between PE and non-PE students		Average difference between those living urban and rural		Average difference between those declaring poor and good or very good financial situation	
Ill-Health Avoidance	0.15*	Nimbleness	0.623*	Social Recognition	0.111*	Social Recognition	–0.581*
Revitalisation	–0.146*	Positive Health	0.413*	Positive Health	0.061	Stress Management	–0.529*
Positive Health	0.089*	Ill-Health Avoidance	0.301*	Weight Management	0.061	Enjoyment	–0.525*
Enjoyment	–0.051*	Appearance	0.285*	Ill-Health Avoidance	0.026	Appearance	–0.510*
Stress Management	–0.045	Weight Management	–0.045	Appearance	0.010	Affiliation	–0.460*
Nimbleness	0.000	Health Pressures	–0.016	Health Pressures	0.001	Health Pressures	–0.434*

Discussion

Our study results showed that the physical and mental well-being of Polish students during the COVID-19 pandemic was very poor. Although most of the participants declared quite good (40.4%) or very good financial situation (17.1%), their access to recreational facilities was poor (31.3%) or very poor (37.1%) and their physical well-being mostly poor (15.2%) or very poor (36.9%). Moreover, a great number of students reported that their mental well-being was poor (16.4%) or very poor (32.9%). Only 10.7% of them stated that they spent daily more than 1,5 (h) performing physical activity, and over 80% declared spending over 5h sitting or lying down daily. Some differences between females and males were noticed. Males declared to be more active – 37.4% of them stated that they spent over 1 hour daily performing physical activity versus 22.8% of females. Simultaneously, fewer males (73.5%) than females (84.2%) reported that they spent over 5h daily in a sitting or lying position. Slightly fewer men declared not having noticed an increase in their body mass – 51.3% versus 49.7% females. There are a number of differences between men and women considering the factors which motivated them to exercise. Whereas, men indicated strength and endurance as the most important motivator, women ranked positive health in the first place. Competition was less motivating for women while men reported health pressures to be of less importance. The most significant differences between men and women were found in competition which was ranked higher by men than women.

Some differences were also observed between the Physical Education students and those of other fields of study. Most of the non-PE students did not notice an increase in their body mass (56.3%). Similarly, the PE students (48.6%) stated that they did not gain weight. Both groups agreed that positive health is the most important motivating factor to exercise, though their responses were different regarding other motivators. While the non-PE students ranked appearance and ill-health avoidance in the second and third place, for the PE students strength and endurance and revitalization were so important. Competition was less important motivating factor to exercise for the non-PE students (14th place), while the PE students ranked it in the tenth place. The most significant differences between the PE and non-PE students were observed for the following motivators: competition (1.566, $p > 0.000$), social recognition (0.995, $p>0.000$) and challenge (0.939, $p>0.000$) which all were much more important for the PE students. There were some differences between the participants declaring very poor and good or very good financial situation, although they ranked motivating factors to exercise in a very similar way – for both groups positive health was the top factor, and health pressures and competition were of less importance. The biggest

differences were noted between challenge (–1.201, p > 0.000), nimbleness (–1.196, p > 0.000) and revitalization (–0.975, p > 0.000) which all were reported as much more important for the students who declared good or very good financial situation. The slightest differences were noticed between the participants living in rural and urban conditions – the greatest one concerned competition and equaled only 0.262 (p > 0.000). Both groups of students reported that positive health was the most important and health pressures the least important motivating factor.

Low levels of mental state registered in the present study could result from the lack of socialization i.e. the conditions imposed by distance learning which created barriers in communication between classmates and teachers, and which negatively affected the students' psychological well-being and increased feeling of loneliness (Lyubetsky et al., 2021; Rizun & Strzelecki, 2020; Wieczorek et al., 2021), and uncertainty about the future, graduation, or quality of curricula (Lyons et al., 2020). In fact, studies have shown that the interaction with colleagues increases involvement, motivation, and benefits academic performance (Wang et al., 2020). In contrast, prolonged isolation has been linked to psychopathological symptoms and behaviors, such as anxiety, depression (Chandratre, 2020), burnout, fatigue, psychotic episodes (Hajdúk et al., 2020), and even suicide (Lathabhavan & Griffiths, 2020). It is worth noting that previous pandemics have demonstrated that individuals without a history of anxiety disorders or panic attacks may develop depressive symptoms, varying degrees of anxiety disorders, and posttraumatic stress disorders, in addition to those who already experience such conditions (Göl & Erkin, 2021).

Those changes to daily life imposed by COVID-19 have influenced students of various faculties worldwide (Maciaszek et al., 2020), and showed that young adult populations are generally similar considering the psychopathological responses to the pandemic (Wieczorek et al., 2021). In a study with medical students of the third year in Russia (Lyubetsky et al., 2021), a prevalence of 29.97% and 24.03% was reported for depressive and anxiety symptoms, respectively. In addition, the same study revealed that 55% of the students changed their usual sleep pattern, which could be influenced by the prolonged use of digital tools (reported by more than 80% students). In the USA, with different student populations, it was noticed a prevalence of 48.14% and 38.48% was noted for depressive and anxiety symptoms, respectively. In the same study, 18.04% of the students mentioned that they had suicidal thoughts (Wang et al., 2020). Also in France, 43% of the participants reported significant depressive, and 39.19% anxiety symptoms (Essadek & Rabeyron, 2020). In Poland, with a sample of different students, higher results were registered, i.e. 65% of the students reported mild to severe anxiety, and 56% of them declared high levels of perceived stress (Wieczorek et al., 2021).

However, as we deal with university students, it should be considered that the level of such feelings could be increased because a great amount of students returned to their family home during confinement. It was suggested that this could be especially problematic for students whose families are not supportive, tolerant, or possibly even dysfunctional (Wieczorek et al., 2021). Moreover, it should be noted that factors, such as female sex (Ibrahim et al., 2013) and financial insecurity were pointed as main contributors to higher levels of depression, anxiety and distress, while living alone was mostly associated with more severe depressive symptoms (Essadek & Rabeyron, 2020). Nevertheless, it should be highlighted that even before COVID-19, the student population had been considered to be an 'at risk' population regarding mental health. Indeed, a systematic review on this topic showed that 30.6% of the students revealed to suffer from depression, which is greatly higher than the prevalence in the general population of many countries which amounted to 9–11% (Wieczorek et al., 2021).

The COVID-19 pandemic negatively affected the examined students in terms of their physical and mental well-being, which is in accordance with other studies from different countries. Positive health is the most important

motivating factor to exercise for Polish students, while competition is scored the lowest. There are some differences observed between genders as well as between Physical Education students and students of other faculties. The analysis of the results in a broad context may yield specific and practical recommendations and guidelines for further research which are presented below.

Practical application

The present study highlighted the importance of monitoring the students' mental health status over time. In fact, this population is normally susceptible to mental health declines while the pandemic conditions even intensify behavioral health concerns. Therefore, it is crucial to maintain constant mental health assessments, and improve accessibility to recreational facilities for students. Also, recommendations for early psychosocial intervention should be developed and increasing access to mental health care is needed. Such actions should aim to facilitate the maintenance of students' mental and physical well-being.

Since positive health is the most important motivating factor to exercise for different subgroups and in total and as competition is considered to be the least important motivator by most of different subgroups and in total, actions aiming to promote physical activity and facilitate participation in activity of 'health-related fitness' character are needed. The authors recommend joint actions aimed at activation in terms of physical activity and provision of professional psychological support to prevent the consequences of insufficient physical activity and social isolation.

Perspective

The COVID-19 pandemic came unexpectedly and many countries were not ready to manage with health and social problems it brought. Now, having in mind that such a situation can occur in the future, as scientists, we have the opportunity to be better prepared to undertake future research. Basing on present state of knowledge, future research should use well established methodology and proceed comparative studies. Future research should include similar groups of students, both from Poland as well as from other countries, which will enable the interpretation of differences and formulation of more general conclusions.

Limitations of the study

The main limitation of this study is the fact that we do not have similar database from the time before the pandemic therefore we cannot conduct comparative analysis. The use of self-report questionnaires can always face criticism. However, in our study we used a well-established and validated tool, and the use of other methods was strongly restricted during the pandemic lockdown.

Conclusions

The Polish students' mental health and well-being during the COVID-19 pandemic was poor, which mainly resulted from very poor accessibility to recreational facilities, spending too much time in sitting or lying positions daily and not performing enough physical activity. Very few students assess their accessibility to recreational facilities and their physical and mental well-being as very good, though the majority of them declare their financial situation to be good or very good. This observation implies that while finance is not a problem for many, poor accessibility and

poor psychological care can be the reason why the participants do not feel emotionally and physically well. During the pandemic lockdown the male students were more active and spent less time in a sitting position than females, which suggests that women may be more likely than man to suffer from obesity and other consequences of physical inactivity. The most significant differences between males and females as well as between the Physical Education students and students of other faculties were observed in competition, as one of motivating factors to exercise, which was much more important for males and the PE-students comparing to females and the non-PE students. The participants living in rural and urban areas assessed motivating factors in a very similar way.

Supplementary Materials: The EMI-2 questionnaires in Polish and English can be downloaded here: http://exercise-motivation.bangor.ac.uk/emi/foreign.php

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