Students' quality of life before and during the Covid-19 pandemic: A comparative analysis using multidimensional inventory of students' quality of life

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A B S T R A C T
Objective: This article aims to describe and compare students' quality of life (QOL) in Poland before and during the Covid-19 pandemic using a multidimensional inventory of students' quality of life (MIS-QOL).
Research Design & Methods: The article shows the results of a study conducted among university students from Poland. The number of participants was N2019=184 and N2021=287. Within the exploratory approach, we analysed fourteen dimensions of the students' QOL using various tools, including general descriptive statistics as well as Student's t-test, correlation, and clustering analysis.
Findings: Evidence from previous research indicates that the Covid-19 pandemic impacted QOL also among university students. The article shows the most vulnerable areas of life possibly affected by the pandemic situation.
Implications & Recommendations: The research confirmed that the students' QOL increased in terms of finance, relationships with partners, and volunteering and decreased in areas such as health, free time, and technology. Importantly, students were aware of the decrease only in the context of technology and perceived other dimensions in the same way as before the pandemic.
Contribution & Value Added: We distinguished the most suitable actions for keeping student's quality of life at a high level. The results may be beneficiary for managers, universities, and students.

INTRODUCTION

In December 2019, the virus SARS-CoV-2 caused a series of serious atypical respiratory diseases in Wuhan, China. Scientists named the disease caused by this novel virus Covid-19 – the Coronavirus Disease 2019. The virus spread from person to person and caused a worldwide pandemic (Yuki *et al.*, 2020). The sudden transmission of the new coronavirus and the immediate action taken in response to the Covid-19 pandemic created many new challenges that negatively affected the quality of life (QOL) (Mohsen *et al.*, 2022). Covid-19-related home lockdown significantly impacted many aspects of peoples' QOL (Algamdi, 2021).

Evidence from previous large-scale epidemics suggests that such events profoundly impact both physical and mental health and QOL in general (Sim & Chua, 2004). They affect the whole population, *i.e.* both healthy people and those considered vulnerable, and influence the brain function, cognition, and mental health (Holmes *et al.*, 2020). Noteworthy, Covid-19 survivors report low QOL within one to three months after infection and significant impairment of physical and mental functioning (Wang *et*

al., 2020; McFann *et al.*, 2021). Importantly, research results show that severe and moderate Covid-19 has a greater impact on QOL compared to its milder form (McFann *et al.*, 2021).

Pandemics can deteriorate people's mental health (Hansel *et al.*, 2022). Limited research from previous pandemics suggests that it contributes to poorer mental health, especially in adolescents, women, and those with lower levels of education (Lau *et al.*, 2005). The pandemic-related loss of resources also contributes to mental health problems, including increased work and financial stress, coupled with reduced social support (Lau *et al.*, 2005; Pierce *et al.*, 2020). Recent Covid-19 research found a link between QOL and mental health issues with recovery (Ma *et al.*, 2020). Furthermore, research results confirm that there is a direct positive link between Covid-19 and anxiety, depression, and stress. This shows that Covid-19-related stress may increase pre-existing threats to mental health by being a potential activator of mental stress (Veronese *et al.*, 2021).

The Covid-19 affected both the labour market and education on a great scale. Both professional life and education activities moved to the online world, which affected the QOL. Students represent both the education and labour force. Hence, it is crucial to investigate their QOL as another pandemic may possibly occur. Recent studies report that Covid-19 reduces the QOL of university students (Cheah *et al.*, 2021; Figueiredo *et al.*, 2021; Leong Bin Abdullah *et al.*, 2021; Trzcionka *et al.*, 2022). Moreover, research indicates that university students had lower QOL levels in psychological and social relationships in response to the Covid-19 pandemic, even after the authorities lifted the movement control order (Leong Bin Abdullah *et al.*, 2021). The study conducted by Leong Bin Abdullah *et al.* (2021) identified two Covid-19-related stressors that predicted lower QOL among university students, *i.e.* frustration with study disruptions and perception of life in an area with a high incidence of Covid-19 cases. Two psychological factors were predictors of lower quality of life, *i.e.* greater severity of depression and stress. On the contrary, the study associated religious coping, the greater number of hours of classes attended per week, and greater support from family, friends, and other significant people with higher QOL among university students (Leong Bin Abdullah *et al.*, 2021).

The abovementioned premises indicate that students' QOL is worth studying. In the next paragraph, we will present the essence and multidimensionality of the QOL concept and describe its components and determinants. Finally, we will introduce assessment tools used to measure QOL.

Quality of life is a research topic in several disciplines such as economics and social and medical sciences. Historians attribute the first use of the term 'quality of life' to American President Johnson (1964). In turn, the use of statistical data to assess living conditions and conduct analyses began in the 1930s. Nowadays, the discussion about QOL is becoming more and more popular in the area of education, security, and meeting aesthetic and spiritual needs (Pajaziti, 2014; Rabe *et al.*, 2018).

The subject literature contains the diversity of QOL's definitions. In Abrams's opinion (1973), QOL is 'the degree of satisfaction or dissatisfaction felt by people with various aspects of their lives.' According to Revicki *et al.* (2000), QOL is a comprehensive range of human experiences linked to one's overall well-being. Meanwhile, Ruževičius (2014) defines QOL as 'an individual's satisfaction with his or her life dimensions compared with his or her ideal life.' The subject literature indicates that QOL has two components (Arsovski *et al.*, 2016):

1. Objective conditions explained as the resources that a person has, including the real opportunities to use these resources to meet one's needs.
2. Subjective experience of one's capabilities and the fulfilment of these needs.

The quality of life results from an individual's mental and physical health, the degree of independence, motivation, job satisfaction, involvement in work performance, workload, safety and welfare at work, stress, burn-out, the social relationship with the environment, and many other factors. Noteworthy, the assessment of QOL depends on one's value system (Ruževičius, 2014; Nur *et al.*, 2017; Kazemi & Panahi, 2019; Shawkat, 2019).

In the subject literature, there are numerous assessment tools used to measure the QOL. However, there are three tools that professionals use most frequently. These are the questionnaire from the World Health Organisations' quality of life tool (WHO-QOL), the satisfaction with life scale (SWLS), and Flanagan's quality of life scale (QOLS).

The tool by World Health Organisation (1997) consists of 100 items gathered around six factors such as physical health, psychological factors, independence, social relations, environment, and spirituality (single item only).

The second tool, *i.e.* satisfaction with life scale (SWLS) dates to 1985. Its authors are Diener, Emmons, Larsen, and Griffin. The questionnaire consists only of five items: (1) In most ways my life is close to my ideal; (2) The conditions of my life are excellent; (3) I am satisfied with my life; (4) So far, I have gotten the important things I want in life; (5) If I could live my life over, I would change almost nothing.

The third tool is Flanagan's QOL scale. It comes from the USA and dates to 1970 (Flanagan, 1982). The original QOLS contained 15 items that represent five conceptual categories: (1) material and physical well-being; (2) relationship; (3) social, community, and civic activities; (4) personal development; and (5) recreation. 'Material and physical well-being' and 'social, community, and civic activities' consist of two items. Three other categories consist of four items. The last item (16. Independence) was added later on.

Noteworthy, the analysis of the subject literature regarding the measurement of the QOL revealed a gap in the scope of research tools to study QOL of the so-called young adults. According to the theory of emerging adulthood, people aged 18-25 considerably differ from people in other age groups not only in demographic terms but also in the forming of identity and the perception of themselves (Chisholm & Hurrelmann, 1995; Arnett, 2000). The aforementioned research gap became a motive for the construction of a Multidimensional Inventory of Students' Quality of Life (MIS-QOL) that we used in the presented research, which aimed to describe and compare students' QOL in Poland before and during the Covid-19 pandemic.

RESEARCH METHODOLOGY

Our research had an exploratory character and there was no hypothesis. However, we introduced research questions. The main question was: How did the Covid-19 pandemic and the resulting increase in the importance of remote work change students' QOL? Moreover, we formulated three detailed research questions. 1) For which dimensions and variables defining quality of life did the assessment change the most due to the pandemic? 2) How did students' perspectives change within the individual dimensions of QOL? 3) Did the nature of the links between individual QOL dimensions change? To answer the questions, we focused on various dimensions important to students while describing and measuring their QOL. Those were:

1. Finance;
2. Health;
3. Family;
4. Relationship with a partner;
5. Friends;
6. Work;
7. Free time;
8. Flat/apartment;
9. Hobby/interest;
10. University/education;
11. Volunteering;
12. Technology;
13. State of mind;
14. Philosophy/ethics.

We obtained the first dataset before February 2019 and the second one – regarding the pandemic period – between January and December 2021. We prepared the questionnaire in the computerized self-administered questionnaire (CSAQ) format which excludes the problem of nonresponse. We conducted the research in accordance with the highest ethical standards. Research participation was voluntary and the sample was random.

We used the MIS-QOL tool (Szydło *et al.*, 2019) to collect the data. In an especially meticulous way, MIS-QOL examines students' QOL in 14 aspects, including finance, health, family, but also university, volunteering, technology, and others. The questionnaire shows very good psychometric properties, including PCLOSE=0.35, Cronbach's alpha 0.802, and r-sb=0.858. Nevertheless, due to the relatively enormous number of questions (100), we decided to build its short version. We selected the questions for the short version using exploratory factor analysis (EFA). The short version contains 30 questions and shows a very strong correlation (0.971) with MIS-QOL.

The research sample was as follows. In 2019, there were 184 respondents, among whom 73.4% were women. Research participants studied at 12 universities with different profiles located in four

cities in Poland (Warsaw, Krakow, Lublin, and Kielce). Respondents were between 20 and 27 years old. The median of respondents age was 22.

In 2021, we increased the research sample. There were now 287 students, among whom 74.6% were women. Respondents studied at 15 different universities located in 10 cities in Poland. Respondents aged between 19 and 29 years old. The median of respondents age was 21.

To compare the assessment of students' QOL before and during the pandemic, we used t-test for independent samples (Aczel & Sounderpandian, 2009). This is an appropriate tool for comparing QOL in two different groups of students. Next, we used Pearson's correlation coefficient to check changes in the relationship between QOL dimensions. Finally, we used hierarchical clustering (Ghosal *et al.*, 2020) – one of the multidimensional analysis methods – to visualise bindings between QOL dimensions and perspectives in the QOL dimensions. For this purpose, we created dendrograms based on Ward's method and Euclidean distance.
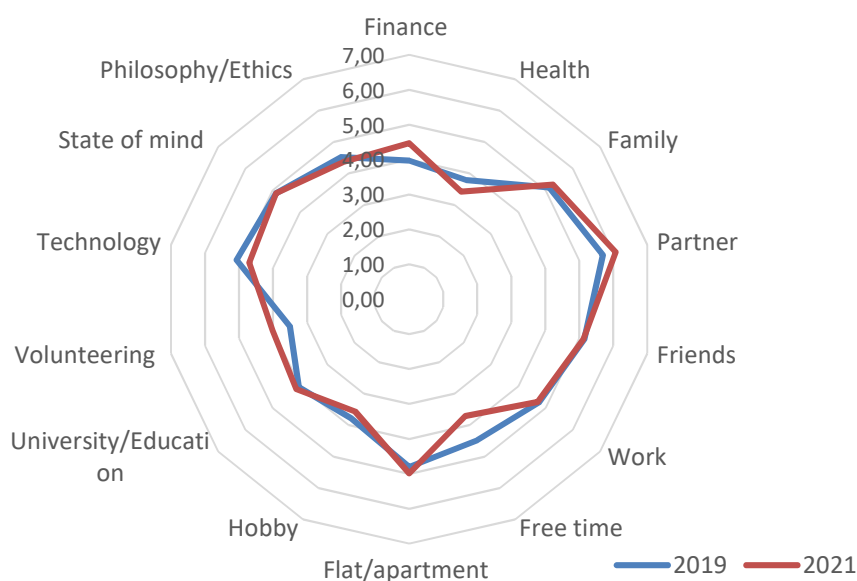

Figure 1. The radar chart for averages of dimensions of MIS-QOL in 2019 and 2021
Source: own elaboration.

In 2019, we observed the lowest assessment for volunteering, hobby, and health (3.5, 3.79, and 3.79 respectively). During the pandemic, assessment in the volunteering dimension increased (4.01). This change was statistically significant and one of the highest in plus. In 2021, respondents still assessed the health dimension the lowest (3.42) and even lower than in 2019. This change was statistically significant and one of the highest changes among researched dimensions. We observed the highest statistically significant decrease for the free time dimension (from 4.48 to 3.71). We noted a statistically significant assessment increase in finance. Before the pandemic, the average score was 3.97 and during – 4.47. Table 1 presents the details for the conducted t-test, including p-value.

The above-described dimensions are aggregates of detailed variables. Thus, changes in dimensions' assessments result from changes in variables' evaluation. Table 2 presents the t-test results for changes in the assessment of variables before and during the pandemic. In the first researched dimension, *i.e.* finance, values of all variables increased and only in one case this change was not statistically significant. We observed the highest increase for the possibility of satisfying own needs (from 4.32 to 4.99, p=0.0001) and the possibility of spending financial resources for pleasure (from 4.06 to 4.67, p=0.0006). We observed a statistically insignificant increase in the assessment of scholarship money received (from 3.33 to 3.55, p=0.3179).

In the field of health, the values of all variables in 2021 were lower than in 2019. Three of them (quality of public health care, availability of information about health, and the quality of advice from medical doctor/general practitioner) were statistically significant. Among them, we observed the

lowest level for the quality of public health care. Before the pandemic, the average score of this item was 3.2 and after two years of the pandemic, this value decreased to 2.67, which is one of the lowest assessed aspects in the conducted research.

Table 1. The t-test results for the changing assessment of MIS-QOL dimensions in 2019 and 2021

Dimension	Mean 2019	Mean 2021	t	df	p-value	N 2019	N 2021	Std. dev. 2019	Std. dev 2021
Finance	3.97	4.47	-3.40	469	0.0007	184	287	1.69	1.47
Health	3.79	3.42	3.00	469	0.0029	184	287	1.33	1.27
Family	5.13	5.26	-1.11	469	0.2668	184	287	1.34	1.24
Relationship with a partner	5.69	6.07	-2.82	287	0.0051	125	164	1.25	1.02
Friends	5.15	5.12	0.27	469	0.7868	184	287	1.19	1.38
Work	4.75	4.73	0.14	266	0.8901	111	157	1.49	1.35
Free time	4.48	3.71	6.41	469	0.0000	184	287	1.27	1.28
Flat	4.80	4.99	-1.23	469	0.2206	184	287	1.60	1.59
Hobby/interests/passion	3.79	3.57	1.40	469	0.1630	184	287	1.77	1.55
University/education	4.05	4.13	-0.72	469	0.4723	184	287	1.30	1.14
Volunteering	3.50	4.01	-2.50	469	0.0128	184	287	2.31	2.03
Technology	5.07	4.70	3.81	469	0.0002	184	287	1.04	1.02
State of mind	4.87	4.87	0.03	469	0.9728	184	287	1.33	1.24
Philosophy/ethics	4.52	4.36	1.39	469	0.1659	184	287	1.38	1.04

Source: own study.

Table 2. The t-test results for the changing assessment of MIS-QOL variables in 2019 and 2021

Dimension	Variable	Mean 2019	Mean 2021	t	df	p-value	Std. dev. 2019	Std. dev 2021
Finance	Opportunities to obtain scholarships	3.82	4.25	2.12	469	0.0342	2.16	2.16
	Amount of money received from scholarships	3.33	3.55	1.00	469	0.3179	2.50	2.23
	The possibilities of unrestricted financial self-management	4.39	4.94	3.18	469	0.0016	1.95	1.77
	The possibility of spending financial resources on pleasure	4.06	4.67	3.43	469	0.0006	1.96	1.84
	The possibility of satisfying your own needs	4.32	4.99	4.07	469	0.0001	1.87	1.66
	Your financial security	3.92	4.43	2.84	469	0.0046	1.93	1.90
Health	Your physical condition	4.19	4.00	-1.20	469	0.2313	1.62	1.72
	Quality of public health care	3.20	2.67	-3.43	469	0.0007	1.77	1.53
	Availability of information about your health	4.11	3.52	-3.93	469	0.0001	1.64	1.56
	Quality of advice from your medical doctor/general practitioner	3.95	3.49	-2.69	469	0.0073	1.81	1.80
	Access to a specialist doctor	3.35	3.05	-1.73	469	0.0838	1.88	1.81
	Quality of medical advice from your specialist doctors	3.92	3.79	-0.72	469	0.4691	1.86	1.87
Family	Frequency of contacts with the closest family (phone, Skype, meetings...)	5.42	5.64	1.67	469	0.0953	1.55	1.29
	Time spent together with your closest family	5.03	5.33	2.08	469	0.0383	1.64	1.52
	The level of trust in the closest family	5.38	5.40	0.15	469	0.8833	1.63	1.59
	Support from the family in difficult life situations	5.41	5.67	1.72	469	0.0858	1.72	1.53
	The level of acceptance of the current partner/his absence	4.98	4.96	-0.10	469	0.9210	2.25	2.42
	The ways of making joint decisions	4.57	4.58	0.09	469	0.9307	1.73	2.20
Relation with a	Frequency of meetings	5.34	5.77	2.25	287	0.0254	1.79	1.47
	Time spent together	5.50	5.94	2.51	287	0.0126	1.65	1.29
	The level of trust in the relationship with him/her	6.01	6.33	2.13	287	0.0340	1.38	1.18
	Partner's respect for my principles	5.78	6.09	2.06	287	0.0403	1.38	1.22
	Partner's respect for my limits	5.86	6.28	2.74	287	0.0065	1.42	1.16
	The impact he/she has on me	5.66	6.01	2.09	287	0.0371	1.48	1.29

Dimension	Variable	Mean 2019	Mean 2021	t	df	p-value	Std. dev. 2019	Std. dev 2021
Friends	The number of friends	5.18	5.14	-0.26	469	0.7939	1.54	1.67
	Frequency of contact with them	4.77	4.38	-2.46	469	0.0142	1.53	1.80
	Time spent together with them	5.27	5.00	-1.68	469	0.0932	1.45	1.84
	Respect for my principles	5.29	5.52	1.66	469	0.0971	1.43	1.53
	Their respect for my limits	5.36	5.54	1.31	469	0.1892	1.38	1.55
	The network of contacts built thanks to them	5.05	5.14	0.56	469	0.5766	1.58	1.63
Work	Work's prestige	4.52	4.52	0.00	266	0.9991	1.99	1.42
	The correlation of the work performed to your education	4.44	4.15	-1.14	266	0.2572	2.30	1.93
	Atmosphere at work	5.25	5.17	-0.37	266	0.7129	1.78	1.74
	Relationships with colleagues	5.35	5.46	0.56	266	0.5782	1.69	1.62
	Relationship with superiors	5.19	5.21	0.09	266	0.9249	1.69	1.87
	Opportunities for future promotion	3.74	3.83	0.36	266	0.7169	2.11	2.13
Free time	The amount of free time	4.14	3.93	-1.22	469	0.2230	1.99	1.64
	Quality of free time	4.57	4.08	-3.35	469	0.0009	1.56	1.56
	The freedom to decide on the form of spending free time	5.18	4.88	-2.03	469	0.0434	1.53	1.65
	Travel possibilities	4.09	3.15	-5.32	469	0.0000	1.76	1.95
	Access to sports events	4.29	3.02	-7.06	469	0.0000	1.88	1.92
	The access to cultural events	4.64	3.21	-8.33	469	0.0000	1.57	1.95
Flat	Relationship with flatmates	4.38	4.26	-0.47	469	0.6361	2.44	2.61
	The size of the flat	4.95	4.94	-0.02	469	0.9802	1.97	2.15
	The size of the room	4.87	5.10	1.22	469	0.2223	2.02	2.00
	Technical condition	4.83	5.15	1.73	469	0.0847	1.92	1.94
	Equipment	4.82	5.20	2.13	469	0.0338	1.94	1.84
	Location	4.97	5.27	1.66	469	0.0976	2.00	1.85
Hobby/interests/passion	The amount of time spent on the hobby	3.59	3.80	1.13	469	0.2598	2.02	1.87
	The availability of places to develop a hobby	3.98	3.67	-1.75	469	0.0812	1.93	1.86
	The level of your hobby development	3.96	3.90	-0.34	469	0.7357	2.05	1.82
	Belonging to the group of 'hobbyists'	3.30	2.74	-2.69	469	0.0073	2.35	2.14
	Spreading interest in your hobby among your friends	3.77	3.46	-1.57	469	0.1167	2.08	2.05
	Social perception of people sharing your hobby	4.13	3.87	-1.36	469	0.1746	2.01	2.02
University/Education	Education content adequate to the needs of the labour market	3.71	4.18	3.33	469	0.0010	1.66	1.43
	University's academic level	4.05	4.69	4.55	469	0.0000	1.60	1.43
	University's didactic level	4.04	4.63	4.25	469	0.0000	1.53	1.44
	Opportunities for out-of-class activities (student groups/organizations)	4.18	4.39	1.11	469	0.2681	2.06	2.04
	Obligatory PE classes	4.15	3.09	-4.53	469	0.0000	2.41	2.52
	Transparency and content of the university website	4.16	3.78	-2.26	469	0.0244	1.67	1.84
Volunteering	Opportunities to implement an idea	3.36	3.73	1.72	469	0.0855	2.34	2.17
	Opportunities to help those in need	3.69	4.25	2.52	469	0.0122	2.48	2.25
	Self-development opportunities	3.53	4.26	3.40	469	0.0007	2.42	2.22
	Opportunities to implement your own ideas	3.44	3.94	2.35	469	0.0193	2.37	2.21
	The sense of belonging to a group	3.58	3.95	1.71	469	0.0885	2.45	2.24
	Appreciating your commitment	3.41	3.91	2.29	469	0.0222	2.41	2.22
Technology	The level of your internet skills	5.88	5.90	0.20	469	0.8386	1.21	1.10
	The use of mobile devices	5.88	5.95	0.71	469	0.4750	1.13	1.04
	The level of your programming skills	3.46	2.66	-4.16	469	0.0000	2.13	1.98
	Knowledge of technological innovations	4.93	4.03	-5.41	469	0.0000	1.69	1.80
	Social networks	5.21	4.95	-1.73	469	0.0841	1.48	1.61
	Own image in social media	5.09	4.73	-2.34	469	0.0199	1.58	1.67

Dimension	Variable	Mean 2019	Mean 2021	t	df	p-value	Std. dev. 2019	Std. dev 2021
State of mind	I am confident	4.49	4.38	-0.70	469	0.4823	1.72	1.60
	I have a lot of energy	4.63	4.47	-1.00	469	0.3174	1.69	1.60
	I deal with problems well	4.61	4.48	-0.87	469	0.3849	1.60	1.57
	I feel loved	5.27	5.35	0.47	469	0.6366	1.67	1.75
	I feel needed	5.02	5.15	0.87	469	0.3851	1.65	1.68
	I feel accepted	5.22	5.37	1.06	469	0.2901	1.54	1.56
Philosophy/ethics	Understanding of suffering	4.61	4.46	-1.04	469	0.3009	1.63	1.60
	Your understanding of passing away	4.65	4.55	-0.62	469	0.5324	1.75	1.65
	Own moral principles	5.22	5.67	3.45	469	0.0006	1.64	1.18
	Existing social norms	4.13	4.00	-0.82	469	0.4106	1.74	1.63
	Socially recognized authorities	4.14	3.64	-3.10	469	0.0021	1.85	1.64
	Social relation to your beliefs	4.36	3.87	-3.13	469	0.0019	1.78	1.57

Source: own study.

Although the assessment changes in some dimensions were not statistically significant, we observed statistically significant changes in some variables within those dimensions. For example, in the family dimension, we observed an increase in the evaluation of time spent together with the closest family (from 5.03 to 5.33, p=0.0383). Similarly, the change for the friends dimension was not statistically significant, but for the frequency of contacts with them, we observed a statistically significant decrease (from 4.77 to 4.38, p=0.0142). We observed a similar situation for flat and hobby/interests/passion. For the flat dimension, we observed statistically significant higher assessment for equipment (from 4.82 to 5.2, p=0.0338). In the case of hobby, we noticed statistically lower evaluation for belonging to the group of 'hobbyists' (from 3.30 to 2.74, p=0.0073), which might have resulted from restrictions in meetings in large groups of people. On the other hand, in the case of philosophy/ethics dimension, we observed a statistically significant increase in the level of the own moral principles variable (from 5.22 to 5.67, p=0.0006), a statistically significant decrease in the level of socially recognized authorities (from 4.14 to 3.64, p=0.0021) and social relation to beliefs (from 4.36 to 3.87, p=0.0019).

Regarding relationship with a partner, the level of all variables increased during the pandemic. Moreover, all changes were statistically significant. We observed the highest assessment in this dimension (both before and during the pandemic) for the level of trust in the relationship with partner (on average 6.01 in 2019 and 6.33 in 2021).

The assessment of all variables included in the free time dimension decreased during the pandemic. Moreover, all changes, except the amount of free time, were statistically significant. We noted the highest decrease in access to sports and cultural events (from 4.29 to 3.02 for sport and from 4.64 to 3.21 for cultural events). Noteworthy, the decreases were the most significant among all variables in the research.

In the university/education dimension, we observed a statistically significant increase in education content adequate to the needs of the labour market, the university's academic level, and the university's didactic level, while a statistically significant decrease refers to obligatory PE classes and transparency and content of the university website. Interestingly, the highest change concerned students' satisfaction with compulsory physical education (from 4.15 in 2019 to 3.09 in 2021, p=0.0000).

The assessment of the level of all variables included in the volunteering dimension increased in 2021 compared to 2019. Statistically significant occurred for the following variables: opportunities to help those in need, self-development opportunities, opportunities to implement own ideas, and appreciation for commitment. The highest change concerned self-development opportunities (from 3.53 to 4.26, p=0.0007).

Although the respondents assessed the technology dimension lower during the pandemic than before it, they assessed some variables higher (the level of internet skills and the use of mobile devices).

However, these increases were not statistically significant in contrast to the statistically significant lower assessment of the level of programming skills (from 3.46 to 2.66, p=0.0000), knowledge of technological innovations (from 4.93 to 4.03, p=0.0000), and image in social media (from 5.09 to 4.73, p=0.0199).

For work and state of mind dimensions, the change in the level of all the examined variables was statistically insignificant.

To obtain a complete picture of changes in the students' quality of life before and during the pandemic, we compared the assessment of perspectives in different dimensions. Figure 2 presents the average assessments of perspectives in individual dimensions in 2019 and 2021.
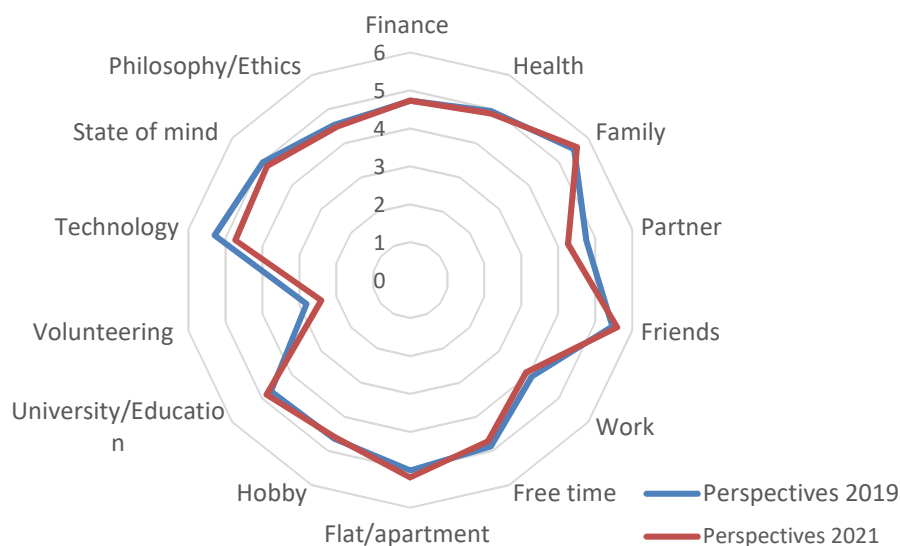
Figure 2. The radar chart for averages of perspectives for MIS-QOL dimensions in 2019 and 2021
Source: own elaboration.

As shown in Figure 2, in 2019, the highest assessment concerned perspectives on family, friends, technology, and flat dimensions (5.53, 5.46, 5.29, and 5.02 respectively). We obtained the lowest assessment for perspective in volunteering (2.80). During the pandemic, the highest assessment concerned perspectives in family, friends, and flat and were even higher than in 2019, (5.62, 5.60 and 5.02 respectively) but these increases were statistically insignificant (Table 2). Again, in 2021, we noted the lowest assessment for the perspective in volunteering (2.40). This score was even lower than before the pandemic, but the change was statistically insignificant.

Table 3. The t-test results for the changing assessment of perspectives of MIS-QOL dimensions in 2019 and 2021

Perspectives	Mean 2019	Mean 2021	t	df	p-value	N 2019	N 2021	Std. dev. 2019	Std. dev 2021
Finance	4.73	4.73	0.03	469	0.9785	184	287	1.50	1.25
Health	4.94	4.87	-0.54	469	0.5865	184	287	1.34	1.35
Family	5.53	5.62	0.74	469	0.4618	184	287	1.49	1.32
Relationship with a partner	4.76	4.27	-1.85	469	0.0647	184	287	2.65	2.87
Friends	5.46	5.60	0.99	469	0.3205	184	287	1.50	1.38
Work	4.09	3.91	-0.85	469	0.3944	184	287	2.31	2.21
Free time	4.88	4.72	-1.12	469	0.2633	184	287	1.53	1.46
Flat	5.02	5.21	1.24	469	0.2154	184	287	1.75	1.52
Hobby/interests/passion	4.64	4.59	-0.3	469	0.7608	184	287	1.93	1.76
University/education	4.70	4.85	1.17	469	0.2407	184	287	1.34	1.35
Volunteering	2.80	2.41	-1.70	469	0.0892	184	287	2.51	2.44
Technology	5.29	4.73	-3.78	469	0.0002	184	287	1.38	1.69
State of mind	4.97	4.83	-1.02	469	0.3068	184	287	1.49	1.48
Philosophy/ethics	4.56	4.48	-0.43	469	0.6648	184	287	1.79	1.88

Source: own study.

The only statistically significant change in perspectives concerned technology. The assessment of this dimensions decreased from 5.29 in 2019 to 4.73 in 2021 (p=0.0002).

To analyse the relationship between researched dimensions, we applied Pearson's correlation coefficient. Tables 4 and 5 present the analysis' outcome. We marked statistically significant correlations (p<0.05) with an asterisk.

Table 4. The correlation matrix between MIS-QOL dimensions in 2019

Variable	Finance	Health	Family	Partner	Friends	Work	Free time	Flat	Hobby/interests/passion	University/education	Volunteering	Technology	State of mind	Philosophy/ethics
Finance	1.00	0.18	0.38*	0.18	0.17	0.18	0.31*	0.11	0.17	0.29*	0.31*	0.09	0.13	0.19*
Health	0.18	1.00	0.29*	0.15	0.35*	0.40*	0.33*	0.06	0.16	0.28*	0.10	0.28*	0.28*	0.27*
Family	0.38*	0.29*	1.00	0.54*	0.37*	0.47*	0.42*	0.23*	0.25*	0.32*	0.27*	0.45*	0.52*	0.28*
Partner	0.18	0.15	0.54*	1.00	0.29*	0.23*	0.29*	0.25*	0.17	0.18	0.04	0.37*	0.61*	0.37*
Friends	0.17	0.35*	0.37*	0.29*	1.00	0.33*	0.30*	0.11	0.31*	0.31*	0.16	0.58*	0.44*	0.32*
Work	0.18	0.40*	0.47*	0.23*	0.33*	1.00	0.20*	0.16	0.05	0.23*	0.21*	0.44*	0.41*	0.28*
Free time	0.31*	0.33*	0.42*	0.29*	0.30*	0.20*	1.00	0.25*	0.39*	0.33*	0.13	0.11	0.30*	0.38*
Flat	0.11	0.06	0.23*	0.25*	0.11	0.16	0.25*	1.00	0.27*	0.18	0.22*	0.18	0.27*	0.28*
Hobby/interests/passion	0.17	0.16	0.25*	0.17	0.31*	0.05	0.39*	0.27*	1.00	0.42*	0.21*	0.28*	0.17	0.11
University/Education	0.29*	0.28*	0.32*	0.18	0.31*	0.23*	0.33*	0.18	0.42*	1.00	0.33*	0.26*	0.15	0.23*
Volunteering	0.31*	0.10	0.27*	0.04	0.16	0.21*	0.13	0.22*	0.21*	0.33*	1.00	0.26*	0.18	0.29*
Technology	0.09	0.28*	0.45*	0.37*	0.58*	0.44*	0.11	0.18	0.28*	0.26*	0.26*	1.00	0.47*	0.26*
State of mind	0.13	0.28*	0.52*	0.61*	0.44*	0.41*	0.30*	0.27*	0.17	0.15	0.18	0.47*	1.00	0.43*
Philosophy/ethics	0.19*	0.27*	0.28*	0.37*	0.32*	0.28*	0.38*	0.28*	0.11	0.23*	0.29*	0.26*	0.43*	1.00

Note: *p<0.05.
Source: own study.

We observed the highest correlation between researched dimensions for state of mind and relationship with a partner (0.61). Both were also highly correlated with family (0.54 for partner and 0.52 for state of mind). The family dimension had also a high correlation with work (0.47), technology (0.45), and free time (0.42). We may assume that young adults, who have good relationships with their families, deal better in everyday life, including partner, work, and state of mind. We also observed a high correlation between friends and technology (0.58), which allowed us to believe that even before the pandemic friends conducted a large part of contacts using information and communications technology.

In 2021, the correlation between family and relationship with partner was even higher than before the pandemic (0.62). The relationships between family and friends (0.57) and partner and friends (0.5) were also much stronger. The correlation between family and state of mind stayed at an equally high level (0.52). During the pandemic, the influence between the relationship with partner and state of mind decreased. On the other hand, the impact of satisfaction and free time on the state of mind increased (0.52). In turn, satisfaction with free time was highly correlated with hobbies, interests, and passion (0.59). We observed the influence of pandemic on the young adults' everyday lives also in the increase in technology's meaning for the state of mind (0.61). Forced domestic isolation increased the dependence between satisfaction from flat and hobby (0.55). We also observed a high correlation between philosophy/ethics and satisfaction with free time (0.51), state of mind (0.56), and technology (0.58).

The changes in relationships between MIS-QOL dimensions presented in Tables 4 and 5 are also visible in the clustering of dimensions presented in Figures 3 and 4. Figure 3 demonstrates clustering outcomes using Ward's method and Euclidean distance for researched dimensions in 2019 and 2021. In turn, Figure 4 shows clustering outcomes for perspectives in 2019 and 2021, using the same parameters.

Table 5. The correlation matrix between MIS-QOL dimensions in 2021

Variable	Finance	Health	Family	Partner	Friends	Work	Free time	Flat / apartment	Hobby / interests / passion	University / education	Volunteering	Technology	State of mind	Philosophy / ethics
Finance	1.00	0.48*	0.25*	0.29*	0.21	0.58*	0.34*	0.17	0.36*	0.32*	0.30*	0.20	0.38*	0.25*
Health	0.48*	1.00	0.38*	0.36*	0.37*	0.35*	0.43*	0.32*	0.46*	0.47*	0.39*	0.10	0.43*	0.28*
Family	0.25*	0.38*	1.00	0.62*	0.57*	0.28*	0.39*	0.24*	0.29*	0.47*	0.32*	0.41*	0.52*	0.49*
Partner	0.29*	0.36*	0.62*	1.00	0.50*	0.35*	0.42*	0.42*	0.25*	0.28*	0.23*	0.35*	0.58*	0.41*
Friends	0.21	0.37*	0.57*	0.50*	1.00	0.37*	0.47*	0.44*	0.53*	0.53*	0.32*	0.31*	0.46*	0.48*
Work	0.58*	0.35*	0.28*	0.35*	0.37*	1.00	0.22*	0.34*	0.38*	0.22*	0.17	0.35*	0.48*	0.39*
Free time	0.34*	0.43*	0.39*	0.42*	0.47*	0.22*	1.00	0.48*	0.59*	0.35*	0.44*	0.46*	0.52*	0.51*
Flat	0.17	0.32*	0.24*	0.42*	0.44*	0.34*	0.48*	1.00	0.55*	0.27*	0.29*	0.34*	0.40*	0.47*
Hobby/interests/passion	0.36*	0.46*	0.29*	0.25*	0.53*	0.38*	0.59*	0.55*	1.00	0.43*	0.35*	0.29*	0.48*	0.43*
University/Education	0.32*	0.47*	0.47*	0.28*	0.53*	0.22*	0.35*	0.27*	0.43*	1.00	0.50*	0.26*	0.37*	0.50*
Volunteering	0.30*	0.39*	0.32*	0.23*	0.32*	0.17	0.44*	0.29*	0.35*	0.50*	1.00	0.24*	0.36*	0.29*
Technology	0.20	0.10	0.41*	0.35*	0.31*	0.35*	0.46*	0.34*	0.29*	0.26*	0.24*	1.00	0.61*	0.58*
State of mind	0.38*	0.43*	0.52*	0.58*	0.46*	0.48*	0.52*	0.40*	0.48*	0.37*	0.36*	0.61*	1.00	0.56*
Philosophy/ethics	0.25*	0.28*	0.49*	0.41*	0.48*	0.39*	0.51*	0.47*	0.43*	0.50*	0.29*	0.58*	0.56*	1.00

Note: *p<0.05.
Source: own study.
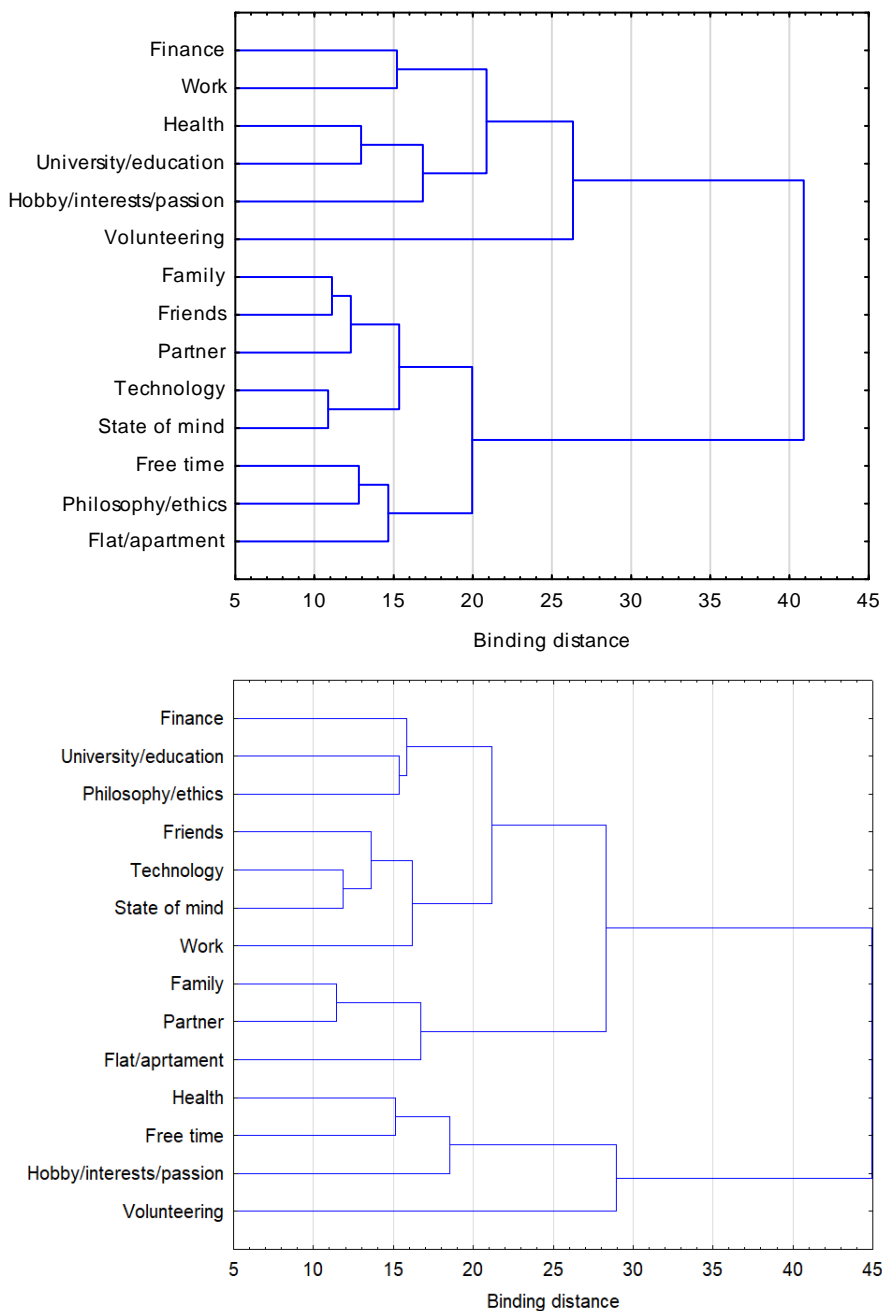
Figure 3. Clustering of MIS-QOL dimensions in 2019 (left) and 2021 (right)
Source: own elaboration.

As follows from the dendrogram, during the pandemic, there were some changes in similarities between MIS-QOL dimensions. For instance, in 2019, the health dimension was grouped with university/education whereas in 2021 – with free time, which may relate to the fact that before the pandemic, health determined participation in classes and achieving success in education, and during the pandemic, health became a prerequisite for a satisfactory way of spending free time. We also noted a significant change for the friends dimension, which moved from a group with family and partner to a group with technology and state of mind. This confirms the aforementioned digitalization of interpersonal contacts.

The clustering of MIS-QOL dimensions' perspectives in 2019 and 2021 was more similar to each other than in the case of the clustering of MIS-QOL dimensions. In both cases, perspectives in health are close to perspectives in state of mind. Before the pandemic, these two perspectives were closer to free time perspectives. In 2021, health and state of mind perspectives clustered with finance and uni-

versity/education perspectives. We also noticed a cluster change for the flat perspective. In 2019, this perspective clustered together with finance and hobby/interests/passion. Two years later, flat perspective was more similar to friends and family perspectives.
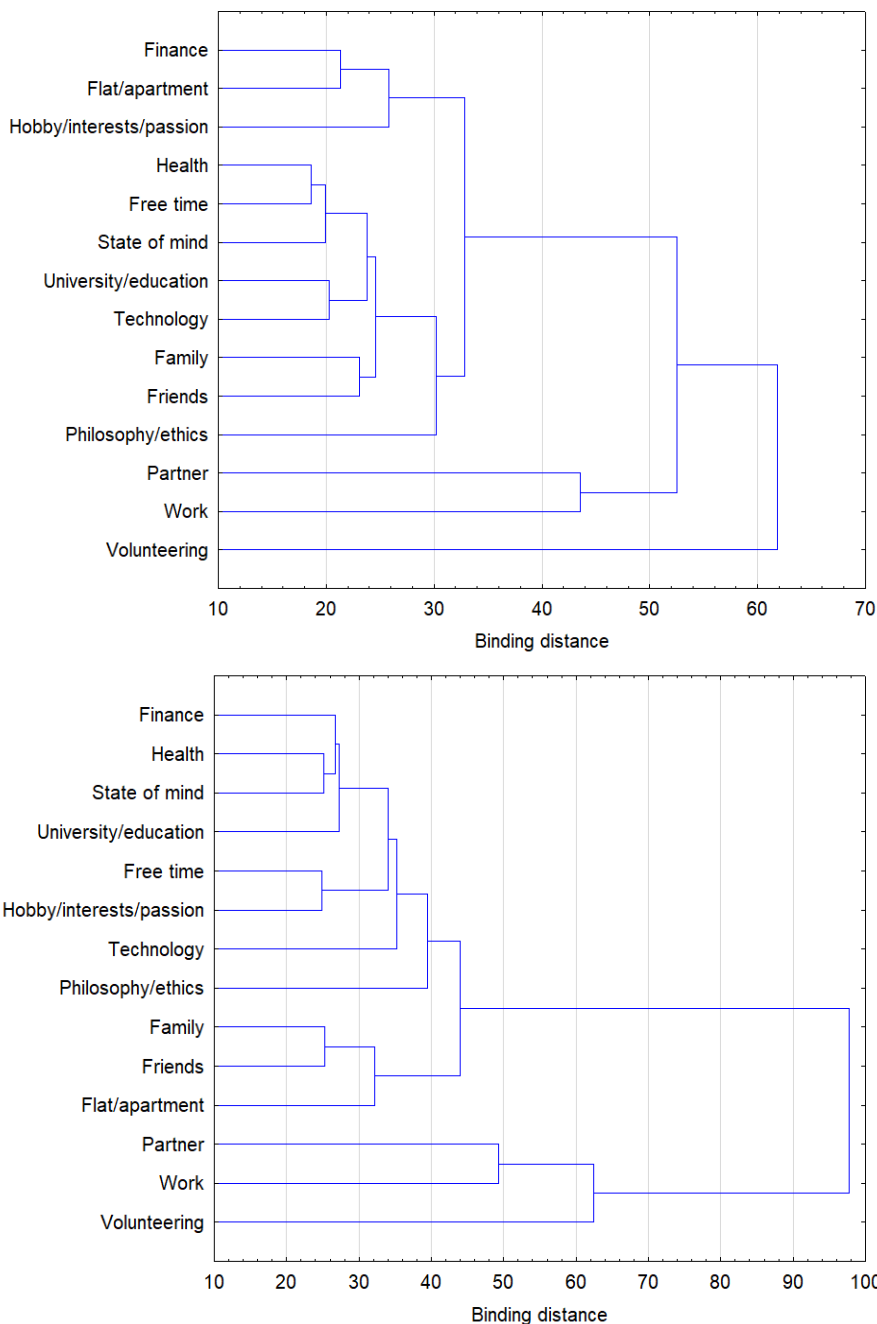
Figure 4. Clustering of MIS-QOL dimensions' perspectives in 2019 (left) and 2021 (right)
Source: own elaboration.

RESULTS AND DISCUSSION

The first part of the discussion will be connected with the subjective perspective of the dimensions. We will present the detailed analysis of a questionnaire in the second part of the discussion.

Importantly, we observed almost no difference in the subjective perspective of the students' QOL from before and during the pandemic. As the period of studies was strongly connected with the emerging adulthood theory, we then perceived it as a temporary period (Arnett, 2000), which does

not affect life as a whole. This transient attitude directly affected the pandemic period, resulting in a lesser impact on quality of life. Research participants assessed the technology lower during the pandemic than before. The characteristic of public life during the pandemic forced society to migrate to the online and technology world in terms of creating strategy (Whielaw *et al.*, 2020), communication (Al-Maroof *et al.*, 2020), medicine (Vaishya *et al.*, 2020), and general daily life (Limone & Toto, 2021). Although most of the current students present the digital competencies at a high level, we may call the members of generation z the digital natives (Hernandez-de-Menendes *et al.*, 2020). The results show that this conclusion concerns mainly the general multimedia usage (Krause *et al.*, 2017). The digital competencies within the professional usage, programming, and codes understanding are not that high (Areias & Mendes, 2007). Moreover, with the growing importance of technology, students become less confident in their skills. The second possible explanation is connected with the data overload. Within days, daily life migrated almost fully to the internet and technology. Education, meeting with friends, and official business conduct were connected with it. Together with the deprivation of physical contact, students started to dislike the technology, asses this dimension lower and simply got rid of it. They were overwhelmed with the technological topics. However, in general, students did not perceive the Covid-19 pandemic as a circumstance that affected their QOL. Does that mean that it did not impact them? The answer is negative.

Our research proved that there were significant changes in various aspects of students' life. The pandemic raised the assessment of financial and volunteering aspects of life and relationship with partner. It also significantly decreased the assessment of health, free time, and technology. Importantly, out of six dimensions, students reported a decrease only in technology.

The research revealed an increase in five out of six criteria for the financial aspects. Although many research articles indicated the effect of the Covid-19 pandemic on students financial situation (Meier *et al.*, 2022), students usually accessed their quality of life connected with the financial aspect higher than before the pandemic. Students reported better information about the possible scholarships as well as financial self-management, satisfying own needs, pleasure spending, and general financial security. With a decreased number of possibilities for going out, clubs, and entertainment facilities, it appeared that students' spending decreased along with the cost of living as many of them came back to their hometowns (Hall, & Zygmunt, 2021). Students satisfied their needs with a lower amount of money. It appeared that their income was sufficient to create financial security.

Relationship with partner raised most significantly. Students assessed all six aspects of a relationship with a partner higher. During the pandemic, they spent the time consumed by work, education, and logistic purposes with a close partner (Vaterkaus *et al.*, 2021). Even though some of the researchers forecasted a tough time for relationships because of spending all the time together (Prime *et al.*, 2020), students reported an increase in mutual trust and respect for partner's limits and principles.

The last dimensions related to voluntary work. During the pandemic, a wide variety of voluntary possibilities emerged connected with helping the elderly, supporting the health system, or organising time for kids and creating online spaces of both education and entertainment (Carlsen *et al.*, 2020; Pickell *et al.*, 2020; Mao *et al.*, 2021). Students participating in those projects reported higher satisfaction from helping those in need, self-development, opportunities to implement own ideas, and a high appreciation of their commitment. All those factors resulted in a significant raise of the volunteering aspect of students' life (Tierney, & Mahtani, 2020). There were also three dimensions that students assessed lower during the pandemic than before.

All over the world, the public healthcare system was under a heavy load during the pandemic (Armocida *et al.*, 2020; Koli, 2021). The results of students' assessment showed a decrease in satisfaction with the quality of public health in Poland as well as accessibility to a health information and general practitioners. As most students went through Covid-19 without suffering from life-endangering condition (Skalski, 2021), they did not experience the lack of specialist treatment nor the postponed hospitalization possibility (Doliński, 2021).

While the relationship with partner was the aspect of life with the highest rise, the free time dimension decreased most significantly. Students were mostly dissatisfied with lower access to sports and cultural events, and the closed borders and the resulting lack of travel possibility.

The last dimension with a significant decrease was technology. Moreover, this was the only dimension, in which students were aware the results (decrease reported both in the questionnaire as well as a self-assessment module). The main problem with technology was connected with the low level of programming skills and the knowledge about technological innovations. Both those aspects are connected with digital competences. Possibly, the pandemic brutally proved to students that their competences were not on a proper level (Vishnu *et al.*, 2022). The last element was connected with a lower self-image on social media. With the growing importance of social media among youth and young adults (Raza *et al.*, 2020) and the extended time spent on social media (Gallarde, 2013), the self-image of students represented by their social media generated lower satisfaction, because of lack of the content to share and growing and overwhelming number of activities on social media in general (Yang *et al.*, 2020; Manson *et al.*, 2021).

Importantly, contrary to some countries (ACHA, 2020; Coa *et al.*, 2020; Dhar *et al.*, 2020; Son *et al.*, 2020), the pandemic did not influence Polish students' state of mind. Their psychic health was on the same level as before the pandemic. It may be connected with strengthening the family bonds, which resulted from the time spent together (satisfaction from that element increased significantly).

CONCLUSIONS

The challenging time of Covid-19 did not strongly affect students' quality of life. The high level of adaptability is an inevitable advantage of the emerging adulthood period. It is also very important that students can count on their relatives and partners when going through difficulties. Family gives the constant and stable position, and a close partner helps overcome difficulties of health deprivation and lack of free time opportunities. Moreover, family members and partners also support each other when it comes to finding a place within the society of the fourth industrial revolution. Given the potential for future pandemics, the Covid-19 constitutes an important guidance for future actions. Managers should maintain the work-life balance, properly manage the hybrid work system, and distribute teams. University representatives should manage the education process. Finally, family members and parents should support students during the pandemic. As an added value, the article shows the most vulnerable dimensions of life that might be affected by the future pandemic. This will help distinguish the most suitable actions for keeping the quality of life of students on a high level.

The conducted research faced some limitations. Most importantly, the data gathering was a challenging task. We could not meet face-to-face with students on campus, hence, we could not control the research sample. Although online questionnaires were accessible for students in the whole country, students were not very keen on participating in online research because of the abovementioned technological overload. Therefore, the research sample did not include students from various universities.

In the future, we will focus on post-pandemic time and describe how the students' QOL will change in a new/old situation of more offline-based life.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.