SELF-REPORTED HEALTH OF UNIVERSITY STUDENTS IN SLOVAKIA DURING THE END PHASE OF THE COVID-19 PANDEMIC AND ITS IMPACT ON THE QUALITY OF LIFE

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Abstract

In the paper, we focused on the self-reported health of university students and its relationship to the quality of their life. Self-reported health is part of the growing interest in non-medical understanding of health. Two objectives and three research hypotheses are established. The first goal is to find out what the self-reported health of university students in Slovakia is during the period in the end of the COVID-19 pandemic. Before starting the measurement, the following research hypotheses were formulated: H1: Respondents will evaluate health on a scale of 0-10 with values of 8 and higher and H2: Differences in self-reported health evaluation of male and female students will be low. The second goal is to determine the impact of self-reported health on students' quality of life and which of the proposed variables are predictors of self-reported health. In connection with the second goal, the third research hypothesis H3 is formulated: The impact of self-reported health on the quality of life of students measured by the correlation coefficient reaches a value of 0.30 – 0.69, i.e. mean value. Self-reported health, quality of life and other variables are measured on a scale of 0-10. The Shapiro-Wilk test and the non-parametric Wilcoxon one-sample test are used in the measurements. The result is knowledge of high values of self-reported health of men and women, hypothesis H1 was fulfilled. The correlation between health and quality of life is higher than 0.3, self-reported health of men and women is a predictor of their quality of life. Hypothesis H3 was fulfilled.

Key words

Quality of life, self-reported health, non-medical understanding of health of university students, COVID-19 pandemic.

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INTRODUCTION

In the paper, we focused on several areas: health and its non-medical understanding; quality of life from geographical view; self-reported as a way of evaluating health in our case; university students; we also mention the COVID-19 pandemic (hereinafter referred to as the pandemic). Considering the age of university students and the resulting expected very good level of self-reported health, attention is focused not only on its value but also on its relationship with the quality of life. Health is one of the most important parts of our lives. The development of medicine in the developed countries in recent decades has brought health care at a first-class level, which is manifested in a wide spectrum from low infant mortality to the increasing of the average life expectancy. We deal with health as it is perceived by the individual, that is, from a non-medical point of view (Costa et al., 2020; Haimi, 2020). We examine such understood health in the form of self-reported health. The quality of life is a concept, on the one hand a complex multidimensional phenomenon, on the other hand an answer to a simple question: How are you doing? The term 'quality of life' immanently contains the question: What (is the quality of life)? When a person evaluates the quality of his or her life, he or she evaluates his or her own satisfaction with it, based on his or her individual idea of what a good life means for him or her. Some scientists equate the quality of life with well-being or happiness (López-Ruiz et al., 2021; Arrondo, Cárcaba, González, 2021), others reject it (Skevington, Böhnke, 2018; Murgaš et al., 2022). Terminological vagueness is not only typical for the research of the quality of life. According to Bieda et al. (2019) satisfaction with life or quality of life is interchangeable with positive mental health. In the paper we work with the term 'self-reported health', we understand it as an assessment of an individual's own health. In connection with health, the term 'self-related' is also used, especially in the term 'Health Related Quality of Life' (hereafter referred to as HRQoL) (Guyatt, Feeny, Patrick, 1993; de Wit, Hajos, 2014). From the point of view of the conventional division of indicators into subjective and objective, self-reported health belongs to subjective indicators. University students are relatively often represented in the investigation of the quality of life focused on individual age groups. The years of university studies are generally considered to be the most beautiful years in a person's life. In this spirit, Bean, Bradley (Bean, Bradley, 1986) define the quality of life of a university student as "a pleasurable emotional state resulting from a person's enactment of the role of being a student". For the value of the quality of life of university students, satisfaction with their teachers is the most influential (El-Hassan, 2014), on the contrary, according to Michalos, Orlando (2006) it is satisfaction with one's self-esteem. Emphasizing the importance of satisfaction with one's self-esteem for the quality of life supports the understanding of the contemporary Western society as a narcissistic society (Podzimek, 2019). We all live our lives not in a vacuum but in a specific physical space. Geographical approach to

the quality of life means to its subjective dimension, meaning that the quality of life is a "psychological matter", we add an objective dimension with its characteristics. The quality of life is also a "geographical matter", that makes it holistic (Petrovič, Murgaš, 2020). The World Health Organization (hereinafter referred to as WHO) declared the respiratory disease that broke out in the spring months of 2020 and was named COVID-19. Governments reacted to its massive impact on the economy and health system of all countries of the world and the high number of deaths by closing borders, canceling classes at all types of schools, introducing the obligation to wear masks and lockdowns. The pandemic caused a global response among scientists dealing with the quality of life (Murgaš, Petrovič, 2020; Dale et al., 2022; Hansel, Saltzman, Melton et al. 2022; Mohsen, El-Masry, Ali et al., 2022). In the spring months of 2022, the last wave of the omikron pandemic died down and restrictive measures and bans were removed. Part of the patients developed persistent health problems, which was labeled "post-covid". Relief in society was expected, positively affecting the assessment of the quality of life.

OBJECTIVES AND METHODS

We have two goals in the paper. The first is to find out what the self-reported health of university students in Slovakia is. Before starting the measurement, we stated the following research hypotheses: H1: Respondents will rate health on a scale of 0-10 with values of 8 and above. H2: The differences in self-reported health evaluation of male and female students will be minimal (on a scale of 0-10, the difference in values will be less than 0.5). The second goal is to determine the impact of self-reported health on students' quality of life and which of the proposed variables are predictors of self-reported health. In connection with the second goal, a third research hypothesis is formulated: H3: The impact of self-reported health on students' quality of life measured by the correlation coefficient reaches a value of 0.30 – 0.69, i.e. mean value. Our goals are part of a significant increase in the use of individual and household population surveys over the past three decades. Self-reported health has become one of the most frequently used measures of health in social science research (Altman, Van Hook, Hillemeier, 2016; Baidin, Gerry, Kaneva, 2021). We verified the research hypotheses with a specific age and professional group, which consisted of students of selected universities in Slovakia. A questionnaire on the Internet is used to verify the research hypotheses, the answers to most of the questions were quantified by the students on the Cantril scale of 0-10. The questions are listed in the appendix of the paper. The research took place in the period March - June 2022, students (N=269) of bachelor's, master's and doctoral studies at Slovak universities participated in it. Attention is paid to researching the quality of life of university students (Kormi-Nouri, Farahani, Trost, 2013; Tkáčová et al., 2022; Kobylarek et al., 2022). University students in all cultural regions declare satisfaction with their lives (El-Hassan, 2014).

The quality of life of Brazilian medical students was investigated by Solis, Lotufo-Neto (2019). The result is the finding of a lower value of the quality of life index in connection with physical and mental health among female students compared to male students. The quality of life of students in Slovakia is investigated by Tkáčová et al. (2021). They came to the conclusion that social media is a significant predictor of well-being in Slovakia during the pandemic. In Slovakia, research into the quality of life is growing (Murgaš et al., 2022; Ira, Andráško, 2007; Michaeli, Ivanová, Solár, 2014; Džuka, Lačný, Babinčák, 2019; Coroničová Hurajová, Hajduová, 2021; Petrovič, Murgaš, 2020; Rutkowska et al., 2021; Petrovič, Maturkanič, 2022; Murgaš, Macků, Grežo, Petrovič, 2023), however, it did not become a part of the mainstream in any scientific discipline. However, it is possible that this situation will change in geography, because the Slovak geographical journals began to pay increased attention to the study of the quality of life, so we can talk about continuity (Rišová, Pouš, 2018; Uher, Ira, 2019; Mihincău, Ilieş, Wendt, Ilieş, Atasoy, Szabo-Alexi, Marcu, Albu, Herman, 2019; Petrovič, Murgaš, 2020; Szűcs, Koncz, 2020; Mousazadeh 2022, Murgaš, Petrovič, 2022).

LITERATURE REVIEW

Health

Health, both physical and mental, is a generally known phenomenon, every person knows whether he or she is healthy or not. In the notorious Maslow's five-level pyramid of needs, health belongs to the group of 'safety needs', which together with physiological needs form the 'basic needs'. Maslow (Maslow, 1970) later supplemented his pyramid of needs with cognitive, and aesthetic needs and transcendence needs, so his pyramid became eight-level. According to Diener et al. (2010), the strongest predictor of life satisfaction is the fulfillment of material desires, which can be classified as basic needs. Between 2005 and 2010, Maslow's theory was analyzed from the aspect of quality of life based on data from more than sixty thousand participants from 123 countries. Respondents answered questions about six needs comparable to the needs in Maslow's pyramid and three indicators of well-being. Two insights emerged from the analysis: (i) There are universal human needs regardless of cultural differences. (ii) Quality of life is not strictly hierarchical like the pyramid of needs. Needs affect the quality of life independent of each other (Tay, Diener, 2011). In connection with health, a medical and non-medical approach can be identified. The medical approach to health includes a spectrum of activities aimed at health promotion in the form of prevention, diagnosis and suppression of diseases. Objective data obtained by diagnostic methods are used for this. The result of the examination of an individual as a patient by the doctor is an objective diagnosis of his health condition. A non-medical approach to health does not mean alternative or any other medicine or self-treatment, but the assessment of one's own health by a lay

individual. Self-related health is part of it. An example of a non-medical health assessment is the health question in our questionnaire. Although everyone has an idea of what health is, there is no universally accepted definition. WHO defines it as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO online). The determinants of health are: (a) the social and economic environment, (b) the physical environment, and (c) the person's individual characteristics and behaviours. These determinants represent a group of indicators: (i) Income and social status, (ii) Education, (iii) Physical environment including Employment and working conditions, (iv) Social support networks including Culture, (v) Genetics, (vi) Health services, and (vii) Gender (WHO, 2017). Quality of life and health are influenced by many variables, we consider those with a strong influence as predictors of the quality of life. Social relations, whether in the form of social capital (Requena, 2003; Bilajac, 2014), trust (Murgaš, Petrovič, Tirpáková, 2022) or neighborhood relations (Howley, O,Neill, Atkinson, 2015). In the paper, we identified (i) vaccination with a vaccine, (ii) the impact of the pandemic on the psyche, (iii) relationships with the relatives before the pandemic, (iv) expected relationships with the relatives after the pandemic, as variables with a potential impact on self-reported health, (v) trust, (vi) quality of life, (vii) happiness, (viii) quality of place and (ix) quality of environment.

Self-Related Health as a Non-Medical Assessment of Health
In the last decade, it has been shown that self-related health is an important outcome variable independent of medical outcomes. In 1996, the WHO recommended the use of self-assessment of health as the main tool for monitoring the health and quality of life of the population (Badin, Gerry, Kaneva, 2021). Altman et al. (2016) characterize self-related health as a single-item and verified indicator of the health status. The American government agency U.S. Food and Drug Administration (2009) (hereinafter referred to as FDA) refers to self-related health as Patient-Reported Outcome (PRO). An important step toward more structured and frequent use of PROs in the drug development is FDA guidance issued in 2006. This describes how the FDA evaluates PROs, including HRQoL, to be used as efficacy endpoints in clinical trials (FDA, 2006). Later, the FDA issued guidance for *"PRO instruments used to support claims in approved medical product labeling. A PRO instrument (i.e., a questionnaire plus the information and documentation that supports its use) is a means to capture PRO data used to measure treatment benefit or risk in medical product clinical trials"* (FDA, 2009). This results in a significant increase in the importance of non-medically understood health. Health has become a social phenomenon, we come across the terms 'social health' (Conrad, Leiter, 2003; Brown et al., 2011), but also 'environmental health' (Mei-Po, 2018), 'place-based health' (Dankwa-Mullan, Pérez-Stable, 2016). Therefore, a more appropriate designation than 'health as a social phenomenon' would be 'health as a geographical

phenomenon', including, in addition to the social dimension of health, the spatial and environmental dimension. In self-related health reporting, cross-cultural differences and geographical disparities apply, resulting in data heterogeneity. Residents of Korea and Japan report relatively low values of self-related health compared to the USA despite a higher average life expectancy (Choi, Miyamoto, 2022). Differentiation of self-related health in China explore Dong, et al. (2010). 6.3% of participants rated their health as poor or very poor, the prevalence of poor or very poor health increased with age and decreased with education level. Women rated their health, both physical and mental, as bad or very bad more often than men. People in the west of the country rated their health worse than residents of the east of the country. It is noteworthy that illiterate people and people with the lowest education rated their physical health the worst, on the other hand, mental health was rated the worst by people with higher education. Dorélien, Xu (2020) dealt with three types of urban-rural disparities in self-related health in China. In all types, residents rated their health level 2-3% better in the rural environment compared to the urban one. Dowd, Zajacova (2007), based on the research on self-related health, state that the assessment of health in the USA is determined by education and level of income.

Quality of Life

"The quality of life is a concept by which people in the current period of late modernity cognitively and emotionally evaluate satisfaction with their lives" (Murgaš, Petrovič, 2020). The concept is based on the basic premise that every person is able to evaluate the quality of his or her life, when he or she evaluates it, he or she evaluates satisfaction with his or her life. Even a person with intellectual disabilities is able to evaluate the quality of their life (Salvador-Carulla et al., 2014). The result of the cognitive and emotional assessment of life satisfaction is a subjective data. A person lives his or her life in a physical environment, so when he or she evaluates the quality of his or her life, he or she also evaluates the environment, in terms of the conditions for living a good life. Even the evaluation of the environment in which a person lives his or her life is a subjective data. The environment can also be evaluated by a scientist investigating the quality of life in a given geographical unit, based on available statistical data. The result is an objective data. There is a low correlation between subjective and objective indicators (Camfield, Skevington, 2003). Murgaš et al. (2022) report a correlation between subjective indicators of quality of life and quality of place on the border between low and medium values of the correlation coefficient (0.33). Subjective and objective data enter into the measurement of the quality of life as its indicators. The answer to the question about the quality of life, obtained by measurement, is usually expressed by words on the five to seven-point Likert scale or numerical on the eleven-point Cantril scale from 0-10. The quality of life

arises in the process of the child's ontogenesis, and ends with the death of the individual. Shalock et al. (1989) define the quality of life as "a multidimensional construct that has both subjective and objective components and is influenced by personal and environmental factors". Despite three decades since the formulation of this definition, it is still relevant today. Quality of life is strongly connected with the term 'good life', in this sense it is defined by Veenhoven (2014) in Encyclopedia Quality of Life and Well-Being Research: "The degree to which a life meets various standards of the good life". Research into the quality of life is experiencing a boom, new phenomena affecting the quality of life are emerging - sport (Szűcs, Koncz, 2020), food, exercise and lifestyle (Petrovič, Murgaš, Králik, 2023), religiosity (Murgaš, Podzimek, Petrovič, Tirpáková, Králik, 2023).

Impact of Health on the Quality of Life

Health is one of the most important values for a person, and therefore it is not surprising that health is an important part of the research of the quality of life. Camfield, Skevington (Camfield, Skevington, 2003) consider health psychology as a starting point for conceptualizing quality of life. "The assessment of well-being is a top priority in health sciences" (Salvador-Carulla et al., 2014). Together with marital status, employment and place of residence, it significantly differentiates the quality of life (Patrício et al., 2014). The knowledge about a better quality of life for healthy people and a worse one for unhealthy people applies [Patrício et al., 2014; Wahl, et al., 2004; Caron et al., 2019). According to a study by Tubergen et al. (2018), two thirds of patients consider health and quality of life to be similar. In 1946, with effect from 1948, the WHO was founded. Since its creation the WHO has declared the closeness of health and quality of life, as evidenced by the definition of health: *"WHO defines Quality of Life as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns"*(WHO, 2022). Another manifestation of WHO's strong interest in the concept of quality of life is the establishment of the WHO Quality of Life Group (hereinafter referred to as WHOQOL) and its activities [WHOQOL, 1994; 1995. In 2006, this group included spirituality, religion and personal beliefs (WHOQOL, 2006) among the domains of the quality of life. In the research of the quality of life, a separate direction of health-oriented quality of life (Healthy Related Quality of Life, hereinafter referred to as (HRQoL) began to be established in the 1980s. The term HRQoL narrows QoL to aspects relevant to health (de Wit, Hajos, 2014). HRQoL is a multidimensional concept that, like other current concepts, does not have a fixed definition. It has an objective component expressing the measurable state of health of an individual and a subjective component expressing a subjective assessment of an objective state of health. People with the same objective health condition subjectively evaluate their condition often in a different way.

MEASUREMENT

The measurement of the quality of life, related phenomena of well-being, happiness and non-medical measurement of health is the output of the conceptualization of the measured variables. Diener, Inglehart, Tay, (2013) use attention, values, standards and top-down effects in their approach to measuring the quality of life. Scientists focused on measuring the quality of life generally prefer subjective or objective indicators, or both (Mackü et al., 2021; Guliyeva 2021). In the paper we measure the self-related health and quality of life as satisfaction with them which results into the fact that we understand them as subjective indicators. Data on self-rated health in the most developed countries of the world is contained in Health at a Glance 2021, published by the OECD (2021). The values of Slovakia and selected countries are mentioned in Table 1.

Tab. 1 Self-rated health in the most developed countries 2019 and 2020
(% of population aged 15 and over)

Self-rated health	Countries and average OECD in %			
	Best	**OECD**	**Slovakia**	**Worst**
Adults rating their own health as bad or very bad	Canada 88.8	68.5	65.1	Korea 33.7
Adults rating their own health as good or very good	Colombia 1.3	´8.6	´12.6	Latvia 15.4

Source: Modified according to OECD (2021)

Table 1 shows that Slovakia achieves below average values in both categories. Patrício et al. (2014) measured the quality of life and, within that, the health of Portuguese residents. 90.6% identified themselves as healthy and 9.4% as unhealthy. In the paper, health is not measured dichotomously as healthy - unhealthy, but on a scale of 0-10, on which university students expressed their level of health. We measure health, quality of life and other variables to confirm or refute hypotheses. In the measurement, basic statistical characteristics are first calculated for each question, namely the arithmetic mean (Means) and standard deviation (SD) (Table 2) for men and women together. The results are also illustrated graphically (Fig. 1).

In Table 2 and Fig. 1 we can see that the average value of the answers to the question "health" is greater than 8 which means that the obtained results of our research confirmed the validity of the research hypothesis H1: Respondents will evaluate health on a scale of 0-10 with values of 8 and higher. Sarbangoli et al. (2019) in their research concluded that students of Tehran University of Medical Sciences reported a partial overlap of self-reported health and quality of life. It was not clear whether these students distinguish between these two phenomena. As

Tab. 2 Basic statistical characteristics (Means and SD)

	Health	Vaccination with a vaccine	Impact on the psyche	Relationships before the pandemic	Trust
Men + Women	8.32±2.22	1.54±0.86	2.19±0.98	8.05±1.91	5.20±1.91

	Relationships after the pandemic	Quality of life	Happiness	Quality of place	Quality of environment
Men + Women	6.21±2.31	6.89±2.33	6.69±2.27	7.15±2.71	6.62±2.10

Source: Own research
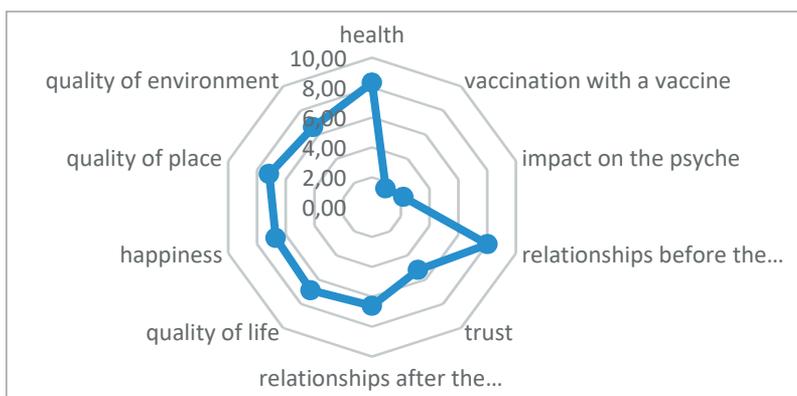
Fig. 1 Responses of respondents (acerage values)
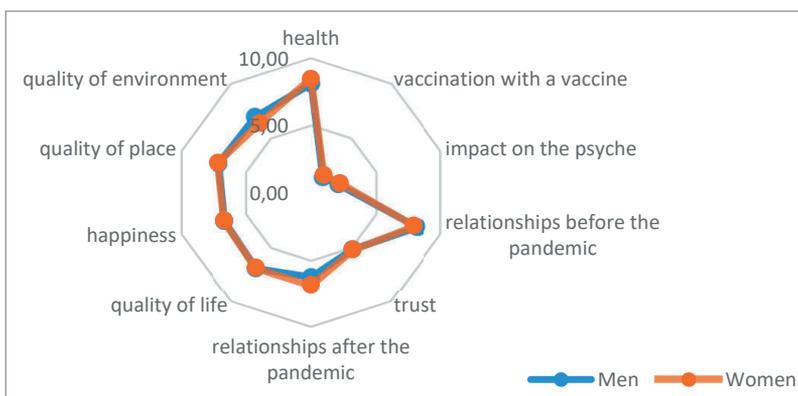*Source: Own research*

can be seen from the Table 2, in our research, which was not dominated by students of medical faculties, students strictly distinguished between the self-related health and the quality of life. Another goal of the research was to find out if there are differences between groups of respondents (groups are created according to gender). In other words, we verified the validity of the research hypothesis H2: The differences in the assessment of self-reported health of male and female students will be minimal. In the first step, we calculated the basic statistical characteristics for each variable, the arithmetic mean (Means) and standard deviation (SD) (Table 3) for both groups of respondents (women, men). The results are also illustrated graphically (Fig. 2).

Tab. 3 Basic statistical characteristics (Means and SD)

	Health	Vaccination with a vaccine	Impact on the psyche	Relationships before the pandemic	Trust	Relationships after the pandemic	Quality of life	Happiness	Quality of place	Quality of environment
Men	8.09±2.21	1.44±0.80	2.09±0.89	8.16±1.48	5.14±2.00	6.21±1.95	6.88±2.18	6.67±1.81	7.12±2.53	6.98±2.13
Women	8.47±2.23	1.61±0.90	2.25±1.04	7.97±2.16	5.23±2.10	6.88±2.50	6.89±2.44	6.70±2.55	7.17±2.84	6.38±2.07

Source: Own research

Fig. 2 Responses of respondents (average values)
Source: Own research

In Table 3 and Fig. 2 we can see that both groups of respondents answered the questions almost the same, the only differences were in the questions "relationships after the pandemic" (women rated higher than men) and the quality of the environment (men rated higher than women). Next, we were interested in whether there are connections between the monitored variables and health - and if so, whether these connections are the same in both groups (sample sets). I.e. whether women and men attribute the same importance to individual variables that affect health. When looking for a connection between the answers to individual questions, the correlation coefficient statistical method is used, specifically Spearman's rank correlation coefficient. And that's because the assumption about the normal distribution of the sample set was not met. In our research, the Shapiro-Wilk test (Markechová, Stehlíková, Tirpáková, 2011) is used

to test the hypothesis of a normal distribution of both sample sets (women and men). In order to verify the normality of the distribution of the respective sample set of answers to individual questions, we will use the Shapiro-Wilk test to test the null hypothesis H0: the random sample comes from a normal distribution against the alternative hypothesis H1: the random sample does not come from a normal distribution. First, we used the Shapiro-Wilk test to verify the normality of the distribution of the sample set "Men" for the answers to the question "Indicate how healthy you feel on a scale of 0-10". The verification took place in the STATSTICA program. After entering the data, we calculated the Shapiro-Wilk test statistic value of $W = 0.819$ and the probability value of $p = 0.000$. We evaluated the test results using the (p) value. Since the probability value p in our case is less than 0.01, the tested hypothesis of a normal distribution of the values of the answers to the health question is rejected at the level of significance. This means that we cannot consider the distribution of the values of the answers to the health question to be normal. The distribution of the response values (frequency) to all questions (variables) for men and women together is also shown in Fig. 2.

We proceeded analogously when testing the hypothesis of a normal distribution of sample sets of answers to the other questions as well. Even in these cases, we used the Shapiro-Wilk test in the STATISTICA program to test the hypothesis of a normal distribution of the relevant sample set. After entering the data, we calculated the value of the Shapiro-Wilk test statistic and the probability p value for both Males and Females in all cases (Table 4).

Table 4 Results of Shapiro-Wilk test (files Men and Women)

| Variables	Men		Women	
	W	p	W	p
1	0.82	0.00*	0.70	0.00*
2	0.56	0.00*	0.61	0.00*
3	0.82	0.00*	0.87	0.00*
4	0.90	0.00*	0.84	0.00*
5	0.94	0.02*	0.85	0.00*
6	0.91	0.00*	0.89	0.00*
7	0.86	0.00*	0.92	0.00*
8	0.90	0.00*	0.93	0.00*
9	0.90	0.00*	0.84	0.00*
10	0.86	0.00*	0.96	0.02*

*statistically important value
Note: Numbering of variables 1- Health, 2 – Vaccination, 3 – Impact on the psyche,
            4 - Relationships before the pandemic. 5 – Trust, 6 - Relationships after the pandemic,
            7 – Quality of life, 8 – Happiness, 9 – Quality of place, 10 – Quality of the environment.
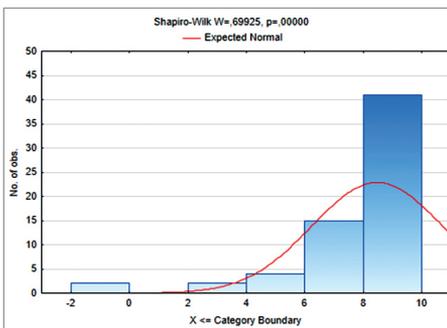Source: Own research

Since the value of the probability p in all cases is less than 0.01, the tested hypothesis about the normal distribution of the values of the answers to each question, listed in Table 3 and Table 4 is rejected at the level of significance. This means that the distribution of the values of the answers to all questions in both sample sets "Men" and "Women", shown in Table 3 and 4 cannot be considered as normal. For illustration, a graphic representation of the frequency distribution of responses to the question "health" in the sets "Men" (Fig. 3) and "Women" is shown (Fig. 4).
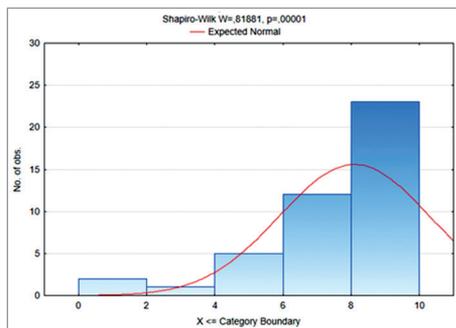
Fig. 3 Distribution of frequencies of responses to the question of "health" in the file "Men"
Source: Own research

Fig. 4 Distribution of frequencies of responses to the question of "health" in the file "Women"
Source: Own research

Based on the results obtained by the Shapiro-Wilk test, when searching for a connection between individual questions both in the set of "Men" and in the set of "Women", the parametric statistical method Spearman's rank correlation coefficient is used, which expresses the degree of dependence between characteristics X and Y and is defined by the relationship:

$$R = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n(n^2 - 1)} \qquad \text{where } d_i = x_i - y_i \text{, for } i = 1,2,...,n.$$

The rank correlation coefficient R takes values from the interval. Other values of the correlation coefficient can be interpreted as follows (Markechová, Stehlíková, Tirpáková, 2011):

If <0,3,   there is almost zero degree of association between X and Y.
If 0,3 ≤ < 0,5, there is a moderate degree of association between X and Y.
If 0,5 ≤ < 0,7, there is a significant degree of association between X and Y.
If 0,7 ≤ < 0,9, we are talking about a high degree of connection between X and Y.
If ≥ 0,9,   there is a very close relationship between X and Y.

Another goal was to determine the impact of self-reported health on students' quality of life and which of the proposed variables are predictors of self-reported health. The following research hypothesis H3 was formulated to pursue the stated goal: Impact of self-reported health on students' quality of life, measured by the correlation coefficient, reaches a value of 0.30 - 0.69, i.e. mean value. The values of the Spearman rank correlation coefficient between the values of the students' answers to individual questions for both men and women are calculated in the STATISTICA program. The results are shown in Table 6 and Table 7.

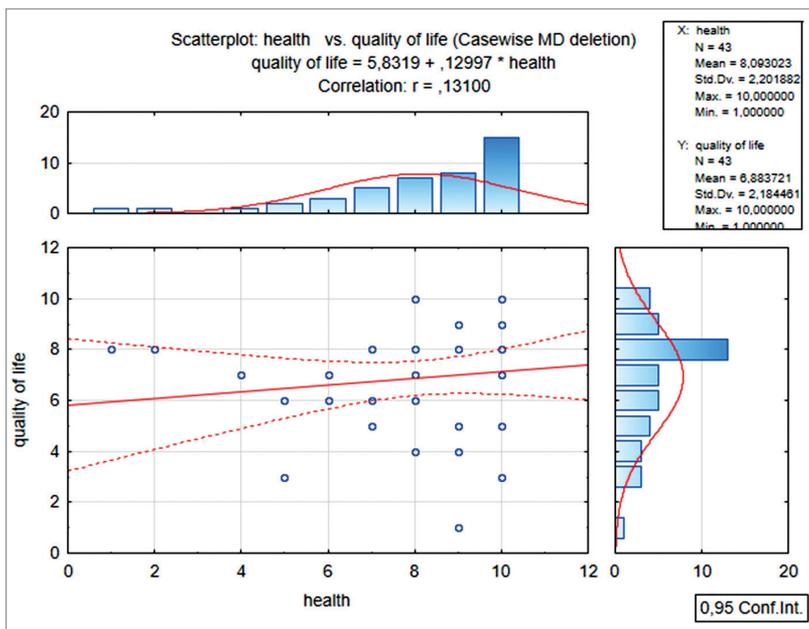**Tab. 5** Spearman rank correlation coefficient values (men)

Variables	1	2	3	4	5	6	7	8	9	10
1	1	-0.36*	´-0.29*	0.18	0.06	0.18	0.34*	0.26	0.22	0.23
2		1	´0.11	´-0.00	-0.10	-0.23	-0.23	-0.21	-0.13	-0.07
3			1	-0.48*	0.04	-0.27	-0.39*	-0.52*	-0.19	-0.15
4				1	0.05	-0.05	0.27	0.39*	0.18	0.35*
5					1	0.11	0.24	0.30	0.28	0.43*
6						1	0.49*	0.34*	0.18	0.16
7							1	0.79*	0.67*	0.54*
8								1	0.55*	0.58*
9									1	0.52*
10										1

statistically important value
Note: Numbering of variables 1- Health, 2 – Vaccination, 3 – Impact on the psyche,
4 - Relationships before the pandemic. 5 – Trust, 6 - Relationships after the pandemic,
7 – Quality of life, 8 – Happiness, 9 – Quality of place, 10 – Quality of the environment.
Source: Own research

Unlike the previously calculated values of the correlation coefficient, its value between the answers to the question "happiness" and "impact on the psyche" there is a negative number (R = - 0.516), this means that as the values of answers to the question "happiness" increase, the values of men's answers to the question "impact on the psyche" decrease and vice versa (the correlation coefficient is symmetrical). This is illustrated by a graph showing the correlation coefficient (Fig. 5) between the responses "health" and "quality of life" in the set "Men".

Fig. 5 Correlation coefficient health – quality of life (men)
Source: Own research

Tab. 6 Values of Spearman's rank correlation coefficient (Women)

| Variables	1	2	3	4	5	6	7	8	9	10
1	1	0	-0.39*	0.33*	0.29	0.26	0.35*	0.35*	0.39*	0.30*
2		1	0.12	-0.18	-0.14	-0.15	-0.17	-0.23	-0.12	0.05
3			1	-0.35*	-0.14	-0.09	-0.45*	-0.56*	-0.28	-0.36*
4				1	0.25	0.09	0.56*	0.54*	0.30	0.27
5					1	0.11	0.28	0.28	0.42*	0.34*
6						1	0.14	0.20	0.06	-0.14
7							1	0.88*	0.45*	0.36*
8								1	0.50*	0.39*
9									1	0.42*
10										1

* statistically important value
Note: Numbering of variables 1- Health, 2 – Vaccination, 3 – Impact on the psyche,
4 - Relationships before the pandemic. 5 – Trust, 6 - Relationships after the pandemic,
7 – Quality of life, 8 – Happiness, 9 – Quality of place, 10 – Quality of the environment.
Source: Own research

Unlike the previously calculated values of the correlation coefficient, the value of the coefficient between the answers to the question "quality of life" and "relationship before the pandemic" is a negative number (R = - 0.564), that means that with the growth of the values of the answers to the question "quality of life" the values of the answers of women to the question "relationship before the pandemic" are decreasing. Similarly, we can interpret the other calculated values of the correlation coefficient, shown in Table 4. For illustration, the graph of the correlation coefficient (Fig. 6) between the answers "health" and "quality of life" in "Women" file is shown.
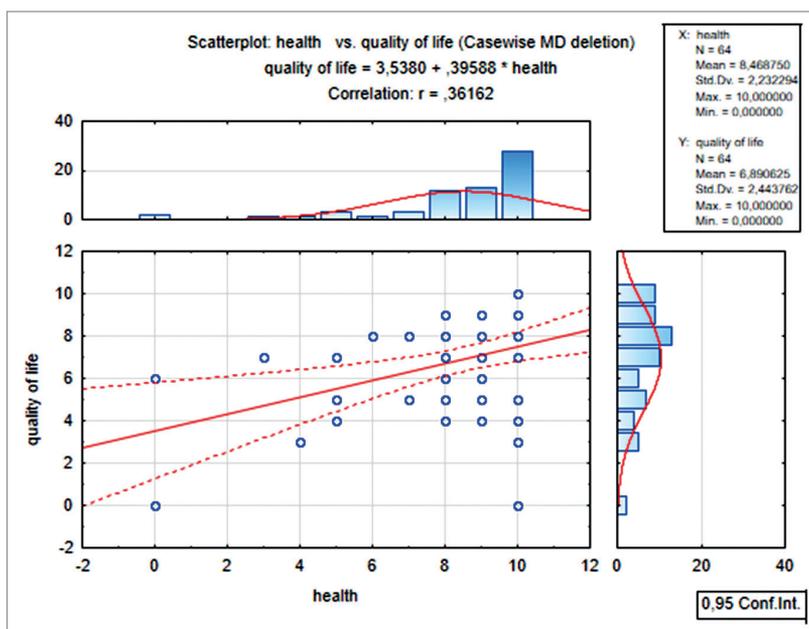

Fig. 6 Correlation coefficient health - quality of life (women)
Source: Own research

The object of another statistical analysis was to find out whether the relationships of students with their relatives differed statistically significantly before and after the pandemic or whether during the pandemic there were statistically significant changes in the relationships among students, in men or women. Since the assumption of a normal distribution of observed characteristics is not justified, to verify the statistical significance of differences on the level of observed characteristics, we used the non-parametric Wilcoxon one-sample test (Wilcoxon signed rank test), which is a non-parametric analogue of the paired parametric t-test. The observed characters will be the characters X, Y, where X is the relationship before the pandemic and Y is the relationship after the pandemic in men (women).

The hypothesis H0 was tested: the medians of characters X, Y are equal against the one-sided alternative hypothesis H1, that the median of character Y is greater. We implemented the test in the STATISTICA program. After entering the input data of the file "Men", we got the following results in the computer output: the value of the test criterion Z Wilcoxon one-sample test (Z = 4.171) and the probability value p (p = 0.000). We will evaluate the test using the p value. Since the calculated probability value p is a small number, the tested hypothesis H0 is rejected at the significance level α =0.01. This means that the attitude to the issue of health among students (in the "Men" set) changed significantly after the pandemic. An analogous procedure was followed in the "Women" file. After inputting the input data of the file "Women" from the output of the computer, the following value of the test criterion Z of the Wilcoxon one-sample test (Z = 2.706) and the probability value of p (p = 0.007) resulted. This means that the attitude to the issue of health changed significantly after the pandemic in the "Women" group as well. We illustrated both results in the following figures (Fig. 7 and Fig. 8):
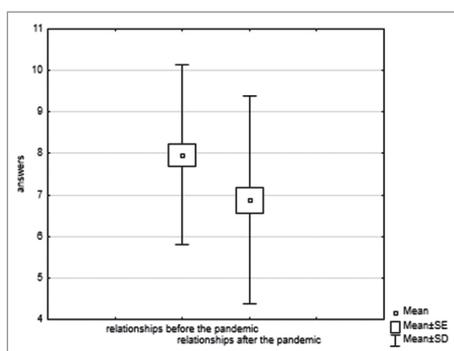
Fig. 7 Relationships before and after the pandemic (men)
Source: Own research
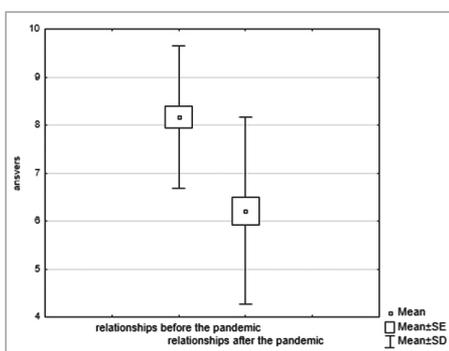
Fig. 8 Relationships before and after the pandemic (women)
Source: Own research

RESULTS AND DISCUSSION

The goals and hypotheses are formulated in the introduction of the paper. The first goal was to find out what the self-reported health of university students in Slovakia is. In hypothesis H1, students' evaluation of their health on a scale of 0-10 was expected to be 8 or higher. By measuring, we found the average value of self-reported health of men and women to be 8.32 (Table 2), the hypothesis was fulfilled. Hypothesis H2 predicted minimal differences in the self-reported health assessment of male and female students (on a scale of 0-10, the difference in values will be less than 0.5). The Shapiro-Wilk test is used in the calculation, the result is the self-reported value of men 8.09, the value of women 8.47 (Table 3, Fig. 3 and 4). Hypothesis H2 was fulfilled. Differences in self-reported health of men and women

in New Zealand were addressed by Jatrana (2021). She stated that women have a better assessment of physical health than men, but a lower assessment and a worse assessment of psychological health. Our research confirmed a better evaluation of "health as a whole" by women than men, we did not deal with the division of health into physical and mental. On the other hand, Boerma et al. (2016) on the basis of the data from the World Health Surveys 2002–04 (Erickson, 2009), in which 59 countries participated, state that the health of women is significantly worse compared to men, in all health indicators. The second goal was to determine the impact of self-reported health on students' quality of life and which of the proposed variables are predictors of self-reported health. In order to reach the second goal, the research hypothesis H3 was formulated: Impact of self-reported health on students' quality of life, measured by the correlation coefficient, reaches a value of 0.30 - 0.69, i.e. mean value. Murgaš, Petrovič (2020) report the value of the Spearman correlation coefficient of health and quality of life in the Czech Republic as 0.38. From the values we measured, the correlation coefficient of self-reported health and quality of life for men is 0.34 and for women 0.34, hypothesis H3 was confirmed. The values of Spearman's rank correlation coefficient for men (Table 5) reveal several remarkable facts. (i) Self-reported health correlates with other variables low, the correlation of 0.34 with quality of life is the highest of those measured. The correlation of self-reported health and vaccination is negative -0.36. We can interpret it so that as self-reported health values increase, vaccination participation decreases and vice versa. (ii) Vaccination is the second measured variable related to health. At the time of the pandemic, it was an extremely strong phenomenon that significantly polarized society. It is surprising that, apart from the low correlation with the effect on the psyche, it was negatively correlated with the other variables. We can interpret it so that with the growth of vaccination, the values of the other variables decreased and vice versa. (iii) As expected, the very high degree of connection between quality of life and happiness is 0.79, the highest correlation measured. The high correlation values between quality of life, happiness, quality of place and quality of the environment are surprising. It means that the geographical space in which the university students lived their lives at the time of the pandemic was extremely important for them. The values of Spearman's rank correlation coefficient for women (Table 6) also reveal several facts worth paying attention to. (i) Health has a zero correlation with vaccination (it was negative for men) and a negative correlation with the effect on the psyche. (ii) The correlation of vaccination and the effect on the psyche with other variables is low and in many cases negative. (iii) The correlation between quality of life and happiness is 0.88, even higher than for men. The values of correlations between quality of life, happiness, quality of place and quality of environment are lower than for men. On the contrary, for women, in contrast to men, the correlation of relationships before the pandemic with the quality of life and happiness is a significant degree of association.

CONCLUSIONS

In the paper, we dealt with health, which is considered by scientists dealing with the quality of life to be a strong part of the quality of life. On the other hand, the quality of life has been considered by health scientists as a significant component since the establishment of the WHO. We approached health from the point of view of a non-medical approach, which includes self-reported health. With two exceptions, we measured health, quality of life and other variables on a scale of 0-10. The result of the measurements is the finding of self-reported health of men 8.09 and women 8.32, hypothesis H1: Respondents will evaluate health on a scale of 0-10 with values of 8 and higher was fulfilled. As well as hypothesis H2: The differences in the self-reported health evaluation of male and female students will be minimal (on a scale of 0-10, the difference in values will be less than 0.5). In addition to the values of self-reported health and its differentiation between men and women, attention was focused on the impact of health on the quality of life. The expected correlation value was 0.3 – 0.5, i.e. moderate degree of attachment (Markechová, Stehlíková, Tirpáková, 2011). Correlations between variables were calculated using Spearman's rank correlation coefficient. In men, the correlation of self-reported health and quality of life is 0.34, in women 0.35. Hypothesis H3: The impact of self-reported health on students' quality of life measured by the correlation coefficient reaches a value of 0.3–0.5 was also fulfilled. It can be interpreted that the self-reported health of university students is a predictor of the quality of their life. The values of Spearman's rank correlation coefficient for men (Table 5) reveal several remarkable facts. (i) Self-reported health correlates with other variables low, the correlation of 0.34 with quality of life is the highest of those measured. The correlation of self-reported health and vaccination is negative -0.36. It can be interpreted in the way that as self-reported health values increase, vaccination participation decreases and vice versa. (ii) Vaccination is the second measured variable related to health. At the time of the pandemic, it was an extremely strong phenomenon that significantly polarized society. It is surprising that, apart from the low correlation with the effect on the psyche, it was negatively correlated with the other variables. It can be interpreted as the fact that the values of the other variables decreased with the increase in vaccination and vice versa. (iii) As expected, the very high degree of association between quality of life and happiness is 0.79, the highest correlation measured. The high correlation values between quality of life, happiness, quality of place and quality of the environment are surprising. It means that the geographical space in which the university students lived their lives at the time of the pandemic was extremely important for them. The values of Spearman's rank correlation coefficient for women (Table 6) also reveal several facts worth paying attention to. (i) Health has a zero correlation with vaccination (it was negative for men) and a negative correlation with the effect on the psyche. (ii) The correlation of vaccination and the effect on the

psyche with other variables is low and in many cases negative. (iii) The correlation between quality of life and happiness is 0.88, even higher than for men. The values of correlations between quality of life, happiness, quality of place and quality of environment are lower than for men. On the contrary, for women, the correlation of pre-pandemic relationships with the quality of life and happiness is a significant degree of attachment, in contrast to men.

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APPENDIX

Questions used in the questionnaire.

1. Self-reported health. On a scale of 0-10, indicate how healthy you feel. 0 means that you suffer from a life-threatening illness or the consequences of a very serious injury. 10 means you feel completely healthy.
2. Inoculation with a vaccine. Please choose one of the options: 1. I am vaccinated. 2. I am not vaccinated but I want to be vaccinated. 3. I am not vaccinated nor do I want to be vaccinated.
3. The impact of the pandemic on your psyche. Please choose one of the options: 1. Anxiety. 2. Depression. 3. Suicidal thoughts. 4. Suicide attempt. 5. No influence on the psyche.
4. Relationships with loved ones before the pandemic, parents and grandparents, siblings, boyfriend/girlfriend, husband/wife are considered loved ones. Please indicate on a scale of 0-10 what kind of relationships you had with your loved ones before the outbreak of the pandemic. 0 means you had very bad relationships, 10 means you had very good relationships.
5. Trust. Please indicate on a scale of 0-10 how much you trust other people. 0 means you trust no one, 10 means you trust everyone.
6. Expected relationships with loved ones after the pandemic. State on a scale of 0-10 how you expect relationships with your loved ones after the end of the pandemic. 0 means you expect very bad relationships, 10 means you expect very good relationships.
7. Quality of life. On a scale of 0-10, indicate how the quality of your life is these days. 0 means that your quality of life is very poor, 10 means that your quality of life is excellent.
8. Happiness. On a scale of 0-10, indicate how happy you are these days. 0 means you are very unhappy, 10 means you are very happy.
9. Quality of place. Indicate on a scale of 0-10 how satisfied you are with the city or village where you live permanently. 0 means that you are very dissatisfied, you would prefer to move away. 10 means that you are very satisfied with your city or village.
10. Quality of the environment. Please indicate on a scale of 0-10 how satisfied you are with the quality of the environment in the city or village where you live permanently. 0 means that you are very dissatisfied, 10 means that you are very satisfied.