

MENTAL CONDITION AND PHYSICAL ACTIVITY OF INDIVIDUALS WORKING DURING THE COVID-19 PANDEMIC IN POLAND

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Abstract

Objectives: The study assessed quality of life and depression in working people during COVID-19 pandemic, relative to their physical activity. **Material and Methods:** The study involved 1194 people living in south-eastern Poland, and assessed life satisfaction (*Life Satisfaction Questionnaire – 9* [LISAT-9]), quality of life (*World Health Organization Quality of Life – BREF* [WHOQoL-BREF]), depression (*Beck Depression Inventory* [BDI]) and physical activity. **Results:** The respondents on average scored 4.32 in LISAT-9; respectively 66.2, 68.3, 69.6 and 63.5 in physical, psychological, social and environment domains of WHOQoL-BREF and 9.2 in BDI. Regularly performed physical activity positively affected the scores in all the psychometric tests in women with higher and secondary education and in men with vocational education. Women presented lower life satisfaction, poorer quality of life and higher level of depression than men. The psychometric scores were also differentiated by type of employment and job. Depression was identified in 44% of all the respondents. **Conclusions:** Individuals who are economically active during the pandemic report good quality of life and no or only mild signs of depression. Working people with higher education cope more effectively with adversities of the pandemic, compared to those with lower education. *Int J Occup Med Environ Health.* 2023;36(2):274–90

Key words:

quality of life, depression, physical activity, life satisfaction, COVID-19, occupational medicine

INTRODUCTION

Regular physical activity, in addition to adequate nutrition, is the most important factor determining people's health status [1]. It positively affects subjective assessment of one's life situation and appears to be one of the factors alleviating symptoms of depression [2]. However, technological advancements, including digitisation of workplaces, contribute to increasingly sedentary behaviours. Therefore, it seems necessary to promote healthy

lifestyles, including regularly taken exercise. According to the World Health Organization (WHO), overall physical activity includes any chores performed at home, and at work as well as movement associated with travelling to/from work [1,3].

On March 11, 2020 the WHO announced a global COVID-19 pandemic [4]. The pandemic led to changes in people's lifestyles and daily habits. The situation evoked panic and contributed to problems related to public mental health [5].

Funding: this research was supported by University of Rzeszow, Medical College (grant No. NIW/1/2021, NIW/54/2023 entitled "Quality of life, depression and physical activity in working individuals during COVID-19 pandemic in Poland," grant manager: Paweł Walski).

Received: February 9, 2022. Accepted: March 31, 2023.

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The pandemic is not only associated with a risk of infection and post-COVID-19 complications, but also with a need for preventive measures, such as social distancing [6].

All these factors related to the pandemic may negatively affect people's quality of life which may further result in decreased life satisfaction and that eventually may lead to depressive symptoms of varying severity. These variables were considered by the authors to be key indicators of the subjects' mental condition. Furthermore, the authors attempted to assess the impact of physical activity and the selected sociodemographic factors on quality of life, life satisfaction and the existing depressive symptoms.

According to the WHO, quality of life is determined by an individual's perception of their position in life in relation to their culture and the value system followed by them, in the context of their goals, expectations, standards and interests. This understanding of the concept implies the individual's comprehensive self-assessment of their physical health, mental status, level of self-reliance/independence, personal beliefs, social interactions and relationships with the environment [7].

Life satisfaction is understood as a subjective component of quality of life. It refers to the satisfaction perceived by the individual in relation to various domains of life [8].

The term "depression" is understood here as a set of sensations which not only involve the mood but also physical, mental and behavioural experiences, reflecting a prolonged, harmful and severe condition that can be clinically diagnosed as depressive syndrome [9].

In this study the variables were treated in accordance with their definitions, as psychological and behavioural variables.

Research conducted to date suggests that the COVID-19 pandemic has adversely affected people's mental health, determining, e.g., their quality of life and intensity of depression symptoms [10].

Remote work and the fact that most sport and recreation facilities were closed adversely affected interpersonal

contacts, and physical activity, possibly contributing to mental disorders of varied intensity [6,10]. Research findings reported before the pandemic show that daily physical activity and occupational activity favourably impact people's mental condition [11,12]. Employment and the related benefits are recognised among the main determinants of the quality of life [13]. According to some authors, the ability to maintain one's job despite the pandemic reduces the risk of anxiety disorder and depression [1,14]. The dynamic evolution of the pandemic resulting in new restrictions, as well as prolonged social isolation and interpersonal contacts limited only to those with one's co-workers, may adversely affect individual's mental state, and satisfaction with life. Furthermore, one's mental condition during the pandemic may be affected by one's family status and number of people living together in a household [15–17].

The study aimed to assess quality of life, life satisfaction and severity of depression symptoms, taking into account factors potentially determining these variables in individuals who continued to be economically active during the COVID-19 pandemic in Poland. The study was also designed to assess the level of physical activity in the study group.

The current study investigated quality of life, life satisfaction, intensity of depression symptoms and physical activity in economically active individuals, and sought to identify the relationships between the subjects' mental health and sex, level of physical activity, forms of employment, distance travelled to work, and size of household.

The following research questions were formulated:

- What quality of life, life satisfaction and intensity of depression symptoms are observed in people economically active during the COVID-19 pandemic?
- Do people who are economically active during the COVID-19 pandemic maintain regular physical activity?
- Do sex, physical activity, form of employment, education and distance travelled to work determine life

satisfaction, quality of life and prevalence of depression symptoms in economically active people during the COVID-19 pandemic?

- What is the correlation between the subjects' mental condition and the size of household?

MATERIAL AND METHODS

Data collection and participants

The study was carried out among residents of south-eastern Poland, October 2020–May 2021, i.e., start of the second wave – end of the third wave of COVID-19 pandemic (the course of the pandemic was monitored based on the daily infection reports for the Podkarpackie Region, published on the website of the Ministry of Health) [18].

A request for permission to conduct the survey was sent to 6 employing entities in south-eastern Poland. One employer refused to allow for including the entity in the study, therefore ultimately the questionnaires were sent, both in paper and electronic form, to the remaining 5 entities. Consultations related to the contents of the questionnaires were conducted by the authors of the study directly with managers in the specific units of the employing entities. A direct-contact procedure used in the process complied with a strict sanitary regime.

The following inclusion criteria were adopted: informed consent to participate in the study, economic activity during the pandemic, and no fortuitous events experienced during the previous 3 months. Individuals who had a positive COVID-19 test, or symptoms of COVID-19 infection, or were required to quarantine or self-isolate by the sanitary and epidemiological service were excluded from the study.

Out of those initially qualified to participate, 5.36% did not meet eligibility criteria, and were eventually excluded from the study. A total of 1537 questionnaires were sent to potential participants, however 26.74% of these were not returned.

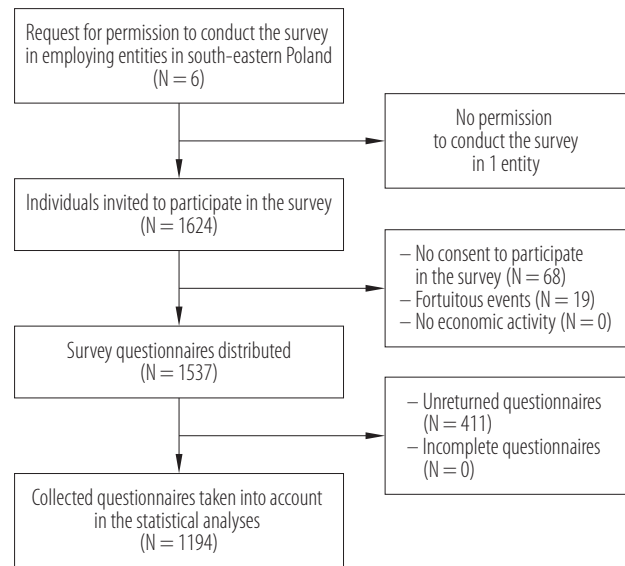


Figure 1. Recruitment process flowchart in the study on life satisfaction in individuals (N = 1194) who continued to be economically active during the COVID-19 pandemic, October 2020–May 2021, south-eastern Poland

Ultimately, 1194 individuals were qualified to participate. All the questionnaires returned were fully completed and were taken into account in the final analysis.

Recruitment process flowchart is shown in Figure 1.

Study instruments

The interviews were carried out using printed survey form with questions related to sex, age, education, residence, number of household members, type of occupation, and physical activity.

The level of respondents' physical activity was determined based on a specially designed physical activity factor (F_{PA}). The factor was calculated taking into account the responses to 3 questions:

- means of transport used to get to/from work;
- weekend leisure activities;
- leisure activities during vacation.

Each response was rated on a scale 0–2 pts, and the subjects could obtain a max score of 6 pts (Figure 2).

Life satisfaction was measured using *Life Satisfaction Questionnaire – 9* (LISAT-9) (Cronbach's α 0.75), proposed



The F_{PA} total score: 0–2 pts – low physical activity; 3–4 pts moderate physical activity; 5–6 pts – high physical activity.

Figure 2. Formula for calculation of physical activity factor (F_{PA}) in the study on life satisfaction in individuals ($N = 1194$) who continued to be economically active during the COVID-19 pandemic, October 2020–May 2021, south-eastern Poland

by Fugl-Meyer et al. (used in the original version [19]). It comprises 1 question related to general assessment of life as a whole, and 8 specific questions addressing: management of self-care, leisure time, vocational situation, financial situation, sexual life, partnership relation, family life and contacts with friends/acquaintances. The responses correspond to a 6-point Likert scale (1 – very dissatisfying, 6 – very satisfying). The final score was calculated as a mean result in all the items, and ranged 1–6 pts. Higher score reflected higher life satisfaction [19].

Quality of life was assessed using the abridged version of *World Health Organization Quality of Life – BREF* (WHOQoL-BREF) (the Cronbach's α 0.896), developed by the WHO (Polish translation – Wołowicka and Jaracz [20]), which comprises 26 items matching 4 domains of life: physical health, psychological health, social relationships and environment. The results in the domains were presented on a scale of 0–100, with higher scores corresponding to better quality of life. Responses to questions related to overall quality of life (Q1) and general health (Q2) were analysed separately [20,21].

Frequency of depression symptoms was assessed using *Beck Depression Inventory* (BDI) (the Cronbach's α 0.80),

designed by Beck et al. (used in the original version [22]), which comprises 21 items rated on a scale of 0–3 pts. The summary measure is in the range 0–63 pts, and intensity of depression symptoms increases with higher score. The score <10 pts reflects a lack of depression symptoms, scores ranging 10–18 pts correspond to mild depression symptoms, 19–29 pts – moderate depression symptoms and 30–63 pts – severe depression symptoms [22].

Ethics approval

The study was conducted in compliance with the Declaration of Helsinki and was approved by the University of Rzeszów Bioethics Commission (Resolution No. 4/10/2020 dated 22/10/2020). The survey was fully anonymous, and was conducted in conformity to the rules of research ethics, in entities and institutions which agreed to participate. Before the survey was conducted, informed consent was obtained from each participant. Those who volunteered to participate were informed about the purpose of the survey and received no gratification for taking part in the study.

Statistical analysis

The presentation starts with socio-economic characteristics (percent structure) and psychometric measures (selected descriptive statistics) in the entire population investigated.

Subsequently, differences in the quality of life and intensity of depression symptoms were examined relative to selected demographic factors, i.e., sex, form of employment and education. The analysis involved comparison of the means, with 95% confidence intervals (CI), corresponding to the specific measures in the groups investigated, and included assessment of the relations for significance, using ANOVA.

Subsequently the analyses focused on the correlations of key importance for the purpose of the study, i.e., the relationships of the overall activity factor to the quality of

life and intensity of depression symptoms. These analyses were carried out for groups distinguished relative to sex and education. Spearman's rank correlation coefficient was used to assess the relation of the quality of life and depression symptoms to physical activity level. The tables present values of the correlation coefficient r_s as well as the statistical significance of the results reflected by p-value.

In order to perform complex assessment of the effects produced by selected factors in quality-of-life and depression symptoms measures, regression analysis was performed using GRM tool in Statistica software. The potential independent factors taken into account included: age, gender, terms of employment (full-time vs. other types of employment), education, number of household members and overall activity factor. Stepwise regression procedures were applied to identify optimal models, i.e., those containing statistically significant factors. Regression analysis also eliminates apparent relationships which may be shown by univariate analyses and could erroneously be adopted as conclusions.

RESULTS

Most respondents reported secondary education and full-time employment. The findings showed similar percentage of blue-collar and white-collar workers. More respondents lived in towns with a population >10 000. Average distance of 10 km from home to work was identified in the study group. In accordance with the adopted classification of distances, nearly 1 in 2 respondents had a long distance to cover on their way to work. Car was the most frequently reported means of transport, whereas only slightly <1 in 5 survey participants reported regular physical activity (more than once a week) (Table 1).

The analyses took into account values of statistics for respondents' scores in the tests (Table 2). Symptoms of depression were reported by 44% of the respondents,

whereas severe depression symptoms were found in 1.3% of the participants.

It was shown that respondents' sex was related to life satisfaction (LISAT-9), and to quality of life in all the domains assessed by WHOQoL-BREF. The group of female respondents was found with significantly lower life satisfaction, lower quality of life and more severe symptoms of depression (Table 3). No signs of depression were identified in 70% of the male respondents and in 47% of the female respondents.

The findings showed marginal correlation between the respondents' age and their quality of life in the specific domains. Although the relationship was statistically significant (except in the psychological domain), the absolute value of Spearman's coefficient (r_s) did not exceed 0.15 in any of the domains. Furthermore, age was not related to the intensity of depression symptoms ($r_s = 0.06$). However, the analysis taking into account the respondents' sex showed that the value of Spearman's rank correlation coefficient amounted to -0.04 ($p > 0.05$) for women, and to 0.09 ($p > 0.05$) for men.

Self-assessed life satisfaction and quality of life were differentiated by the form of employment. The highest quality of life was identified in the individuals employed part-time and those reporting other types of employment. However, the level of depression symptoms was not differentiated by the form of employment (Table 3). The group of respondents employed occasionally was found with the lowest rate in the category of no signs of depression (51.8%), and the highest rate in the category of moderate depression symptoms (16.7%). Higher rate of severe depression symptoms was identified only in the group of respondents reporting other form of employment (3.4%), compared to those working occasionally (1.9%).

The relationships of the scores in LISAT-9, WHOQoL-BREF and BDI with the place of residence (population <10 000 or >10 000) were statistically non-significant ($p > 0.05$).

Table 1. Characteristics of the study group in the study on life satisfaction in individuals who continued to be economically active during the COVID-19 pandemic, October 2020–May 2021, south-eastern Poland

Variable	Participants (N = 1194)	
	n	%
Sex		
female	722	60.5
male	472	39.5
Age		
<30 years	382	32.0
30–39 years	332	27.8
40–49 years	322	27.0
≥50 years	158	13.2
Form of employment		
full-time	832	69.7
part-time	78	6.5
occasional	108	9.0
other	176	14.7
Place of residence – population		
<10 000 inhabitants	550	46.1
≥10 000 inhabitants	644	53.9
Education		
primary	19	1.6
vocational	146	12.2
secondary	603	50.2
higher	426	35.7
Type of occupation		
white-collar	578	48.4
blue-collar	616	51.6
Distance from workplace		
short (<1 km)	114	9.5
medium (1–5 km)	498	41.7
long (>5 km)	582	48.7
Means of getting to work		
on foot	140	11.7
bike	160	13.4
car	812	68.0
train	62	5.2
bus	20	1.7

Variable	Participants (N = 1194)	
	n	%
Household members [n]		
1	62	5.2
2	200	16.8
3	278	23.3
4	374	31.3
5	166	13.9
6	74	6.2
7	22	1.8
≥8	18	1.5
Frequency of physical activity		
daily	76	6.4
a few times per week	150	12.6
once a week	286	24.0
a few times per month	292	24.5
once a month	378	31.7
less often	12	1.0
Refund by employer		
yes	528	44.2
no	666	55.8

The study assessed relationship between education and life satisfaction, quality of life as well as depression symptoms. The respondents with higher education had the highest scores in all the domains of life (Table 3), and were most likely to report “no signs of depression” (65.5%). Conversely, secondary education corresponded to the lowest likelihood of “no signs of depression” (50.9%) and the highest likelihood of severe depression symptoms (2.5%).

Blue-collar workers, compared to white-collar workers, reported significantly higher quality of life in the domains of physical health ($p = 0.0331$), social relationships ($p = 0.0395$) and environment ($p = 0.0482$). Shorter distance between home and work corresponded to higher satisfaction according to LISAT-9 ($p = 0.0000$) and higher quality of life in the domain of social rela-

Table 2. Descriptive statistics for the specific measures: satisfaction, quality of life and depression in all the study participants (N = 1194) economically active during the COVID-19 pandemic, October 2020–May 2021, south-eastern Poland

Psychometric test	Questionnaire score [pts]				
	M (95% CI)	Me	SD	min.	max
LISAT-9 – overall score	4.32 (4.27–4.37)	4.44	0.89	1.00	6.00
Overall QoL (Q1)	3.82 (3.77–3.86)	4	0.80	1	5
Overall health (Q2)	3.70 (3.64–3.75)	4	0.92	1	5
Physical health	66.2 (65.4–67.0)	67.9	14.6	28.6	100.0
Psychological domain	68.3 (67.4–69.1)	70.8	15.2	8.3	100.0
Social relationships	69.6 (68.6–70.7)	75.0	18.6	0.0	100.0
Environment	63.5 (62.7–64.2)	62.5	13.0	12.5	93.8
BDI	9.2 (8.8–9.6)	8	7.0	0	47

BDI – Beck Depression Inventory; LISAT-9 – Life Satisfaction Questionnaire – 9; Q1 – question 1 from WHOQoL-BREF; Q2 – question 2 from WHOQoL-BREF; QoL – quality of life.

tionships ($p = 0.0134$). Similarly, the self-assessed overall quality of life (Q1), addressed by the first question in WHOQoL-BREF, was related to the distance to one's workplace ($p = 0.0090$). The highest mean score for this item was identified in the group of respondents reporting medium distance to their workplace. Conversely, symptoms of depression were not related to the distance to one's workplace ($p > 0.05$).

The mean value of F_{PA} in the study group was 3.35. Correlations between F_{PA} and quality of life were also assessed, separately for groups distinguished relative to education and sex. In the case of women with higher and secondary education, higher level of physical activity was positively related to life satisfaction and quality of life. In the group of women with vocational education such effect was identified in the quality of life in the environment domain only. No relationship between physical activity and quality of life was identified in the group of men with higher education, whereas the strongest associations were observed in the group of men with vocational education. The level of depression symptoms decreased with higher physical activity; however, significance of these correlations was weak. This effect was not observed

in individuals with higher education and in women with vocational education (Table 4).

The study also investigated the effect of employer's refund for physical activity on the level of that activity, measured with F_{PA} . The respondents receiving refund for physical activity were found with mean F_{PA} value of 3.57, compared to 3.17 in the group receiving no such refund. The distribution of F_{PA} values in the 2 groups was significantly different ($p = 0.0000^{***}$).

Life satisfaction, quality of life and intensity of depression symptoms were also assessed relative to the number of household members. Positive statistically significant, yet very weak, correlations were found between number of household members and the scores in LISAT-9, and in psychological health and environment domains in WHOQoL-BREF as well as self-reported general health (Q2) (Table 4).

The analyses of the respondents' sex and education showed that size of household was linked to life satisfaction (LISAT-9) in the case of individuals with higher education, and to the self-assessed general health (Q2) in the case of men. With regard to men with vocational education, the findings show negative statistically sig-

Table 3. Mean values for the measures of satisfaction, quality of life and depression relative to sex, form of employment and education in the study on life satisfaction carried out among individuals (N = 1194) who continued to be economically active during the COVID-19 pandemic, October 2020–May 2021 south-eastern Poland

Psychometric test	Questionnaire score [pts]													
	sex						form of employment						education	
	woman (N = 722)	man (N = 472)	p	full-time (N = 832)	part-time (N = 78)	occasional (N = 108)	other (N = 176)	p	vocational (N = 165)	secondary (N = 603)	higher (N = 426)	p		
LISAT-9 – overall score	4.24 (4.17–4.30)	4.45 (4.37–4.53)	0.0000***	4.33 (4.27–4.39)	4.45 (4.28–4.62)	4.09 (3.90–4.28)	4.36 (4.22–4.50)	0.0249*	4.40 (4.29–4.52)	4.17 (4.10–4.24)	4.50 (4.42–4.58)	0.0000***		
Overall QoL (Q1)	3.77 (3.71–3.83)	3.89 (3.82–3.96)	0.0098**	3.78 (3.73–3.83)	4.00 (3.82–4.18)	3.74 (3.54–3.94)	3.94 (3.83–4.06)	0.0113*	3.77 (3.65–3.89)	3.72 (3.66–3.79)	3.96 (3.89–4.03)	0.0000***		
Overall health (Q2)	3.57 (3.50–3.63)	3.89 (3.81–3.98)	0.0000***	3.61 (3.55–3.67)	3.95 (3.77–4.13)	3.83 (3.63–4.03)	3.90 (3.76–4.04)	0.0000***	3.76 (3.61–3.90)	3.57 (3.50–3.65)	3.85 (3.77–3.92)	0.0000***		
Physical health	64.2 (63.1–65.3)	69.3 (68.1–70.5)	0.0000***	65.0 (64.1–66.0)	71.8 (68.8–74.8)	69.3 (65.9–72.7)	67.2 (64.8–69.6)	0.0001***	67.1 (65.0–69.3)	64.2 (63.1–65.4)	68.6 (67.2–69.9)	0.0000***		
Psychological domain	66.2 (65.1–67.3)	71.4 (70.0–72.8)	0.0000***	67.8 (66.8–68.8)	71.7 (68.6–74.8)	64.9 (61.1–68.7)	71.1 (68.6–73.5)	0.0011**	69.2 (67.2–71.2)	65.9 (64.7–67.2)	71.2 (69.8–72.6)	0.0000***		
Social relationships	67.4 (66.1–68.7)	73.0 (71.4–74.7)	0.0000***	68.0 (66.8–69.2)	76.1 (71.2–80.9)	71.8 (67.4–76.1)	72.9 (70.3–75.6)	0.0001***	69.8 (67.4–72.3)	66.8 (65.3–68.3)	73.5 (71.7–75.2)	0.0000***		
Environment	61.7 (60.7–62.7)	66.2 (65.1–67.3)	0.0000***	62.2 (61.3–63.0)	67.9 (65.4–70.5)	64.9 (61.8–68.0)	66.7 (64.8–68.5)	0.0000***	64.3 (62.4–66.3)	61.8 (60.8–62.9)	65.5 (64.2–66.7)	0.0000***		
BDI	10.5 (9.9–11.0)	7.4 (6.8–7.9)	0.0000***	9.4 (8.9–9.8)	8.3 (7.0–9.5)	9.9 (8.4–11.5)	8.6 (7.2–10.0)	0.2366	9.2 (8.2–10.1)	10.1 (9.5–10.7)	8.0 (7.4–8.6)	0.0000***		

Abbreviations as in Table 2.

P value was calculated using 1-way ANOVA (separately for each factor).

Statistical significance * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 4. Correlations of the specific measures of satisfaction, quality of life and depression to the overall activity factor, relative to education, sex, and number of household members in the study on life satisfaction in individuals (N = 1194) who continued to be economically active during the COVID-19 pandemic, October 2020–May 2021, south-eastern Poland

Variable	Correlation																	
	LISAT-9 – overall score		overall QoL (Q1)		overall health (Q2)		physical health		psychological domain		social relationships		environment		BDI			
	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p		
Education																		
vocational																		
women	0.19	0.0528	0.01	0.9047	0.24	0.0143*	0.11	0.2924	0.10	0.3162	-0.02	0.8232	0.34	0.0006***	0.02	0.8107		
men	0.06	0.6130	0.13	0.3160	0.38	0.0018**	0.22	0.0853	0.12	0.3508	0.25	0.0494*	0.19	0.1324	-0.11	0.4032		
secondary																		
women	0.17	0.0020**	0.14	0.0126*	0.22	0.0000***	0.21	0.0001***	0.13	0.0165*	0.07	0.1741	0.24	0.0000***	-0.15	0.0064**		
men	-0.07	0.2422	0.03	0.5788	0.06	0.3280	0.12	0.0577	0.12	0.0559	0.12	0.0439*	0.13	0.0344*	-0.13	0.0321*		
higher																		
women	0.14	0.0179*	0.10	0.1068	0.08	0.1824	0.19	0.0012**	0.18	0.0027**	0.05	0.3981	0.16	0.0057**	-0.05	0.3597		
men	-0.13	0.1081	-0.08	0.3587	0.10	0.2254	0.05	0.5118	-0.11	0.1773	-0.12	0.1355	-0.02	0.8566	0.06	0.4759		
Number of household members	0.08	0.0035**	0.01	0.7032	0.06	0.0312*	0.04	0.1834	0.06	0.0362*	0.04	0.1620	0.09	0.0022**	-0.05	0.1010		
education																		
vocational																		
women	0.09	0.3715	-0.04	0.6713	0.15	0.1300	0.07	0.4784	0.05	0.6504	0.14	0.1608	0.19	0.0574	0.01	0.8852		
men	-0.09	0.4931	-0.30	0.0149*	-0.06	0.6204	-0.13	0.2905	-0.18	0.1637	-0.30	0.0171*	-0.28	0.0228*	0.43	0.0005***		
secondary																		
women	-0.07	0.1883	-0.01	0.8593	-0.06	0.2539	-0.01	0.8777	-0.09	0.0952	-0.12	0.0262*	0.06	0.2583	0.03	0.5515		
men	0.12	0.0573	0.14	0.0282*	-0.01	0.8889	0.08	0.2118	0.20	0.0015**	0.15	0.0121*	0.17	0.0050**	-0.11	0.0680		
higher																		
women	0.18	0.0028**	-0.07	0.2776	0.09	0.1435	0.03	0.5660	0.11	0.0775	0.06	0.3169	0.01	0.8813	-0.05	0.3772		
men	0.17	0.0442*	0.08	0.3569	0.25	0.0023**	-0.05	0.5381	-0.03	0.7130	0.03	0.6789	0.05	0.5273	0.00	0.9751		

* p < 0.05, ** p < 0.01, *** p < 0.001.

Table 5. Regression models comprising factors significantly differentiating the measures of *Life Satisfaction Questionnaire – 9* (LISAT-9), overall quality of life (QoL), overall health and *Beck Depression Inventory* (BDI) in individuals (N = 1194) who continued to be economically active during the COVID-19 pandemic, October 2020–May 2021, south-eastern Poland

Independent feature	B (95% CI)	p	β	Model statistics
LISAT-9				$R^2 = 6.1\%$, $F = 12.9$, $p = 0.0000^{***}$
age [years]	0.007 (0.002–0.011)	0.0043**	0.09	
women vs. men	–0.236 (–0.339–(–0.134))	0.0000***	–0.13	
secondary vs. vocational	–0.214 (–0.365–(–0.063))	0.0054**	–0.08	
higher vs. vocational	0.343 (0.235–0.451)	0.0000***	0.19	
number of household members	0.050 (0.016–0.085)	0.0043**	0.08	
physical activity factor	0.035 (–0.005–0.075)	0.0851	0.05	
Overall QoL (Q1)				$R^2 = 3.4\%$, $F = 10.4$, $p = 0.0000^{***}$
women vs. men	–0.115 (–0.209–(–0.022))	0.0159*	–0.07	
full-time vs. other types of employment	–0.120 (–0.221–(–0.018))	0.0205*	–0.07	
higher vs. vocational	0.255 (0.161–0.350)	0.0000***	0.15	
physical activity factor	0.031 (–0.005–0.068)	0.0939	0.05	
Overall health (Q2)				$R^2 = 8.3\%$, $F = 21.6$, $p = 0.0000^{***}$
women vs. men	–0.294 (–0.398–(–0.190))	0.0000***	–0.16	
full-time vs. other types of employment	–0.256 (–0.369–(–0.142))	0.0000***	–0.13	
secondary vs. vocational	–0.241 (–0.394–(–0.088))	0.0020**	–0.09	
higher vs. vocational	0.348 (0.237–0.460)	0.0000***	0.18	
physical activity factor	0.073 (0.033–0.114)	0.0004***	0.10	
BDI				$R^2 = 7.4\%$, $F = 23.9$, $p = 0.0000^{***}$
women vs. men	3.218 (2.427–4.009)	0.0000***	0.22	
secondary vs. vocational	1.135 (–0.028–2.299)	0.0559	0.06	
higher vs. vocational	–2.396 (–3.237–(–1.555))	0.0000***	–0.16	
physical activity factor	–0.299 (–0.608–0.010)	0.0580	–0.05	

P value for significance of each regression coefficient.

β – standardize regression coefficient; B – regression coefficient with 95% CI; F – test statistic and p value for significance of whole model; R^2 – coefficient of determination.

nificant correlations of the number of household members with overall quality of life (Q1), and quality of life in the domains of social relationships and environment. This group was also found with positive statistically significant correlations between number of household members and level of depression symptoms (Table 4).

The results of the regression analysis first of all showed that the factors investigated only to a small extent explained variability in the quality-of-life and intensity of

depression symptoms measures (the coefficient of determination does not exceed 10%) (Table 5).

DISCUSSION

The necessary precautions introduced in response to COVID-19 pandemic led to radical suppression of interpersonal interactions and social relations [23]. The purpose of the study was to assess quality of life, life satisfaction and severity of depression symptoms, relative

to the factors potentially determining these variables in individuals who continued to work during the COVID-19 pandemic in Poland. The study also assessed the level of physical activity of the study group.

These individuals were less affected by limitations related to social contacts and physical activity, due to which it seems the risk of quality-of-life deterioration and incidence of mental disorders, including depression symptoms, should be lower in their case. The present study was carried out during a high-tide and a low-tide wave in the pandemic in Poland.

Mental condition of economically active individuals during the COVID-19 pandemic

There are many factors contributing to development of depression symptoms and they include social isolation, and constant flow of information related to the spread of the pandemic, number of deaths, and lack of sufficient therapeutic measures [15]. The present study shows that nearly 1 in 2 respondents suffer from signs of depression and 1 in 3 respondents are affected by mild depression symptoms. A study by Stanton et al. [24] showed no significant increase in the cases of depression in Australia during COVID-19 pandemic. However, higher incidence of depression during the period of social distancing was observed in Brazil [17,25]. The rate of people reporting moderate to severe depression increased over 6-fold in that country [25]. Chinese studies reported that symptoms of severe depression were found in 4.3% of Chinese population, whereas frontline COVID-19 workers in Wuhan experienced more severe symptoms of depression, anxiety and distress, compared to other individuals [26]. Another Chinese study showed that depression and anxiety occurred at the rates of 17.7% and 6.33%, respectively in the assessed population [27]. Majority of these studies suggested that the risk of depression was lower in individuals with better education [24,25,27]. The current findings show that women are more likely to experience more severe

symptoms of depression. This is consistent with observations reported by other researchers [25,28]. Women tend to be more sensitive and may cope less effectively with difficult life situations, which probably is reflected by the higher incidence of more severe depressive symptoms. It should also be pointed out that women potentially more frequently face unequal treatment at work.

Furthermore, according to Puccinelli et al. [17], men who did not reduce their physical activity presented better mental status during the period of social distancing.

Earlier studies showed that individuals with lower health status, or less advantageous occupational and financial resources are more at risk of poorer quality of life, lower life satisfaction and depression [10,14,17,25]. This was confirmed by Bidzan-Bluma et al. [15], who demonstrated that better quality of life in the elderly may be linked to their right to receive retirement benefits and to the lack of fear of losing their job during the pandemic. Likewise, Madden et al. [29] showed an association between the type of employment and workers' mental state. Those with temporary employment contracts are more likely to feel distressed and in need of social support, compared to those with permanent employment contracts. In line with the latter observation, the current findings related to the group of respondents working occasionally show the lowest percentage of those reporting no signs of depression and the second highest rate of those with severe depression symptoms. The above observations justify an assumption that onsite work allowing for direct contacts during the period of social distancing positively affects workers' well-being and mental condition. Furthermore, lack of permanent employment and unstable economic status may contribute to perceived symptoms of depression. Conversely, Lades et al. [16] showed that interactions connected with one's work negatively affect one's emotional condition whereas direct social contacts outside work, and direct-contact education positively impact subjects' emotions. Another study reported

more frequent mental problems in individuals authorised to go out during the isolation period, compared to individuals who were not allowed to leave home [30].

Even before the pandemic, higher levels of depression and poorer quality of life associated with lower physical activity were observed in young people [11]. Furthermore, a study by Bell and Blanchflower [12] covering a period of 2013–2018 reported a trend towards higher rates of depression, poorer quality of life and life satisfaction in people working irregular hours and unemployed. The current study took into account the risks associated with the COVID-19 pandemic and partly supports the above findings, nevertheless, it should be emphasised that there are many other factors that may contribute to the development of depressive symptoms.

Physical activity in individuals working during the COVID-19 pandemic

In the current study, the authors observed a disturbingly low percentage of respondents reporting daily physical activity. Low level of exercise and a tendency for passive leisure activities during the pandemic were also reported by Lades et al. [16]. Only 1 in 4 respondents in the present study got to work on foot or by bike. This may be linked with the fact that more than half of the survey participants had to travel a distance of at least 5 km to work. The findings showed a higher level of life satisfaction (LISAT-9) and better quality of life in the domain of social relationships in the group of individuals covering a shorter distance on the way to work. It can be assumed that shorter distance travelled on the way to work is associated with lower difficulties, as well as reduced duration and costs of transport.

Regular physical activity and less frequent sedentary behaviours decrease a risk of depressive disorders and other diseases [31]. Physical activity increases overall efficiency of the body, and improves functioning of the respiratory and immune systems, which is extremely

important during the current pandemic. Adequate physical activity also facilitates recovery from COVID-19 [2]. Physical exercise constitutes an important element of medical care provided to patients with depressive disorders representing all age groups. Effectiveness of exercise has been proven by research [32]. It has also been shown that even a short period of reduced physical activity may lead to negative physical and mental symptoms [33]. Physical activity during the pandemic beneficially affects the quality of life, improves sleep quality as well as cognitive functions and prevents onset of depression [17,30,34]. The present findings partly confirm positive effect of physical work on majority of the quality-of-life domains. Possibly physical nature of work contributes to reduced sedentary behaviours. However, the differences between blue-collar and white-collar workers were not as clear as the between-sex differences.

A number of studies reported changes in physical activity, relative to the situation before the pandemic, and the negative changes were most commonly linked to increased incidence of depression and anxiety [17,24,25,34,35]. The negative changes in physical activity during the time of imposed social distancing are explained by the findings of Wagner et al. [36] showing that the generally preferred and most beneficial types of activity are those performed outdoors.

The F_{PA} , specially designed for the needs of the present study, is a resultant of the physical activity performed during weekends and during vacation as well as the means of transport used to get to work. On average the activity factor was satisfying. The authors have shown that the factor is not differentiated by either education or sex. It is only slightly higher in the case of men, compared to women, in the group of respondents with better education. It is likely that in the case of working women the necessity to combine work and family responsibilities makes it difficult to maintain high levels of physical activity.

Factors related to the quality of life, life satisfaction and intensity of depression symptoms

The study by Nguyen et al. [10], carried out during COVID-19 pandemic, showed poorer quality of life and greater risk of depression among people with better education. Likewise, women participating in the present study reported poorer quality of life, which tended to improve with higher level of physical activity (except in women with vocational education). These correlations were found to be weak, which is not surprising given the fact that quality of life is affected by other factors which were not taken into account in the current study. As regards findings related to men, it is surprising that there is no relationship between physical activity and quality of life in the group of people with higher education. Perhaps, physical activity in this population is a more common habit and it does not significantly affect the perception of the quality of life.

The regression analysis did not show a significant effect of the level of physical activity (F_{PA}) on life satisfaction (LISAT-9) or the self-assessed overall quality of life (Q1). On the other hand, it confirmed highly significant effect of this type of activity on self-reported general health (Q2). Surprisingly, the findings showed that general level of physical activity (F_{PA}) does not significantly impact the intensity of depression symptoms (BDI). However, the p value approaching the level of significance suggests that a study involving a larger group of respondents could confirm such association.

Bidzan-Bluma et al. [15] reported higher life satisfaction, better quality of life and sense of well-being in older individuals, compared to young and middle-aged subjects. According to these authors this may be linked to greater occupational and financial stability. Other studies demonstrated that depression is negatively related to age [17,25,30]. The fear of losing one's job and uncertainty related to the future in the post-COVID-19 world may

adversely affect people's mental health [25]. An opposite trend was observed in Vietnam, where older subjects were found with poorer quality of life during COVID-19 pandemic, compared to younger individuals [10].

The present findings show that the quality of life during the pandemic is only slightly related to age, and there is no association between the respondents' age and the intensity of depression symptoms experienced by them. Similar findings were identified for life satisfaction which is higher in older individuals. The regression analysis showed a weak correlation between these variables.

Regression analysis confirmed differences in mental health between men and women, reflecting poorer condition of the latter, as indicated by positive regression coefficients for BDI and negative for quality-of-life and life satisfaction measures. As regards all the psychometric measures, the current findings also showed that individuals with higher education were likely to report better mental health, whereas those with secondary education were found with the poorest condition (they achieved poorer scores than those with vocational education). Furthermore, the results of the regression analysis seem to suggest that individuals employed full-time experience poorer quality of life, compared to individuals reporting other form of employment.

Household size versus mental condition

Presence of children in a household during the imposed quarantine is a factor protecting against depression [37]. However Lades et al. [16] point to possible difficulties in adapting to continuous interaction with relatives in a shared household during the pandemic. Likewise, Nguyen et al. [10] showed that individuals who have ever been married report lower quality of life. The present study assessed correlations between the number of household members and the level of satisfaction, qual-

ity of life as well as depression symptoms. A trend for greater satisfaction and better quality of life has been observed in the case of individuals living in larger households. The regression analysis confirmed that greater number of household members corresponds to higher life satisfaction. This may be linked to the positive influence of family life and the support provided by housemates or close relatives. The present findings also suggest that cohabitation with extended family is perceived negatively by men with poor education and positively by men with secondary education. Well educated individuals tend to be better off economically, so they are able to provide a higher standard of living for a larger family.

Limitation

This study did not compare the level of physical activity and mental status of economically active individuals before and during the pandemic, which is a limitation.

By comparing the physical and mental condition of respondents before and during the pandemic it would be possible to more reliably assess the impact of the pandemic on the mental condition of economically active people. However, as shown by Feter et al. [25], a risk of pandemic-induced mental health issues is not related to the level of activity preceding the pandemic, but only to the activity during the relevant time.

Due to pandemic restrictions, the authors were unable to reach individuals who were on sick leave at the time of the survey, and had no way of verifying the reasons for the sick leave. The authors are aware of the fact that those absent, due to sick leave, self-isolation or quarantine, may have included individuals e.g., affected by depression. However, the purpose of this research project was to investigate the mental condition of individuals who were affected by the inconveniences of the pandemic but continued to be active and maintained social contacts in their work environment.

In order to minimise the time required to fill in the questionnaire the authors did not use standardised tools enabling assessment of physical activity; instead, the specially designed activity factor was applied. The issues taken into account in the specially designed F_{PA} seem to be adequate to the subject matter of this study.

An assessment of the long-term effects of the pandemic would require a new study based on the same assumptions after the COVID-19 pandemic has ended.

CONCLUSIONS

The present study suggests that majority of people who work during COVID-19 pandemic report good quality of life, whereas symptoms of depression are observed in nearly half of the working population in Poland, irrespective of age. Regular physical activity is performed by a small part of the population. The highest quality of life is reported in the domain of social relationships, and the lowest in the domain of environment. Economically active women tend to present lower level of satisfaction, poorer quality of life and more severe symptoms of depression, compared to men. On the other hand, higher physical activity reported by women with higher or secondary education contributes to greater life satisfaction and better quality of life. Jobs and other forms of employment, but not full-time jobs, may positively impact the quality of life, whereas short distance covered on the way to work may positively affect the level of life satisfaction and quality of life in the domain of social relationships. Economically active individuals with higher education, living in larger households, may cope better with adversities, also those resulting from the pandemic. Notably, the respondents' mental well-being was assessed at the specific time, i.e., during the pandemic (the WHOQoL questionnaire addressed perceptions of their well-being in the last 4 weeks and the BDI addressed their well-being in the last 7 days). No data related to the respondents' condition prior to

the pandemic were available to the authors, therefore it was not possible to draw clear-cut conclusions that the risks related to and disadvantages of the COVID-19 pandemic were the only factors impacting the present findings.

ACKNOWLEDGMENTS

The authors wish to express gratitude to the respondents for giving their time and energy to take part in this study, and to all people who actively participated in preparing this article.

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