

Self-efficacy and fatigue perceived by nursing students in Poland, Spain and Slovakia during the COVID-19 pandemic

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Abstract. – OBJECTIVE: The two-year long epidemic situation around the world has resulted in an increasing number of people experiencing “pandemic fatigue”. The aim of this study was to examine the correlation between a sense of self-efficacy and fatigue experienced in everyday life by nursing students in Poland, Spain and Slovakia during the COVID-19 pandemic.

PATIENTS AND METHODS: The study was conducted by the diagnostic survey method on a group of 756 nursing students of the first-cycle degree program, from 20 March to 15 May 2021, in the University of Warmia and Mazury in Olsztyn, Pomeranian Medical University in Szczecin (Poland), as well as in Murcia University (Spain) and in the Catholic University in Ružomberok (Slovakia).

RESULTS: The sense of self-efficacy was significantly lower among the students in Poland than in those in Spain ($p < 0.0001$) and in Slovakia ($p < 0.0001$). Students in Slovakia showed symptoms of general, physical, cognitive and psychosocial fatigue much less frequently than those in Poland ($p < 0.001$) and Spain ($p < 0.001$). Especially students in Spain acutely felt physical health issues as a result of COVID-19 pandemic-imposed restrictions.

CONCLUSIONS: A high level of a generalized sense of self-efficacy among the nursing students participating in the study was identified. However, it was significantly differentiated with respect to the country of residence. The fatigue severity experienced by the students during the COVID-19 pandemic was determined by a sense of self-efficacy.

Key Words:

Sense of self-efficacy, Fatigue, COVID-19 pandemic.

Introduction

The phenomenon of fatigue is a complex problem. It is recognized as a natural response of the body to increased work, stress or overstimulation. In physiological terms, it is defined as a state of exhaustion of the organism as a result of exertion, while in psychological terms, it refers to a subjective state of feeling tired resulting from an individual's activity. The consequence of this state is the inability to meet the requirements, or the necessity to put more effort into current activities. Fatigue is very often accompanied by a set of emotional symptoms (unwillingness to study, work, irritability, aggression, apathy, depression) and physical symptoms (sleep disorders, disturbances of vegetative functions)^{1,2}.

The COVID-19 pandemic has affected the physical and mental health of people worldwide. The rapid transmission of SARS-CoV-2 forced immediate actions and changes that societies were not ready for. Isolation, the need for social distance, and far-reaching restrictions all had a considerable impact on the mental functioning of individuals. Several studies³⁻⁶ have shown that during a pandemic, people experience a range of negative emotions, from feelings of danger to uncertainty, frustration, and anger. These emotions impair people's well-being and quality of life, and often exacerbate symptoms of depression and anxiety. The psychological effects of a pandemic are likely to persist longer than the pandemic itself³⁻⁷.

Despite the difficult times and the ever-changing epidemic situation, nursing students also per-

formed volunteer work or continued practical classes and internships in hospitals, where they were exposed to the risk of SARS-CoV-2 infection every day⁸.

Stress exerted on the body inevitably leads to fatigue. Direct exposure to infection contributes to chronic stress, which creates a sense of helplessness and loss of control. Liu et al⁹ conducted a study on 1,070 nursing students in China and found that fatigue is quite common and has a negative impact on students' quality of life and daily functioning. Mahmoud et al¹⁰ observed that students experiencing medications, stress, and depression are at increased risk for chronic fatigue, which consequently contributes to poorer academic performances, absenteeism, and inactivity. Factors contributing to increased stress levels may also include easy access to communication technology and inaccurate or false news and false information on social media¹¹⁻¹³. The development of depressive and anxiety disorders exacerbated by prolonged exposure to electronic devices is a latent crisis of the pandemic according to Ma et al¹⁴, as suggested by nationwide studies of Chinese student populations¹⁵. Zhang et al¹⁶ confirmed the prevalence of physical fatigue (50.03%) and mental fatigue (45.43%) in quarantined students during the COVID-19 pandemic, resulting from the impact of Problematic Smartphone Use (PSU). Another factor contributing to negative emotions was the introduction of remote education, creating both the difficulty in adapting to this form of learning and the need to work independently compounded anxiety and stress leading to mental and physical exhaustion in young people.

With the prolonged pandemic, many people, including students, are experiencing some form of fatigue. Young people in particular, lacking the skills to cope with difficult situations/stressors, are at risk for depressive disorders¹⁷⁻¹⁹. Fatigue is a specific by-product of depleted psychological resources, thus having selected personal resources may be a protective factor. The sense of self-efficacy represents one of these determinants. Self-efficacy differentiates people in terms of thinking, feeling and actions taken, since people who are characterized by a stronger belief in their own efficacy set themselves higher goals, engaging in their realization despite difficulties and failures. Self-efficacy and certain personality traits represent two of the determinants of career preferences. Self-efficacy is the belief that we can control our own actions in order to achieve a de-

sired outcome, a belief in our own potential, an individual's belief that he/she can handle a difficult and stressful situation²⁰⁻²². A sense of self-efficacy results in increased concentration and self-control which, according to Alboghdady et al²³, is valuable, especially among medical professionals, as individuals with high self-efficacy are able to better manage their feelings. Their personal level of self-efficacy during such a difficult time as the COVID-19 pandemic was able to change their behaviour, allowing them to properly assess the situation and seek an effective method of coping in the face of obstacles and adversity. Chan²⁴ states that self-efficacy in nursing students is positively correlated with exercise and is a predictor of health behaviors. Coping skills and self-efficacy can protect nursing students from compassion fatigue²⁵. Researchers^{26,27} have pointed to self-efficacy as a protective factor for students against academic burnout, which can manifest as fatigue and exhaustion - both physical and psychological. Rohmani and Andriani²⁶ demonstrated a correlation between sense of academic self-efficacy and burnout among first-year nursing students at a university in Indonesia who taught online classes during the COVID-19 pandemic. A study by Kong et al²⁷ also confirmed sense of self-efficacy as a protective factor against the consequences of academic burnout among nursing students.

The COVID-19 pandemic, in addition to a pre-existing number of psychosocial implications, has posed a specific challenge for young people wishing to pursue nursing in the future. A study by Mannino et al²⁸ confirmed that the experience gained during the pandemic has contributed to feelings of confidence and competence, and the experience gained has been a source to create self-efficacy. Thus, individuals with a higher sense of self-efficacy in nursing practice are more likely to be challenged, which is undoubtedly an asset in this profession²⁹.

The aim of this study is to examine the correlation between a sense of self-efficacy and fatigue experienced in everyday life by nursing students in Poland, Spain and Slovakia, in connection with the consequences of spreading SARS-CoV-2 virus infections.

The study aimed to answer the following research questions:

1. What is the level of self-efficacy claimed by nursing students during the COVID-19 pandemic, and to what extent did they experience fatigue, taking into account the inter-group differences?

2. To what extent is the level of self-efficacy correlated to the fatigue experienced by nursing students, and what are the inter-group differences?
3. Is general, physical, cognitive and psychosocial fatigue a determinant of fatigue severity among the study participants? If so, to what extent?

Patients and Methods

Settings and Design

The study was conducted by using the diagnostic survey method on a group of 756 nursing students of the first-cycle (bachelor degree) programme between 20 March and 15 May 2021. Students up to 30 years old were enrolled after providing informed consent to participate in the study. Those who failed to provide such consent were excluded from the study. The survey was carried out among students from the University of Warmia and Mazury in Olsztyn, and the Pomeranian Medical University in Szczecin (Poland), as well as from Murcia University (Spain) and from the Catholic University in Ružomberok (Slovakia). After obtaining consent from the deans, questionnaire sets were delivered in Poland and Spain by one of the researchers to the sites in the universities where the teaching classes were conducted. Since the classes for nursing students in Slovakia were conducted online during the study period, the questionnaire sets were sent by email and returned by the same route within two days. Participants were informed about the study advisability and legitimacy and about the method of completing the questionnaires. They had an opportunity to ask questions and to receive exhaustive answers. Participation in the study was voluntary, and the respondents could withdraw at any time without giving a reason and without any consequences. It took approximately ten minutes to complete the questionnaire. A total of 850 questionnaire sets were distributed, of which 756 (88.94%) correctly completed questionnaires were considered for the final analysis. The collected empirical data were then encoded in an Excel spreadsheet, and a cumulative analysis was performed. This study is part of an international research project executed within the scientific internship programme of one of the researchers (E.K.). The research project was given a favourable opinion (No. 3/2021) by the Senate Scientific Research Ethics Committee at the Olsztyn University in Olsztyn and was carried out in accordance with the Declaration of Helsin-

ki and the procedures and instructions in force in the universities. The study meets the criteria of a cross-sectional study³⁰.

Participants

The study included 756 nursing students from three European countries. There were 390 students (51.59%) from Poland, 196 (25.92%) from Spain and 170 (22.49%) from Slovakia. The mean age of the participants was 21.20 years (± 1.97). The subjects' age was analyzed in three age intervals: ≤ 20 years, 21-22 years and 23-30 years. The largest group included students aged 21-22 years ($n = 334$; 44.18%) and those of the second year of studies ($n = 294$; 38.89%). A large majority of the respondents ($n = 630$; 83.33%) had lived with family/someone close during the COVID-19 pandemic. The time of working on a computer was analyzed in three intervals: ≤ 5 , 6-9 and ≥ 10 hours. Because of the online teaching, students in different countries differed significantly (Chi-square=56.33; $p < 0.0001$), with respect to the number of hours spent working on a computer. Nearly $\frac{1}{3}$ of the Spanish students reported that they worked on a computer ≥ 10 hours/day, whereas 60% of the Slovak students worked on a computer ≤ 5 hours/day. The students usually had 3 ($n = 266$; 35.19%) or 4 ($n = 293$; 38.76%) meals daily, but they had only some of them at fixed times. A great majority of the participants in all the groups declared that their social contacts during the COVID-19 pandemic were restricted to a great or average extent. Only $\frac{1}{4}$ of the group reported that their physical exercise was not restricted as a result of the SARS-CoV-2 virus spread. Almost all participants described their health status as very good or good.

Research Instruments

The diagnostic survey method with the questionnaire technique was applied, and the following standardized research tools were used to collect the empirical data:

- Generalized Self-Efficacy Scale (GSES), developed by Schwarzer et al^{31,32};
- Fatigue Severity Scale (FSS), developed by Krupp et al^{32,33};
- Modified Fatigue Impact Scale (MFIS), modified by Gruszczak et al³⁴.

An original survey questionnaire was also used, containing the basic personal data (i.e., gender, age, study year, place of residence), as well as the subjective evaluation of the health status

and selected elements of the lifestyle during the COVID-19 pandemic (i.e., physical exercise, meals, time spent working on a computer).

Generalised Self Efficacy Scale (GSES)

The GSES scale measures the strength of an individual's general conviction regarding his/her efficacy of coping with difficult situations and adversities. It consists of ten statements which comprise one factor. The participant selects the extent to which he/she agrees with each statement, choosing one of the four answers with the assigned points: no (1), rather not (2), rather yes (3), yes (4). The total score gives a general index of a sense of self-efficacy, which lies within a range from 10 to 40 points. The higher the score, the higher the sense of self-efficacy. After being converted to standardized units, the overall index is interpreted according to the properties characterizing the Standard Tens (sten) scores. Scores between 1 and 4 sten are regarded as low, whereas those from 7 to 10 sten are regarded as high, which corresponds to an area of ca. 33% of low scores and the same percentage of the highest scores. The scores of 5 and 6 sten are regarded as average. The internal consistency index (Cronbach's alpha) for the 13 language versions of the GSES ranges from 0.91 to 0.78³¹.

Fatigue Severity Scale (FSS)

The FSS is used to assess the impact of fatigue on a person's activity, motivation, work and family life. It contains nine statements in which a participant determines a subjective severity of fatigue symptoms. Points on the seven-point Likert scale are given for each answer, where 1 point means that the participant definitely disagrees with the statement, whereas 7 points mean that he/she definitely agrees with it. The maximum score is 63. The higher the score, the higher the fatigue severity. The limit point denoting the normal level is not used in the scale analysis, but it is assumed that a score of ≥ 36 is indicative of significant clinical fatigue. The scale reliability is high, and the internal consistency index (Cronbach's alpha) is 0.88^{32,33}.

Modified Fatigue Impact Scale (MFIS)

The MFIS scale comprises 21 statements and is used to evaluate a fatigue impact on general (MFIS), but also on physical (Ph-MFIS), cognitive (C-MFIS) and psychosocial (Ps-MFIS) health. The Ph-MFIS subscale comprises nine statements which are used to evaluate the participant's sub-

jective feeling concerning the impact of fatigue on physical activity. The C-MFIS subscale comprises ten statements evaluating fatigue impact on cognitive functions, whereas Ps-MFIS contains two statements evaluating the psychosocial functions. When giving an answer, a participant states the incidence of specific symptoms/health issues during the past four weeks. The answers have point numbers assigned: never (1 point), rarely (2), sometimes (3), often (4) and nearly always (5). An overall evaluation with the MFIS questionnaire can give 21 to 105 points, with 9 to 45 points in the physical function subscale, 10 to 50 in the cognitive function subscale, and 2 to 10 points in an evaluation of psychosocial functions. The higher the score, the larger the fatigue impact on the quality of a participant's life. The scale has satisfactory psychometric properties³⁴.

Statistical Analysis

The statistical analysis of the empirical data was performed with the Polish version of STATISTICA 13 (TIBCO, Palo Alto, CA, USA). The characteristics of the study group were presented as the number of cases and percentage, and the group equipotency was verified with the Chi-square test (χ^2). The data were described with the position and variation measures: arithmetic mean (M), median (Me), minimum - maximum (Min. - Max.), standard deviation (SD) and the confidence interval for the mean was established $\pm 95\%$. The variation of scores for a sense of self-efficacy and fatigue, as felt by the nursing students, was evaluated with the analysis of variance ANOVA (F) for a comparison of multiple samples in independent groups, and it was detailed with a post-hoc test (LSD). An assessment of the nature and power of the correlation between a sense of self-efficacy and fatigue severity as experienced by participants, as well as of the correlation between the fatigue severity on the FSS scale and the fatigue impact on the health status as assessed in the MFIS scale, was performed with the Pearson correlation (r). A multiple regression analysis was performed to build a random variable estimation model from the independent variables. The interpretation of the correlation power between the analyzed variables was based on the Guilford's classification, taking, in sequence: $|r| = 0$ - no correlation, $0.0 < |r| \leq 0.1$ - slight correlation, $0.1 < |r| \leq 0.3$ - weak correlation, $0.3 < |r| \leq 0.5$ - average correlation, $0.5 < |r| \leq 0.7$ - high correlation, $0.7 < |r| \leq 0.9$ - very high correlation, $0.9 < |r| < 1.0$ - nearly full correlation, $|r| = 1$ - full correlation. The test prob-

Table I. The sense of self-efficacy and the feeling of fatigue in opinions of nursing students in the Polish, Spanish and Slovak studies – variation of scores.

Variables	Country of residence			ANOVA (F)	P	
	Poland - A n = 390 (51.59%)	Spain - B n = 196 (25.92%)	Slovakia - C n = 170 (22.49%)			
	M ± SD, Me, Min. – Max., -95%, +95%	M ± SD, Me, Min. – Max., -95%, +95%	M ± SD, Me, Min. – Max., -95%, +95%			
GSES	29.76±4.34,30 14-40 29.33-30.19	30.80±4.70,31 20-40 30.30-31.46	30.13±4.32,30 11-40 29.48-30.78	3.55	0.02 A < B***	
FSS	36.31±11.40,36 9-63 35.17-37.44	33.62±12.40,34 9-62 31.87-35.37	36.94±9.74,37 10-61 35.47-38.42	4.88	0.007 A > B*** C > B***	
MFIS – overall dimension	55.53±15.67,54 21-101 53.97-57.09	58.33±19.73,60 21-105 55.55-61.11	42.90±13.56,41 21-105 40.85-44.96	46.96	0,0001 C < A*** C < B***	
MFIS (subscales)	Ph-MFIS	24.02±7.24,24 9-42 23.30-24.74	25.08±8.65,25 9-45 23.86-26.30	17.33±6.13,17 9-45 16.40-18.25	61.00	0,0001 C < A*** C < B***
	C-MFIS	26.38±8,92,26 10-50 25.50-27.27	28.12±10.77,29 10-50 26.61-29.64	21.46±7.45,21 10-50 21.46-26.40	26.19	0,0001 C < A*** C < B***
	Ps-MFIS	5.12±2.08,5 2-10 4.91-5.33	5.13±2.36,5 2-10 4.79-5.46	4.11±1.74,4 2-10 3.85-4.37	15.44	0,0001 C < A*** C < B***

Statistically significant: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Explanation: GSES - Generalised Self Efficacy Scale, FSS - Fatigue Severity Scale, MFIS - Modified Fatigue Impact Scale, Ph-MFIS – fatigue impact on physical health, C-MFIS – fatigue impact on cognitive health, Ps-MFIS – fatigue impact on psychosocial health

ability at the level of significance of $p < 0.05$ was regarded as significant^{22,35}.

Results

Variation of Scores for a Sense of Self-Efficacy and Fatigue Among Nursing Students in the Polish, Spanish and Slovak Studies

It was shown with the analysis of variance ANOVA that the scores for the strength of nursing students' views regarding the efficacy of coping with difficult situations and adversities, as measured by the GSES scale in the Polish, Spanish and Slovak studies, were significantly differentiated with respect to the country of residence ($F = 3.55$; $p < 0.05$). The mean score (Table I) for the Polish sample was 29.76 (SD = 4.34) points in the scale from 10 to 40 points, 30.80 (SD = 4.70) points for the Spanish sample and 30.13 (SD = 4.32) points for the Slovak sample, which it was higher than the mean score for the normalization group ($M = 27.32$).

Detailed analyses with a post-hoc test (LSD) showed the sense of self-efficacy to be significantly lower in the students in Poland compared to the students in Spain ($p < 0.0001$) and in Slovakia ($p < 0.0001$) (Figure 1).

After being converted to standardized units, the overall sense of self-efficacy index was interpreted according to the properties characterizing the sten scale. No statistically significant differences were found between low, average and high scores on the sten scale in the Polish, Spanish and Slovak studies. High scores were noted for over half of the participants in all the three samples (Poland: 56.92%; Spain: 62.24%; Slovakia: 54.12%), showing that the nursing students perceive their self-efficacy as high, which allows for predicting intentions and actions in various areas of human activity. A low sense of self-efficacy was exhibited by 10% of the participants in the Polish sample, 9.69% in the Spanish and only 7.65% in the Slovak group (Table II).

No statistically significant differences were found between low, average and high scores on the sten scale in the Polish, Spanish and Slovak studies (Table II).

Table II. The percentage of scores for a sense of self-efficacy on the sten scale in the Polish, Spanish and Slovak studies.

Variables	Results on a sten scale (1-10)	Poland - A	Spain - B	Slovakia - C	Chi-square test χ^2	p
		n = 390	n = 196	n = 170		
%						
GSES	Low (1-4)	10.00	9.69	7.65	4.73	0.31
	Average (5-6)	33.08	28.06	38.24		
	High (7-10)	56.92	62.24	54.12		

Statistically significant: * $p < 0.05$. Explanation: GSES - Generalised Self Efficacy Scale.

Subsequent comparative analyses revealed statistically significant variation of scores concerning the fatigue severity among nursing students in the three European countries during the COVID-19 pandemic, depending on the country of residence ($F = 4.88$; $p < 0.007$). The mean scores in the Polish ($M = 36.31$; $SD = 11.40$) and Slovak groups ($M = 36.94$; $SD = 9.74$) may indicate clinical fatigue among nursing students (Table II). A detailed analysis performed by means of a post-hoc (LSD) test showed that the fatigue severity examined with the FSS scale was significantly higher among the Polish than among the Spanish students ($p < 0.001$), and it was significantly higher among the Slovak students than among the Spanish students

($p < 0.0001$) (Figure 2). It can be concluded that nursing students in Poland and Slovakia are worse at coping with life and experience more severe fatigue as a consequence of the SARS-CoV-2 virus pandemic than students in Spain.

The MFIS scale was used to perform a subjective assessment of the fatigue impact on nursing student health levels over the previous four weeks. A statistical analysis with an ANOVA test revealed variations in the scores between the study groups in Poland, Spain and Slovakia. There were statistically significant differences in the study groups concerning general fatigue ($F = 46.96$; $p < 0.001$) and the impact of fatigue on the physical ($F = 61.00$; $p < 0.001$), cogni-

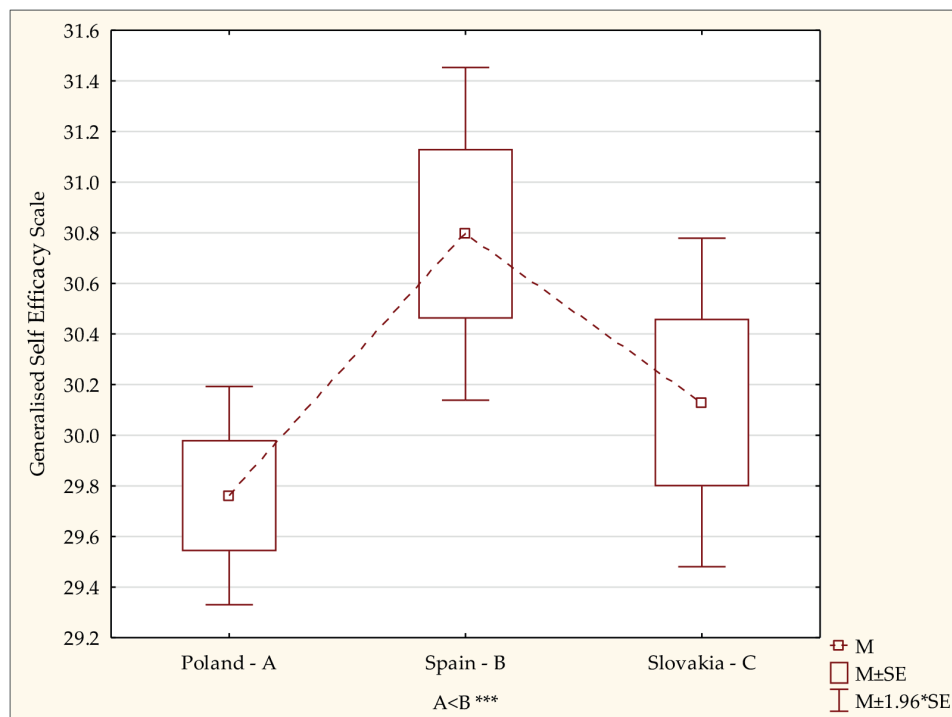


Figure 1. Variation of scores for a sense of self-efficacy in the study groups. Statistically significant: *** $p < 0.001$

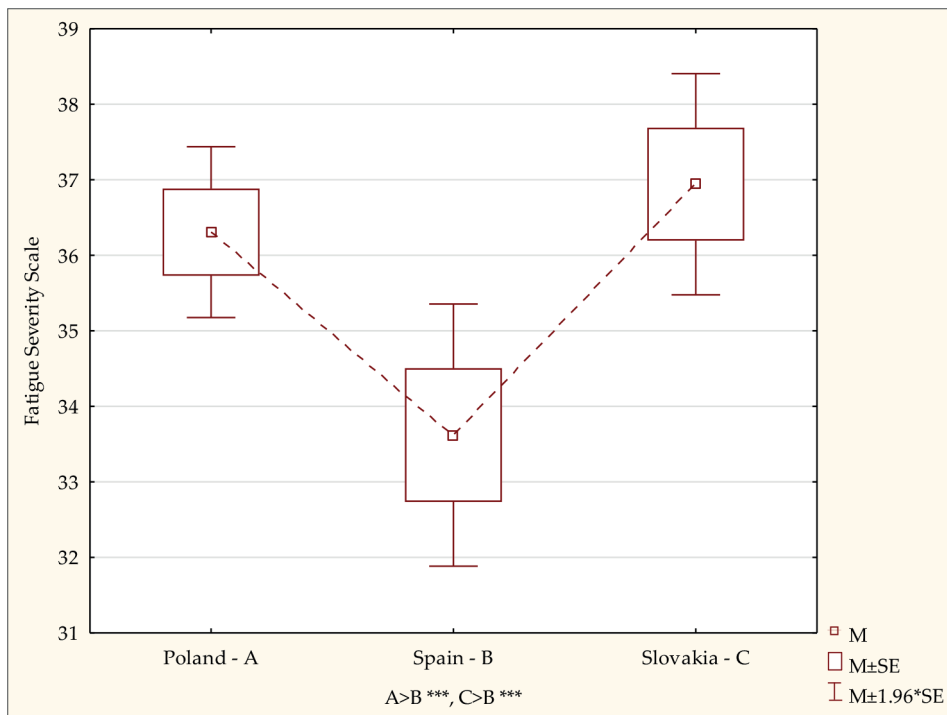


Figure 2. Variation of scores for the fatigue severity in the study groups. Statistically significant: *** $p < 0.001$.

tive ($F = 26.19$; $p < 0.001$) and psychosocial ($F = 15.44$; $p < 0.001$) health. The highest general index of fatigue impact on health was noted in the group of students in Spain - 58.33 points ($SD = 19.73$) on a scale from 21 to 105 points, whereas the lowest score was in the group of students in Slovakia ($M = 42.90$; $SD = 13.56$) (Table II). A detailed analysis with a post-hoc (LSD) test showed that students in Slovakia mentioned symptoms of general, physical, cognitive and psychosocial fatigue much less frequently than students in Poland ($p < 0.001$) or Spain ($p < 0.001$) (Figures 3, 4, 5, 6).

Correlations Between the Fatigue Severity and a Subjective Assessment of Fatigue Impact on General, Physical, Cognitive and Psychosocial Health Among Students in the Polish, Spanish And Slovak Studies

Another data analysis revealed a statistically significant correlation between fatigue severity and a subjective assessment of fatigue impact on general health among the nursing students in the groups under comparison. According to the Guilford classification, the power of correlations was high, with the following values: $r = 0.60$ ($p <$

0.0001) in the Polish group, $r = 0.67$ ($p < 0.0001$) in the Spanish group and $r = 0.56$ ($p < 0.0001$) in the Slovak group. These are positive correlations, which means that an increase/decrease in the fatigue severity is followed by an increase/decrease in the intensity of typical symptoms of fatigue among the students. In the subsequent step, the correlation coefficient between the fatigue severity and a subjective assessment of the impact of fatigue on physical health in the Spanish group resulted to be very high ($r = 0.72$; $p < 0.0001$). The correlation coefficients for physical health among students in Poland ($r = 0.52$; $p < 0.0001$) and Slovakia ($r = 0.58$; $p < 0.0001$) were very similar and high in both cases. It may be concluded that nursing students in the Polish, Spanish and Slovak studies felt a lower motivation for physical exercise after the introduction of the COVID-19 pandemic restrictions. They were forced to reduce their physical activity and, in consequence, they felt discomfort caused by the deterioration in their fitness. A high and positive correlation was found between the fatigue severity and a subjective assessment of the fatigue impact on cognitive health in the Polish ($r = 0.54$; $p < 0.0001$), Spanish ($r = 0.56$; $p < 0.0001$) and Slovak ($r = 0.50$; $p < 0.0001$) groups. It may

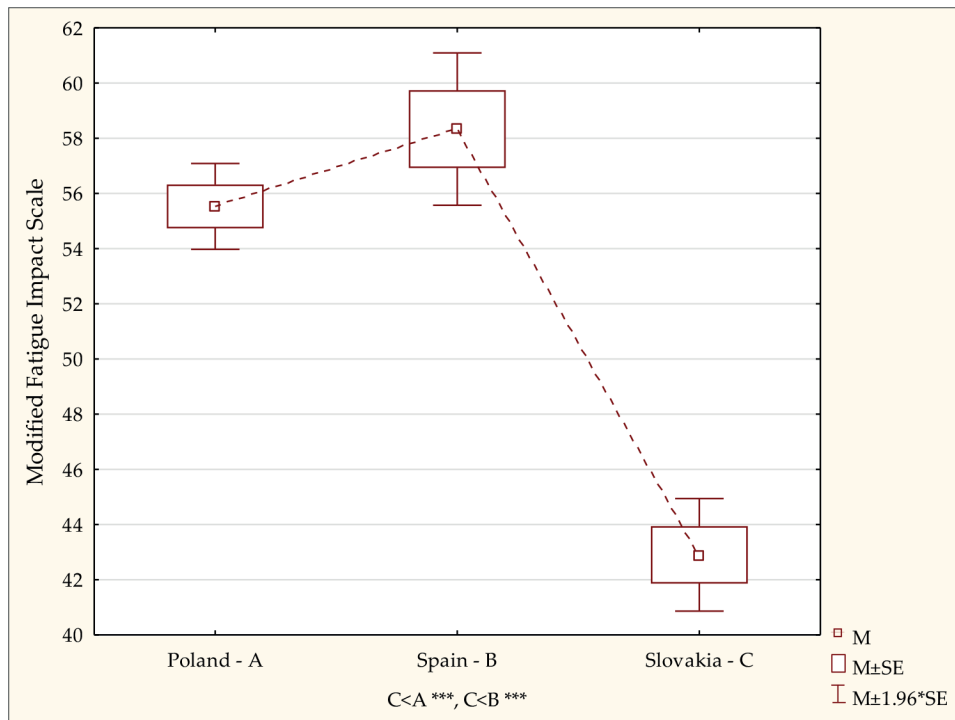


Figure 3. Variation of scores for the impact of fatigue on general health. Statistically significant: *** $p < 0.001$.

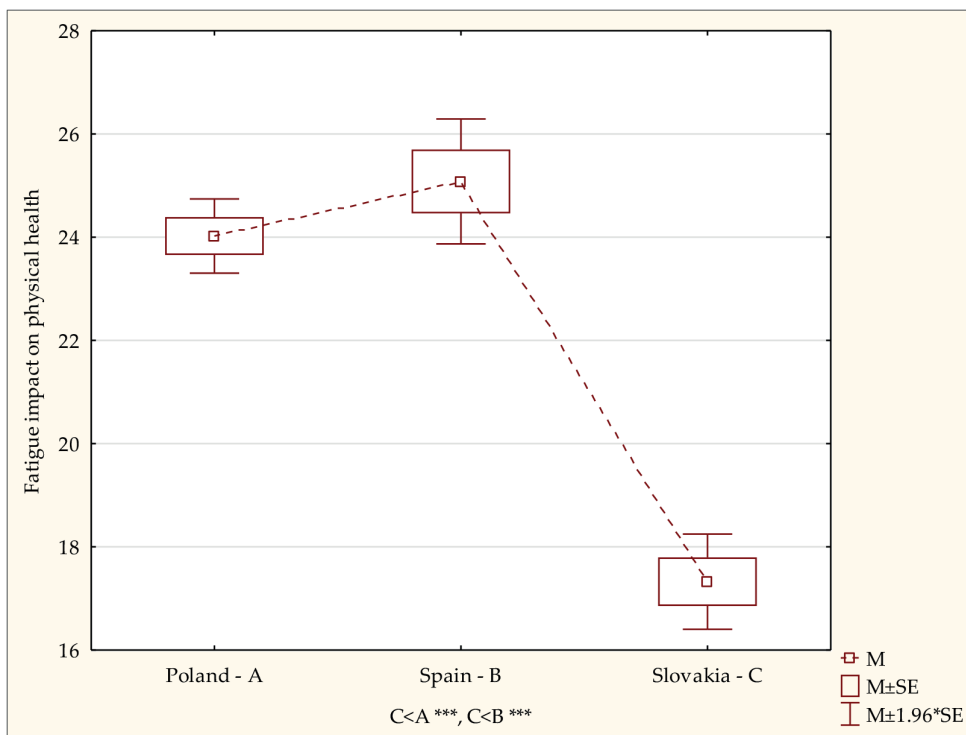


Figure 4. Variation of scores for the impact of fatigue on physical health. Statistically significant: *** $p < 0.001$.

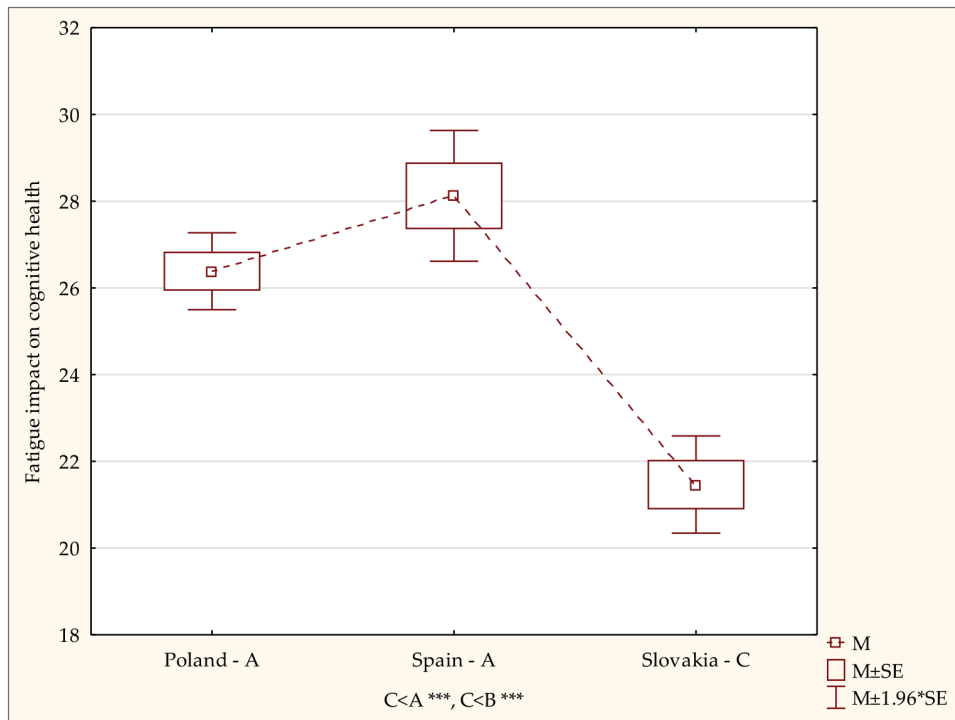


Figure 5. Variation of scores for the impact of fatigue on cognitive health. Statistically significant: $***p < 0.001$.

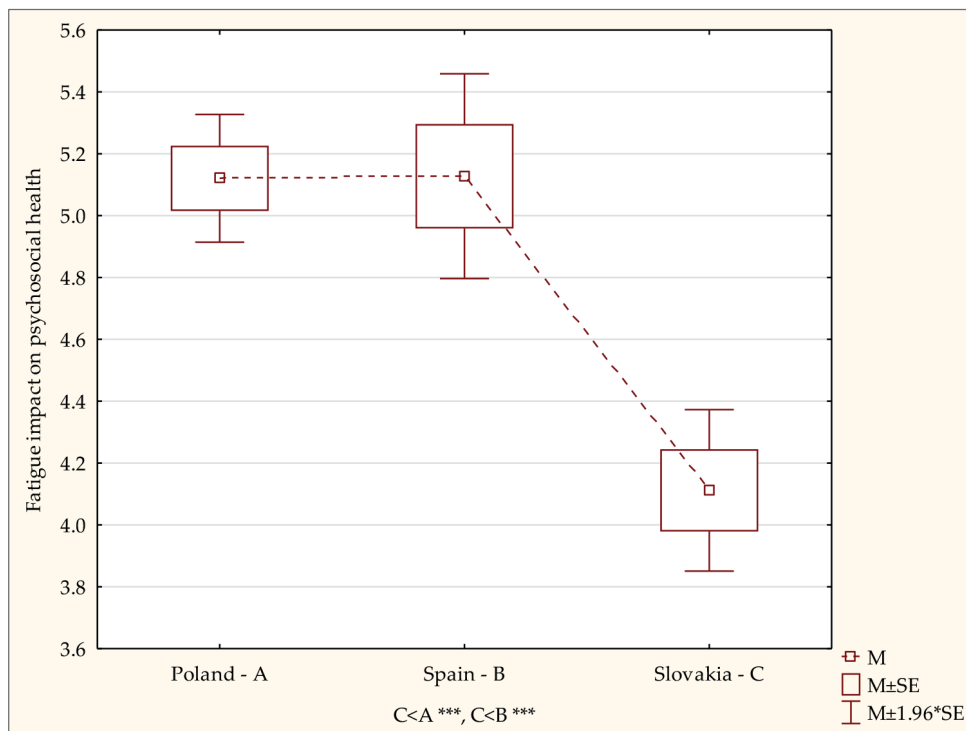


Figure 6. Variation of scores for the impact of fatigue on psychosocial health. Statistically significant: $***p < 0.001$.

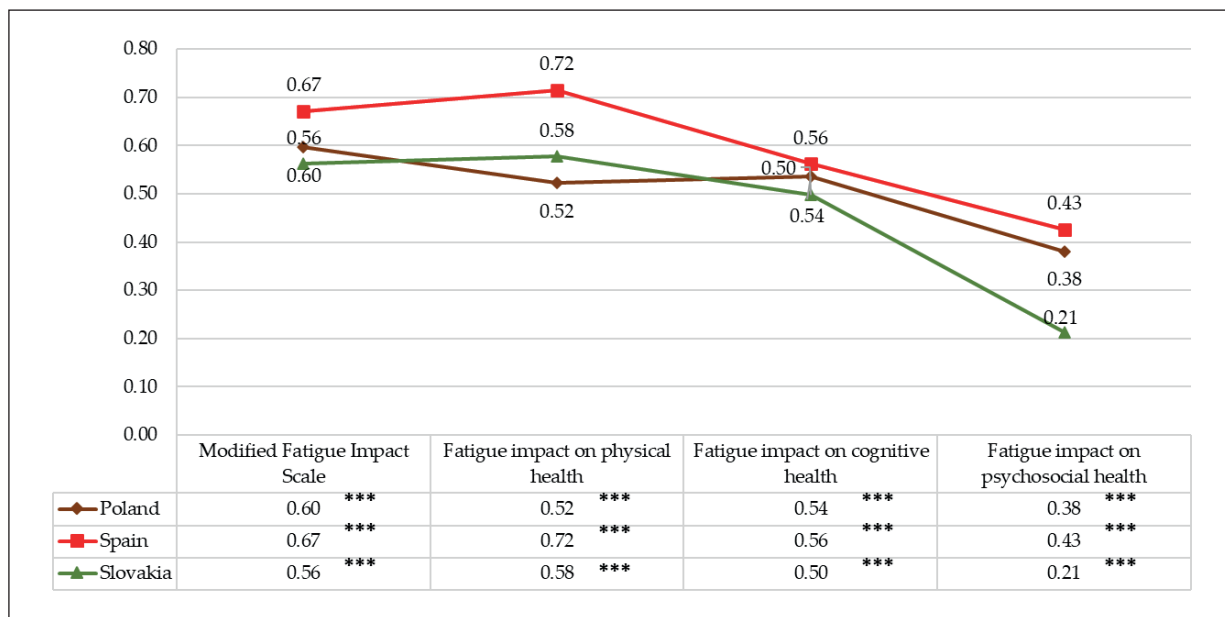


Figure 7. Power of correlation between the fatigue severity in the FSS scale and the experienced fatigue on the MFIS scale – Pearson correlation coefficients (r). Statistically significant: *** $p < 0.001$.

mean that the prolonged period of online teaching has made students suffer more intensively from cognitive health issues associated, for example, with concentration, decision making and with lowered motivation for performing tasks. The correlation coefficients between fatigue severity and a subjective assessment of the impact of fatigue on psychosocial health, associated with lowered motivation for social life and activities in a group of people were positive and slightly lower than the ones for physical or cognitive health. The power of correlation was on an average level in the Polish ($r = 0.38, p < 0.0001$) and the Spanish ($r = 0.43, p < 0.0001$) group, while it was weak in the Slovak group ($r = 0.21, p < 0.0001$) (Figure 7).

Correlations Between a Sense of Self-Efficacy and the Fatigue Severity According to the FSS Scale Among the Students in the Polish, Spanish and Slovak Studies

The statistical analyses also revealed a statistically significant negative correlation between a sense of self-efficacy, as measured by the GSES scale, and the fatigue severity in the FSS scale among the nursing students participating in the study. This means that the higher the students' sense of self-efficacy (which may be related to the specific areas of their activity or it may be a man-

ifestation of their general conviction regarding a specific role in a problem or new situations), the less severe fatigue they experience and viceversa. The highest power of correlation – at an average level – was observed in the Polish group ($r = -0.33, p < 0.0001$), whereas it was weak in the Spanish group ($r = -0.18, p < 0.0001$) and in the Slovak group ($r = -0.15, p < 0.0001$) (Figure 8).

Statistical Analysis

Further statistical analyses involved determining the fatigue severity predictors in the study participants. Fatigue severity was taken as a dependent variable in the multiple regression model, whereas, at a preliminary stage, the independent variable set included an assessment of the fatigue impact on general, physical, cognitive and psychosocial health, as well as the students' age, study year, place of residence during the COVID-19 pandemic, the daily time spent working on a computer, the number and regularity of meals. However, the statistical analyses showed that some of the variables did not have any impact on the regression model structure and, ultimately, the following variable was included in the independent variable set: a subjective assessment of the fatigue impact on general and physical health. The study findings presented in Table III indicate that one variable, explaining 36% of the result variation (the impact of fatigue on the students'

Table III. Summary of the multiple regression results – predictors of fatigue severity in nursing students in the Polish, Spanish and Slovak studies.

Variables	FSS					
	R ²	Beta	β	Error β	t	p
Poland	Constant value		26.82	7.09	3.79	0.0002***
	MFIS	0.36	0.60	0.44	9.98	0.0001***
	R=0.61; R ² =0.38; corrected R ² =0.36					
Spain	Constant value		21.86	8.44	2.59	0.01**
	Ph-MFIS	0.51	0.68	0.97	11.56	0.0001***
	R=0.72; R ² =0.52; corrected R ² =0.51					
Slovakia	Constant value		26.82	7.09	3.79	0.0002***
	MFIS	0.36	0.60	0.44	9.98	0.0001***
	R=0.61; R ² =0.38; corrected R ² =0.36					

Statistically significant: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Explanation: FSS - Fatigue Severity Scale, MFIS - Modified Fatigue Impact Scale, Ph-MFIS – fatigue impact on physical health.

general health), was a predictor of the fatigue severity among Polish and Slovak students. The regression coefficient was positive ($\beta = 0.60$; $R^2 = 0.36$), which is indicative of the positive correlation. The regression analysis also identified one variable with considerable predictive power in the Spanish group, which explained 51% of the results' variation [assessment of the fatigue impact on physical health ($\beta = 0.68$; $R^2 = 0.51$)]. It can be concluded that the students in Spain particularly acutely felt all the consequences of the

restrictions during the COVID-19 pandemic on their physical health.

Discussion

The COVID-19 outbreak provoked a reflection about the importance of the nursing profession in the society, since both the qualified personnel and the future generation, i.e., nursing students, form one of the reality pillars in these difficult times.

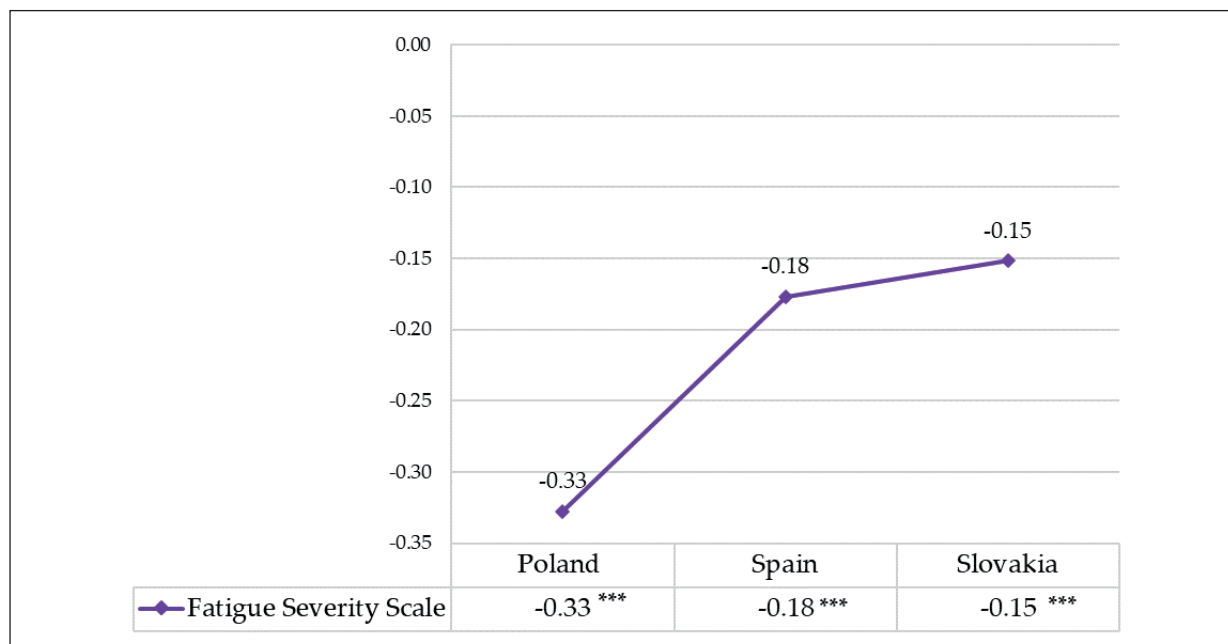


Figure 8. Nature and power of correlation between a sense of self-efficacy (GSES) and the fatigue severity (FSS) in the study participants – Pearson correlation coefficients (r). Statistically significant: *** $p < 0.001$.

The crucial motivation within the nursing profession is the need to provide aid and care to other people. Acting for social benefit does not exclude thinking about one's own and one's relatives and one's development^{36,37}. It is a well-known fact that the choice of an individual's profession cannot be separated from his/her personality because people prefer working in an environment in which they will make use of their competences and skills and express their values and personality traits³⁸. According to the social cognitive theory³⁹, human behavior is driven by expectations concerning the outcome of one's actions, situation and self-efficacy. The first two concern the consequence of actions, and the last factor is directly linked to controlling an individual's activity³⁹. A sense of self-efficacy has an effect on people's skills, which results in them feeling, thinking and acting differently³⁹.

It was shown in this study that the generalized sense of self-efficacy among the nursing students was higher than its mean level in the normalization group ($M = 27.32$). The mean self-efficacy, as perceived by Polish nursing students, was 29.76 ± 4.34 , while in the Spanish group it was 30.80 ± 4.70 , and among the Slovak students it was 30.13 ± 4.32 , although the GSES score level was significantly lower among the students in Poland than in those in Spain and Slovakia. The findings of a study conducted by Żołnierz et al⁴⁰ for a group of medical students were similar (30.58 ± 4.53). Given that all medical professions bear with them a high level of social responsibility, the high GSES scores will certainly result in a sense of competence and commitment in the future. This phenomenon was described by Locke and Latham, who noted that individuals with a high sense of self-efficacy set higher goals before themselves, and they can completely fulfill new obligations and requirements in difficult situations⁴¹. According to Juczyński³⁹, a strong sense of self-efficacy has a significant impact on cognitive processes and intellectual achievements, providing encouragement to make more effort, to be more persistent and to choose more demanding tasks. All of these traits are particularly valuable in the nursing profession.

According to the World Health Organization (WHO), a growing number of people feel "pandemic fatigue" caused by the present situation. Living under threat and all of the restrictions have had a negative impact on individuals' wellbeing and health, leading to a feeling of fatigue and burnout, which resembles professional burnout⁷.

It was demonstrated in this study, conducted during the pandemic among nursing students in three European countries, that the fatigue severity was significantly higher in Polish and Slovak students than in the Spanish group. Social isolation with a consequent need for modifications in everyday life has had negative consequences, upsetting people's inner balance^{29,42}. Isolation has been observed to have an impact on the mental health of individuals who have never experienced such disorders before, as the restrictions make them more worried about the future, with a consequent increase in the intensity of stress, anxiety, loneliness and frustration⁴³⁻⁴⁸. A study conducted by Wang et al⁴⁹ in China showed that the highest levels of stress and depressive states during the national quarantine due to the COVID-19 pandemic were experienced by students. The mental stress associated with the restrictions was caused by having to stay indoors for 20-24 hours daily, which was confirmed by as many as 84.7% of the respondents⁴⁹. Changes in the higher education system – introducing online or hybrid teaching – have had an impact on the attitudes and mental condition of young people. The findings of this study confirmed that students perceived the prolonged period of online teaching as contributing to the exacerbation of cognitive, physical and psychosocial health issues, regardless of the country of residence. The pace of life, defined by meal times and periods of studying, became tiring in a longer perspective. The monotony of life caused boredom and apathy. These emotions, being a consequence of social isolation and restricted contacts and interpersonal relations, made people exhausted. According to Długosz⁵⁰, it is a symptom of burnout caused by online teaching, because when working alone, anxiety, stress, deprivation of needs can lead to physical and mental exhaustion.

The study findings showed that nursing students in Poland and Slovakia were worse at coping with life and experienced more severe fatigue as a consequence of the SARS-CoV-2 infection spread than the students in Spain. However, a detailed analysis showed that the students in Slovakia mentioned symptoms of fatigue less frequently in recent weeks.

Most countries imposed restrictions and introduced obligatory social isolation following the outbreak of the pandemic. According to Xiao et al⁵¹, people in home isolation have suffered from physical stress caused by a lack of space for physical exercise and stress caused by restricted social interactions. A beneficial impact of physical exercise on human health – both physical and mental –

has been mentioned by many researchers⁵²⁻⁵⁶ since such exercise alleviates stress, boosts a person's mood, reduces the risk of non-infectious chronic illnesses and inhibits the processes of premature body ageing. The beneficial role of physical activity in maintaining well-being and reducing anxiety during COVID-19 restrictions was pointed out by Akbari et al⁵⁷. Practizing a professional sport is not necessary, but strolling, bike riding or walking a certain distance at a fast pace every day can be sufficient to activate the cardiovascular system and stimulate the brain to secrete hormones and to produce new nerve cells. Serotonin, dopamine, noradrenaline and endorphins reduce emotional tension, decrease the level of stress, eliminate pain stimuli and make one feel blissful⁵⁸. Not being allowed to leave home has been a real torment for many people, and it considerably restricted their ability to cope with their own emotions. Having to stay at home for a long time has had an impact on the mental and physical functions of both active individuals and those leading a sedentary life. According to the findings of this study, the restrictions imposed by the COVID-19 pandemic have contributed to the reduction in the students' physical activity, to lowering of their motivation for doing physical exercise and, in consequence, to discomfort caused by deterioration of their fitness. A study conducted by Brand et al⁵⁹ confirmed the significant correlation between the frequency of doing physical exercise and better mood and emotional condition during obligatory isolation⁵⁹. The researchers demonstrated that those individuals who did physical exercise before the pandemic by maintaining or increasing their activity and those who did not do it earlier and started during the pandemic had a better mood and overall mental wellbeing⁵⁹. A Chinese study⁴⁹ conducted at the beginning of the pandemic showed that 53.8% of the respondents experienced its serious psychological effects, whereas no physical symptoms were observed in them. This study showed the students in Spain to feel the most acute consequences of the pandemic-related restrictions on their physical health.

The sociodemographic factors, identified by researchers as those having an impact on how the COVID-19 pandemic is perceived, undoubtedly include the respondents' gender, since women have more often shown negative emotions associated with the pandemic^{60,61}. Considerable stress severity was observed among women by a team of Spanish researchers, whose findings were similar for a group of adolescents and students⁶². A high level

of concern arising from a critical attitude and an insightful assessment of pandemic-related stress was observed by Skalski⁶³ among people with university education. The respondents, aged 30 years and older, were also more concerned about the epidemic situation and, in consequence, about the instability of their life situation⁴⁹. According to the findings of a British study, a younger age, being female and living in a town, made a person feel worried (if associated with COVID-19), increasing the probability of anxiety or depression. Contrary to the researchers' expectations, elderly people and men were less likely to develop these disorders⁶⁴. This study attempted to assess the impact of selected variables on the students' activities, however such an impact was not confirmed.

Confidence in one's self-efficacy determines an individual's motivation and behaviour, and it triggers the release of energy for action. During the difficult time of the pandemic, self-efficacy can result in a person's actions and efforts facing obstacles encountered. All stress reactions, negative emotions, tension, pain and fatigue can reduce self-efficacy resources⁶⁵. This seems to be confirmed in the current study, since the higher GSES the nursing students exhibited, the lower severe fatigue they felt, and viceversa.

The time of the pandemic is a specific cognitive dissonance – what seemed impossible a week ago becomes a reality that we have to face. We have never been in a situation like this, and we do not have a well-trained, specific behaviour for it. Everyone lives in distress, employing various defence mechanisms in everyday life. A sense of self-efficacy has a huge impact on our well-being and on our actions. This function seems to be the most valuable now that the pandemic often forces us to face many difficult challenges.

Limitations and Implications Regarding Professional Practice

The current findings regarding the analyzed correlations between a sense of self-efficacy and fatigue during the COVID-19 pandemic do not close the research of this connection. Students have never been in a situation like this, and they do not have a well-trained, specific defence mechanisms to face it in everyday life. Thus further research is needed because the time of the pandemic is a specific phenomenon. The authors point out that further research is needed with a larger study group, with systematic identification of the factors with a negative impact on the physical, mental and social health of nursing students. Interventions are recom-

mended, including psychoeducational workshops for boosting personal resources and controlling negative emotions. Regular exercise can help reducing occupational stress. Yoga is particularly recommended and effective. It can be safely practiced at home during the COVID-19 pandemic.

Conclusions

A high level of a general sense of self-efficacy dominates in the study group of nursing students in the three European countries. It is significantly differentiated with respect to the students' country of residence, which can determine their functioning during the COVID-19 pandemic.

The restrictions imposed by the pandemic and the prolonged period of online teaching has contributed to students' fatigue severity and, consequently, to exacerbation of their cognitive, physical and psychosocial health issues. Our analysis showed that the students in Slovakia mentioned symptoms of fatigue in recent weeks less frequently. Nursing students in Poland and Slovakia are worse at coping with life and experience more severe fatigue due to the SARS-CoV-2 infection spread. A sense of self-efficacy determines the fatigue severity. An increase in the sense of self-efficacy entails a decrease in fatigue severity.

Authors' Contribution

Conceptualization, E.K.; methodology, E.K. and A.J.; software, E.K.; validation, E.K., H.K. and M.M.; formal analysis, E.K.; investigation, E.K.; resources, E.K.; data curation, E.K.; writing—original draft preparation, E.K., and S.W-H.; writing—review and editing, E.K.; visualization, E.K.; supervision, E.K. and E.G. and A.J.; project administration, E.K.; funding acquisition, E.K. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Senate Committee on Ethics of Scientific Research at the Higher School in Olsztyn, Poland. (protocol code No. 3/2021).

Informed Consent Statement

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

Data Availability Statement

The data presented in this study are available on request to the first author.

Conflict of Interests

The authors declare no conflict of interest.

Ethics Approval

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Senate Committee on Ethics of Scientific Research at the Higher School in Olsztyn, Poland. (protocol code No. 3/2021).

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