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Resilience as a protective factor in the development of post-traumatic stress disorder in patients hospitalised for COVID-19

Prężność jako czynnik chroniący w rozwoju zespołu stresu pourazowego u pacjentów hospitalizowanych z powodu COVID-19

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Abstract

Introduction and objective: Both the illness itself and hospitalisation due to COVID-19 are potentially traumatic experiences, especially when the course of the disease is severe. Resilience has been identified as a crucial factor in the process of successfully coping with traumatic events and may protect against the development of symptoms of post-traumatic stress disorder. The aim of this study was to determine the role of resilience in the prevention of post-traumatic stress disorder symptoms in patients requiring hospitalisation due to COVID-19. **Materials and methods:** A total of 138 patients (59 women, 79 men; mean age: 52.34 years; standard deviation, *SD* = 12.46) hospitalised at the University Hospital in Krakow were included in the study, which was conducted 7–8 months after their COVID-19 diagnosis. The PTSD Checklist for DSM-5 (PCL-5) and the Resilience Measurement Scale (SPP-25) were administered, and stepwise multiple regression analysis was used in the predictive models. **Results:** A total of 31 participants (22.5%) met the criteria for probable post-traumatic stress disorder symptoms. The study participants were characterised by a moderate level of resilience (5th sten), with women exhibiting lower levels than men. Higher levels of resilience were associated with lower severity of PTSD symptoms. A significant predictor of post-traumatic stress disorder symptoms was "Tolerance for failure and treating life as a challenge". **Conclusions:** Resilience has an impact on the severity of symptoms of post-traumatic stress disorder. Specifically, the dimension of "Tolerance" within resilience appears to be an important protective factor against post-traumatic stress disorder symptoms after hospitalisation for COVID-19. Patients hospitalised with severe course of COVID-19 exhibit a moderate level of resilience, with men demonstrating higher resilience levels than women.

Keywords: resilience, post-traumatic stress disorder – PTSD, COVID-19/long COVID

Streszczenie

Wprowadzenie i cel: Zachorowanie i hospitalizacja z powodu COVID-19 stanowi potencjalnie traumatyczne doświadczenie, zwłaszcza gdy przebieg choroby jest ciężki. Prężność (*resilience*) uznana jest za istotny czynnik w procesie skutecznego radzenia sobie z wydarzeniami o charakterze traumatycznym i może chronić przed rozwojem objawów zespołu stresu pourazowego. Celem badania było ustalenie roli prężności w prewencji zespołu stresu pourazowego u pacjentów wymagających hospitalizacji ze względu na przebieg COVID-19. **Materiał i metody:** Zbadano 138 chorych (59 kobiet i 79 mężczyzn, średnia wieku 52,34 roku; odchylenie standardowe, *standard deviation*, *SD* = 12,46) hospitalizowanych w Szpitalu Uniwersyteckim w Krakowie z powodu średniego lub ciężkiego przebiegu COVID-19. Badanie przeprowadzono po 7–8 miesiącach od rozpoznania COVID-19. Użyto testów PCL-5 oraz SPP-25. W modelach predykcyjnych zastosowano analizę regresji krokowej. **Wyniki:** 31 osób (22,5%) spełniło

kryteria prawdopodobnego zespołu stresu pourazowego. Badanych charakteryzował umiarkowany poziom nasilenia prężności (5. sten), z niższym jej poziomem u kobiet. Wyższy poziom prężności wiązał się z mniejszym nasileniem objawów zespołu stresu pourazowego. Istotnym predyktorem objawów zespołu stresu pourazowego był czynnik prężności „Tolerancja na niepowodzenia oraz traktowanie życia w kategoriach wyzwania". **Wnioski:** Prężność ma wpływ na nasilenie objawów zespołu stresu pourazowego. Jest ona – a zwłaszcza jej wymiar „Tolerancja" – istotnym czynnikiem chroniącym przed zespołem stresu pourazowego po hospitalizacji z powodu COVID-19. Pacjentów hospitalizowanych z ciężkim przebiegiem COVID-19 charakteryzuje umiarkowany poziom nasilenia prężności, przy większym nasileniu tej cechy u mężczyzn niż u kobiet.

Słowa kluczowe: prężność, zespół stresu pourazowego – PTSD, COVID-19/*long COVID*

INTRODUCTION

The COVID-19 pandemic – a global threat linked to the rapid spread of the virus and its effects – has impacted countries worldwide and social groups of all health conditions and age groups. It had a significant impact on human biopsychosocial functioning. The pandemic upset the equilibrium in various facets of human life, undermining the fundamental need for security. It also imposed numerous constraints and necessitated adaptation to new circumstances. Particularly in the early stages of the pandemic, the lack of clear information about the disease and effective coping strategies amplified social and individual anxieties, fuelling a sense of crisis. Receiving a COVID-19 diagnosis forced individuals to adapt and develop new coping mechanisms to navigate the challenges of the illness. Considering the extensive disruption to patients' daily lives, the frequently severe course, and the need for hospitalisation, COVID-19 can be viewed as a traumatic event that may result in symptoms or the development of full-blown post-traumatic stress disorder (PTSD) (Forte et al., 2020; Koweszko et al., 2023; Mazza et al., 2020; Rogers et al., 2020; Schou et al., 2021; Simani et al., 2021; Tarsitani et al., 2021; Vindegaard and Benros, 2020; Vlake et al., 2021), comprising four main symptom clusters as defined in the DSM-5 classification: re-experiencing the traumatic event through intrusive memories, nightmares, flashbacks, or intense distress when exposed to reminders of the event (intrusion); efforts to avoid thoughts, feelings, or external reminders associated with the traumatic event (avoidance); negative alterations in cognition and mood; and alterations in arousal and reactivity (American Psychiatric Association, 2013). PTSD models highlight the crucial role of cognitive processing of trauma in the development of the disorder (e.g. Ehlers and Clark, 2000; Taylor, 1983). It can either generate or reinforce negative beliefs about oneself and the world, thereby contributing to the development of PTSD symptoms (Ogińska-Bulik and Juczyński, 2023). On the other hand, indicators of positive trauma processing include accepting the event, recognising its positive aspects, and reducing the level of negative emotions (Williams et al., 2002). Being hospitalised due to SARS-CoV-2 infection can be a traumatic experience, particularly in cases of severe illness (Forte et al., 2020; Mazza et al., 2020; Rogers et al., 2020; Schou et al., 2021; Simani et al., 2021; Tarsitani et al., 2021; Vindegaard and Benros 2020; Vlake et al., 2021), and may trigger the symptoms described above. To examine the psychological distress related to the pandemic, an Italian version of the PTSD symptom scale has been adapted specifically for COVID-19-related characteristics (Forte et al., 2020). Furthermore, the term "long COVID" (Mahase, 2022) or "post-acute COVID-19 syndrome" (PASC) (Montani et al., 2022; Thaweethai et al., 2023) is used to describe the cluster of persistent symptoms following COVID-19 infection, including cardiovascular, respiratory, neurological, and psychological complaints, such as fatigue, sleep disturbances, anxiety, and depression. According to the widely recognised transactional theory of stress and coping proposed by Lazarus and Folkman (1984), the effectiveness of an individual's response to a stressful situation – such as the often traumatic experience of COVID-19 – is shaped not only by the objective nature of the event but also by the individual's personal circumstances. In the search for personality-related factors that play a significant role in coping with COVID-19 and influence the development of PTSD after experiencing this disease, we focused on the dimension of resilience. The protective role of resilience has already been investigated in the context of coping with other disease entities (Fredrickson and Losada, 2005). This served as our reference point for analysing resilience as a factor that predisposes individuals to the diagnosis of psychopathological disorders, including PTSD. Resilience is considered a relatively stable personality trait that plays a key role in effectively managing traumatic events and challenges (Ogińska-Bulik and Juczyński, 2008). Resilient personalities are "characterised by traits that reflect a strong, well-differentiated, and integrated sense of self (self-structure), including feelings of self-esteem, self-efficacy, and an internal locus of control, self-directedness (as defined by Cloninger), self-awareness, a strong sense of own identity, coherence, with a purpose in life [...] they are goal-oriented, productive, emotionally balanced, flexible in the ability to adapt to challenges, capable of regulating negative behaviours and emotions, and exhibiting hardiness (a tendency to feel and act as if one is influential rather than helpless in the face of external forces)" (Reich et al., 2010, as cited in Izdebski and Suprynowicz, 2011).

Resilience is linked to what is known as flourishing, or a person's optimal range of functioning, which is conducive to maintaining mental health (Fredrickson and Losada,

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2005), and post-traumatic growth (Ogińska-Bulik, 2010). It contributes to improving resistance to stress and the perception of stressful situations as challenges, potentially protecting against the development of maladaptive symptoms, including PTSD (Connor et al., 1999; Ogińska-Bulik, 2010). Resilience helps mitigate feelings of helplessness stemming from trauma or failure, and is linked to increased flexibility in coping with stress (Basińska et al., 2017; Connor et al., 1999). Research on patients hospitalised for COVID-19 has indicated that resilience can serve as a buffer against the development of anxiety and depression (Zhang et al., 2020).

The importance of resilience in the context of PTSD symptoms among SARS-CoV-2 infected patients has been under-researched. Therefore, we conducted a **study to investigate the role of resilience in preventing PTSD in patients several months after their hospitalisation for COVID-19 in Poland**.

Given the exploratory nature of this study, we formulated the following research questions instead of hypotheses:

1. Are there differences in the dimensions of PTSD and resilience between women and men who have experienced COVID-19?
2. Are there differences in the dimensions of resilience between individuals with PTSD and those without PTSD who have experienced COVID-19 and hospitalisation?
3. Which of the resilience factors has a predictive function for PTSD and its dimensions?

MATERIALS AND METHODS

Study participants and procedure

The study, conducted between January 2021 and December 2022, involved 138 patients who were assessed 7–8 months after hospital admission. The study group consisted of 59 women (mean age: 53.64; standard deviation, *SD* = 11.45) and 79 men (mean age 51.27; *SD* = 13.15) aged 24 to 77 years (mean age for the whole group: 52.34 years; *SD* = 12.46), hospitalised due to COVID-19. There were no differences in age or the frequency of occurrence of PTSD between men and women. The PCL-5 scores show that 22.5% (31 individuals) had symptoms of PTSD, including 16 men (21.51%) and 15 women (25%) who had an overall PCL-5 score of at least 33 points, suggesting PTSD. No PTSD (scores <33) was noted in 62 men and 45 women.

The inclusion criteria for the study were the consent to participate and hospitalisation due to SARS-CoV-2 infection. Medical variables were excluded from the analysis due to the relatively small study group and the high prevalence of coexisting conditions, including diabetes, hypertension, chronic kidney disease, obesity, chronic obstructive pulmonary disease, and heart failure (multiple morbidities), with varying severity and co-occurrence.

The study was carried out by hospital-employed psychologists, following a study protocol approved by the Ethics Committee, with prior written consent from participants, who also had the option to withdraw their consent at any time. The post-discharge survey was administered either during a follow-up appointment or via a dedicated data collection app, as part of the National Centre for Research and Development's project "Model for multispecialty in-hospital and out-of-hospital care of patients with SARS-CoV-2 infection".

Method

1. The PTSD Checklist for DSM-5 (PCL-5) (Weathers et al., 2013) in its Polish adaptation (Ogińska-Bulik et al., 2018) was used to screen for the presence of PTSD, assessing both its overall severity and the severity of its individual dimensions as a result of a traumatic event. The scale consists of 20 statements describing PTSD symptoms according to the DSM-5 classification criteria. Respondents indicate the extent to which they relate to each statement on a scale from 0 to 4, with 0 representing "not at all" and 4 indicating "extremely". An analysis of results includes an overall score and four symptom clusters of PTSD, including "Intrusion" (B), "Avoidance" (C), "Negative alterations in cognition and mood" (D), and "Alterations in arousal and reactivity" (E). A cut-off score of ≥33 is used for the differential diagnosis, effectively distinguishing between the subjects. The scale has very good reliability (Cronbach's α 0.96), for each dimension: B – 0.91; C – 0.80; D – 0.91; E – 0.89.
2. Resilience Measurement Scale (SPP-25) developed by Ogińska-Bulik and Juczyński (2008). The scale allows for the assessment of both overall resilience, considered a personality trait, and its five constituents: persistence and determination in action, openness to new experiences and sense of humour, personal coping skills and tolerance of negative emotions, tolerance for failure and treating life as a challenge, and optimistic attitude towards life and ability to mobilise in difficult situations. Patients respond to 25 items in the 5-point Likert scale, ranging from 0 ("not at all") to 4 ("extremely"). The resilience scale score is calculated by adding the scores for the five factors, each consisting of five items. The higher the score, the greater the resilience. The overall SPP-25 score can be represented on a sten scale, where 1^{st}–4^{th} sten indicates low resilience, 5^{th}–6^{th} sten represents medium resilience, and 7^{th}–10^{th} sten signifies high resilience. Reliability, as measured by Cronbach's α coefficient, is 0.89 for the total score and ranges from 0.67 to 0.75 for the subscales. Absolute stability, assessed using the test-retest method after four weeks, is 0.85.
3. Information on medical history, including gender, age, and any coexisting mental health conditions.

Statistical analysis

Data analysis was performed using Statistica 13 software, and included the presentation of mean values for the variables within the research model. Since the variables were

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not normally distributed, the Mann–Whitney *U* test was applied. Subsequently, the strength of association between the psychological outcomes (dependent variables) and predictors (independent variables) was evaluated using Spearman's rank correlation. A stepwise multiple regression analysis was used to estimate the strength and direction of predictors of PTSD severity in the form of individual resilience dimensions, in which the dimensions of resilience and the age of the subjects were included. Separate analyses of variance were used to examine both the overall PTSD score and its individual constituents.

The study received approval from the Jagiellonian University Ethics Committee (No. 1072.6120.278.2020) and adheres to the ethical principles outlined in the Declaration of Helsinki.

RESULTS

Tab. 1 provides a summary of the descriptive statistics for the variables associated with PTSD dimensions and resilience. For the entire study group, the overall PCL-5 score was 20.13 (*SD* = 15.75), which is below the cut-off point for diagnosing PTSD. The overall score on the SPP-25 scale (71.12; *SD* = 13.26) corresponded to the upper limit of the 5th sten, indicating a moderate level of resilience in the study group. Based on the limits established in the SPP-25 scale, the study group exhibited the following distribution of resilience levels: 27% low, 44% medium, and 29% high (Tab. 1). The differences in the dimensions of PTSD and resilience between women and men after COVID-19, analysed using the non-parametric Mann–Whitney *U* test, are shown in Tab. 2. There were no significant differences between men and women regarding PTSD and its dimensions. A chi^2 analysis was also performed, revealing no significant differences

Psychological variables	*M*	*SD*	Min–max
PCL-5			
Overall score	20.13	15.75	0–68
Intrusion	5.38	4.96	0–20
Avoidance	2.24	2.16	0–8
Negative alterations in cognition and mood	5.72	5.41	0–26
Alterations in arousal and reactivity	6.79	5.03	0–22
SPP-25			
Overall score	71.12	13.26	29–98
Persistence and determination in action	14.59	2.77	5–20
Openness to new experiences and sense of humour	14.96	2.80	4–20
Personal coping skills and tolerance of negative emotions	13.94	3.15	3–20
Tolerance for failure and treating life as a challenge	14.22	2.84	5–20
Optimistic attitude towards life and ability to mobilise in difficult situations	13.40	3.45	2–20

Tab. 1. Characteristics of variables – PTSD and resilience in the study group (for continuous variables)

Variables for PTSD and resilience	Means		*SD*		*t*(98)	*p*
	M	F	M	F		
PCL-5						
Overall score	19.33	21.18	16.36	14.96	−0.69	0.494
Intrusion	4.76	6.20	4.91	4.95	−1.71	0.090
Avoidance	2.18	2.32	2.20	2.13	−0.38	0.708
Negative alterations in cognition and mood	5.76	5.67	5.75	4.97	0.10	0.921
Alterations in arousal and reactivity	6.63	7.00	5.23	4.78	−0.43	0.671
SPP-25						
Overall score	73.77	67.62	12.79	13.16	2.78	0.006
Persistence and determination in action	14.63	14.53	2.89	2.61	0.21	0.834
Openness to new experiences and sense of humour	15.59	14.13	2.73	2.70	3.14	0.002
Personal coping skills and tolerance of negative emotions	14.63	13.02	2.88	3.29	3.08	0.002
Tolerance for failure and treating life as a challenge	14.78	13.48	2.70	2.88	2.73	0.007
Optimistic attitude towards life and ability to mobilise in difficult situations	14.13	12.45	3.36	3.36	2.91	0.004

*Tab. 2. Differences between men (*n *= 79) and women (*n *= 59) in the severity of PTSD and resilience*

in PTSD prevalence between men and women, and no statistically significant associations between PTSD and the age of the subjects. Gender was identified as a significant factor influencing resilience levels. The analyses revealed that men scored higher on the SPP-25 total score as well as all dimensions of resilience. However, in the dimension of "Persistence and determination in action", women achieved values similar to men, and the difference in the intensity of the variable studied did not reach statistical significance.

Among the study participants, nearly one-fifth (31) individuals scored 33 or higher on the PCL-5 scale, indicating that they were experiencing post-traumatic stress. The resilience variables were then compared between individuals with and without PTSD. The results are listed in Tab. 3.

Compared to individuals without PTSD, the study participants whose result indicated the presence of the syndrome had lower values in the overall SPP-25 score ($p = 0.028$) and in the three parameters of resilience: "Openness to new experiences and sense of humour" ($p = 0.005$), "Personal coping skills and tolerance of negative emotions" ($p = 0.036$), and "Tolerance for failure and treating life as a challenge" ($p = 0.013$).

The next step involved analysing the correlation between the severity of PTSD symptoms and the dimensions of

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Resilience variables	Means		*SD*		*t*(98)	*p*
	PTSD	No PTSD	PTSD	No PTSD		
PCL-5						
Overall score	66.40	72.43	16.68	11.94	2.23	0.028
Persistence and determination in action	14.37	14.63	2.79	2.79	0.45	0.653
Openness to new experiences and sense of humour	13.70	15.33	3.78	2.39	2.87	0.005
Personal coping skills and tolerance of negative emotions	12.90	14.25	3.95	2.80	2.12	0.036
Tolerance for failure and treating life as a challenge	13.10	14.56	3.37	2.62	2.53	0.013
Optimistic attitude towards life and ability to mobilise in difficult situations	12.33	13.66	4.25	3.15	1.88	0.062

Tab. 3. Variations in resilience levels in relation to the presence of PTSD (PTSD: n = *31; no PTSD:* n = *107)*

Variable	Overall score	Intrusion	Avoidance	Negative alterations in cognition and mood	Alterations in arousal and reactivity
Overall score	–0.26	–0.24	–0.18	–0.29	–0.17
Persistence and determination in action	–0.19	–0.17	–0.16	–0.23	–0.12
Openness to new experiences and sense of humour	–0.23	–0.23	–0.15	–0.25	–0.17
Personal coping skills and tolerance of negative emotions	–0.20	–0.20	–0.14	–0.21	–0.12
Tolerance for failure and treating life as a challenge	–0.32	–0.30	–0.23	–0.31	–0.25
Optimistic attitude towards life and ability to mobilise in difficult situations	–0.20	–0.18	–0.12	–0.23	–0.11

Tab. 4. Spearman's rank correlation analysis of the relationships between resilience dimensions and dependent variables: PTSD dimensions for p < *0.05*

Dependent variables from PCL-5	Predictor	*B*	*Beta*	% variance	*t*(132)	*p*
Overall score $R = 0.34$; $R^2 = 0.85$; $F = 3.55$; $p < 0.001$	(Constant)	44.44			5.49	<0.001
	Tolerance	–2.47	–0.45	8.50	–2.54	0.012
Intrusion $R = 0.37$; $R^2 = 10.18$; $F = 4.11$; $p < 0.001$	(Constant)	11.92			4.72	<0.001
	Tolerance	–0.87	–0.50	10.18	–2.87	0.005
Avoidance $R = 0.24$; $R^2 = 2.14$; $F = 1.60$; $p < 0.001$	(Constant)	4.40			3.91	<0.001
	Tolerance	–0.27	–0.37	2.14	–2.01	0.046
Alterations in arousal and reactivity $R = 0.29$; $R^2 = 0.08$; $F = 2.42$; $p < 0.001$	(Constant)	12.09			4.60	<0.001
	Tolerance	–0.84	–0.48	8.41	–2.66	0.008

R – coefficient of multiple correlation; ***R*²** – coefficient of multiple determination; ***F*** – *F*-statistic of the analysis of variance for the entire model; ***p* (at *F*)** – *p*-value for the entire model; ***B*** – partial regression coefficient; ***Beta*** – partial standardised regression coefficient; **% variance** – percentage of variance in the dependent variable explained by a given predictor (calculated as the square of the semipartial correlation multiplied by 100%); ***t*** – value of the Student's *t*-statistic for a given predictor; ***p*** – *p*-value associated with a given predictor; **Tolerance** – "Tolerance for failure and treating life as a challenge" (SPP-25).

Tab. 5. Predictors of overall PTSD score and its dimensions

resilience. The results are listed in Tab. 4. Additionally, a very weak negative correlation ($r = -0.20$; $p < 0.05$) was observed between age and the dimension of "Openness to new experiences and sense of humour".

All correlation values were negative and ranged from –0.11 to –0.32. The total PCL-5 score correlated with the total SPP-25 score ($r = -0.26$; $p < 0.05$) and its dimensions ($p < 0.05$) "Openness to new experiences and sense of humour" ($r = -0.23$), "Personal coping skills and tolerance of negative emotions" ($r = -0.20$), "Tolerance for failure and treating life as a challenge" ($r = -0.32$), "Optimistic attitude towards life and ability to mobilise in difficult situations" ($r = -0.20$), "Persistence and determination in action" ($r = -0.19$). Scores on the "Intrusion" scale correlated most strongly with "Tolerance for failure and treating life as a challenge" ($r = -0.30$; $p < 0.05$), followed by the SPP-25 overall score ($r = -0.24$; $p < 0.05$) and the scales "Openness to new experiences and sense of humour" ($r = -0.23$; $p < 0.05$), "Personal

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coping skills and tolerance of negative emotions" ($r = -0.20$; $p < 0.05$), "Optimistic attitude towards life and ability to mobilise in difficult situations" ($r = -0.18$; $p < 0.05$) and "Openness to new experiences and sense of humour" ($r = -0.17$; $p < 0.05$). The "Avoidance" scale showed successive correlations with the following factors: "Tolerance for failure and treating life as a challenge", the overall score on the SPP-25 scale, "Persistence and determination in action", "Openness to new experiences and sense of humour", "Personal coping skills and tolerance of negative emotions", and "Optimistic attitude towards life and ability to mobilise in difficult situations" (correlation coefficients: $r = -0.23$, $r = -0.18$, $r = -0.16$, $r = -0.15$, $r = -0.14$, and $r = -0.12$, respectively; $p < 0.05$). The "Negative alterations in cognition and mood" dimension from the PCL-5 scale showed the strongest correlation ($r = -0.31$; $p < 0.01$) with "Tolerance for failure and treating life as a challenge". It also correlated with the total score on the SPP-25 scale ($r = -0.29$; $p < 0.05$) and with the following dimensions: "Openness to new experiences and sense of humour" ($r = -0.25$; $p < 0.05$), "Optimistic attitude towards life and ability to mobilise in difficult situations" ($r = -0.23$; $p < 0.05$), "Persistence and determination in action" ($r = -0.23$; $p < 0.05$), and "Personal coping skills and tolerance of negative emotions" ($r = -0.21$; $p < 0.05$). The PCL-5 scale dimension of "Alterations in arousal and reactivity" exhibited a correlation with "Tolerance for failure and treating life as a challenge" ($r = -0.25$; $p < 0.05$). The correlation was at the same level as the total score on the PCL-5 scale and "Openness to new experiences and sense of humour" ($r = -0.17$; $p < 0.05$). Additionally, it showed a similar level of correlation ($r = -0.12$; $p < 0.05$) with the factors "Persistence and determination in action" and "Personal coping skills and tolerance of negative emotions", and a correlation of $r = -0.11$ ($p < 0.05$) with "Optimistic attitude towards life and ability to mobilise in difficult situations".

Backward stepwise regression analysis was employed to explore the role of resilience in the severity of PTSD in the study group. Backward stepwise regression was used to obtain the model with the highest coefficient of determination while ensuring all included parameters remained statistically significant. Initially, the model considered the five dimensions of resilience (excluding the overall score). The results are listed in Tab. 5.

For the "Overall score" and the three variables – "Intrusion", "Avoidance", and "Alterations in arousal and reactivity" on the PCL-5 scale – the factor "Tolerance for failure and treating life as a challenge" from the SPP-25 scale demonstrated a negative correlation. The relationship between "Tolerance" and "Intrusion" is particularly noteworthy, accounting for 10.18% of the variance; in contrast, the correlations for the other PTSD dimensions are relatively small.

DISCUSSION

Recognising the significance of the mental state of patients hospitalised due to COVID-19, the study aimed to investigate the role of the personality trait of resilience in preventing PTSD among hospitalised patients with severe COVID-19 in Poland. The group of SARS-CoV-2-infected patients assessed in this study exhibited a moderate level of resilience. Among the 138 individuals examined, 22.5% were found to meet the criteria for probable PTSD. Gender was shown to play a role in resilience levels, with female participants demonstrating lower resilience compared to males. Higher levels of resilience were associated with less severe PTSD symptoms. Patients with scores indicating the presence of PTSD exhibited lower levels of overall resilience and in three out of five of its parameters. There was no significant differences between men and women regarding PTSD. The factor "Tolerance for failure and treating life as a challenge" emerged as a significant predictor of PTSD during the COVID-19 pandemic.

In our analysis of resilience intensity within the study group, we discovered that the patients exhibited an average level of resilience, comparable to that found in the general population. Comparable results were observed in the study of patients undergoing treatment for cardiac issues (Ogińska-Bulik and Juczyński, 2012). However, our findings diverge from those reported by foreign authors. For example, in a study by Adjorlolo et al. (2022), more than half of the participants had a high resilience score. Studies examining hospitalised patients with mild COVID-19 symptoms in China revealed a resilience level slightly below that of the general population (Zhang et al., 2020). One possible factor contributing to the observed differences in resilience levels among Polish, Ghanaian, and Chinese patients could be the varying severity of COVID-19 symptoms within the study groups. In our study, the severity of symptoms caused by SARS-CoV-2 infection was classified as moderate to severe. However, Chinese researchers studied patients with mild disease symptoms. Also, when interpreting the results, it is important to consider that different resilience scales were used across the studies (Resilience Measurement Scale – SPP-25, Brief Resilience Scale, Connor–Davidson Resilience Scale). The onset of the pandemic, likely originating in China, and its psychological effects, including increased stress levels, uncertainty, lack of prior knowledge about the virulence of the virus, and insufficient information to mitigate the threat and its potential deadly consequences, may also significantly influence the level of resilience exhibited by patients from different countries. In contrast, the prevalence of PTSD in our study group, affecting almost a quarter of the participants (more details in Bętkowska-Korpała et al., in press), aligned with the rates observed in other studies of hospitalised patients (Bellan et al., 2021; Mazza et al., 2020; Tarsitani et al., 2021).

Addressing the question of gender differences in resilience, our findings suggest that men, compared to women, tend to be more open to new experiences, exhibit a greater sense of humour, and demonstrate higher personal competence in coping and a greater tolerance for negative emotions. Men also have a higher tolerance for failure, a greater tendency

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to view life as a challenge, and a more optimistic outlook coupled with the ability to mobilise themselves in difficult situations. Similar results were obtained by Ogińska-Bulik and Juczyński (2008) in the general population. However, our study found that men scored significantly higher on the "Openness to new experiences and sense of humour" dimension, a difference not observed in the aforementioned study. A study of the general population in Spain found that one of the variables increasing the likelihood of resilience to stress related to the COVID-19 pandemic was the male gender (Valiente et al., 2021), which aligns with our findings. However, the aforementioned comparisons should be approached with caution, considering the differences between the study groups – individuals hospitalised due to SARS-CoV-2 virus infection versus the general population examined by Valiente et al. (2021). It was found that, alongside hypertension and obesity, being female was also linked to more severe anxiety symptoms 12 months after hospitalisation for COVID-19 (Gramaglia et al., 2022).

The level of resilience is influenced by multiple factors. Psychological factors – alongside sociodemographic, social, and physiological variables – are critical in determining the development of resilience. The resilience of women and girls is significantly shaped by interpersonal relationships, which provide a sense of unconditional acceptance, mutual support, and interdependence, while also offering a safe space for emotional expression (Jefferis and Theron, 2018). Thus, the conditions of hospitalisation, combined with the need for safe distancing and limited close interactions, which affected interpersonal relationships and emotional expression, may have had a more significant indirect effect on the resilience of the female patients in our study than on the male participants.

It is worth noting that current theoretical and methodological approaches may not adequately capture gender nuances in psychological resilience, potentially contributing to lower scores for women compared to men on resilience measures. The existing concepts of resilience do not adequately capture how gender roles, social expectations, and environmental factors interact to shape the different ways women and men experience and respond to stressful events (Hirani et al., 2016). To gain a deeper understanding of how gender impacts resilience, further analyses are needed that consider potential mediators and moderators of the relationships being studied.

The next research question focused on comparing resilience levels between individuals with PTSD and those without. In our study, patients without PTSD had a higher overall resilience score as well as higher scores in the three resilience dimensions: "Openness to new experiences and sense of humour", "Personal coping skills and tolerance of negative emotions", and "Tolerance for failure and treating life as a challenge". In a review of resilience research, Semmer (2006) concluded that more resilient individuals viewed challenges as opportunities for personal growth and the acquisition of new experiences. Similar to optimists, resilient individuals will be drawn to new things, seeing them as opportunities for positive rather than negative experiences. In our study, higher scores of individuals without PTSD on the SPP-25 scale in terms of "Openness to new experiences" from the second dimension and in the aspect of "Treating life as a challenge" from the third dimension of resilience mentioned above refer to the characteristics according to Semmer (2006) and the interpretation of stress as a challenge in the transactional theory of stress proposed by Lazarus and Folkman (1984). Both Semmer's findings and the results of this analysis (specifically the aspect of "Personal coping skills and tolerance of negative emotions") suggest that a resilient individual believes they possess the necessary resources and skills to handle challenges, which serves as a protective factor against developing PTSD as a result of illness and hospitalisation due to COVID-19. Resilient individuals, who are characterised by emotional stability and low neuroticism (Semmer, 2006; Ogińska-Bulik and Juczyński, 2008), tend to maintain equilibrium even in the face of traumatic events. A stressful event is mainly perceived as a challenge, and potential setbacks are regarded as occurrences that do not diminish their competence (Semmer, 2006). Also in our study, the protective factors against PTSD were "tolerance of negative emotions" and "tolerance for failure".

In the present study, the variable "Tolerance for failure and treating life as a challenge" turned out to be a significant predictor of the overall PTSD score and its three dimensions ("Intrusion", "Avoidance", and "Alterations in arousal and reactivity"). The higher the level of "Tolerance for failure and treating life as a challenge", the lower the overall PTSD severity and the tendency to experience intrusion, alterations in arousal and reactivity, negative alterations in cognition and mood, and avoidance. Our findings suggest that the role of resilience in PTSD might be confined to a single factor. While interpreting the findings with caution, it can be concluded that understanding resilience in general – and specifically its dimension described above – as protective factors against the onset and severity of PTSD and its manifestations. These findings align with previous research highlighting the importance of resilience in mitigating the negative effects of stress (Gramaglia et al., 2022; Miglani et al., 2022; Mróz, 2014; Ogińska-Bulik and Juczyński, 2012; Semmer, 2006). The positive psychology movement, which is focused on identifying factors and mechanisms that aid in the healing process, highlights that traumatic events, such as illness, can lead to post-traumatic growth through the process of coping with stress, rather than as a direct result of the trauma itself. In the context of resilience, the aspect of "Tolerance for failure and treating life as a challenge" served as a predictor of post-traumatic growth, e.g. among women after mastectomy (Ogińska-Bulik, 2010). In our study, the same resilience factor was a predictor of PTSD and its selected dimensions. Resilience likely empowered the patients in this study to reframe their illness and find positive meaning within their experience. Prior research has demonstrated an association between a higher level of resilience with

a lower level of distress experienced as a result of illness and hospitalisation for COVID-19 as well as more adaptive coping strategies to manage the stress of the disease (Miglani et al., 2022). Additionally, resilience served as a protective factor against symptoms of anxiety and depression (Weathers et al., 2013). Our prior study (Bętkowska-Korpała et al., in press) also showed that subjectively experienced distress was a predictor of the "Alterations in arousal and reactivity" dimension of PTSD, among other factors. An Italian study found that higher resilience was linked to lower levels of post-traumatic stress symptoms, including intrusions and avoidance, in individuals experiencing anxiety and depression one year after hospitalisation for COVID-19 (Gramaglia et al., 2022). It is intriguing why "Tolerance for failure and treating life as a challenge" was not a predictor solely for the "Negative alterations in cognition and mood" dimension of the PCL-5 scale. This dimension showed the strongest correlation with PTSD symptoms. The greater the tolerance for failure and the inclination to view events as challenges, the less severe the negative impacts on cognitive and emotional functioning. PTSD models highlight the crucial role of cognitive processing of trauma in the development of the disorder (e.g. Ehlers and Clark, 2000; Taylor, 1983). It can lead to or sustain negative beliefs about oneself and/or the world, thereby contributing to the development of PTSD symptoms (Ogińska-Bulik and Juczyński, 2023). Conversely, indicators of positive trauma processing encompass acceptance of the situation, recognition of the event's positive aspects, and a decrease in negative emotions (Williams et al., 2002). In light of the qualitative analysis of the items within the subscale "Tolerance for failure and treating life as a challenge", the protective role of tolerance in mitigating the severity of PTSD symptoms emphasises the importance of viewing difficult situations as opportunities for growth, even when setbacks and failures must be acknowledged and accepted. At the same time, this factor can also enable individuals to learn from their experiences, adapt more effectively, and draw conclusions for the future. Obstacles and difficulties can be cognitively reframed as challenges, accompanied by a sense of excitement viewed as a positive state, rather than being perceived as threats that contribute to the development of PTSD following a COVID-19 experience.

Measuring resilience, perceived stress, and coping styles is crucial for identifying factors that can safeguard against the development of PTSD. It is also important to acknowledge the role of optimism as a personal psychological resource that, irrespective of the level of resilience, can contribute to psychological well-being to a certain extent (Souri and Hasanirad, 2011). A study examining stress coping styles and dispositional optimism as predictors of PTSD symptom severity among paramedics found that an emotion-focused coping style was the sole significant predictor of the severity of PTSD symptoms (Kucmin et al., 2018). A preference for an emotion-based coping style in reaction to traumatic experiences heightens the risk of PTSD symptoms, particularly when optimism is low. Dispositional optimism thus serves as a negative predictor and/or moderator solely in the context of the relationship between the overall dimension of PTSD and the emotion-focused coping style. Limitations of the study include the small number of women in the sample, which hinders gender-based comparative analyses, and the low response rate to the surveys (36%), reducing the overall sample size.

A promising avenue for future research could involve incorporating other psychological health factors (Borys, 2010) into the research model, such as optimism, sense of coherence, or hardiness, as protective elements in the development of PTSD symptoms, and examining their relationships with the level of resilience.

In the investigation of the mechanisms underlying stress, an approach that considers the interplay between the immunological, hormonal, and psychological components of the stress response is becoming increasingly vital. The Polish study examined the relationship between stress coping styles, emotional control, and biochemical markers as a shared protective factor in the inflammatory stress response. The rise in the level of biochemical variables that are markers of the inflammatory response (IL-1, IL-2, IL-6, IL-10, CRP, TNF-alpha, CRH, ACTH) coincided with an increase in favourable stress coping styles, a reduction in the level of perceived stress, and a decrease in maladaptive stress coping styles (Filip et al., 2018). Given that the cytokine response to stress is not instantaneous, future research investigating psychological protective factors against PTSD triggered by COVID-19, in conjunction with biochemical variables, should employ a longitudinal design. The development of long COVID in some subjects may also be important.

In conclusion, resilience – particularly the ability to tolerate failure and view life as a challenge – serves as a protective factor against the delayed effects of disorders, including PTSD. Consequently, identifying individuals who are susceptible to chronic or delayed stress and long COVID/PASC symptoms is crucial for improving their mental resilience. Identifying such patients allows for the implementation of specialised therapeutic interventions, including in non-hospital and outpatient care settings. Tangible benefits can be achieved by educating healthcare workers on the importance of resilience in improving mental health and by implementing targeted programmes for COVID-19 survivors to enhance their resilience – a psychological resource known to promote well-being. This approach could lead to more effective treatment outcomes for post-COVID disorders while also improving overall quality of life.

CONCLUSIONS

Our study suggests that resilience does not contribute to the development of PTSD symptoms, and one of its constituents may serve as a protective factor against PTSD. In this study, the group of patients hospitalised due to COVID-19

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within 7–8 months of disease onset exhibited moderate resilience. Notably, men demonstrated greater resilience compared to women. Recognising individuals with low resilience could be a crucial part of assessing mental health in those recovering from COVID-19. At the same time, strengthening resilience already during hospitalisation is a crucial intervention for preventing PTSD symptoms.

STUDY LIMITATIONS

This study has several limitations. One is the reliance on self-report methods, which can be susceptible to response bias. It is also important to note that the PCL-5 scale is a screening tool that provides a provisional diagnosis of PTSD. However, a clinical examination is necessary to confirm the diagnosis. Third, the study was conducted at a single hospital in Poland and followed a cross-sectional design, so the findings should be cautiously generalised to the broader population of patients hospitalised for COVID-19. Also, other potential traumatic experiences in the participants' lives, which could have influenced PTSD severity more than COVID-19, were not considered in the study. Yet another limitation is that the impact of coexisting diseases was not taken into account due to the small size of the study group and the high prevalence, severity, and overlap of comorbid conditions.

Conflict of interest

The authors state that there are no conflicts of interest arising from any commercial or financial relationships.

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Author contribution

Original concept of study: DD, BBK. Collection, recording and/or compilation of data: ALW, JW. Analysis and interpretation of data; final approval of manuscript: KOT, BBK. Writing of manuscript: KOT, ALW, APD, BBK. Critical review of manuscript: KOT, ASF, BBK.

References

Adjorlolo S, Adjorlolo P, Andoh-Arthur J et al.: Post-traumatic growth and resilience among hospitalized COVID-19 survivors: a gendered analysis. Int J Environ Res Public Health 2022; 19: 10014.

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders. 5th ed., American Psychiatric Association, Washington DC 2013.

Basińska MA, Sołtys M, Peplińska S et al.: Personal resources – resiliency and hope – and coping flexibility among oncological patients: moderating role of the sense of stress. Psychoonkologia 2017; 21: 100–112.

Bellan M, Soddu D, Balbo PE et al.: Respiratory and psychophysical sequelae among patients with COVID-19 four months after hospital discharge. JAMA Netw Open 2021; 4: e2036142.

Bętkowska-Korpała B, Olszewska-Turek K, Pastuszak-Draxler A et al.: Predyktywna rola objawów psychopatologicznych i predyspozycji osobowościowych w PTSD u pacjentów hospitalizowanych z powodu COVID-19. Psychiatr Pol 2023 [in print].

Borys B: Zasoby zdrowotne w psychice człowieka. Forum Med Rodz 2010; 4: 44–52.

Connor KM, Sutherland SM, Tupler LA et al.: Fluoxetine in post-traumatic stress disorder. Randomised, double-blind study. Br J Psychiatry 1999; 175: 17–22.

Ehlers A, Clark DM: A cognitive model of posttraumatic stress disorder. Behav Res Ther 2000; 38: 319–345.

Filip M, Macander M, Gałecki P et al.: Style radzenia sobie ze stresem, kontrola emocji i wykładniki biochemiczne jako wspólny element protekcyjny w zapalnej reakcji na stres. Psychiatr Pol 2018; 52: 511–524.

Forte G, Favieri F, Tambelli R et al.: COVID-19 pandemic in the Italian population: validation of a post-traumatic stress disorder questionnaire and prevalence of PTSD symptomatology. Int J Environ Res Public Health 2020; 17: 4151.

Fredrickson BL, Losada MF: Positive affect and the complex dynamics of human flourishing. Am Psychol 2005; 60: 678–686.

Gramaglia C, Gattoni E, Gambaro E et al.: Anxiety, stress and depression in COVID-19 survivors from an Italian cohort of hospitalized patients: results from a 1-year follow-up. Front Psychiatry 2022; 13: 862651.

Hirani S, Lasiuk G, Hegadoren K: The intersection of gender and resilience. J Psychiatr Ment Health Nurs 2016; 23: 455–467.

Izdebski P, Suprynowicz M: Rozwój pourazowy a prężność. Nauki o Edukacji. Rocznik Naukowy Kujawsko-Pomorskiej Szkoły Wyższej w Bydgoszczy 2011; 5: 61–69.

Jefferis TC, Theron LC: Explanations of resilience in women and girls: how applicable to black South African girls. Womens Stud Int Forum 2018; 69: 195–211.

Koweszko T, de Barbaro B, Izydorczyk B et al.: The position statement of the Working Group on the treatment of post-traumatic stress disorders in adults. Psychiatr Pol 2023; 57: 705–727.

Kucmin T, Kucmin A, Turska D et al.: Style radzenia sobie ze stresem i dyspozycyjny optymizm jako predyktory nasilenia objawów PTSD w grupie ratowników medycznych. Psychiatr Pol 2018; 52: 557–571.

Lazarus RS, Folkman S: Stress, Appraisal, and Coping. Springer, New York 1984.

Mahase E: Covid-19: what do we know about "long covid"? BMJ 2020; 370: m2815.

Mazza MG, De Lorenzo R, Conte C et al.: Anxiety and depression in COVID-19 survivors: role of inflammatory and clinical predictors. Brain Behav Immun 2020; 89: 594–600.

Miglani M, Upadhyay P, Mahajan R et al.: Psychological resilience, coping, and distress in admitted patients with COVID-19 infection. Prim Care Companion CNS Disord 2022; 24: 21m03230.

Montani D, Savale L, Noel N et al.; COMEBAC Study Group: Post-acute COVID-19 syndrome. Eur Respir Rev 2022; 31: 210185.

Mróz J: [Resilience, perceived stress and types of work-related behavior and experience among nurses]. Hygeia Public Health 2014; 49: 857–863.

Ogińska-Bulik N: Potraumatyczny rozwój w chorobie nowotworowej – rola prężności. Polskie Forum Psychologiczne 2010; 15: 125–139.
Ogińska-Bulik N, Juczyński Z: Prężność jako wyznacznik pozytywnych i negatywnych konsekwencji doświadczonej sytuacji traumatycznej. Polskie Forum Psychologiczne 2012; 17: 395–410.
Ogińska-Bulik N, Juczyński Z: Skala pomiaru prężności – SPP-25. Now Psychol 2008; 3: 39–56.
Ogińska-Bulik J, Juczyński Z: Właściwości psychometryczne polskiej wersji Listy Zaburzeń po Stresie Traumatycznym według DSM-5 – PCL-5. Psychiatr Pol 2023; 57: 607–619.
Ogińska-Bulik N, Juczyński Z, Lis-Turlejska M et al.: Polska adaptacja *PTSD Checklist-5 for DSM-5* – PCL-5. Doniesienie wstępne. Przegląd Psychologiczny 2018; 61: 281–285.
Rogers JP, Chesney E, Oliver D et al.: Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic. Lancet Psychiatry 2020; 7: 611–627.
Schou TM, Joca S, Wegener G et al.: Psychiatric and neuropsychiatric sequelae of COVID-19 – a systematic review. Brain Behav Immun 2021; 97: 328–348.
Semmer NK: Personality, stress, and coping. In: Vollrath ME (ed.): Handbook of Personality and Health. John Wiley & Sons Ltd., 2006: 73–113.
Simani L, Ramezani M, Darazam IA et al.: Prevalence and correlates of chronic fatigue syndrome and post-traumatic stress disorder after the outbreak of the COVID-19. J Neurovirol 2021; 27: 154–159.
Souri H, Hasanirad T: Relationship between resilience, optimism and psychological well-being in students of medicine. Procedia Soc Behav Sci 2011; 30: 1541–1544.
Tarsitani L, Vassalini P, Koukopoulos A et al.: Post-traumatic stress disorder among COVID-19 survivors at 3-month follow-up after hospital discharge. J Gen Intern Med 2021; 36: 1702–1707.
Taylor SE: Adjustment to threatening events: a theory of cognitive adaptation. Am Psychol 1983; 38: 1161–1173.
Thaweethai T, Jolley SE, Karlson EW et al.: Development of a definition of postacute sequelae of SARS-CoV-2 infection. JAMA 2023; 329: 1934–1946.
Valiente C, Vázquez C, Contreras A et al.: A symptom-based definition of resilience in times of pandemics: patterns of psychological responses over time and their predictors. Eur J Psychotraumatol 2021; 12: 1871555.
Vindegaard N, Benros ME: COVID-19 pandemic and mental health consequences: systematic review of the current evidence. Brain Behav Immun 2020; 89: 531–542.
Vlake JH, Wesselius S, van Genderen ME et al.: Psychological distress and health-related quality of life in patients after hospitalization during the COVID-19 pandemic: a single-center, observational study. PLoS One 2021; 16: e0255774.
Weathers FW, Litz BT, Keane TM et al.: The PTSD checklist for *DSM-5* (PCL-5). Scale available from the National Center for PTSD at www.ptsd.va.gov. 2013.
Williams RM, Davis MC, Millsap RE: Development of the cognitive processing of trauma scale. Clin Psychol Psychother 2002; 9: 349–360.
Zhang J, Yang Z, Wang X et al.: The relationship between resilience, anxiety and depression among patients with mild symptoms of COVID-19 in China: a cross-sectional study. J Clin Nurs 2020; 29: 4020–4029.

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