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Effect of selected personality traits and stress on symptoms of irritable bowel syndrome

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Abstract: Irritable bowel syndrome (IBS) is a chronic functional gastrointestinal disorder diagnosed on the basis of Rome IV criteria. Stress is an important contributor to the development of IBS symptoms, while personality, perceived self-efficacy, resilience, and coping strategies may be indirectly involved in the modulation of the body's response to various stressors.
The aim of this study was to assess the effect of selected personality traits and stress with IBS symptoms. We enrolled 129 participants (59 men and 70 women) aged from 18 to 61 years. The study group included 94 patients with IBS, while the control group comprised 35 participants without a diagnosed psychosomatic disorder and chronic comorbidities. Participants were assessed using a self-designed questionnaire as well as the Coping Inventory for Stressful Situations, NEO-Five Factor Inventory, 25-item Resilience Coping Scale (Skala Pomiaru Prężności — SPP-25), and General Self-Efficacy Scale.
We observed a significant effect of personality, perceived self-efficacy, resilience, and coping strategies in patients with IBS. Moreover, stress was shown to be associated with disease severity, while the type of a coping strategy was related to the frequency of symptoms. The groups differed in terms of personality traits such as resilience, self-efficacy, extraversion, and neuroticism.
Our study confirms the significant effect of personality traits and coping strategies in patients with IBS.

Key words: irritable bowel syndrome, personality, stress.

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Introduction

Irritable bowel syndrome (IBS) is a chronic functional gastrointestinal disorder. It is diagnosed on the basis of Rome IV criteria published in 2016 as an update to previous diagnostic criteria of functional gastrointestinal disorders that linked IBS to brain-gut axis dysfunction [1, 2]. Currently, IBS is defined as recurrent abdominal pain with symptom onset at least 6 months prior to diagnosis, with the presence of symptoms on at least 1 day per week in the last 3 months, and fulfilling at least 2 of the following 3 criteria: improvement with defecation, onset associated with a change in the frequency of stool, and onset associated with a change in the form of stool. There are 4 types of IBS: with constipation, with diarrhea, with mixed bowel habits, and unclassified IBS [1, 2]. The pathophysiology of IBS is complex and not completely understood. The risk factors include genetic predisposition, disruption of the brain-gut axis, gastrointestinal dysmotility, visceral hypersensitivity, low-grade mucosal inflammation, increased intestinal permeability, and altered microbiota [3].

Stress is an important factor affecting the function of the brain-gut axis and may contribute to the development of IBS symptoms. However, despite daily exposure to stress, the body's response to stressors differs between individuals and may be modulated by such factors as personality and coping strategies. Studies on the association between personality factors and increased risk and severity of chronic diseases revealed that emotional states and personality traits may affect bowel function, patient's perception of disease, and treatment outcomes [4, 5].

There are 4 major types of personality. Type A individuals are characterized by high competitiveness and are highly goal oriented. They tend to be overreactive and vigilant and likely to experience anxiety, anger, irritation, and hostility. Type A personality is commonly associated with heart diseases. On the other hand, type B personality is considered as "healthy" and "balanced". Type B individuals are ambitious but do not set unrealistic goals. They experience less stress and show greater patience. Type C personality is typically associated with predisposition to cancer. These individuals are characterized by no or reduced emotional expression, excessive patience, calmness, lack of assertiveness, and hiding negative emotions [6]. Finally, type D personality (or distressed personality) encompasses 2 dimensions: negative affectivity and social inhibition [7, 8]. In addition, it is characterized by a constantly depressed mood with a tendency to feel tension and worry, a pessimistic outlook on life, and exhaustion [8]. Accumulation of negative affect is typical for neuroticism, while social inhibition may indicate introversion. Both dimensions are associated with social reserve and a lower inclination to seek social support, which may favor disease development and exacerbation [7, 9].

Agreeableness and neuroticism are personality dimensions that may be both beneficial for an individual or may be the source of additional stress, depending on their

level. A low level of agreeableness is associated with high reactivity, inability to accept failure, and poorer adaptive skills. Individuals with low agreeableness are egocentric, aggressive, and competitive. This may lead to a higher susceptibility to disease.

Neuroticism may negatively affect the daily functioning of an individual. Accumulation of negative emotions is not conducive to effective coping. People with neuroticism show higher levels of stress than individuals without this trait [7]. Ineffective coping strategies, accumulation of negative affect, and excessive worrying about past failures may also predispose an individual to disease. Moreover, neurotic people tend to exaggerate their ailments, which causes even more stress and negative emotions. A high level of neuroticism was shown to predispose to cardiovascular disease [7]. On the other hand, personality traits such as conscientiousness and extraversion help cope with problems. High levels of these dimensions play an important role in human behavior [4, 6].

A person's psychological resources are another factor that may be important in the context of psychosomatic disorders. These resources are tools, such as perceived self-efficacy, resilience, or emotional intelligence, that people can use to achieve their goals.

Perceived self-efficacy is acquired through direct personal experience, indirect experience (by observing other people), or symbolic experience (verbal persuasion by others) [8]. Self-efficacy affects a person's health. The effect may be direct or indirect through a change of perception and appraisal of a given situation. Our perspective on a situation determines the choice of a coping strategy. Also, the way we care for our health may be related to perceived self-efficacy [8, 9].

Resilience is defined as effective functioning at different stages of life as well as one's skills and ability to achieve positive adaptation or development in the context of adversity [9]. Resilience is a dynamic process that reflects how well an individual adapts in the face of threats or trauma [8, 10]. The concept of resilience encompasses 3 groups of phenomena: 1) better-than-expected adaptation despite the risk of adversity; 2) positive adaptation maintained despite the occurrence of stressful events; and 3) good recovery from trauma [9, 10]. Finally, resilience is understood as a set of personality traits that reflect efficacy and determination in coping with adversity [10].

The aim of this study was to assess the influence of personality traits, perceived self-efficacy, and resilience on coping strategies and to evaluate how this affects the severity and frequency of IBS symptoms.

Materials and Methods

We enrolled 129 participants (mean age, 30.7 ± 8.3 years) followed at the Outpatient Clinic and Department of Gastroenterology and Hepatology, University Hospital in Kraków, Poland. There were 91 women (mean age, 29.7 ± 8.34 years) and 38 men

(mean age, 32.4 ± 8.2). Demographic data are presented in Table 1. The study group included 94 patients (70 women and 24 men) with IBS diagnosed on the basis of Rome IV criteria. The control group included 35 individuals (21 women and 14 men) without a known psychosomatic disorder or a chronic comorbidity. All participants were first assessed with an anonymous self-developed questionnaire containing questions on demographic characteristics as well as the course and severity of IBS in the study group. Subsequently, participants were assessed using personality and coping questionnaires.

Table 1. Demographic characteristics of the study population.

	No. of participants	Age, years
Women	91	29.7 ± 8.34
Men	38	32.4 ± 8.2
Total	129	30.7 ± 8.3

Data are presented as mean ± standard deviation.

To identify personality traits, the NEO-Five Factor Inventory (NEO-FFI), also known as the five-factor model, was used. It identifies 5 personality factors including neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. The questionnaire contains 60 self-descriptive items rated on a 5-point scale.

To assess resilience, a 25-item Resilience Coping Scale (Skala Pomiaru Prężności [SPP-25]) was used. It contains 25 items grouped into 5 components: 1) endurance and determination in taking actions; 2) openness to experience and sense of humor; 3) personal coping skills and tolerance of negative affect; 4) acceptance of failures and viewing change or stress as a challenge, 5) optimism and action-oriented approach to adversity.

The General Self-Efficacy Scale (GSES) is a 10-item scale designed to comprehensively assess self-efficacy beliefs to cope with a variety of stressful situations.

The Coping Inventory for Stressful Situations (CISS) scale was used to assess coping strategies. It contains 48 items related to behavior in stressful situations, with 3 subscales measuring task-oriented, emotion-oriented, and avoidance-oriented coping.

The study was voluntary and anonymous. Volunteers were encouraged to provide their email address to receive the study results with a short commentary by the author. The inclusion criteria were as follows: diagnosed IBS, age older than 18 years, and consent to participate in the study. The exclusion criteria included Crohn disease, ulcerative colitis, diabetes, celiac disease, cancer, chronic inflammatory, cardiovascular, or kidney disease, alcohol abuse, and pregnancy.

Any sensitive data of participants were anonymized to ensure privacy protection. The study was approved by the Ethics Committee at Jagiellonian University in Kra-

ków, Poland (no. 1072.6120.27.2020; as of February 27, 2020). The surveys were conducted by a psychologist.

Statistical analysis

The results were presented as mean and standard deviations. The Spearman rho correlation coefficient analysis was used to examine the associations of personality dimensions, perceived self-efficacy, and resilience with coping strategies. The non-parametric χ^2 test was used to assess differences in coping strategies and the level of extraversion between the study and control groups as well as to assess the associations between disease severity and the levels of agreeableness and neuroticism. Finally, the Mann–Whitney test was used to compare the study and control groups in terms of perceived self-efficacy and resilience. A p value of less than 0.05 was considered significant. The statistical analysis was conducted using the SPSS software.

(IBM Corporation, New York, United States).

Results

We showed that perceived self-efficacy correlated most strongly with the task-oriented coping strategy. Neuroticism was most strongly related to emotion-oriented coping. A correlation was also shown between neuroticism and task-oriented coping. Extraversion was most strongly correlated with task-oriented coping, with weaker correlations noted for emotion- and avoidance-oriented coping. Agreeableness was associated with avoidance-related coping. A high level of self-efficacy was correlated with task-oriented coping. A correlation was also observed between resilience and emotion-oriented coping. No correlations were observed between openness to experience and conscientiousness and coping strategies. Data are presented in Table 2.

Table 2. Correlations of personality dimensions and psychological resources with coping strategies in the study population (n = 129).

Variable		Task-oriented coping	Emotion-oriented coping	Avoidance-oriented coping
Self-efficacy	*r*	**0.442****	**–0.392****	–0.044
	statistical significance	0.000	0.000	0.622
Neuroticism	*r*	**–0.317****	**0.403****	–0.034
	statistical significance	0.000	0.000	0.702

Table 2. Cont.

Variable		Task-oriented coping	Emotion-oriented coping	Avoidance-oriented coping
Extraversion	r	**0.398****	**–0.194***	**–0.181***
	statistical significance	0.001	0.027	0.040
Openness to experience	r	–0.094	0.011	0.140
	statistical significance	0.289	0.905	0.114
Agreeableness	r	–0.175	0.034	**0.582***
	statistical significance	0.048	0.702	0.039
Conscientiousness	r	–0.173	0.072	0.115
	statistical significance	0.050	0.418	0.194
Resilience	r	**0.390****	**–0.231****	–0.090
	statistical significance	0.000	0.000	0.310

* p value <0.05
** p value <0.01

Our study revealed that patients with IBS had lower adaptive coping skills: 63% of cases showed emotion-oriented coping, while 91% of controls showed task-oriented coping (Fig. 1).

The level of extraversion differed significantly between groups, with lower levels in patients with IBS. A low level of extraversion was noted in 35 patients with IBS (37%), while moderate levels, in 37 patients (40%). In the control group, 23 individuals (66%) showed high level of extraversion. Data are presented in Fig. 2.

The level of agreeableness was not significantly associated with the severity of IBS. Detailed data are presented in Fig. 3.

In the study group, the level of neuroticism was associated with the severity of IBS. Patients with high level of neuroticism (50 patients [53.2%]) reported daily symptoms of IBS, while in those with a low level of neuroticism (12 patients [11% of patients]), the symptoms occurred once a month (Fig. 4).

The Mann–Whitney test showed that patients with IBS had a lower level of perceived self-efficacy (Table 3) and resilience (Table 4) in comparison with controls.

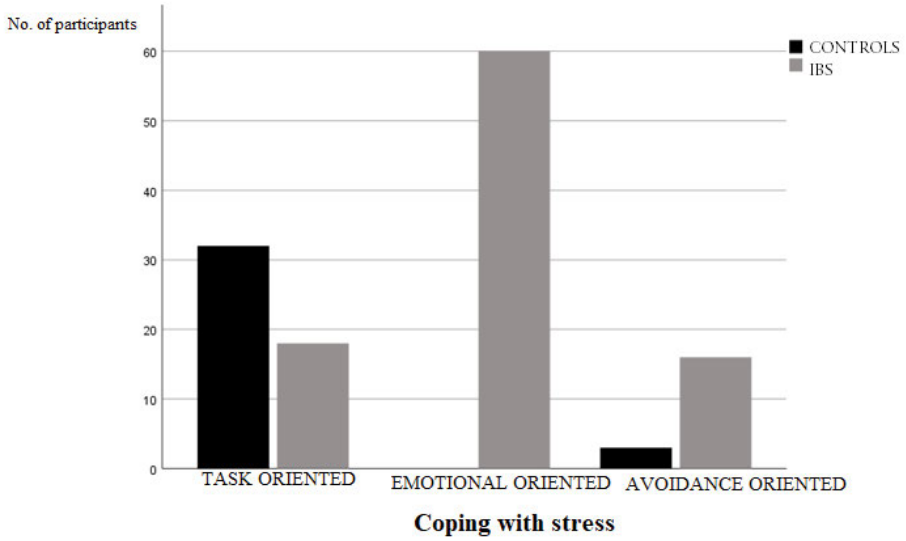

Fig. 1. Comparison of task-oriented, emotion-oriented, and avoidance-oriented coping between patients with irritable bowel syndrome (IBS) and controls (χ^2 = 38.25; df = 2; p <0.05; Cramer's V = 0.54).

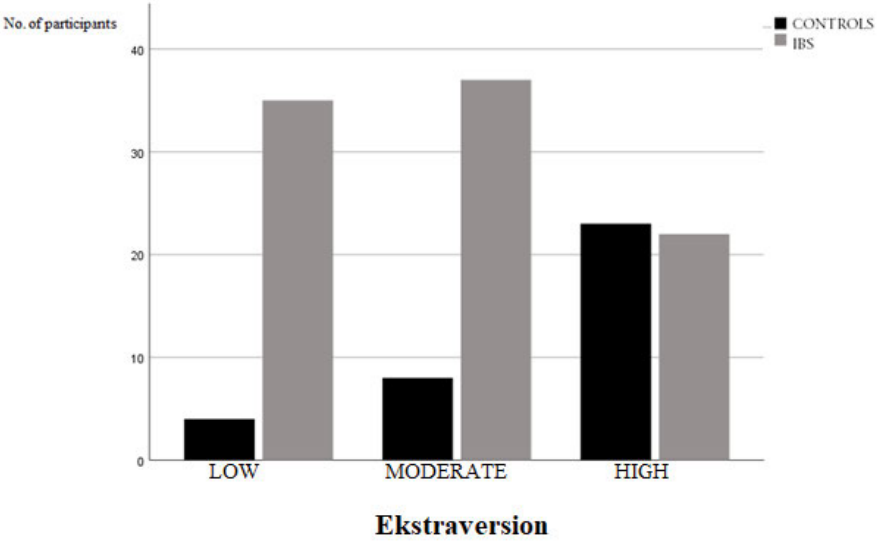

Fig. 2. Comparison of extraversion level between patients with irritable bowel syndrome (IBS) and controls (χ^2 = 20.69; df = 2; p <0.05; Cramer's V = 0.4).

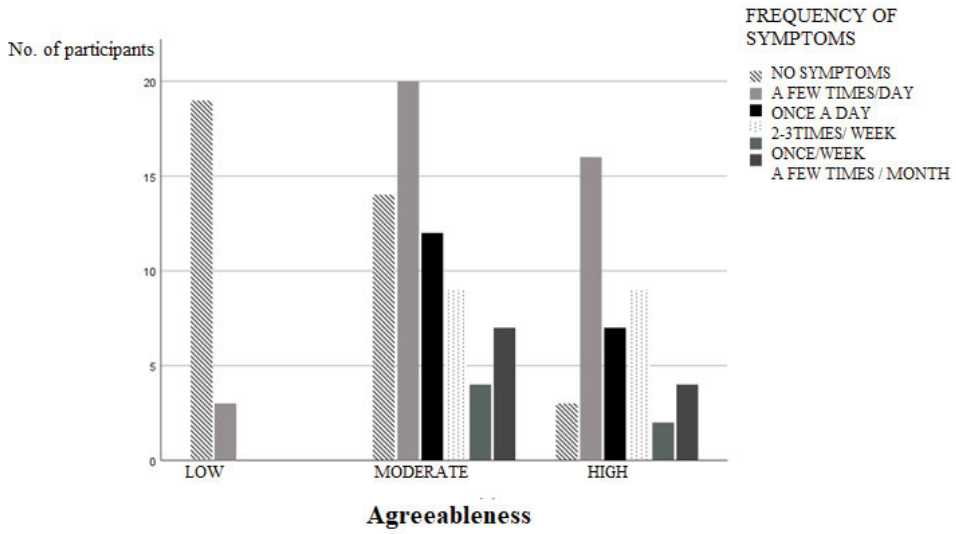

Fig. 3. Association between the level of agreeableness and the frequency of symptoms in patients with irritable bowel syndrome (χ^2 = 6.24; df = 10; p = 0.749 Cramer's V = 0.21).

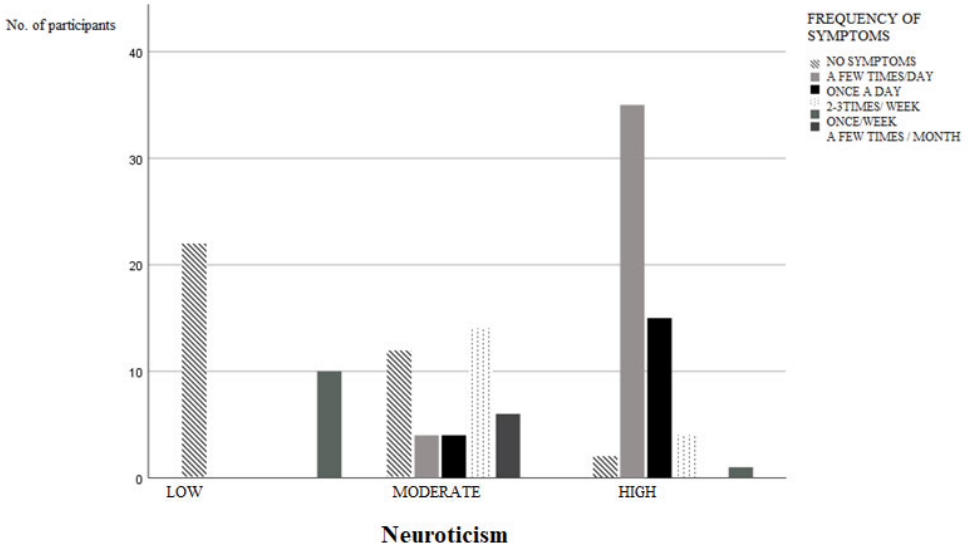

Fig. 4. Association between the level of neuroticism and the frequency of symptoms in patients with irritable bowel syndrome (χ^2 = 107.79; df = 10; p <0.05; Cramer's V = 0.75).

Table 3. Level of perceived self-efficacy in patients with irritable bowel syndrome (IBS) and controls (n = 129). Mann–Whitney test = 188; p <0.05.

Perceived self-efficacy	Control group (n = 35)	IBS group (n = 94)
Mean rank	106.63	49.50
Rank sum	3732.00	4653.00

Table 4. Level of resilience in patients with irritable bowel syndrome (IBS) and controls (n = 129). Mann–Whitney test = 544; p <0.05.

Resilience	Control group (n = 35)	IBS group (n = 94)
Mean rank	96.46	53.29
Rank sum	3376.00	5009.00

Discussion

Stress is widely known to influence the symptoms of IBS, most likely due to the bidirectional communication between the central and enteric nervous system (the brain-gut axis), which underlies the pathogenesis of this biopsychosocial disorder [11, 12]. We showed that patients with IBS differ from individuals without a psychosomatic disorder in terms of coping strategies. Healthy individuals more often show task-oriented coping and view a potentially stressful situation as a challenge and a task, which is considered the most adaptive and beneficial strategy. The remaining strategies are associated with accumulation of negative affect, rumination, and poor problem-solving skills, which may lead to dysregulation of the brain-gut-microbiota axis [11]. A bidirectional interaction between the central nervous system and gut was shown in a study investigating correlations of anxiety and depression with functional gastrointestinal disorders [13]. Moreover, individuals with good cognitive appraisal and risk assessment skills who are task oriented and positively appraise their coping strategy under stressful conditions were shown to have lower glucocorticoid levels [14]. Owing to these competencies, such individuals can draw conclusions and use their experience to better handle similar situations in the future.

Suomi [15] showed that high-reactive individuals are more susceptible to stress. A neutral situation may be considered as a threat, inducing a disproportionately hostile reaction, fight, or withdrawal. Moreover, such individuals often have poor coping skills [15]. Our study showed that the level of perceived self-efficacy, extraversion, and resilience were most strongly correlated with task-oriented coping. Individuals with a high level of perceived self-efficacy, emotional expression, and posi-

tive adaptation approach adversity as a challenge or a task. On the other hand, patients with IBS scored low on the self-efficacy, extraversion, and resilience scales, which may negatively affect coping skills and disease symptoms. Similar findings were reported in a study assessing the correlation of personality traits with coping strategies, using the NEO-FFI questionnaire [16]. Extraverted individuals showed more adaptive coping strategies, which is in line with our results. In another study, patients with IBS were shown to be more reactive to stress associated with daily life and new situations, at the same time being less adaptive and less inclined to apply problem-solving skills than healthy individuals [14].

Previous research showed that a low level of agreeableness is correlated with higher blood pressure as well as an elevated risk of cardiovascular disease, cancer, dyspepsia, and psoriasis. On the other hand, a moderate level was shown to be a protective factor in cardiovascular disease, cancer, and dyspepsia, and as such, agreeableness constitutes an important psychological resource [6]. Our study did not reveal an association between the level of agreeableness and IBS symptoms. The level of agreeableness is associated with avoidance-oriented coping, which may be explained by a tendency to avoid conflict and accept an unpleasant situation. Agreeable individuals are often meek and compliant, which under stressful conditions may result in unwillingness to change the situation, lack of decisiveness, and avoiding interaction with others [14].

In our study, neuroticism was positively correlated with emotion-oriented coping, which may be related to the fact that neurotic individuals more often experience negative emotions, they are more reactive to stress, and their coping skills are less well developed. Bogaczewicz *et al.* [17] showed that neuroticism is associated with lower psychological resilience, and often also with shyness and emotional reserve. Moreover, it is related to maladaptive response to stress, which negatively affects treatment of numerous diseases, such as psoriasis [17].

Individuals with neuroticism are likely to worry and ruminate about negative events rather than seek solutions to problems. Emotional containment and high reactivity may lead to IBS symptoms, such as diarrhea and abdominal pain [14]. Moreover, people with a high level of neuroticism tend to become easily discouraged and to worry, which is associated with a prolonged exposure to stress and its detrimental effects on the body. Brebner [16] showed that a high level of neuroticism was most strongly correlated with emotion-oriented coping.

Our study revealed that patients with IBS had a lower level of extraversion, perceived self-efficacy, and resilience compared with healthy controls, while a higher level of neuroticism was related to a higher frequency of IBS symptoms. This suggests that more open and sociable individuals are more confident, adapt to new situations more quickly, and perceive disease symptoms as less burdensome. Vollrath [18] studied the effect of extraversion on predicting negative events in the future and

their subsequent appraisal. It was shown that highly extraverted individuals had a more positive attitude towards negative events and responded to those events with lower levels of stress and negative affect [18]. Perceived self-efficacy is a belief in one's ability to attain a goal, which in the context of disease may translate into improved health and quality of life. Self-efficacy also affects our perception of the resources we have to cope with a stressful situation as well as the way we manage these resources [16]. Individuals with a low level of self-efficacy more often act ineffectively in the face of a stressful situation and more often give up, which may lead to a longer exposure to stress and exacerbation of IBS symptoms. A higher level of perceived self-efficacy under stressful conditions is associated with lower catecholamine levels and blood pressure, which has a significant influence on health [14]. Finally, a high level of self-efficacy is related to better coping skills [8].

It was shown that neuroticism is one of the strongest factors affecting mental and physical health [18]. Moreover, neurotic individuals tend to exaggerate illness and problems, which has a negative influence on treatment. People with a high level of neuroticism are more likely to suffer from cardiovascular, gastrointestinal, and skin diseases [19, 20]. Moreover, increased neuroticism was positively correlated with disease progression [21]. As high neuroticism is associated with increased irritation, anxiety, lethargy, and negative affect, it may lead to exacerbation of disease symptoms [17].

Whitehead *et al.* [5] reported significant differences in the levels of neuroticism and agreeableness between patients with IBS, inflammatory bowel disease, and healthy controls, with the highest levels of neuroticism in the IBS group. This is in line with our study. Moreover, Whitehead *et al.* [5] noted lower levels of agreeableness in patients with IBS than in those with inflammatory bowel disease, while no differences were noted between IBS and control groups. Also, no differences between groups were revealed for extraversion, openness, and conscientiousness [5], which is in contrast to our study, as we observed differences in the level of extraversion. Ogińska-Bulik and Juczyński [22] investigated differences in personality traits between patients with somatic disorders and healthy individuals in a group of 387 participants. Patients with somatic disorders scored higher on the neuroticism and agreeableness scales but lower on extraversion and openness in comparison with healthy controls. On the other hand, healthy individuals showed a lower accumulation of negative affect and social inhibition [19]. These data are in line with our results for personality dimensions. Despite differences in the level of agreeableness between groups, we did not show the association between this personality trait and IBS symptoms.

In our study, we observed a significant role of personality, perceived self-efficacy, resilience, and coping strategy in IBS as a psychosomatic disorder. Further research should investigate psychological interventions and modes of psychotherapy that might facilitate disease management. It is also important to increase the awareness of med-

ical personnel and patients about the influence of psychological factors and the psychosomatic basis of this condition, as pharmacotherapy alone has limited efficacy, providing temporary alleviation of symptoms without a long-term improvement in health and quality of life.

In conclusion, patients with IBS have a higher level of neuroticism but a lower level of extraversion, perceived self-efficacy, and resilience than healthy individuals. Task-oriented coping is more common among healthy individuals, while patients with IBS more often show emotion- and avoidance-oriented coping strategies. Finally, psychological resources of an individual, such as self-efficacy and resilience, as well as psychological dimensions may be associated with different coping strategies in patients with IBS and affect the severity of clinical symptoms.

The limitation of our research is undoubtedly the group gathered from only one hospital.

For further research it seems interesting to compare patients from other medical centers.

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Conflict of interest

None declared.

Contribution statement

A.D.D. — idea and conducting research, T.M., M.Z.W. — substantive help during research and writing.

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