

Locus of control and selected mental health variables in asthmatics: what are the associations with dyspnea?

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KEY WORDS

asthma, dyspnea,
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ABSTRACT

INTRODUCTION The literature provides ambiguous information concerning the associations between asthma and psychopathology. The concept of the locus of control (LOC) can shed some light on the psychosomatic aspects of asthma.

OBJECTIVES The aim of the study was to analyze the relationship between dyspnea perception and psychopathological symptoms in asthma. We also tested how a tendency to attribute the LOC affects the relations between psychopathology and dyspnea.

PATIENTS AND METHODS We examined 111 consecutive, unselected asthma patients, including 74 women and 37 men. The mean age was 49.79 ± 14.19 years, with no significant differences between sexes. There were mainly patients with level 2 (38.7%) and level 4 (35.1%) of asthma severity according to the Global Initiative for Asthma classification. Sociodemographic data were collected and the General Health Questionnaire (GHQ) by Goldberg and the Locus of Control questionnaire by Rotter were applied. The level of dyspnea was assessed by patients on the 10-point Borg scale. Spirometry tests were performed.

RESULTS Gender, education, and LOC differentiated patients according to psychopathological symptoms. There were no differences in psychopathology between the groups with different levels of asthma severity. In women, there was a significant correlation between intensity of dyspnea and higher scores on all GHQ scales; in men, the correlation was observed only for the depression subscale and the general scale.

CONCLUSIONS Psychopathological disorders are more significantly associated with subjective asthma symptoms than with asthma severity. Gender, education, and a tendency to attribute the LOC internally may be significant for this association.

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INTRODUCTION Asthma is still a clinical challenge in contemporary medicine and requires a multidisciplinary approach. Numerous studies,¹⁻³ but not all,⁴ have pointed to a significant association between psychopathological symptoms and asthma. Nascimento et al.⁵ observed widespread psychiatric problems, particularly anxiety disorders, in more than 61% of asthmatics. Another study indicated psychiatric morbidity of

over 34%, dominated by affective disorders and with a significant incidence of panic disorder.⁶ Dyspnea in the course of asthma can be associated with marital dysfunction⁷ and problems at work⁸ that potentially lead to psychopathology. Studies on brittle asthma^{9,10} have indicated that this form of asthma is linked to increased psychiatric morbidity. Other studies,¹¹ based on different asthma classification systems, have pointed to a frequent

lack of correlation between the stage of the disease and psychopathological symptoms.

Lavoie et al.⁶ indicated that although asthma patients with psychiatric disorders are not different in terms of pulmonary function tests from those without such disorders, the use of inhaled bronchodilators is much more widespread among asthmatics with psychopathological symptoms. Rimington et al.¹² demonstrated that the results of the Hospital Anxiety and Depression Scale (HADS) do not correlate with lung function but with subjective symptoms.

The diagnosis of psychiatric comorbidity largely depends on which method is used. Heaney et al.¹³ showed significant psychiatric morbidity among patients with severe asthma, but the scale (HADS) that they used in their study yielded a lot of false-positive results.

Spinoven et al.¹⁴ showed that patients with high anxiety levels report more severe dyspnea than those with low anxiety. On the other hand, they demonstrated the same degree of histamine-provoked bronchoconstriction.

The General Health Questionnaire (GHQ), devised by David Goldberg, provides significant data on the associations between psychiatric morbidity and somatic diseases (including asthma). It can be used to identify psychopathological disorders, such as anxiety, depression, somatization, or to identify functioning disorders.¹⁵ In a study by ten Brinke et al.,¹⁶ the samples of patients with a high GHQ score did not differ in terms of their sociodemographic parameters from those with a low GHQ score, but the former would much more often visit their doctors, emergency services, and hospitals.

In another study by ten Brinke et al.,¹¹ the GHQ showed no significant differences between the mild and severe asthma subgroups, and neither did the Anxiety Sensitivity Index or the Temperament and Character Inventory. The only differences were observed in terms of the locus of control (LOC). In severe asthma, the LOC was internal – patients demonstrated less confidence in doctors and treatment. The conclusion was that the effect of psychopathology and personality on asthma was overestimated. Campbell et al.¹⁷ observed that although there was no link between the GHQ results and asthma severity, psychopathologies identified by the questionnaire were associated with asthma-related dysfunctions in everyday activity.

The ambiguity of the above results provides justification for another study of the links between psychopathology and asthma in a wider context. In this study, we took into consideration an interesting finding of ten Brinke et al.¹¹ that points to the relationship between the LOC and the course of asthma.

PATIENTS AND METHODS **Patients** The study included 111 consecutive and unselected outpatients with asthma. The Study was approved by the local Ethics Committee. All participants

gave written informed consent to participate in the study. Assessment procedures were anonymous. Psychological questionnaires were used only for statistical analyses and not for individual diagnosis.

Tools Sociodemographic data were obtained using a structured interview.

Asthma severity was assessed by experienced clinicians according to the Global Initiative For Asthma (GINA) guidelines. The spirometry tests were performed in the morning following abstinence from inhaled bronchodilators, so the patients with asthma exacerbations were excluded from the study.

Patients rated their perceived dyspnea on the 10-point Borg scale. Mental health was assessed using the GHQ-28.¹⁵ This is a screening tool that is most sensitive to cases of temporary psychiatric symptoms in the context of normal functioning than on characteristics of permanent psychopathology. The GHQ-28 describes 4 areas: 1) somatic symptoms (as an expression of “somatization” of emotions) – GHQ A; 2) anxiety – GHQ B; 3) functioning disorders – GHQ C; 4) depression – GHQ D. In large studies, the GHQ demonstrated high sensitivity and specificity to a broad spectrum of mental disorders diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders III.¹⁸

To assess Rotter's¹⁹ internal vs. external LOC, the Polish adaptation of the tool was used. The result defines how the subjects perceive the causal link between their own behavior and its consequences. People who tend to believe that they have no influence on their environment (external LOC) score high, while those with a developed sense of agency (internal LOC) score low.

Statistical analysis Statistical analyses were performed using the STATISTICA software. The differences between populations on continuous variables were studied with the *t* test. Gender differences in the severity of disease and educational level were determined by the χ^2 test. Links between quantitative variables were identified using correlation analysis.

The analysis of variance (ANOVA) was used to test the relationship between quantitative variables, such as education, and GHQ, including interaction effects with other variables, such as gender.

If statistically significant interactions were found, the analysis of the simple effects was performed in order to check the effect of one variable, for example gender, at selected levels of another variable, for example education.

RESULTS The study included patients with asthma step 1 to 4 according to the GINA classification: step 1 (3.60%), step 2 (38.7%), step 3 (22.5%), step 4 (35.1%). The majority of the study population were patients with secondary education (44.14%): primary education (10.81%),

TABLE 1 Characteristics of the patients

	Total	Women	Men	Differences (men–women)
patients, n (%)	111 (100)	67 (74)	33 (37)	–
age, y, mean (SD)	49.79 (14.19)	50.77 (14.13)	47.84 (14.29)	NS
FEV ₁ , % of predicted value, mean (SD)	78.10 (22.87)	77.5 (21.56)	79.23 (25.56)	NS
BMI, kg/m ² , mean (SD)	27.53 (5.09)	27.96 (5.48)	26.75 (4.26)	NS
duration of asthma, y, mean (SD)	14.49 (10.71)	14.74 (11.16)	14.07 (10.09)	NS

Abbreviations: BMI – body mass index, FEV₁ – forced expiratory volume in 1 second, NS – nonsignificant ($P > 0.05$), SD – standard deviation

vocational school (23.42%), and higher education (21.62%). In the subgroups of women and men, we observed no significant differences in the education level (chi-squared) $\chi^2(3) = 1.00$, $P = 0.8$ or in the disease severity (chi-squared) $\chi^2(3) = 2.99$, $P = 0.39$. The characteristics of patients are presented in **TABLE 1**.

The ANOVA revealed no correlation ($P > 0.05$) between the GHQ scale and asthma severity (according to the GINA classification). There was no correlation between asthma severity and gender ($P > 0.05$). No statistically significant differences by gender were found in terms of age or asthma severity in this sample ($P = 0.25$). However, women had a significantly higher level of somatization symptoms as measured by the GHQ questionnaire than men ($t(109) = 3.07$, $P = 0.003$), (15.68 ± 3.74 and 18.09 ± 4.0 , $P = 0.003$, respectively), as well as higher overall results in the GHQ ($t(109) = 2.37$, $P = 0.02$), (54.43 ± 10.29 and 59.93 ± 12.11 , $P = 0.02$, respectively).

The GHQ results did not vary by age, either in the sample as a whole or in the subgroups of men and women. However, the ANOVA revealed a statistically significant association ($P = 0.03$) between education and the results of GHQ D scale. This indicates that patients with a higher education level reacted to a lesser extent in terms of depressive symptoms.

A separate analysis of the associations between education and the GHQ results in the subgroups of men and women revealed that there was a statistically significant gender difference in the results obtained on the GHQ A scale (level of somatization) for people with primary and vocational education ($P = 0.001$ and $P = 0.008$, respectively). The differences were not significant between the groups with secondary or tertiary education. Somatization levels also differed by gender: primary or vocational education (but not secondary and tertiary) was associated with a significantly higher level of somatization in women than in men.

Level of psychopathology and the locus of control The level of symptoms as expressed on the GHQ scales correlated with the internal–external LOC. LOC was linked to anxiety symptomatology ($r = 0.21$, $P = 0.03$), depressive symptomatology ($r = 0.26$, $P = 0.006$), and the general GHQ scale ($r = 0.22$, $P = 0.02$). The correlations

were positive. The level of psychopathological symptoms was higher in patients with external LOC.

GHQ and the severity of dyspnea In the whole study group, as well as in the subgroup of women, there was a significant statistical correlation between all the GHQ scales and perceived dyspnea. In the subgroup of men, there was a positive correlation between the GHQ general scale and dyspnea, and only between the D scale (depression) and dyspnea.

After adjustment to the LOC scores, the association between dyspnea and psychopathology remained unchanged: it was observed between the GHQ and perceived dyspnea in subjects with internal and external LOC.

The analysis of the associations between psychopathology and the degree of dyspnea revealed that in the group with a strong sense of agency, high levels of dyspnea showed a strong positive correlation with the anxiety and depression scales. In the group with a weak sense of agency, there was a positive correlation between dyspnea and all the GHQ scales, and these links were stronger than in the group with a strong sense of agency.

At the next level of detail, evidence of such associations was sought in the subgroups of women and men (**TABLE 2**).

DISCUSSION We did not include the use of corticosteroids in our analyses, which could possibly affect the mental status.²⁰ Psychopathology occurred to be clearly associated with subjective asthma symptoms.

Psychopathology and demography in asthma Our research indicates that age does not affect the GHQ results. In the samples of nonspecific population this association is not present either, and can only be observed in the populations aged over 75 years.²¹

Research on twins have showed that higher education level reduces the risk of asthma.²² Low education level has been identified as an independent variable associated with asthma exacerbations.²³ Our study points to a significant link between the level of education and the degree of depression in asthma patients.

TABLE 2 Associations between the General Health Questionnaire and perceived dyspnea

	Associations between GHQ and dyspnea								
	total	men	women	internal LOC			external LOC		
	n = 108	n = 36	n = 72	total n = 55	men n = 24	women n = 31	total n = 52	men n = 11	women n = 41
GHQ A (somatization)	0.31 ^a	0.23	0.32 ^a	0.25	0.08	0.37 ^b	0.35 ^b	0.28	0.29
GHQ B (anxiety)	0.37 ^a	0.28	0.40 ^b	0.28 ^b	0.41 ^b	0.19	0.45 ^b	0.17	0.51 ^a
GHQ C (behavior)	0.37 ^a	0.07	0.45 ^a	0.07	0.16	0.02	0.63 ^a	0.06	0.71 ^a
GHQ D (depression)	0.36 ^a	0.39 ^b	0.34 ^a	0.34 ^b	0.58 ^a	0.14	0.39 ^a	0.06	0.40 ^a
GHQ	0.46 ^a	0.33 ^b	0.49 ^a	0.32 ^b	0.41 ^b	0.25	0.57 ^a	0.15	0.62 ^a

a significant at the level of 0.01 (bilaterally)

b significant at the level of 0.05 (bilaterally)

Abbreviations: GHQ – General Health Questionnaire, LOC – locus of control

Psychopathology in asthma varies between sexes.^{24,25} Women in our group of patients showed more psychopathological symptoms than men. These results are in line with population studies based on the GHQ, which confirmed the psychopathological differences between men and women. In a number of studies in the general population,^{26,27} women had higher average results than men. However, it was not confirmed in other studies.^{18,28,29}

The analysis of psychopathological parameters and perceived dyspnea revealed a significant association between all the GHQ scales and dyspnea in women. In men, there was a significant positive correlation only between dyspnea and the general GHQ scale and the GHQ D scale (depression). However, women experience more subjective symptoms than men in numerous other diseases. A study by Wijnhoven et al.³⁰ indicated that women have more intensive subjective asthma symptoms although their respiratory parameters measured objectively are better than those of men. Psychological distress associated with asthma is stronger in women than in men and is clearly evident already in the mild stages of the disease, while in men it appears only when asthma is chronic or more severe symptoms occur.³¹ One explanation of the fact can be found in studies conducted by cultural anthropologists. According to Robbins,³² men are taught from childhood to be strong and hard and not to express discomfort.³²

Locus of control In the group with a weak sense of agency, there was a significant positive correlation between dyspnea and all the GHQ scales, but in the group with a strong sense of agency there was a correlation only between dyspnea and anxiety and depression. Based on these results, we cannot conclude that a sense of internal control protects against the dyspnea-psychopathology link. Further research is needed

to clarify the role of this character trait in moderating the effect of psychopathologies on perceived dyspnea.

The significant associations between dyspnea and psychopathology in the context of LOC are different for men and women. In men with a strong internal LOC, the link was found between dyspnea and anxiety and depression. In women with internal LOC, the only link was an isolated one for psychopathology associated with somatization. In the “external LOC” group, men demonstrated no associations between psychopathology and dyspnea. In women, however, this correlation was obvious and was not present only for depressive psychopathology.

The above finding provides grounds for the hypothesis that internal LOC protects women against, but makes men sensitive to, psychopathology-dyspnea correlations. Based on this concept, we could propose a further hypothesis, namely, that in analogous situations men will demonstrate fewer psychopathological symptoms than women. Thus, a poor sense of agency, similarly to the high level of psychopathology in the GHQ, is a more significant probability factor for the aggravation of asthma symptoms in women than in men. Nevertheless, both these hypotheses and the latter suggestion require further analysis.

In their study, van Wijk and Kolk³³ referred to the effect of cognitive schemas on the perception of symptoms. They indicated that significant differences in experiencing the symptoms of a disease have their roots in the system of convictions, and that cognitive processes are important factors differentiating the way men and women experience symptoms.

One of the limitations of our study was the difference in the number of women and men; however, we decided to recruit consecutive patients, and thus the sample composition reflected the gen-

eral population. A larger sample might result in more correlations.

Conclusions Our study confirms and to some extent reconciles the apparently contradictory correlations reported earlier by other researchers. On the one hand, it demonstrates that psychiatric morbidity (expressed in the GHQ) is not associated with the stage of asthma, but on the other hand, it proves that the level of psychopathology is linked to subjective asthma symptoms. This association should probably receive more attention in asthma management guidelines.³⁴

The nature of the link between psychiatric symptomatology and dyspnea may be influenced by gender and by whether the LOC is internal or external. More associations between psychopathology and dyspnea were found in women; therefore, the extent to which gender and LOC differentiate the perception of dyspnea in the context of psychopathology is an issue that requires further investigation.

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Poczucie umiejscowienia kontroli i niektóre wskaźniki zdrowia psychicznego u osób chorujących na astmę – jakie są ich związki z dusznością?

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SŁOWA KLUCZOWE

astma, duszność, płeć, poczucie umiejscowienia kontroli, psychopatologia

STRESZCZENIE

WPROWADZENIE Literatura podaje dwuznaczne informacje dotyczące związków między astmą a psychopatią. Koncepcja poczucia umiejscowienia kontroli (*locus of control* – LOC) rzuca nieco światła na psychosomatyczne aspekty astmy.

CELE Celem badania jest analiza związku między dusznością a objawami psychopatologicznymi w astmie oraz sprawdzenie, jak przypisywanie kontroli wpływa na związek między psychopatią a dusznością.

PACJENCI I METODY Zbadano 111 kolejnych, nieselekcjonowanych pacjentów z astmą, w tym 74 kobiety i 37 mężczyzn. Średni wiek wynosił $49,79 \pm 14,19$ roku, bez istotnych różnic między płciami. Dominował II (38,7%) i IV (35,1%) stopień zaawansowania astmy według klasyfikacji Global Initiative for Asthma. Zebrano dane społeczno-demograficzne, a także zastosowano kwestionariusze Goldberga (General Health Questionnaire) i Rottera (Locus of Control). Pacjenci oceniali swój poziom duszności na dziesięciopunktowej skali Borga. Wykonano testy spirometryczne.

WYNIKI Płeć, wykształcenie i LOC różnicowały pacjentów ze względu na objawy psychopatologiczne. Nie wykazano różnic w poziomie psychopatologii między grupami z różnym poziomem zaawansowania astmy. U kobiet wykazano istotną korelację między nasileniem duszności a wyższymi wynikami na wszystkich skalach GHQ, u mężczyzn związek taki występował jedynie w podskali depresji oraz skali ogólnej.

WNIOSKI Zaburzenia psychopatologiczne są bardziej związane z subiektywnymi objawami astmy niż ze stopniem jej nasilenia. Płeć, wykształcenie i tendencja do przypisywania kontroli wewnętrznej mogą mieć dla tego związku znaczenie.

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