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Towards Psychosomatic Medicine: Psychometric Properties of the Polish Version of the Giessen Subjective Complaints List (GBB-8) and the Prevalence of Somatic Symptoms in a Polish Community Sample

W stronę medycyny psychosomatycznej. Właściwości psychometryczne polskiej wersji Subiektywnej listy dolegliwości Giessen (GBB-8) i rozpowszechnienie symptomów somatycznych wśród dorosłych Polaków

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ABSTRACT

The Giessen Subjective Complaints List (GBB-8) is an 8-item self-report measure of somatic symptoms. Originally developed in German and then validated in English, it was designed for measuring eight of the most frequently assessed somatic complaints in four categories (exhaustion, gastrointestinal, musculoskeletal, and cardiovascular complaints). This study aimed to validate a Polish version of the GBB-8 and to examine the prevalence of somatic complaints in a Polish community sample. Our sample consisted of 846 Polish adults (545 females, 281 males and 20 non-binary) aged 18–77 (M = 27.42, SD = 12.67). The study was conducted from February to September 2022. The GBB-8's factor structure was verified with confirmatory factor analysis, whereas convergent and divergent validity were assessed via relationships with depressive and anxiety symptoms. Our results indicated strong factorial validity, conforming to the intended 4-factor model with a second-order factor. The GBB-8 subscales correlated in expected directions with markers of depression and anxiety symptoms. Moreover, the questionnaire showed good discriminant validity against these mental health symptoms. Internal consistency reliability was good for three subscales and the

total score and it was satisfactory for the cardiovascular subscale. The test-retest reliability of the questionnaire was good. Overall, the Polish version of the GBB-8 has strong psychometric properties. We also examined the age, gender, and demographic differences. Specific age–gender relationships with somatic complaints were noted. We provided current group norms (sten scale) of somatic symptoms for females and males separately.

Keywords: psychosomatic medicine; prevalence of somatic complaints; validation; psychometric properties

INTRODUCTION

A screening assessment of mental and somatic symptoms is of great importance for preventing health problems. For example, the recent study conducted from February to July 2022 in a general community sample of Poles showed that more than one-half of respondents were screened positively for anxiety and depression (Larionow, Mudło-Głagolska, 2022). These results indicate that the prevalence of mental health problems in the Polish population is extremely high. Moreover, research has shown that anxiety and depressive symptoms are associated with somatic symptoms (Simms, Prisciandaro, Krueger, Goldberg, 2012), and somatic symptoms in adolescence predict severe mental illnesses in adulthood (Bohman et al., 2018). Due to these facts, further assessment, monitoring, and treatment of mental health and somatic symptoms have great importance for conducting prevention. For this aim, developing short screening measures for these symptoms is needed. This paper aims to introduce and validate a Polish version of the Giessen Subjective Complaints List (GBB-8) for measuring somatic symptoms.

The GBB-8 is an 8-item questionnaire for measuring eight of the most frequently assessed somatic complaints in four categories presented by (1) exhaustion complaints (i.e. being easily exhausted; tiredness), (2) gastrointestinal complaints (i.e. feeling bloated or distended; stomach ache), (3) musculoskeletal complaints (i.e. backache; neck or shoulder pain) and (4) cardiovascular complaints (i.e. palpitations or heart pounding; dizziness). The questionnaire has four subscales, each containing two items. Originally developed in German (Kliem et al., 2017), the English version of the GBB-8 was recently presented by Petrowski, Zenger, Schmalbach, Bastianon and Strauss (2022), who showed that the questionnaire has excellent psychometric properties. Factor analysis supported a 4-factor model with a second-order factor, conforming to the intended four factors. Convergent validity was also supported. All subscales and the total score had high levels of internal consistency reliability. Moreover, the GBB-8 was invariant across age and gender categories (Petrowski et al., 2022). Population-based studies evidenced that somatic symptoms were consistently associated with the female gender and higher age (Beutel et al., 2020). The original study by Kleim et al. (2017) showed

that age was positively correlated with GBB-8 complaints. Thus, we anticipated similar results in our study.

The GBB-8 has promising psychometric properties and clinical relevance for epidemiological studies, however, there is presently no Polish version of the questionnaire. Due to this fact, the aim of the current study is (1) to present the psychometric properties (factor structure, discriminant validity, internal consistency and test-retest reliability) of the GBB-8 in a Polish general community sample and (2) to estimate the prevalence and differences in somatic symptoms in various age and gender groups (including people of non-binary gender), and in different categories of residence, education, marital status, and main activity. Based on the theory and previous works (Kliem et al., 2017; Petrowski et al., 2022), we predicted that (1) the 4-factor structure with a second-order factor will be the best factor structure for the GBB-8, (2) the GBB-8 scores will have high levels of internal consistency reliability (Cronbach's alpha and McDonald's omega values), (3) the GBB-8 will positively correlate with anxiety and depressive symptoms (refer to Simms et al., 2012), (4) the GBB-8 subscales will show a good discriminant validity against the general mental health symptoms, (5) females and older people of all genders will have higher levels of somatic complaints.

MATERIAL AND METHODS

1. Participants

The sample included 846 Polish adults (545 females, 281 males and 20 non-binary) aged 18–77 ($M = 27.42$, $SD = 12.67$). People with higher education made up 30.73% of respondents, and 69.27% had lower educational levels. Large cities (above 100,000 inhabitants) were home to 38.89% of the respondents, medium-sized towns (from 20,000 to 100,000) – to 21.04%, small towns (up to 20,000) – to 13.59%, and villages – to 26.48%. 53.19% of the participants were single, whereas 46.81% were married or living common-law. 36.76% of the respondents worked professionally, 20.69% were students, people working and studying at the same time made up 20.92% of the sample, 18.20% were unemployed, and 3.43% were retired.

Sören Kliem, one of the authors of the original version of the GBB-8 (Kliem et al., 2017), gave the permission for this Polish validation study. The current data on the GBB-8 were derived from our research projects, which were conducted from February to September 2022 via social networks where there was a link to an online anonymous survey. All the projects were conducted in accordance with the Declaration of Helsinki Ethical Principles. No data from the current study have been published previously. All the respondents provided their informed consent digitally before they answered the questions.

2. Measures

1. The GBB-8 is an 8-item questionnaire for measuring somatic symptoms (Petrowski et al., 2022). The GBB-8 has four subscales, namely exhaustion, gastrointestinal, musculoskeletal, and cardiovascular, each containing two items. A total score can also be calculated. The GBB-8 uses a 5-point Likert scale from 0 (*not at all*) to 4 (*very much*). The original English version of the GBB-8 was translated into Polish by three independent translators, and a common Polish translation was developed. Then it was translated back into English, and this back translation was compared with the original version. The necessary minor corrections were made resulting in the final Polish version of the GBB-8 (see Appendix A).
2. The Patient Health Questionnaire-4 (PHQ-4) is a 4-item questionnaire for measuring anxiety and depressive symptoms in the previous 2 weeks (Kroenke, Spitzer, Williams, Löwe, 2009; Löwe et al., 2010). The PHQ-4 has two subscales, namely anxiety (2 items; *Feeling nervous, anxious, or on edge*; *Not being able to stop or control worrying*) and depression (2 items; *Little interest or pleasure in doing things*; *Feeling down, depressed, or hopeless*). The PHQ-4 uses a 4-point Likert scale from 0 (*not at all*) to 3 (*nearly every day*). The Polish version of the PHQ-4 developed by Larionow and Mudło-Głagolska (2022) was applied.

3. Statistical analysis

We tested 1-factor and 4-factor models as well as an intended 4-factor model with a second-order factor of the GBB-8 by confirmatory factor analysis using maximum likelihood estimation with robust standard errors and a Satorra–Bentler scaled test statistic. The fit was assessed based on the following fit index values: root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), and Tucker–Lewis index (TLI). RMSEA and SRMR values below 0.08, and CFI and TLI values greater than 0.9 indicate an acceptable fit (Hu, Bentler, 1999). Cronbach's alpha (α) and McDonald's omega (ω) coefficients were calculated for four GBB-8 subscales and the total score.

For assessing test-retest reliability of the GBB-8, we calculated intraclass correlation coefficients using two-way mixed method with absolute agreement type (Koo, Li, 2016) between GBB-8 scores at baseline and a 3-week follow-up. For intraclass correlation coefficients, values less than 0.50 indicate poor reliability, between 0.50 and 0.75 indicate moderate reliability, between 0.75 and 0.90 indicate good reliability, and greater than 0.90 indicate excellent reliability (Koo, Li, 2016).

The Kruskal–Wallis *H* test with a Bonferroni correction (*post hoc* comparisons) was used to compare the levels of somatic, anxiety, and depressive symptoms among different gender groups. When examining differences in the GBB-8 scores between groups in different categories of residence, education, marital status, and main activity, a series of one-way analyses of covariance (ANCOVAs) with the Bonferroni correction (*post hoc* comparisons) was used. This analysis provided the control of age influence on the GBB-8 scores.

There was no missing data. The data were screened for accuracy (min. and max. range of each variable). Statistical analysis was carried out using Statistica (version 13.3), SPSS (version 28), and R (version 4.2.1). In R the following packages were used: *lavaan* (for confirmatory factor analysis), *psych* (for reliability analysis) as well as *EFAtools* (for exploratory factor analysis).

RESULTS

Descriptive statistics for the GBB-8 and PHQ-4 scores in different gender groups are presented in Table 1. In the total sample, age was reasonably normally distributed (skewness = 1.73, kurtosis = 2.19). All questionnaires showed high internal reliability (α and $\omega \geq 0.71$; refer to Table 1), except the cardiovascular subscale (α and $\omega = 0.57$).

Table 1. Descriptive statistics for the GBB-8 and PHQ-4 scores in different gender groups

Scales	Total sample (N = 846)				Females (N = 545)		Males (N = 281)		Non-binary (N = 20)		The Kruskal–Wallis H test results	Significant differences between groups (*post hoc* comparisons)	The effect size for the H test (η^2)
	α	ω	M	SD	M	SD	M	SD	M	SD			
GBB-8 items													
1. Being easily exhausted	–	–	2.02	1.25	2.12	1.22	1.79	1.26	2.65	1.46	$H(2, 846) = 17.46$, $p = 0.0002$	female > male; non-binary > male	0.018 (small)
2. Feeling bloated or distended	–	–	1.33	1.22	1.52	1.23	0.94	1.11	1.65	1.46	$H(2, 846) = 45.99$, $p < 0.001$	female > male; non-binary > male	0.052 (small)
3. Backache	–	–	1.80	1.31	1.99	1.27	1.40	1.29	2.25	1.37	$H(2, 846) = 42.65$, $p < 0.001$	female > male; non-binary > male	0.048 (small)
4. Palpitations or heart pounding	–	–	1.10	1.18	1.25	1.19	0.77	1.08	1.60	1.35	$H(2, 846) = 39.30$, $p < 0.001$	female > male; non-binary > male	0.044 (small)
5. Tiredness	–	–	2.59	1.19	2.74	1.13	2.28	1.24	2.85	1.31	$H(2, 846) = 26.70$, $p < 0.001$	female > male; non-binary > male	0.029 (small)
6. Stomach ache	–	–	1.07	1.44	1.20	1.14	0.75	1.06	1.70	1.30	$H(2, 846) = 42.51$, $p < 0.001$	female > male; non-binary > male	0.048 (small)
7. Neck or shoulder pain	–	–	1.50	1.32	1.67	1.32	1.14	1.22	2.00	1.56	$H(2, 846) = 34.76$, $p < 0.001$	female > male; non-binary > male	0.039 (small)
8. Dizziness	–	–	0.96	1.60	1.11	1.19	0.63	0.99	1.65	1.39	$H(2, 846) = 42.64$, $p < 0.001$	female > male; non-binary > male	0.048 (small)
GBB-8 subscales													
Exhaustion	0.79	0.79	4.61	2.22	4.86	2.12	4.07	2.31	5.50	2.44	$H(2, 846) = 25.51$, $p < 0.001$	female > male; non-binary > male	0.028 (small)
Gastrointestinal	0.71	0.71	2.39	2.09	2.72	2.06	1.69	1.92	3.35	2.60	$H(2, 846) = 57.97$, $p < 0.001$	female > male; non-binary > male	0.066 (medium)
Musculoskeletal	0.71	0.71	3.30	2.31	3.66	2.24	2.54	2.21	4.25	2.75	$H(2, 846) = 51.74$, $p < 0.001$	female > male; non-binary > male	0.059 (medium)
Cardiovascular	0.57	0.57	2.06	1.96	2.35	1.93	1.40	1.77	3.25	2.55	$H(2, 846) = 60.55$, $p < 0.001$	female > male; non-binary > male	0.069 (medium)

Total	0.81	0.81	12.36	6.39	13.59	5.99	9.70	6.07	16.35	8.98	$H(2, 846) = 76.64$, $p < 0.001$	female > male; non-binary > male	0.089 (medium)
PHQ-4 subscales													
Anxiety	0.74	0.74	3.13	1.82	3.24	1.75	2.83	1.88	4.20	1.91	$H(2, 846) = 16.83$, $p = 0.002$	female > male; non-binary > female; non-binary > male	0.018 (small)
Depression	0.79	0.79	2.87	1.91	2.94	1.87	2.69	1.97	3.50	1.76	$H(2, 846) = 6.14$, $p = 0.047$	*ns*	0.005 (negligible)
Total	0.84	0.85	5.99	3.41	6.18	3.33	5.52	3.50	7.70	3.51	$H(2, 846) = 12.97$, $p = 0.002$	female > male; non-binary > female; non-binary > male	0.013 (small)

Note. GBB-8 = the Giessen Subjective Complaints List; PHQ-4 = the Patient Health Questionnaire-4; α = Cronbach's alpha; ω = McDonald's omega; *M* = mean; *SD* = standard deviation; *ns* = non-significant ($p > 0.05$). Effect size (η^2 = eta squared; interpretation: negligible < 0.01 < small < 0.06 < medium < 0.14 < large).

Source: Authors' own study.

1. Confirmatory factor analysis

The Henze–Zirkler multivariate normality test indicated the absence of multivariate normality of the GBB-8 items (HZ = 2.560, $p < 0.001$). The 1-factor model was a very poor fit to the data. The 4-factor model was an excellent fit and the 4-factor one with a second-order factor was also an excellent fit with the best fit index values overall (see Table 2). All item factor loadings were strong and loaded on intended subscales for the 4-factor model with a second-order factor (loadings ≥ 0.561, all *ps* < 0.001; refer to Table 3), besides, all four subscales loaded on a second-order factor well (factor loadings ≥ 0.692, all *ps* < 0.001).

Table 2. Goodness-of-fit indices for the GBB-8 models in a total sample ($N = 846$)

Models	χ^2/df	CFI	TLI	RMSEA (90% confidence interval)	SRMR
1-factor model	359.563/20	0.791	0.708	0.154 (0.140; 0.168)	0.077
4-factor model	22.403/14	0.995	0.990	0.028 (0.000; 0.049)	0.016
4-factor model with a second-order factor	23.591/16	0.996	0.992	0.025 (0.000; 0.046)	0.017

Note. CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual. Confirmatory factor analysis with maximum likelihood estimation with robust standard errors and Satorra–Bentler scaled test statistic.

Source: Authors' own study.

Table 3. Descriptive statistics of the GBB-8 statements and standardized item factor loadings from the confirmatory factor analysis ($N = 846$)

Variables	*M*	*SD*	*Me*	Skewness	Kurtosis	Standardized item factor loadings (all *ps* < 0.001)		
						1-factor model	4-factor model	4-factor model with a second-order factor
GBB-8 items								
1. Being easily exhausted Exhaustion	2.02	1.25	2.00	0.04	–1.02	0.686	0.777	0.777
2. Feeling bloated or distended Gastrointestinal	1.33	1.22	1.00	0.62	–0.59	0.509	0.671	0.675
3. Backache Musculoskeletal	1.80	1.31	2.00	0.23	–1.05	0.558	0.766	0.764

4. Palpitations or heart pounding Cardiovascular	1.10	1.18	1.00	0.81	–0.35	0.497	0.560	0.561
5. Tiredness Exhaustion	2.59	1.19	3.00	–0.35	–0.95	0.722	0.846	0.846
6. Stomach ache Gastrointestinal	1.07	1.14	1.00	0.89	–0.11	0.575	0.824	0.820
7. Neck or shoulder pain Musculoskeletal	1.50	1.32	1.00	0.48	–0.91	0.524	0.714	0.716
8. Dizziness Cardiovascular	0.96	1.16	1.00	1.11	0.32	0.615	0.707	0.705
GBB-8 subscales								Subscale loadings on a second--order factor
Exhaustion	4.61	2.22	5.00	–0.11	–0.98	–	–	0.764
Gastrointestinal	2.39	2.09	2.00	0.76	–0.16	–	–	0.696
Musculoskeletal	3.30	2.31	3.00	0.37	–0.73	–	–	0.692
Cardiovascular	2.06	1.96	2.00	0.82	–0.01	–	–	0.929
Total score	12.36	6.39	12.00	0.28	–0.51	–	–	–

Note. GBB-8 = the Giessen Subjective Complaints List; *M* = mean; *SD* = standard deviation; *Me* = Median. Confirmatory factor analysis with maximum likelihood estimation with robust standard errors and Satorra–Bentler scaled test statistic.

Source: Authors' own study.

2. Internal consistency and intercorrelations of the subscales

In the total sample, the internal consistency reliability of three subscales (α and ω ≥ 0.71) and the total score (α and ω = 0.81) was high. The Cardiovascular subscale showed slightly lower reliability (α and ω = 0.57). All four GBB-8 subscales were positively intercorrelated (*r* from 0.34 to 0.47; Table 4).

3. Concurrent validity

Pearson correlations between the GBB-8 and PHQ-4 scores are presented in Table 4. Among the GBB-8 subscales, the Exhaustion was the most positively correlated with anxiety (*r* = 0.52) and depressive symptoms (*r* = 0.59), whereas the Gastrointestinal subscale was the least correlated with these mental health symptoms (*r* = 0.29 and 0.25, respectively).

Table 4. Pearson correlations between age, the GBB-8, and PHQ-4 scores ($N = 846$)

Variables	Age (females, $N = 545$)	Age (males, $N = 281$)	GBB-8 Exhaustion	GBB-8 Gastrointestinal	GBB-8 Musculoskeletal	GBB-8 Cardiovascular	GBB-8 Total	PHQ-4 Anxiety	PHQ-4 Depression	PHQ-4 Total
Age (females, $N = 545$)	–	–	–0.24***	–0.17***	–0.01	–0.16***	–0.20***	–0.16***	–0.20***	–0.20***
Age (males, $N = 281$)	–	–	0.10	–0.01	0.15*	0.14*	0.13*	–0.02	–0.01	–0.01
GBB-8 Exhaustion	–0.24***	0.10	–	0.40***	0.41***	0.47***	0.77***	0.52***	0.59***	0.60***
GBB-8 Gastrointestinal	–0.17***	–0.01	0.40***	–	0.34***	0.42***	0.72***	0.29***	0.25***	0.29***
GBB-8 Musculoskeletal	–0.01	0.15*	0.41***	0.34***	–	0.41***	0.74***	0.29***	0.26***	0.30***
GBB-8 Cardiovascular	–0.16***	0.14*	0.47***	0.42***	0.41***	–	0.75***	0.42***	0.37***	0.43***
GBB-8 Total	–0.20***	0.13*	0.77***	0.72***	0.74***	0.75***	–	0.51***	0.49***	0.55***
PHQ-4 Anxiety	–0.16***	–0.02	0.52***	0.29***	0.29***	0.42***	0.51***	–	0.68***	0.91***
PHQ-4 Depression	–0.20***	–0.01	0.59***	0.25***	0.26***	0.37***	0.49***	0.68***	–	0.92***
PHQ-4 Total	–0.20***	–0.01	0.60***	0.29***	0.30***	0.43***	0.55***	0.91***	0.92***	–

Note. GBB-8 = the Giessen Subjective Complaints List; PHQ-4 = the Patient Health Questionnaire-4; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

Source: Authors' own study.

4. Discriminant validity

Discriminant validity was assessed by conducting a second-order exploratory factor analysis (principal axis factoring with direct oblimin rotation) of the four GBB-8 subscales and the Anxiety and Depression subscales of the PHQ-4. It was expected that the GBB-8 subscales would load on "somatic symptoms" factor, whereas the two PHQ-4 subscales would load on the separate "mental health symptoms" factor.

Table 5. Factor loadings from a second-order exploratory factor analysis (principal axis factoring with direct oblimin rotation) of the GBB-8 and PHQ-4 subscales ($N = 846$)

Variables	Factor 1 "mental health symptoms"	Factor 2 "somatic symptoms"
PHQ-4 Anxiety	**0.641**	0.159
PHQ-4 Depression	**1.002**	–0.105
GBB-8 Exhaustion	0.396	**0.449**
GBB-8 Gastrointestinal	–0.046	**0.624**
GBB-8 Musculoskeletal	–0.019	**0.603**
GBB-8 Cardiovascular	0.084	**0.644**
Proportion of total variance (%)	44.0	9.3

Note. PHQ-4 = the Patient Health Questionnaire-4; the GBB-8 = Giessen Subjective Complaints List. Factor loadings ≥ 0.4 are shown in bold.

Source: Authors' own study.

A second-order exploratory factor analysis of the four GBB-8 subscales, anxiety and depressive symptoms (the two PHQ-4 subscales) extracted two factors (i.e. factor 1 "mental health symptoms" and factor 2 "somatic symptoms"; Table 5). All the GBB-8 subscales loaded precisely on the "somatic symptoms" (loadings from 0.449 to 0.644) and did not load on the "mental health symptoms" factor (loadings from –0.046 to 0.396). The Exhaustion subscale showed slight cross-loadings, but it is justified because its two complaints ("being easily exhausted" and "tiredness") are common symptoms related to anxiety and depression. In general, the "somatic symptoms" construct, as measured by the GBB-8, was statistically separable from one's current level of mental health symptoms. Thus, the GBB-8 showed empirically good discriminant validity.

5. Test-retest reliability

Seventy-two participants filled out the GBB-8 two times with approximately three weeks' intervals between each test. Intraclass correlation coefficients of all the GBB-8 subscale scores and the total GBB-8 score between the two-time

measurements were high (from 0.81 to 0.91, all *ps* < 0.001), thus, supporting the good GBB-8's test-retest reliability.

6. Gender, age, and demographic differences

The analysis showed that the gender groups differed significantly in somatic, anxiety and depressive symptoms levels (Table 1). Females and non-binary had significantly higher symptom levels than males (excluding the depression scores). Non-binary had significantly higher anxiety and total anxiety-depressive symptom levels than females.

In the sample of females, age was significantly negatively correlated with exhaustion, gastrointestinal and cardiovascular complaints (*r* from –0.16 to –0.24) as well as with the GBB-8 total score (*r* = –0.20). In the sample of males, in contrast, age was significantly positively correlated with musculoskeletal (*r* = 0.15) and cardiovascular complaints (*r* = 0.14) as well as with the GBB-8 total score (*r* = 0.13).

We divided our sample into two age groups of adults (i.e. one group aged 18–24 and the other group aged 25 years and above) and compared their somatic symptom levels separately in female and male samples. Females aged 18–24 had significantly higher levels for almost all somatic symptoms (except backache, neck or shoulder pain, and total musculoskeletal symptoms) than females aged 25–77, but the effect sizes of these differences were small (Table 6). Compared to males aged 18–24, males aged 25–70 had significantly higher scores on two symptoms (being easily exhausted; neck or shoulder pain), two subscales (exhaustion and musculoskeletal symptoms), and the GBB-8 total score. The effect sizes of the differences were also small. In general, these results suggest that with age females suffer more from somatic symptoms, whereas males do less.

A series of one-way ANCOVAs was conducted to examine whether people in different categories of residence, education, marital status and main activity differ concerning the GBB-8 results (age was used as a covariate for controlling its influence; see Table 7).

Table 6. Descriptive statistics of somatic symptoms in different age groups by gender

Variables	Females aged 18–24 ($N = 332$)		Females aged 25–77 ($N = 213$)		*U*-value and *p*-value	Effect size (η^2)	Males aged 18–24 ($N = 207$)		Males aged 25–70 ($N = 74$)		*U*-value and *p*-value	Effect size (η^2)
	M	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*		
GBB-8 items												
1. Being easily exhausted	2.26	1.22	1.89	1.19	29432.0; $p < 0.001$	0.02 (small)	1.69	1.24	2.05	1.29	6480.5; $p = 0.050$	0.014 (small)
2. Feeling bloated or distended	1.61	1.24	1.36	1.19	31208.5; $p = 0.021$	0.01 (small)	0.91	1.12	1.03	1.07	7016.5; *ns*	0.004 (negligible)
3. Backache	1.99	1.26	1.98	1.28	35305.0; *ns*	0 (negligible)	1.32	1.25	1.64	1.39	6697.5; *ns*	0.009 (negligible)
4. Palpitations or heart pounding	1.35	1.24	1.08	1.09	31383.0; $p = 0.027$	0.009 (negligible)	0.71	1.07	0.92	1.11	6707.5; *ns*	0.009 (negligible)
5. Tiredness	2.92	1.08	2.46	1.13	27319.0; $p < 0.001$	0.037 (small)	2.20	1.24	2.51	1.23	6548.0; *ns*	0.012 (small)
6. Stomach ache	1.35	1.19	0.97	1.03	29041.0; $p < 0.001$	0.023 (small)	0.77	1.09	0.72	1.00	7584.0; *ns*	0 (negligible)
7. Neck or shoulder pain	1.64	1.32	1.73	1.31	33895.0; *ns*	0.001 (negligible)	1.06	1.23	1.34	1.17	6458.0; $p = 0.045$	0.014 (small)
8. Dizziness	1.31	1.24	0.80	1.05	26812.0; $p < 0.001$	0.042 (small)	0.57	0.93	0.81	1.13	6850.0; *ns*	0.006 (negligible)
GBB-8 subscales												
Exhaustion	5.17	2.05	4.36	2.13	27511.5; $p < 0.001$	0.035 (small)	3.89	2.29	4.57	2.29	6388.5; $p = 0.034$	0.016 (small)
Gastrointestinal	2.97	2.10	2.33	1.94	29187.5; $p < 0.001$	0.022 (small)	1.68	1.97	1.74	1.75	7103.0; *ns*	0.003 (negligible)

Musculoskeletal	3.62	2.21	3.71	2.31	34673.5; *ns*	0 (negligible)	2.38	2.23	2.97	2.10	6203.5; $p = 0.015$	0.021 (small)
Cardiovascular	2.66	1.99	1.88	1.73	27336.5; $p < 0.001$	0.037 (small)	1.29	1.69	1.73	1.97	6657.5; *ns*	0.01 (small)
Total	14.42	5.98	12.28	5.79	28168.0; $p < 0.001$	0.029 (small)	9.23	6.02	11.01	6.06	6339.5; $p = 0.028$	0.017 (small)

Note. GBB-8 = the Giessen Subjective Complaints List; *M* = mean; *SD* = standard deviation; *U*-value = the Mann-Whitney *U* value; *ns* = non-significant ($p > 0.05$). Effect size (η^2 = eta squared; interpretation: negligible < 0.01 < small < 0.06 < medium < 0.14 < large). In all cases of statistically significant differences, females aged 18–24 had higher symptom levels than females aged 25–77, whereas males aged 25–70 had higher symptom levels than males aged 18–24.

Source: Authors' own study.

Table 7. Differences in somatic symptoms for groups in different categories of residence, education, marital status and main activity (controlled for age and Bonferroni correction)

Socio--demographics	*N*	GBB-8 Exhaustion			GBB-8 Gastrointestinal			GBB-8 Musculoskeletal			GBB-8 Cardiovascular		
		M (*SD*)	Adjusted M^a (*SE*)	Model parameters and significant differences	*M* (*SD*)	Adjusted M^a (*SE*)	Model parameters and significant differences	*M* (*SD*)	Adjusted M^a (*SE*)	Model parameters and significant differences	*M* (*SD*)	Adjusted M^a (*SE*)	Model parameters and significant differences
Residence													
Villages	224	4.34 (2.25)	4.26 (0.15)	$F(1, 843) = 7.42$, $p = 0.007$, $\eta^2 = 0.009$. Towns > villages	2.37 (2.18)	2.31 (0.14)	*ns*	3.25 (2.33)	3.28 (0.16)	*ns*	2.13 (2.08)	2.10 (0.13)	*ns*
Towns	622	4.70 (2.21)	4.73 (0.09)		2.40 (2.05)	2.43 (0.08)		3.32 (2.30)	3.31 (0.09)		2.03 (1.91)	2.04 (0.08)	
Educational categories													
Primary, vocational and secondary (less educated)	586	4.80 (2.24)	4.74 (0.10)	$F(1, 843) = 4.42$, $p = 0.036$, $\eta^2 = 0.005$. Less educated > higher	2.54 (2.14)	2.48 (0.09)	*ns*	3.33 (2.30)	3.39 (0.10)	*ns*	2.22 (2.04)	2.23 (0.09)	$F(1, 843) = 10.17$, $p = 0.001$, $\eta^2 = 0.012$. Less educated > higher
Higher	260	4.18 (2.12)	4.32 (0.16)		2.07 (1.92)	2.20 (0.15)		3.24 (3.23)	3.08 (0.17)		1.69 (1.70)	1.67 (0.14)	
Marital status													
Single	450	4.61 (2.28)	4.55 (0.11)	*ns*	2.28 (2.08)	2.23 (0.10)	$F(1, 843) = 5.89$, $p = 0.015$, $\eta^2 = 0.007$. In a relationship > single	3.18 (2.37)	3.19 (0.11)	*ns*	2.04 (1.98)	2.02 (0.09)	*ns*
In a relationship	396	4.61 (2.16)	4.67 (0.11)		2.53 (2.09)	2.58 (0.11)		3.44 (2.23)	3.42 (0.12)		2.08 (1.93)	2.11 (0.10)	

Main activity													
Non-active (unemployed or retired)	183	4.90 (2.36)	4.98 (0.16)	$F(1, 841) = 2.95$, $p = 0.032$, $\eta^2 = 0.010$. Non-active > studying	2.61 (2.03)	2.67 (0.15)	$F(1, 841) = 2.63$, $p = 0.049$, $\eta^2 = 0.009$. No *post hoc* differences	3.33 (2.24)	3.31 (0.17)	$F(1, 841) = 2.85$, $p = 0.036$, $\eta^2 = 0.010$. Studying and working > studying	2.57 (2.02)	2.61 (0.14)	$F(1, 841) = 6.16$, $p < 0.001$, $\eta^2 = 0.021$. Non-active > all other groups
Studying	175	4.48 (2.24)	4.29 (0.17)		2.25 (2.27)	2.10 (0.16)		2.84 (2.20)	2.88 (0.18)		2.01 (2.06)	1.91 (0.15)	
Studying and working	177	4.79 (2.27)	4.66 (0.17)		2.63 (2.14)	2.53 (0.16)		3.55 (2.48)	3.58 (0.18)		1.99 (1.93)	1.93 (0.15)	
Working	311	4.41 (2.08)	4.54 (0.13)		2.21 (1.97)	2.31 (0.12)		3.40 (2.29)	3.37 (0.14)		1.83 (1.83)	1.90 (0.11)	

Note. GBB-8 = the Giessen Subjective Complaints List; *ns* = non-significant ($p > 0.05$). Effect size (η^2 = eta squared; interpretation: negligible < 0.01 < small < 0.06 < medium < 0.14 < large). [a] The adjusted means (controlled for the covariate "age"). The covariates in the models were estimated at the following values: age = 27.42.

Source: Authors' own study.

People living in towns had higher exhaustion levels than people living in villages. Less educated people had higher levels of exhaustion and cardiovascular symptoms than people with higher education. People in relationships had higher gastrointestinal symptom levels than the single. People combining studies and work had higher musculoskeletal symptom levels than people who only studied. Unemployed or retired people (non-active group) had significantly higher exhaustion levels than studying people as well as higher cardiovascular symptom levels than other main activity categories. The effect sizes of the differences were negligible or small.

7. Group norms

We provide the current (September 2022) group norms by sten scale for the total GBB-8 scores in females and males separately to help facilitate the interpretation of the GBB-8 scores (Table 8). Sten scores were calculated from Z-scores using the formula: sten = (Z-score × 2) + 5.5 (Eatwell, 1997).

Table 8. The current (September 2022) group norms for the GBB-8

Interpretation	Sten	Total scale scores	
		Females (N = 545)	Males (N = 281)
Low	1	0–1	–
	2	2–4	0
	3	5–7	1–3
Below average	4	8–10	4–6
Average	5	11–13	7–9
	6	14–16	10–12
Above average	7	17–19	13–15
High	8	20–22	16–18
	9	23–25	19–21
	10	26–32	22–32

Source: Authors' own study.

DISCUSSION

The study aimed to explore the psychometric properties of the Polish version of the GBB-8. Overall, the analyses empirically supported the validity and reliability of the questionnaire as a measure of somatic symptoms. The intended 4-factor model with a second-order factor had the best fit to the data, which is in line with the original validation studies (Kleim et al., 2017; Petrowski et al., 2022). Intercorrelations of the GBB-8 subscales showed a similar pattern as in the original study (Kleim et al., 2017). The internal consistency reliability of three subscales (α and $\omega \geq 0.71$) and the total score (α and $\omega = 0.81$) was high, however, in the case of the cardiovascular subscale it was low (α and $\omega = 0.57$). On the one hand, we assume that the reason lies in the acceptable (loadings ≥ 0.4 are considered

meaningful; Pituch, Stevens, 2016), but somewhat low factor loading of the item (*Palpitations or heart pounding*; factor loading = 0.561) on the cardiovascular subscale. On the other hand, in general, very short questionnaires tend to have low reliability. As the GBB-8 subscales consist of two items, the low reliability of the cardiovascular subscale can be justified. Moreover, the GBB-8 is developed for use in epidemiological research and was not designed for diagnosing at the clinical level. Thus, the low reliability of one GBB-8 subscale does not impact the usage of the questionnaire significantly.

Concurrent validity and discriminant validity were also supported. The GBB-8 subscales were significantly and positively correlated with anxiety and depressive symptoms, which is also consistent with other validation studies on the GBB-8 (Kliem et al., 2017). Moreover, our study evidenced that the GBB-8 subscales showed empirically good discriminant validity against the "mental health symptoms" factor. This indicates that the "somatic symptoms" construct is separable from the "mental symptoms" one. Thus, somatic symptoms (assessed by the GBB-8) and mental health ones (the PHQ-4) are independent constructs that can be successively measured by these short questionnaires. On the whole, the Polish version of the GBB-8 seems to have promising psychometric properties.

Exhaustion and musculoskeletal complaints are the leading symptoms in our sample, which are also in line with the German study by Beutel et al. (2020). As for gender differences, our results suggest that females and the non-binary group had more somatic symptoms than males. Similar results regarding higher symptom levels in females compared to males were shown in other studies (Beutel et al., 2020; Kliem et al., 2017). Considering the understudied role of gender identity in health studies (Reisner, Katz-Wise, Gordon, Corliss, Austin, 2016), we analyzed this issue in our research. We can conclude that the non-binary group had the highest levels of somatic complaints. We encourage researchers to take into account the role of gender in their future studies when studying somatic symptoms or mental health ones (Larionow, Mudło-Głagolska, 2022). Our results indicated that further studies should take into account the moderation role of gender when providing research on the GBB-8 questionnaire.

Previous studies evidenced that somatic symptoms were consistently associated with the female gender and higher age (Beutel et al., 2020; Kleim et al., 2017). However, we provided more specific analyses in exploring patterns of correlations between somatic complaints and age in females and males. We noted that younger females suffer more from somatic symptoms than older ones. The opposite trend was characteristic for males, i.e. younger males had fewer somatic symptoms than older ones. It should be stressed that the correlations between age and somatic complaints were small. The differences between the analyzed groups were also characterized by small effect sizes. Considering the low correlations and small effect sizes for presented specific age relationships, we calculated the

current group norms for the GBB-8 for females and males separately, but we did not take into account these small age differences.

Our additional analyses on demographic differences (adjusted for age) showed that in general being less educated, unemployed or retired was related to higher somatic complaint levels (negligible or small effect sizes). In general, people with these characteristics can be identified as risk groups for somatic symptoms. Moreover, unemployed and less educated people were in risk groups for anxiety and depression in a Polish community sample (Larionow, Mudło-Głagolska, 2022). All things considered, unemployed and less educated people have the worst psychosomatic status.

STRENGTHS AND LIMITATIONS OF THE STUDY

The validation study took place in a broad general sample with a wide range of ages. As we calculated the current gender-specific group norms, they may be helpful when comparing somatic symptoms levels across individuals from the general community and clinical samples. This is a cross-sectional study, thus, no conclusion can be drawn regarding the temporal order of somatic symptoms and their correlates.

CONCLUSIONS

The study showed that the Polish version of the GBB-8 seems to have strong psychometric properties. The questionnaire appears to be a useful tool for measuring somatic complaints in epidemiological studies on samples of adults comprehensively and shortly. It presents good support for conducting the studies in different settings (i.e. on clinical and adolescent samples). We assume that the GBB-8 questionnaire can be successfully used in screening studies or online clinical trials on population-based samples considering the problems and opportunities of psychosomatic research (Larionow, 2022).

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ABSTRAKT

Subiektywna lista dolegliwości Giessen (GBB-8) to ośmiopunktowy kwestionariusz samoopisowy służący do oceny występowania symptomów somatycznych. Pierwotnie opracowany w języku niemieckim, a następnie zwalidowany w języku angielskim, GBB-8 został zaprojektowany do pomiaru ośmiu najczęściej ocenianych dolegliwości somatycznych w czterech kategoriach (wyczerpanie, dolegliwości żołądkowo-jelitowe, dolegliwości mięśniowo-szkieletowe, dolegliwości sercowo-naczyniowe). Niniejsze badanie ma na celu walidację polskiej wersji GBB-8 oraz zbadanie rozpowszechnienia symptomów somatycznych w próbie polskiej. Zbadano 846 dorosłych Polaków (545 kobiet, 281 mężczyzn i 20 osób niebinarnych) w wieku 18–77 lat (M = 27,42; SD = 12,67) w okresie od lutego do września 2022 r. Strukturę czynnikową polskiej wersji GBB-8 zweryfikowano za pomocą konfirmacyjnej analizy czynnikowej, natomiast trafność zbieżną i rozbieżną oceniono, analizując związki dolegliwości somatycznych z symptomami depresji i lęku. Wyniki wykazały,

że kwestionariusz GBB-8 charakteryzował się czteroczynnikową strukturą z czynnikiem drugiego rzędu. Podskale GBB-8 dodatnio korelowały z symptomami depresji i lęku. Co więcej, kwestionariusz wykazał dobrą trafność dyskryminacyjną wobec tych symptomów. Rzetelność (*alfa* Cronbacha i *omega* McDonalda) była wysoka dla trzech podskal i wyniku ogólnego oraz zadowalająca dla podskali symptomów sercowo-naczyniowych. Stabilność bezwzględna testu (test-retest) była dobra. Podsumowując, polska wersja GBB-8 ma dobre właściwości psychometryczne. Odnotowano różnice w nasileniu symptomów somatycznych ze względu na wiek, płeć i inne cechy demograficzne. Podkreślono specyficzne zależności wiekowo-płciowe z tymi symptomami. Zaprezentowano również tymczasowe normy (skala stenowa) dla kobiet i mężczyzn osobno.

Słowa kluczowe: medycyna psychosomatyczna; rozpowszechnienie symptomów somatycznych; walidacja; właściwości psychometryczne

APPENDIX A (IN POLISH)

Subiektywna lista dolegliwości Giessen (polska wersja: Larionow i in., 2022)
The Giessen Subjective Complaints List (GBB-8; Kliem i in., 2017)

Instrukcja. Proszę zastanów się przez chwilę, na który z poniżej wymienionych symptomów cierpisz. Oceń nasilenie tych symptomów, zaznaczając swoją odpowiedź. Jeśli nie doświadczasz danego symptomu, zaznacz „wcale".

Lp.	Cierpię z powodu	Wcale	Nieznacznie/ lekko	Nieco/w pewnym stopniu	Znacznie	Bardzo
1	łatwego wyczerpania się	0	1	2	3	4
2	uczucia rozdęcia lub wzdęcia brzucha	0	1	2	3	4
3	bólu pleców	0	1	2	3	4
4	kołatania serca lub nieprzyjemnego uczucia bicia serca	0	1	2	3	4
5	zmęczenia	0	1	2	3	4
6	bólu brzucha	0	1	2	3	4
7	bólu szyi lub ramion/barków	0	1	2	3	4
8	zawrotów głowy	0	1	2	3	4

Instrukcja obliczania wyników GBB-8

Tabela A1 obrazuje wszystkie podskale, a także wskazuje, jak je obliczyć. Im wyższy wynik dla poszczególnych podskal i wyniku ogólnego, tym wyższe nasilenie symptomów somatycznych.

Tabela A1. Obliczanie wyników GBB-8

Podskale/wynik ogólny	Jak obliczyć?	Zakres wyników
Podskale		
1. Wyczerpanie	Zsumuj pozycje 1 i 5	0–8
2. Dolegliwości żołądkowo-jelitowe	Zsumuj pozycje 2 i 6	0–8
3. Dolegliwości mięśniowo-szkieletowe	Zsumuj pozycje 3 i 7	0–8
4. Dolegliwości sercowo-naczyniowe	Zsumuj pozycje 4 i 8	0–8
Wynik ogólny		
Wynik ogólny	Zsumuj wszystkie pozycje	0–32

Polska wersja kwestionariusza GBB-8 może być bezpłatnie użyta w badaniach naukowych bez uprzedniej zgody autorów polskiej adaptacji.