

## The GSDS-26 Male Depression Scale – Polish adaptation and validation of the tool and links to gender stereotypes

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### Summary

**Aim.** The study aimed to create a Polish version of the Gender-Sensitive Depression Screening (GSDS-26) by AM Möller-Leimkühler and to assess its validity and reliability. The tool measures the overall level of depression and the following factors: depressiveness, stress perception, aggressiveness, emotional control, alcohol consumption, and risky behavior. The relationships between depression measured by the GSDS 25 and the subjects' adjustment to stereotypical male roles were also checked.

**Method.** The study included 1,087 participants – 746 men and 341 women from a nonclinical group. In addition to the adapted method, the Beck's Depression Inventory (BDI), Gotland Male Depression Scale (GMDS) by Rutz and Conformity to Masculine Norms Inventory (CMNI-22) by Mahalik were used.

**Results.** The results of the exploratory and confirmatory factor analysis confirmed the adopted six-factor structure. Cronbach's alpha coefficients were satisfactory and comparable to the original version, i.e., the overall score was  $\alpha = 0.92$ , the score for five of the six subscales  $\alpha$  was between 0.80 and 0.85, and for the alcohol consumption subscale  $\alpha = 0.63$ . The GSDS-26 scores, as in the original, showed weak to moderate associations with the subjects' adjustment to stereotypical male roles.

**Conclusions.** The GSDS-26 has satisfactory psychometric properties and is suitable for use in studies of levels of depression specific to men.

**Key words:** GSDS-26, male depression, Polish adaptation

## Introduction

Data from the literature indicate that depression is diagnosed in women two to three times more often than in men [1–3]. At the same time, particularly since the end of the 20<sup>th</sup> century, increasing attention has been paid to the fact that some men may demonstrate different symptoms of this disease than women [4, 5].

The interest in the aforementioned differences stems from a number of reasons, the most prominent among which is the so-called gender paradox [6, 7]. It relies on the fact that the number of fatal suicide attempts in men exceeds that in women by two to six times in most countries around the world [8–10]. In Poland, the prevalence is particularly high – police statistics indicate [11] that 5,108 people died by suicide in 2022, including 4,261 men and 847 women (5:1). Figures similar to those provided, together with gender relations, are revealed in Poland every year.

Given the above data, it seems reasonable to ask whether the lower rate of depression diagnoses in men corresponds to its actual prevalence, or whether one of the reasons (in addition to biological and psychosocial factors, such as men seeking help less frequently) for this state of affairs is the focus in clinical diagnosis on prototypical symptoms of depression, which were created based on data mostly from depressed women [12].

The experience of an early diagnosis of depression and suicide prevention program introduced in Gotland (Sweden) in the 1980s also supports such a view of the presented issues. The said program, intended for general practitioners, focused on typical symptoms of depression. Its implementation led to favorable changes in the incidence of suicidal behavior as well as the diagnosis and treatment of affective disorders almost exclusively among women, with little change for men. Evaluation of the program allowed the authors to conclude that the reason may be differences in symptomatology between male and female depressive syndrome, leading to difficulties in correctly diagnosing and treating male patients. The primary differences were seen in the predominance of atypical and externalizing symptoms in many depressed men – primarily anger, irritability, aggressive and risky behavior, as well as abuse of alcohol and other psychoactive substances [13–16]. It should be noted that ongoing studies also confirm these reports [17–20].

The symptoms of depression listed in the most commonly used tools, for example, the *Patient Health Questionnaire* (PHQ-9), *Beck Depression Inventory* (BDI; BDI-II), *General Health Questionnaire* (GHQ-28), *Hospital Anxiety and Depression Scale* (HADS), are mainly based on signs such as lowered mood, sadness, tearfulness, guilt, lack of energy, apathy, and loss of interest. Thus, they reflect internalizing symptoms of depressive disorders, which are typical for women, and significantly less frequently reported by men [20–23]. For the above reasons, attempts have been made to create methods to study depression in men, referring more to its externalizing symptoms.

The best-known diagnostic method to assess the severity of male depression symptoms is the *Gotland Male Depression Scale* (GMDS) by Rutz [15, 24]. Developed as a screening tool intended for general practitioners, the method has become very popular [25–27]. To date, there have been numerous adaptations of it, including a Polish one

[28]. However, this tool, like others also used in studies of the aforementioned area, has limitations, such as an excessively brief and vague description of externalizing symptoms, ignoring prototypical depressive symptoms, lack of cut-off points, too small and male-only validation samples, or excessively categorical response format [12, 29, 30].

An attempt to go beyond the limitations mentioned above and create a reliable and quick tool for screening depression in men was made by the authors of the *Gender-Sensitive Depression Screening* (GSDS) [12, 31].

The first version of the GSDS contained 33 statements relating to prototypical and externalizing symptoms, the frequency of which was rated on a 4-point Likert scale (0 = never or seldom; 1 = sometimes; 2 = mostly all of the time; and 3 = always). In creating the tool, seven hypothetical constructs were derived from contemporary research on depression in men, namely depressiveness ('classic' symptoms), stress perception, emotional control (suppressing emotions), aggressiveness, alcohol consumption, risky behavior, and hyperactivity. The GSDS-33 scale was validated in three large German non-psychiatric samples of men and women. With the exception of 'hyperactivity', all hypothesized constructs were confirmed by exploratory factor analysis, which revealed a six-factor structure, resulting in a reduction of scale items to 26 [12, 31].

The final version of the GSDS-26 thus consists of the following subscales: depressiveness (items 1, 3, 4, 5, 23), stress perception (10, 12, 19, 21, 24), aggressiveness (2, 8, 9, 13, 15, 17), emotional control (6, 7, 18, 20), alcohol consumption (11, 14, 16), and risky behavior (22, 25, 26). In all the three German studies, the internal consistency of the GSDS-26 was high ( $\alpha = 0.88$ ) and subscale scores were satisfactory (ranging from  $\alpha = 0.60$  to  $\alpha = 0.87$ ) [12]. The validity of the GSDS was confirmed by significant correlations with standard depression screening tools, whereas with regard to traditional male roles, conformity to which is believed to be one of the causes of depression in men, by moderate to weak correlations with Thompson and Pleck's *Male Role Norms Scale* (MRNS) [32]. A cut-off point of 20.5 points was also set for both men and women. The German validation studies also showed that the GSDS-26 is a more sensitive screening tool for the diagnosis of depressive symptoms in men than one-dimensional standard diagnostic tools [12, 31].

The aim of the study presented herein was to create a Polish adaptation of the GSDS-26, validate it and assess its relationships with selected tools for measuring the severity of depressive symptoms and the intensity of male role stereotypes. This study is the first major validation study conducted outside Germany. It was approved by the Research Bioethics Committee of the University of Lodz (Resolution No. 12/KBBN-UŁ/II/2021-22).

## Material and method

The study, conducted in 2021–2022, included 1,194 non-clinical adults from different regions of Poland. However, after excluding people ( $n = 107$ ) who confirmed that they were receiving psychiatric treatment, the study group was reduced to 1,087 people – 746 men (68.63%) and 341 women (31.32%). The respondents included students from various universities (with the exception of psychology students), as well as

employed and unemployed individuals. The mean age of the subjects was 30.46 years ( $SD = 10.08$ ) – the youngest participant was 18, the oldest 75 years old. There were no statistically significant differences between the age of the male and female subjects.

In addition to the validated method, the study used Polish adaptations of the following tools:

- *Beck Depression Inventory (BDI)* as adapted by Parnowski and Jernajczyk [33]. The method is used to determine the subjective severity of depressive symptoms. It contains 21 statements, each of which is scored between 0 and 3 points. The higher the score, the greater the severity of depressive symptoms. A score of more than 12 points indicates the possibility of depression. In the study presented herein, the value of Cronbach's  $\alpha$  coefficient was 0.91.
- *Gotland Male Depression Scale (GMDS)* by Rutz [15, 24] in a Polish adaptation by Chodkiewicz [28]. It consists of 13 statements describing the subject's symptoms over the past month. The items refer to feelings of anxiety, fatigue, excessive stress, frustration, difficulty with self-control, alcohol abuse, as well as changes in previous functioning noted by the respondent and their relatives. The method has good psychometric properties, and Cronbach's  $\alpha$  in this study was 0.86.
- *Conformity to Masculine Norms Inventory (CMNI 22)* [34, 35]. The questionnaire, authored by Mahalik, assesses the congruence of respondents' opinions with a range of dominant cultural norms of masculinity. The abbreviated version consists of 22 items to which the respondent answers on a 4-point scale from 0 to 3, where 0 is "strongly disagree" and 3 is "strongly agree." The total score is made up of 11 subscales dealing with traditional masculine norms, such as emotional control, risk-taking, dominance, pursuit of status, playboy, power over women, primacy of work, self-reliance, violence, winning, disdain for homosexuals. Both the original and abbreviated versions have good psychometric properties, and Cronbach's  $\alpha$  for the total score was 0.76 in the Polish version (0.70 in the original) [34, 36]. The method was used since the authors of the GSDS-26 showed associations of its results with male behavioral norms [31].

### **Development of the Polish version of the GSDS and statistical analyses**

After obtaining the authors' permission for the adaptation, the scale was translated by two independent translators (including a certified translator) from German to Polish. The agreed Polish version was back translated into German, which showed a satisfactory correspondence with the original. An exploratory and confirmatory factor analysis was used to verify the tool's internal structure. It should be noted that the authors of the method did not use confirmatory analysis, but only exploratory analysis [12, 31]. The reliability of the method was assessed by Cronbach's internal consistency alpha ( $\alpha$ ) coefficient. The relevance of the tool was also assessed through an analysis of correlation coefficients between its results and those of selected measurement tools.

In addition, the mean scores obtained by men and women were compared. Finally, given the potential screening nature of the method, a cut-off point for the total score was proposed based on the ROC curve. A significance level of 0.05 was adopted. All calculations were performed using Statistica 13.3 (Statsoft; Tulsa, OK, USA) and STATA 13.

### Exploratory factor analysis

An exploratory factor analysis was first used to verify the scale structure. The established strength of the relationship between the variables (Kaiser-Meyer-Olkin index,  $KMO = 0.90$ ; Bartlett's sphericity test  $p < 0.001$ ) made it possible to carry out the exploratory analysis. The principal components method with Varimax rotation and Kaiser normalization was applied. Using Kaiser criterion for the eigenvalue of the matrix ( $k > 1$ ) and Cattell's scree test (Figure 1), the authors demonstrated and confirmed, as in the original, the six-factor structure of the tool. The result for each factor and their loadings are shown in Table 1. Factor loadings above 0.4 were consid-

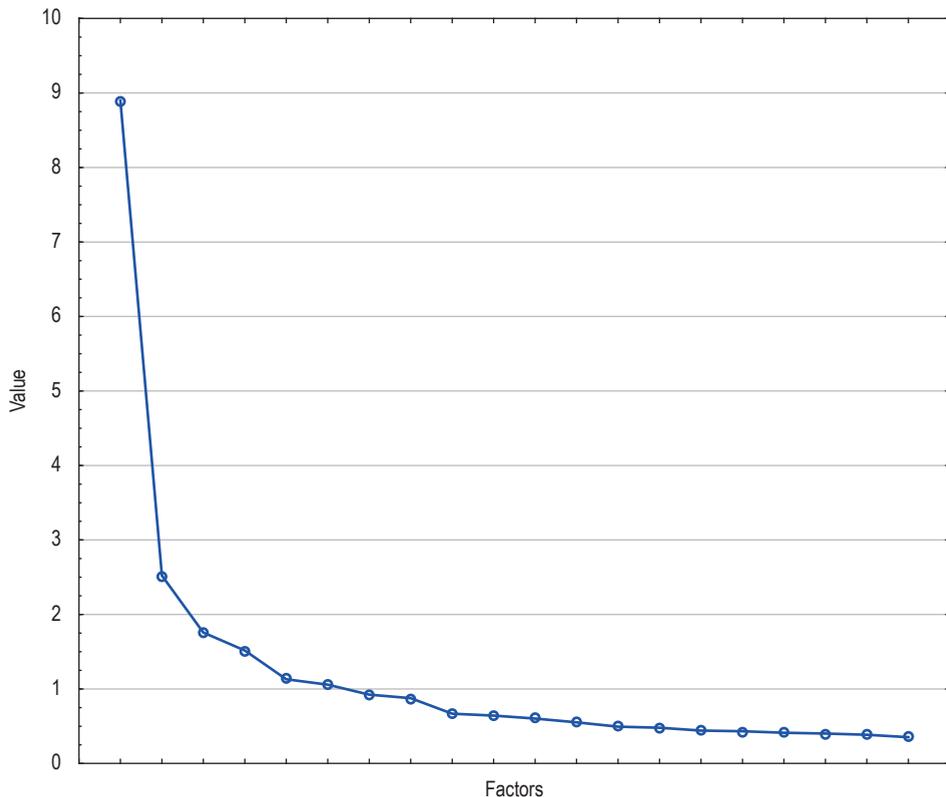


Figure 1. Scree plot of eigenvalues GSDS 26

ered a prerequisite for a statement to belong to a given factor. The two test items are loaded by two factors, but the higher loading force is assumed for factors analogous to the original. In addition, one item reached a loading of 0.33. The extracted factors together explain more than 64% of the variance in the results.

Table 1. Factor loadings for GSDS-26 items of the tested model (n = 1,087)

Item	Depressiveness	Stress perception	Risky behavior	Aggressiveness	Alcohol consumption	Emotional control
1	0.66					
2				0.68		
3	0.66					
4	0.79					
5	0.80					
6						0.87
7						0.81
8				0.60		
9				0.71		
10		0.57				
11					0.85	
12		0.80				
13				0.79		
14					0.83	
15				0.66		
16					0.33	
17				0.59		
18						0.41
19		0.69				
20		0.40				0.61
21		0.78				
22			0.83			
23	0.56					
24	0.43	0.55				
25			0.86			
26			0.78			
Own value	8.89	2.52	1.75	1.51	1.13	1.05

### Confirmatory factor analysis

To verify the assumed factor structure of the tool, a confirmatory factor analysis was also performed using structural equation modeling (STATISTICA 13.3). Indicators were obtained at the limit of the model's acceptability:  $\chi^2(284) = 1738.6$ ,  $p < 0.001$ ; TLI = 0.877; CFI = 0.893; GFI = 0.894; RMSEA = 0.071 (90%CI 0.068–0.074); SRMR = 0.075.

### Internal consistency of the Polish version

The Cronbach's  $\alpha$  coefficient for the entire scale was fully satisfactory at 0.92. The coefficients of five of the six subscales were equally satisfactory ( $\alpha$  between 0.80 and 0.85). Only the "alcohol consumption" subscale scored lower, i.e.,  $\alpha = 0.63$ .

### Construct validity of the Polish version of the GSDS-26

The convergent validity of the method was estimated by analyzing its associations with the results of tools measuring the severity of depressive symptoms – Beck's BDI and Rutz's GMDS, as well as with the CMNI 22, which measures the intensity of beliefs regarding loyalty to traditional male roles (in this case, only male scores were analyzed). The obtained results (Pearson's  $r$  correlation) are shown in Tables 2 and 3.

Table 2. Assessment of construct validity of the GSDS-26 – relationships with the BDI and GMDS (n = 347)

	BDI	GMDS
Stress perception	0.46**	0.48**
Depressiveness	0.82**	0.76**
Aggressiveness	0.51**	0.56**
Emotional control	0.52**	0.41**
Risky behavior	0.16**	0.19**
Alcohol consumption	0.35**	0.31**
GSDS-26 total	0.76**	0.72**

Note: \*\* $p < 0.01$

All dimensions of the GSDS-26 and the total scale score correlate with both the BDI and GMDS (Table 2). Strong and comparable relationships apply to the GSDS-26 total score with BDI and GMDS ( $r = 0.76$ ;  $p < 0.01$  and  $r = 0.72$ ;  $p < 0.01$ , respectively). A very strong relationship is shown by the depressive dimension with both the BDI ( $r = 0.82$ ;  $p < 0.01$ ) and GMDS ( $r = 0.76$ ;  $p < 0.01$ ). In contrast, the weakest correlations refer to the relationship of the risky behavior dimension with the BDI and GMDS ( $r = 0.16$ ;  $p < 0.01$  and  $r = 0.19$ ;  $p < 0.01$ ).

Table 3. Assessment of construct validity of the GSDS-26 – associations with CMNI (n = 200)

	W	EC	RT	V	POW	D	P	SR	PW	DH	ST	T
S	0.22**	-0.04	-0.06**	0.09	0.08	0.16*	0.07	0.14*	0.05	0.06	0.31**	0.36**
D	0.27**	0.17*	-0.04	0.01	0.05	-0.12	0.06	0.31**	0.10	0.10	0.17*	0.17*
A	0.32**	0.03	-0.20**	0.04	0.14*	0.23**	0.12	0.21**	0.08	0.07	0.27**	0.19*
E	0.08	0.52**	0.05	0.15*	0.19**	0.06	-0.05	0.43**	0.13	0.12	0.08	0.32**
R	0.15*	-0.03	-0.10	0.12	0.21**	0.23**	0.27**	0.14*	0.21**	0.13	0.18*	0.32**
A	0.17*	0.13	0.11	0.08	0.05	-0.03	0.18	0.21**	0.10	0.21**	0.18*	0.33**
T	0.31**	0.19*	0.06	0.02	0.15*	0.12	0.13	0.36**	0.15*	0.15*	0.30**	0.36**

\* $p < 0.05$ ; \*\* $p < 0.01$ .

S – stress perception; D – depressiveness; A – aggressiveness; E – emotional control; R – risky behavior, A – alcohol consumption, T – GSDS-26 total score; W – winning; EC – emotional control; RT – risk-taking; V – violence; POW – power over women; D – dominance; P – playboy; SR – self-reliance; PW – primacy of work; DH – disdain of homosexuals; ST – pursuit of status; T – CMNI total

The results of the analysis of the relationship of the adapted scale with the CMNI-22 were as expected. The strongest correlations between the GSDS-26 total score and the CMNI-22 dimensions (Table 3) relate to winning ( $r = 0.31$ ;  $p < 0.01$ ), self-reliance ( $r = 0.36$ ;  $p < 0.01$ ) and pursuit of status ( $r = 0.30$ ,  $p < 0.01$ ). Most of these correlations are at moderate levels. The dimension of stress perception correlates moderately with pursuit of status ( $r = 0.31$ ;  $p < 0.01$ ). The depressiveness dimension is weakly associated with winning ( $r = 0.27$ ;  $p < 0.01$ ) and moderately with self-reliance ( $r = 0.31$ ;  $p < 0.01$ ). Aggressiveness correlates weakly and moderately with four dimensions of the CMNI-22, i.e., winning ( $r = 0.32$ ;  $p < 0.01$ ), dominance ( $r = 0.23$ ;  $p < 0.01$ ), self-reliance ( $r = 0.21$ ;  $p < 0.01$ ), and pursuit of status ( $r = 0.27$ ;  $p < 0.01$ ). As expected, emotional control is most strongly associated with emotion suppression ( $r = 0.52$ ;  $p < 0.01$ ), and self-reliance ( $r = 0.43$ ;  $p < 0.01$ ). Risky behavior correlates weakly with power over women ( $r = 0.21$ ;  $p < 0.01$ ), dominance ( $r = 0.23$ ;  $p < 0.01$ ), playboy ( $r = 0.27$ ;  $p < 0.01$ ), and primacy of work ( $r = 0.21$ ;  $p < 0.01$ ). Alcohol consumption correlates weakly with self-reliance ( $r = 0.21$ ;  $p < 0.01$ ) and disdain for homosexuals ( $r = 0.21$ ;  $p < 0.01$ ). All dimensions of the adapted scale thus correlate with winning and self-reliance. Also, all dimensions of the GSDS-26 and the overall score correlate with the sum of the CMNI-22.

A comparison of the GSDS-26 results in terms of gender differences (Table 4) indicates that men show significantly higher scores than women on the dimensions of emotional control ( $p < 0.001$ ;  $d = 0.24$ , weak effect), risky behavior ( $p < 0.001$ ;  $d = 0.46$ , moderate effect) and alcohol consumption ( $p < 0.001$ ;  $d = 0.34$ , weak effect). In contrast, on the BDI and GMDS scales, it is women who score higher ( $p = 0.001$ ;  $d = 0.31$  and  $p = 0.01$ ;  $d = 0.33$ , weak effects, respectively).

Table 4. GSDS-26 – comparison of male and female results (n = 1,087)

	Men N = 746		Women N = 341		t	p	d
	M	SD	M	SD			
Stress	6.10	3.69	6.03	3.77	0.29	0.76	
Depressiveness	5.02	3.82	4.90	3.71	0.44	0.65	
Aggressiveness	3.58	3.23	3.60	3.08	-0.07	0.94	
Emotional control	6.55	3.20	5.77	3.41	3.69	0.001	0.24
Risky behavior	1.26	2.04	0.47	1.35	6.47	0.001	0.46
Alcohol consumption	2.09	2.11	1.40	1.92	5.11	0.001	0.34
GSDS-26 total	24.63	13.28	22.19	12.46	2.86	0.01	0.19

Table 5. BDI and GDMS score comparison between men and women (n = 1,087)

	Men N=746		Women N=341		t	p	d
	M	SD	M	SD			
BDI	9.06	9.77	12.26	10.85	-4.32	0.001	0.31
GMDS	7.62	7.69	10.27	8.25	-2.69	0.01	0.33

### ROC method cut-off point

A receiver operating characteristic (ROC) curve (Figure 2) was used to evaluate the utility of the GSDS scale as a classifier of dichotomously assessed depression according to the Beck's scale.

The ROC curve helps find the cut-off point for the classifier under test with optimized sensitivity and specificity values. Based on the Youden's index (simultaneous maximization of sensitivity and specificity), a value of 23 on the GSDS (for both men and women) was proposed as the cut-off point, for which 81% sensitivity and 78% specificity were demonstrated for diagnosing depression based on the Beck' scale (Figure 2).

### Recapitulation

The purpose of the article was to validate the Polish adaptation of the GSDS-26. The completed research project made it possible to determine the factor structure, reliability, relevance and cut-off point of the Polish version of the tool. As mentioned above, to the authors' knowledge, the results presented herein are the first attempt outside Germany to adapt the scale.

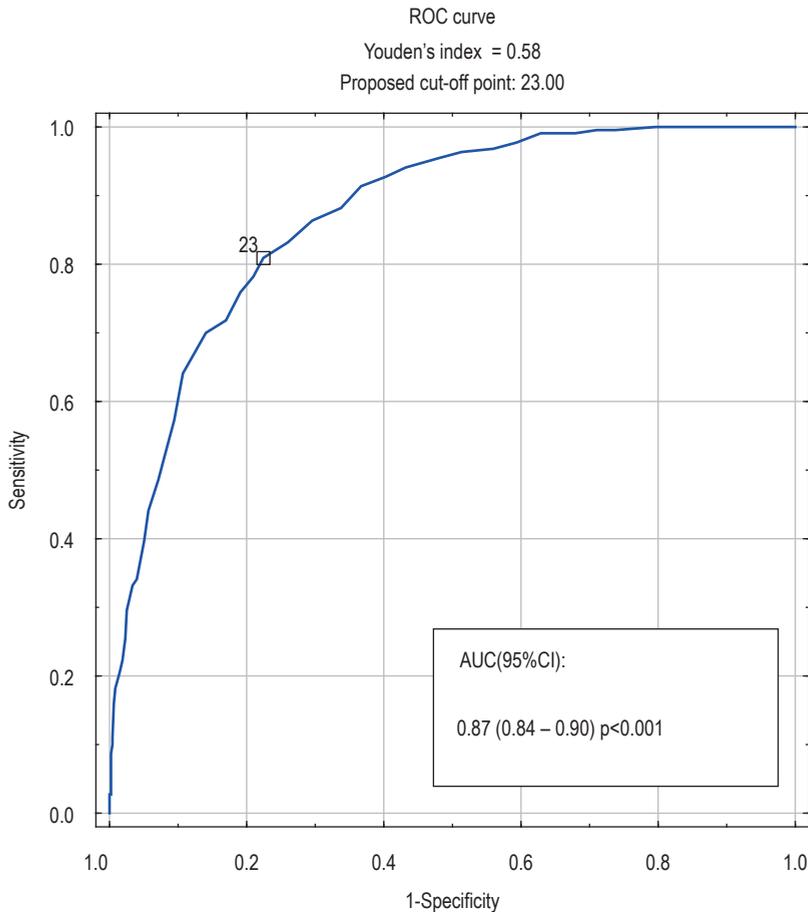


Figure 2. Summarized results of the ROC analysis

Although the issue of gender differences in the clinical picture of depression has been increasingly studied, there is still a lack of tools for accurate screening diagnosis of its symptoms. This issue seems particularly relevant in view of the high and unchanging rates of successful suicide attempts among men over the years [19, 37]. The desire to provide Polish researchers working on male depression with an alternative tool to the GMDS served as additional motivation for working on the Polish version of the GSDS-26. This will make it possible to expand research on male depression.

The conducted analyses allowed confirmation of the 6-factor structure of the scale, originally extracted in its initial version. This was possible using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) with structural equation modeling. The extracted factors together explain more than 64% of the variance in the results. It should be emphasized again that confirmatory analysis was not carried out in German studies.

The Cronbach's  $\alpha$  coefficient for the entire scale was fully satisfactory at 0.92. The coefficients of five of the six subscales were equally satisfactory ( $\alpha$  between 0.80 and 0.85), with the exception of the "alcohol consumption" subscale ( $\alpha = 0.63$ ). These results are fully comparable to the original [12, 31].

The construct validity rates of the GSDS-26 are also satisfactory. High correlation coefficients were obtained with the total score of both the BDI (0.76) and GMDS (0.72). As expected, the strongest correlations of the BDI and GMDS total scores relate to typical depressive symptoms as measured by the GSDS-26 (depressiveness dimension), and the weakest correlations relate to the dimensions of alcohol consumption and risky behavior. This supports the assumption that both the BDI and GMDS are scales with lower sensitivity to externalizing depressive symptoms specific to men. It is worth noting that in order to determine relevance in the German study, the *Kurzform der Allgemeinen Depressionsskala* (ADS-K) method, unknown in Poland, was used, and the correlation of ADS-K scores with the GSDS-26 was  $r = 0.79$  [12]. However, other German studies also calculated the correlation of the GSDS with the BDI II, and the results were comparable to ours, which used the BDI. The GSDS-26 total score in men correlated with the BDI II at  $r = 0.69$  in this study, and among the subscales, the strongest correlations were reported between the BDI II and depressiveness ( $r = 0.73$ ) [38].

Further analyses regarding the relationship between conformity to traditional male behavioral patterns and depressive symptoms are also consistent with the original tool and the literature [12, 31, 39–42]. All dimensions of the adapted scale correlate with the norms of winning and self-reliance, as well as with the CMNI-22 total score. Interestingly, although the presented study used a different scale from the original to test compliance with traditional male roles (due to the lack of a Polish version of Thompson and Pleck's MRNS), but the strength of the associations of the GSDS-26 with the results of the two scales is similar – the correlation of the MRNS total score with the GSDS was  $r = 0.30$  in the German study [12], while in ours the correlation coefficient of the GSDS-26 with the CMNI-22 was  $r = 0.36$ .

In the study group, men scored significantly higher than women on the GSDS-26 total score and dimensions such as emotional control, risky behavior and alcohol consumption. These results would indicate that the GSDS-26 is a scale with greater sensitivity of depressive symptoms in men than the BDI or GMDS. Since the effect size in the mentioned cases is not high, it is worth conducting further investigation on a larger group of people. It is interesting to note that there were no statistically significant differences between men and women with regard to the GSDS-26 total score in the German study. While women scored higher on the depression and stress subscales (these differences did not occur in our study), men – as in our study – had significantly higher scores on the alcohol consumption subscale. In contrast, with regard to suppression of emotions, men scored higher in the German study, but the results were not statistically significant (they were significant in our study) [31]. This phenomenon requires further research.

Determining the cut-off point for the Polish version of the scale (it was set at 23 points) was an important outcome of the presented study. The cut-off point was 20.5

in the German study. It is worth noting that a different method was used as the reference point in the German study, namely the ADS-K [12, 31], while in our study we used Beck's BDI.

In conclusion, despite the not fully satisfactory result of the confirmatory analysis, it can be said that the GSDS-26 allows for accurate and reliable diagnosis of both externalizing and internalizing symptoms of male depression.

A limitation of the study is the lack of clinical groups, mainly of both sexes suffering from depression. These findings could significantly enrich knowledge of gender differences in externalizing symptoms among patients suffering from affective disorders.

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