THE METHODS OF DATA COLLECTION
AND ANALYSIS
IN EDUCATIONAL RESEARCH

METODY ZBIERANIA
I ANALIZY DANYCH
W BADANIACH EDUKACYJNYCH

Barbara Ciżkowicz

Kazimierz Wielki University in Bydgoszcz, Poland
e-mail: cizbar@ukw.edu.pl
ORCID: https://orcid.org/0000-0002-7176-0520

Psychometric Properties of the Polish Version of the Social Interaction Anxiety Scale and the Social Phobia Scale: Validity, Reliability and Factor Structure

Abstract

Social anxiety is the experience of stress and discomfort associated with social situations and the fear of negative evaluation by others. The aim of this study was to assess the psychometric properties of the Polish version of two related scales: Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS). The study was conducted on a non-clinical sample of 698 people (M=26.1; SD=8.18; 55% female). Factor structure, internal consistency and content validity, criterion convergent and discriminant validity were assessed for the SIAS and SPS, analysed separately and together. Reliability of the scales was high. Values of all Cronbach's α and McDonald's ωt coefficients were > 0.90. The factor structure of the scales was confirmed. The fit indices had acceptable values for the single factor SIAS model, three factor SPS model and for the bifactor model for the combined SIAS + SPA scales. It was found that the Polish versions of the SIAS and SPS scales are tools with good psychometric properties and can be used together to assess social anxiety in general or employed separately as reliable measures of two aspects of social anxiety: fear of interaction (SIAS) and fear of negative evaluation (SPS).

Keywords: social anxiety, Social Phobia Scale, Social Interaction Anxiety Scale, bifactor models, adulthood.

Introduction

Social anxiety (SA) is the experience of stress, discomfort and fear associated with social interaction, as well as fear of being observed by others and of being negatively evaluated by them. SA occurs quite commonly resulting in lowered mood (Deros et al., 2018), deterioration of well-being, reduced mindfulness, increased sense of loneliness (Öztekin, 2024) and many other adverse changes in an individual's state (Heimberg et al., 2014) and, as a result, leads to conscious avoidance of social situations. Furthermore, according to the cognitive-behavioural model of generalised problematic Internet use (GPIU), social anxiety causes a preference for online contact, increasing the risk of Internet addiction (Caplan, 2003).

Excessive levels of social anxiety are considered a disorder (social anxiety disorder, SAD) and is included in the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5; APA, 2013). The percentage of people with SAD reported in different studies varies (1.9–12%) and depends on the country, age group and research methodology used (Jefferies & Ungar, 2020). An additional reason for these differences is the difficulty in distinguishing SAD from poor social skills or shyness. SAD symptoms usually appear in childhood or adolescence. A proper diagnosis of people with SAD makes it possible to mitigate disruptions in their functioning through appropriate education or intervention. Research indicates that social anxiety increases mainly among adolescents (Essau et al., 1999; Deros et al., 2018; Jefferies & Ungar, 2020). Therefore, screening during adolescence seems particularly justified (Kearney, 2005).

There are a number of scales to measure SAD, designed for different age groups, varying in theoretical assumptions (Carleton et al., 2007), psychometric properties, form (Liebowitz, 1987) and usefulness in clinical, screening and scientific studies (Smith et al., 2021; Cook et al., 2022).

The Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS) developed by Mattick & Clarke (1998) are widely used, self-report scales for the study of social anxiety. Since their publication by Mattick and Clarke (1998), this article has been cited 4,635 times (Google Scholar, 2024). This demonstrates the large impact that SIAS and SPS have had on social anxiety research. Mattick & Clarke assumed that social anxiety consists of

two components, i.e. the tendency to avoid social situations due to the discomfort experienced in the presence of others and the fear of being observed by others and being negatively assessed by them, and that it is possible to have only one component without high levels of the other. This justified the construction of two separate scales that could be used together (Carleton et al., 2009) or separately (aan het Rot et al., 2022).

The SIAS and SPS items were partly drawn by the authors from the pool of items used in earlier scales and partly created based on clinical interviews with patients with social anxiety. The SPS contains 20 items. The SIAS most often exists in one of two forms: 20-items (Safren et al., 1998; Šipka et al., 2023), provided by Mattick & Clarke in their unpublished manuscript, or 19-items created after the authors removed item 5: "I find it easy to make friends of my own age". These scales can be used to study adults (Mattick & Clarke, 1998; aan het Rot et al., 2022) and adolescents (Deros et al., 2018).

The SIAS measures the anxiety felt by an individual when meeting and talking to other people. The SIAS items examine stress and avoidance, the anxiety associated with being in a variety of social situations such as meeting and talking with strangers, with friends or members of the opposite sex, maintaining eye contact and expressing opinions. The SPS measures anxiety about being watched and judged by others while doing routine activities such as eating, drinking, writing, working, traveling on public transport, or simply being observed. The person fears being judged as sick, strange, shaking, blushing, or showing physical signs of distress (Mattick & Clarke, 1998; Safren et al., 1998; Cook et al., 2022).

The SIAS and SPS scales are used in research, screening and clinical studies. They are sensitive to changes after both cognitive-behavioural and pharmacological treatment of SAD (Caballo et al., 2013; Carter et al., 2014; Deros et al., 2018). Furthermore, the scales discriminate not only between clinical and non-clinical groups (Brown et al., 1997; Carleton et al., 2009; de Beurs et al., 2014; Gomez & Watson, 2017; Šipka et al., 2023) but also between clinical groups (Brown et al., 1997; Mattick & Clarke, 1998).

Some researchers use the SIAS and SPS together to determine levels of social anxiety (Mattick & Clarke, 1998, Safren et al., 1998; Gomez & Watson, 2017). Others see the validity of using the scales separately (Jefferies & Ungar, 2020; aan het Rot et al., 2022).

The psychometric properties of SIAS and SPS are fully satisfactory, both in the cultural adaptations carried out (Caballo et al., 2013; de Beurs et al., 2014), and in other studies (Mörtberg et al., 2017; Chen et al., 2020). Both scales have high internal consistency (Cronbach's α: 0.87 to 0.94) and stability (0.86 to 0.93). Convergent validity (depression and anxiety: rs = 0.32 – 0.56; loneliness rs = 0.49 – 0.54) and discriminant validity have also been confirmed (Brown et al., 1997; Mattick & Clarke, 1998; Carleton et al., 2009; de Beurs et al., 2014).

The only unstable property of the scales is their structure. This applies not only to the number of factors but also to the items included in them. This may be partly due to the a posteriori fixed internal structure of the scales and partly to the ways in which the analyses are carried out (EFA[1], CFA[2], ESEM[3], IRT[4]).

The aim of the study was to assess the psychometric properties of the Polish version of two related scales used to test social anxiety: the Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS) in the version as presented by Mattick & Clarke (1998). Reliability, scale structure, as well as content, convergent and discriminant validity were examined. Psychometric properties were assessed separately for the SIAS and the SPS, as well as for the combined scales (SIAS + SPS: 39 items).

Method

Participants and procedure

The sample comprised 698 Polish participants. In the first study, 514 people completed the questionnaire (M = 24.7 years old ± 5.5 SD). They were full-time and part-time students studying mainly psychology, pedagogy and computer science, in whom fear of social interaction, social phobia and feel-

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[1] Exploratory Factor Analysis.
[2] Confirmatory Factor Analysis.
[3] Exploratory Structural Equation Modeling.
[4] Item Response Theory.

ings of loneliness were examined. In addition, questions on gender, age and place of residence were included.

In the second study, 232 people (M = 28.4 years old ± 11.5 SD) recruited with the snowball sampling method completed the questionnaire. A request to participate in the study and a link to the questionnaire was sent to people who knew the sender. People under the age of 18 were excluded from the study. Persons who declared that they suffered from mental illness (N = 48) were excluded from the sample. Data from these individuals were used only to assess discriminant validity. The study was anonymous, and participation was voluntary. In addition to the SIAS, SPS, and questions about the participants' age, gender, and education, the study examined depression, anxiety and emotional well-being.

The research was approved by the Research Ethics Committee of the Faculty of Psychology at UKW, Poland (No1/04.09.2024).

The following variables were used to verify the convergent validity of the Polish version of the SIAS and SPS: loneliness, depression, anxiety, and perception of emotional well-being.

The demographic characteristics of the participants are shown in Table 1.

Table 1. Sociodemographic characteristics of the sample (N = 698)

Variable		Students $N=514$		General sample $N=184$		Total sample $N=698$	
		n	%	n	%	N	%
Gender	males	219	42.6	92	50.0	311	44.6
	females	295	57.4	92	50.0	387	55.4
Residence place	**village**	101	19.6	43	23.4	144	20.6
	small town	160	31.1	72	39.1	232	33.2
	big city	253	49.3	69	37.5	322	46.2
Educational level	< secondary			5	2.7		
	secondary			137	74.5		
	higher			42	22.8		

Source: Own research results.

Measures

Social anxiety was measured using the SIAS and SPS, consisting of 19 and 20 self-report items, respectively. Each item was rated on a five-point Likert scale, ranging from 0 = "not at all" to 4 = "strongly agree" (Mattick & Clarke, 1998). Items 8 and 10 of the SIAS had reverse coding. For the SIAS, the score ranged from 0 to 76, and for the SPS from 0 to 80. A higher score indicated greater anxiety.

The SIAS and SPS were translated into Polish by two independent translators who were psychologists. The agreed versions were created and then translated back into English by a native English speaker. The back translation was compared with the original SIAS and SPS items. To ensure content validity, four non-psychologists were additionally asked to complete the questionnaires and provide any comments on the items, and two bilinguals were asked to compare the items in both language versions. A logical analysis of the comments collected was carried out, which were mainly concerned with the non-obvious meaning of words or phrases. After minor corrections, linguistic and measurement equivalence of the scales was achieved. The values of Cronbach's α and McDonald's ω coefficients obtained in the current study are provided in Tables 2 and 3, respectively, and the full SIAS and SPS versions are provided in (Appendix 1).

Loneliness was measured with the 11-item De Jong Gierveld Loneliness Scale (DJGLS; De Jong Gierveld & Kamphuis, 1985; Grygiel et al., 2013). Respondents rated each item on a Likert scale ranging from 1 = "definitely not" to 5 = "definitely yes"'. Five items were reverse coded (item: 1, 4, 7, 8, 11). The higher the score, the greater the feeling of loneliness. In previous studies, Cronbach's α were high and equal to 0.89 for the English version and 0.90 for the Polish version.

Anxiety and depression were examined using the 4-item Patient Health Questionnaire for Depression and Anxiety (PHQ–4), designed for screening. Participants indicated the frequency of their feelings in the past 2 weeks using a 4-point Likert scale, from 0 = "not at all" to 3 = "nearly every day". The first two items measured anxiety, the next two measured depression. The total score ranges from 0 to 12 (Kroenke et al., 2009; Larionow & Mudło-Głagolska, 2023). In the original study, the Cronbach's α value was 0.85.

General emotional well-being was examined with the World Health Organization 5-item scale (WHO-5; Cichoń et al., 2020). Participants indicated how they felt over the past two weeks with a Likert scale from 0 = "never" to 5 = "all the time". The sum of the scores for the 5 items ranged from 0 to 25. The higher the score, the better the well-being. The Cronbach's α coefficient was 0.87.

The Cronbach's α coefficients obtained in the current study for the DJGLS, PHQ-4 and WHO-5 scales were presented in Table 6.

Data analysis

Statistical analyses were conducted using SPSS v. 29 (descriptive statistics, correlation coefficients, Cronbach's α; power of tests) and R packages (semTools v. 0.5-6; Jorgensen et al., 2022; R Core Team, 2022; lavaan v. 0.6-10; Revele, 2022). The data were checked for missing values, multivariate outliers and normality of distributions (skewness < 3 and kurtosis < 8; Kline, 2015). Internal consistency was tested with Cronbach's α and McDonald's ωt (α and ωt > 0.7 are acceptable; 1999). Both ωt (total) and ωh (hierarchical) were calculated using hierarchical analyses with the Schmid and Leiman (1957) procedure. An ωh value above 0.7 and Explained Common Variance (ECV) general factor > 0.75 indicates the essential unidimensionality of the scale (Rodriguez et al., 2016), and an ωh close to 0.5 indicates the meaning of the subscales (Reise et al., 2013; Ciżkowicz, 2018). Confirmatory factor analysis (CFA) was used to examine the structure of the SIAS and SPS.

Model fit was assessed with: the Satorra-Bentler correction of χ2, *Standardized Root Mean Square of Residual* (SRMR), *Root Mean Square Error of Approximation* (RMSEA), *Comparative Fit Index* (CFI) and *Tucker-Lewis Index* (TLI). When SRMR and RMSEA < 0.05 and CFI and TLI > 0.95, the model fit was good, and when SRMR and RMSEA < 0.08 and CFI and TLI > 0.90, the model fit was acceptable (Hu, Bentler, 1999). For nested models, Δ CFI > 0.010 supplemented by Δ RMSEA > 0.015 indicated significant differences between the compared models (Chen, 2007). Local fit was estimated using modification indices (Schermelleh-Engel & Moosbrugger, 2003).

Replicability of the study (Stanley et al., 2018) was assessed by analysing the power of a priori tests assuming: type I error = 0.05 and medium effect sizes. Test power for bivariate correlations ($n1$ = 514; $n2$ = 184) = 1.00; for between-group differences ($n1$ = 184; $n2$ = 48) = .924; for CFA (N = 698) for all models (df: in the range 116 to 701) = 1. This means that the replicability of the results reaches 92% or more (cut off > 80%; MacCallum et al., 1996; Arend & Schäfer, 2019).

Results

Internal consistency

The SIAS and SPS were analysed separately and together (SIAS + SPS). The mean, standard deviation, item-total correlation and Cronbach's α were shown in Table 2. In addition, skewness and kurtosis were calculated. For the SIAS, skewness ranged from –0.02 to 0.95, and kurtosis from –1.12 to 0.54, and for the SPS, the skewness values ranged between 0.12 and 1.62, and the kurtosis ranged between –0.96 and 0.66. Only for two SPS items (10 and 19) was the kurtosis higher, at 2.68 and 2.96, respectively. These values showed that the item responses had distributions slightly different from the normal distribution. The results for the SIAS + SPS were shown at the bottom of Table 2.

Table 2. Descriptive Statistics of Items, Item-total Correlation and Cronbach's α for the SIAS, SPS and SIAS+SPS (N=698)

SIAS				SPS			
Item	M	SD	r_{it}	Item	M	SD	r_{it}
1	2.1	1.12	0.56	1	1.7	1.14	0.53
2	1.4	1.15	0.57	2	1.1	1.11	0.45
3	2.0	1.19	0.57	3	1.5	1.15	0.48
4	1.2	1.02	0.51	4	1.1	1.10	0.65
5	1.0	1.05	0.62	5	1.3	1.20	0.52

Table 2 (continued)

	SIAS				SPS		
Item	*M*	*SD*	r_{it}	Item	*M*	*SD*	r_{it}
6	1.1	0.99	0.62	6	1.7	1.20	0.62
7	1.1	1.01	0.55	7	1.1	1.13	0.60
8	1.8	1.29	0.40	8	1.1	1.08	0.68
9	1.2	1.01	0.70	9	1.1	1.05	0.59
10	1.6	1.18	0.34	10	0.6	0.78	0.53
11	2.0	1.06	0.58	11	1.2	1.16	0.64
12	1.3	0.91	0.35	12	1.4	1.13	0.65
13	1.6	1.21	0.50	13	1.4	1.22	0.54
14	1.6	1.12	0.72	14	1.1	1.07	0.51
15	1.7	1.14	0.68	15	1.4	1.13	0.65
16	1.7	1.10	0.62	16	1.2	1.12	0.68
17	1.6	1.10	0.57	17	1.1	1.11	0.54
18	1.3	1.01	0.72	18	1.9	1.24	0.54
19	1.7	1.15	0.44	19	0.7	0.89	0.58
				20	1.6	1.17	0.70
Cronbach's α = 0.91 Average Inter-item Correlation = 0.35				Cronbach's α = 0.92 Average Inter-item Correlation = 0.38			
SIAS + SPS: Cronbach's α = 0.95				Average Inter-item Correlation = 0.32			

Note: r_{it} = item-total correlation

Source: Own research results.

Item-total correlations of both scales were satisfactory (r_{it} > 0.40). Only items 10 and 12 of the SIAS were slightly lower. Cronbach's α showed high reliability for each of the three scales (see Table 2). Furthermore, Cronbach's α calculated for the three SPS factors proposed by Mattick & Clarke (see Appendix 1) had values of 0.88; 0.70; 0.77, respectively. For SIAS + SPS, the

item-total correlation was lower than 0.40 only for the three SIAS items: 8 (0.33), 10 (0.27) and 12 (0.35).

The values of McDonald's ωt and ωh and ECV of the general factor were given in Table 3. ωh was an estimator of the percentage variance of raw scores associated with the variance of the general factor.

Table 3. McDonald's ω and ECV (N = 698)

Scale	ωt	ωh	ECV
SIAS	0.92	0.79	0.74
SPS	0.93	0.83	0.79
SIAS+SPS	0.95	0.74	0.63

Note: ECV = Explained Common Variance of the general factor

Source: Own research results.

For the SIAS scale (see Table 3), ωh = 0.79 indicates that (100% * 0.79 / 0.92) = 86% of the reliable variance in SIAS scores was related to the general factor, and only 14% could be attributed to multidimensionality caused by specific factors. Furthermore, only 8% (1.0–0.92) was due to random error. For SPS, (100% * 0.83 / 0.93) = 89% of the reliable total variance was related to the general factor and only 11% to the specific factors. The eigenvalues of the specific factors combined with the ECVs and ωh of the general factor indicated that the scales were essentially unidimensional (Rodriguez et al., 2016).

For SIAS + SPS, the variance explained by the general factor was lower and accounted for 78% of the reliable total variance.

Structural validity

For the SIAS, the M1 and M2 models were tested (see Table 4). The M2 model was the M1 model with four correlated residuals. For the SPS, the M3 and M4 models were tested. The M3 model was a three-factor model by Mattick & Clark (Appendix 1), and in the M4 model, correlated residuals were

added. For the SIAS + SPS, three models were tested: a first-order model with two correlated factors (M5), a bifactor model with a general factor and two uncorrelated factors (B-M5) and model B-M6, in which correlated residuals were added to B-M5.

Table 4. Fit Indices for Measurement Models for the SIAS and SPS and SIAS + SPS (N = 698)

Model	$S\text{-}B\chi^2$	df	CFI	TLI	SRMR	RMSEA [90%CI]
SIAS						
M1	627.50	152	0.886	0.872	0.049	0.067 [0.062-0.072]
M2	408.52	148	0.937	0.928	0.041	0.050 [0.045-0.055]
SPS						
M3	534,56	167	0.910	0.898	0.046	0.056 [0.052-0.061]
M4	431.79	164	0.935	0.924	0.042	0.048 [0.044-0.053]
SIAS + SPS						
M5	1936.87	701	0.863	0.855	0.051	0.050 [0.048-0.053
B-M5	1486.36	663	0.909	0.898	0.041	0.042 [0.040-0.045]
B-M6	1462.79	661	0.911	0.900	0.040	0.042 [0.039-0.044]

Note: M1-one-factor model; M2-M1 with correlated residuals si5-si6; si6-si18; si8-si10; si17-si18; M3-three-factors model; M4-M3 with correlated residuals sp6-sp17; sp8-sp16; sp18-sp20; M5- two-factors model; B-M5-bifactor model (general+SIAS-19+SPS-20); B-M6 -B- M5 with correlated residuals si1-si16, si2-si3; $S\text{-}B\text{-}\chi^2$ = chi-square with a Satorra-Bentler correction; SRMR = Standardised Root Mean Square Residual; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Squared Error of Approximation; CI = confidence interval.

Source: Own research results.

The fit indices of the one-factor model M2 for SIAS and the three-factor model M4 for SPS were acceptable. For the SIAS + SPS, the RMSEA and SRMR values indicated a good fit for all three models (M5, B-M5 and B-M6), but the CFI and TLI for the M5 and B-M5 models were too low. All fit indices were acceptable only for model B-M6.

Table 5 shows the standardised factor loadings of the three measurement models adopted.

Table 5. Standardised Factor Loadings in Measurement Models CFA (N = 698)

| | SIAS | | | | SPS | | | | |
| | M2 | B-M6 | | | M4 | | | B-M6 | |
Item	F	g	F1	Item	F1	F2	F3	g	F2
si1	0.68	0.72	0.00 ni	sp1		0.63		0.59	0.25
si2	0.69	0.67	0.12*	sp2	0.52			0.32	0.43
si3	0.71	0.69	0.11*	sp3	0.56			0.46	0.32
si4	0.54	0.44	0.39	sp4	0.76			0.58	0.46
si5	0.66	0.54	0.56	sp5			0.65	0.48	0.42
si6	0.61	0.51	0.62	sp6	0.81			0.84	0.22
si7	0.58	0.48	0.36	sp7		0.76		0.49	0.49
si8	0.52	0.49	0.18**	sp8	0.78			0.53	0.58
si9	0.75	0.70	0.21	sp9			0.67	0.42	0.52
si10	0.41	0.35	0.19**	sp10		0.47		0.27	0.38
si11	0.66	0.67	0.03 ni	sp11	0.78			0.58	0.52
si12	0.34	0.31	0.10*	sp12			0.81	0.62	0.45
si13	0.65	0.65	0.06 ni	sp13	0.69			0.53	0.42
si14	0.86	0.88	0.07 ni	sp14			0.63	0.39	0.45
si15	0.82	0.83	0.07 ni	sp15			0.81	0.63	0.43
si16	0.73	0.76	0.01 ni	sp16	0.81			0.60	0.54
si17	0.63	0.63	0.22	sp17	0.65			0.39	0.53
si18	0.73	0.68	0.46	sp18	0.68			0.77	0.16**
si19	0.54	0.56	0,08 ni	sp19		0.61		0.31	0.48
				sp20	0.86			0.81	0.35

Note: M2- M1-one-factor model the SIAS with correlated residuals si5-si6; si6-si18; si8-si10; si17-si18; M4-three-factors model with correlated residuals sp6-sp17; sp8-sp16; sp18-sp20; B-M6-bifactor model (general+SIAS-19+SPS-20) with correlated residuals si1-si16, si2-si3; ni $p \geq 0.05$; * $p < 0.05$; ** $p < 0.01$; unmarking $p < 0.001$.

Source: Own research results.

SIAS (M2) and SPS (M4) factor loadings were almost all > 0.50 (see Table 5) and statistically significant (p < 0.001). The exceptions were two SIAS items (si10 and si12) and one SPS item (sp10). The distribution of factor loadings for the SIAS + SPS bifactor model (B-M6) confirmed the unidimensionality of the SIAS. In this model, the factor loadings for the general factor were mostly > 0.50, but the factor loadings for the F1 factor in B-M6 were low – for thirteen items, they were < 0.30, and for seven items, it was statistically insignificant – meaning that these items mainly explain the common variance in the general factor.

Convergent and discriminant validity

The convergent validity of the Polish version of the SIAS, SPS and SIAS + SPS was examined through the relationship with loneliness, the well-being index and the patient health questionnaire and its anxiety and depression subscales. Descriptive statistics for quantitative variables and Pearson's correlations were calculated. All variables had a distribution only slightly different from the normal distribution (Table 6).

Table 6. Descriptive Statistics and Correlations of all Quantitative Variables (N=698)

Variable	1. SIAS	2. SPS	3. SIAS + SPS	4. DJGLSa	5. PHQ-4b	6. PHQ-4 Anxietyb	7. PHQ–4 Depressb	8. WHO-5b
1		0.69***	0.91***	0.45***	0.42***	0.42***	0.45***	-0.43***
2			0.93***	0.43***	0.63***	0.58***	0.56***	-0.46***
3				0.47***	0.60***	0.57***	0.53***	-0.51***
M	28.8	25.2	54.0	25.3	4.6	2.6	2.1	12.1
SD	12.79	14.10	24.75	8.80	3.15	1.66	1.82	5.46
Skew	0.40	0.70	0.52	0.58	0.55	0.55	0.62	-0.18
Kurtosis	-0.17	0.59	0.21	-0.27	-0.61	-0.46	-0.61	-0.77

Note: SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; DJGLS = De Jong Gierveld Loneliness Scale; PHQ–4 = Patient Health Questionnaire; WHO-5 = World Health Organization Well-Being Index; [a] = sample N = 514; [b] = sample N = 184; *** p < 0.001.

Source: Own research results.

Pearson correlation coefficient values confirmed convergent validity for each of the three scales. Correlations of social anxiety scales with the criterion variables were medium and significant (p < 0.001) and positive for loneliness, depression and anxiety, but were negative for general emotional well-being.

Discriminant validity was assessed by examining whether levels of social anxiety as measured by the SIAS, SPS and SIAS + SPS were significantly higher in the mental health treatment group than in the general population (Table 7).

Table 7. Descriptive Statistics and Between-Group Differences for the General and the Mental Health Treatment Sample and Effect Size (healthy n_1 = 184; sick n_2 = 48)

Variable		M	SD	Skew	Kurtosis	t(230)	Cohen's d
SIAS	healthy	29.9	12.6	0.30	-0.21	4.80***	0.78
	sick	39.9	13.8	-0.86	1.01		
SPS	healthy	25.5	13.6	0.61	0.58	5.02***	0.81
	sick	37.0	16.3	-0.15	-0.72		
SIAS+SPS	healthy	55.4	24.2	0.25	-0.20	5.37***	0.87
	sick	77.0	27.0	-0.81	0.85		

Note: SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; *** p < 0.001.

Source: Own research results.

Those in mental health treatment had significantly higher (p < 0.001) levels of social anxiety than those in the general sample (Table 7). This was true for both social interaction anxiety (SIAS) and social phobia (SPS), and consequently for social anxiety involving both aspects together (SIAS + SPS). The effect sizes measured with Cohen's d were large.

Discussion

The main aim of the study was to test the psychometric properties of the SIAS and SPS (Mattick & Clarke, 1998) in a Polish non-clinical sample. These scales are widely used in the study of social anxiety in clinical and non-clin-

ical populations and can be used together or separately to provide information about social interaction anxiety (SIAS) or social phobia (SPS). Therefore, the analysis was conducted separately for each scale and for the combined scales (SIAS + SPS). The study used the 19-item SIAS and 20-item SPS (Mattick & Clarke, 1998).

The study was conducted on a sample of 698 people (*M*age = 26.1 SD = 8.17) with no mental health problems. As a result of the analyses carried out, it was found that:

- The item-total correlations of both scales (Table 2) were fully satisfactory and similar to those obtained by Mattick & Clarke (1998) on an Australian general sample.
- The reliability was high. For the SIAS, SPS and SIAS + SPS, Cronbach's α and McDonald's ω total (ωt) > 0.90, and for the three factors the SPS > 0.70.
- McDonald's ω hierarchical (ωh) and ECV of the SIAS and SPS general factors (Table 3) indicated an essential unidimensionality of the scales (Rodriguez et al., 2016).
- For the combined (SIAS + SPS) scales, both McDonald's ωh and ECV of the general factor had lower values than for the SIAS and SPS analysed separately (Table 3). This confirmed the possibility of using the SIAS + SPS together to examine social anxiety with two separate factors as well as using each scale separately.
- As a result of the CFA, the M2 model was adopted for the SIAS, M4 for the SPS and B-M6 for the SIAS + SPS (see Table 4). In these models, almost all factor loadings of the SIAS and SPS were > 0.50 and statistically significant (p < 0.001). The same was true for the general factor in the bifactor model (B-M6, Table 5).
- Convergent validity was confirmed by examining the relationship between social anxiety and loneliness, depression, anxiety and general emotional well-being. Social anxiety correlated moderately with each criterion variable but positively with the sense of loneliness, depression and anxiety, and negatively with well-being (Table 6). This was in line with the assumptions (Heimberg et al., 2014; Deros et al., 2018).
- Discriminant validity was also confirmed (Table 7). As expected, the level of social anxiety in people undergoing mental health treatment

was significantly higher ($p < 0.001$) than in the general sample (Brown et al., 1997; Mattick & Clarke, 1998; Carleton et al., 2009; de Beurs et al., 2014). The effect sizes measured using Cohen's *d* were large.

To summarise, the psychometric properties of the SIAS, SPS and SIAS + SPS on the Polish sample were fully satisfactory. The SIAS and SPS are two aspects of measuring social anxiety and can be used together with the possibility of additional interpretation for each. It is also legitimate to use each scale separately. The scales can be used to measure social anxiety among Polish adolescents and adults in general samples for which preliminary standard STEN have been determined (Appendix 1). It should be emphasised that the reference group was neither random nor representative of the Polish population and therefore the norms cannot be used for individual diagnosis, but only for scientific research.

Limitations and future directions

The current study was conducted on a non-clinical sample of adolescents and adults, a significant proportion of whom were students. Therefore, they require continuation in two areas: validation of scales on Polish clinical samples and development of norms on appropriate clinical and non-clinical standardisation groups.

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