



A Comparison of Short Forms of the Social Interaction Anxiety Scale and the Social Phobia Scale: Psychometric Properties of the Scales in a Polish Sample

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Summary: The Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS) are commonly used scales to measure social anxiety. These scales have satisfactory psychometric properties. However, due to their length (i.e. 39 items), shortened versions of these scales have been developed. The most commonly used are two 12-item versions developed by two different teams of researchers. The aim of the study was to assess the psychometric properties of the two short forms of the SIAS and the SPS and to compare their usefulness in a Polish non-clinical sample. Analyses were conducted on a sample of 698 adults ($M = 26.1$; $SD = 8.2$; 55% female). Factor structure, internal consistency, and content, criterion convergent and discriminant validity were assessed. Confirmatory factor analysis (CFA) was used to determine construct structure. Measurement invariance was examined across gender and age. Reliability was assessed using Cronbach's alpha. The reliability of the scales was high. All Cronbach's alpha coefficients were $> .78$. The CFA confirmed the two-factor structure of both short forms of the scales. Model fit indices were good for the Peters et al. short form, and acceptable for the Peters et al. short form. Measurement invariance across subjects' gender and age for both short forms of the SIAS-6+SPS-6 confirmed configural, metric and scalar invariance. These results prove that both short forms of the scales have fully satisfactory psychometric properties including confirmed measurement invariance across gender and age and can be used in research and screening studies in adults and adolescents.

Keywords: social anxiety, short forms of the Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS), factor structure, measurement invariance

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Porównanie skróconych wersji Skali Lęku przed Interakcją Społeczną i Skali Fobii Społecznej: właściwości psychometryczne skal na polskiej próbie

Streszczenie: Skala Lęku przed Interakcją Społeczną (SIAS) i Skala Fobii Społecznej (SPS) to powszechnie stosowane skale do pomiaru lęku społecznego. Skale te mają satysfakcjonujące właściwości psychometryczne. Jednak ze względu na ich długość (tj. 39 pozycji) opracowano skrócone wersje tych skal. Do najczęściej stosowanych należą dwie 12-pozycyjne wersje opracowane przez dwa różne zespoły badaczy. Celem badania była ocena właściwości psychometrycznych dwóch skróconych wersji SIAS i SPS oraz porównanie ich przydatności w badaniach na polskiej próbie nieklinicznej. Analizy przeprowadzono na próbie 698 osób dorosłych ($M = 26.1$; $SD = 8.2$; 55.0% kobiet). Ocenie poddano strukturę czynnikową, spójność wewnętrzną oraz trafność treściową, kryterialną zbieżną i dyskryminacyjną. Do określenia struktury konstruktu wykorzystano konfirmacyjną analizę czynnikową (CFA). Równoważność pomiaru badano ze względu na płeć i wiek badanych. Rzetelność oceniano α Cronbacha. Rzetelność skal była wysoka. Wszystkie współczynniki α Cronbacha były $> .78$. CFA potwierdziła dwuczynnikową strukturę obu skróconych wersji skal. Wskaźniki dopasowania modeli były dobre dla wersji Peters i in., i akceptowalne dla wersji Fergusona i in.. Równoważność pomiaru względem płci i wieku badanych dla obu skróconych wersji SIAS-6+SPS-6 potwierdziła niezmienną konfiguracyjną, metryczną i skalarną. Wyniki te dowodzą, że obydwie skrócone wersje skal mają w pełni zadowalające właściwości psychometryczne w tym potwierdzoną równoważność pomiaru względem płci i wieku badanych i mogą być stosowane w badaniach naukowych i przesiewowych u dorosłych i nastolatków.

Słowa kluczowe: lęk społeczny, skrócone wersje Skali Lęku przed Interakcją Społeczną (SIAS) i Skali Fobii Społecznej (SPS), struktura czynnikowa, równoważność pomiaru

Introduction

Social anxiety (SA) is an irrational fear of direct social interactions and a fear of negative evaluation by others in various social situations, causing discomfort, embarrassment, and anxiety about the outcome of interactions. Such feelings are fairly common, and their intensity forms a continuum. A growing sense of discomfort in direct social interactions leads to conscious avoidance and, as a result, intensifies the fear of making further social attempts. This results in social isolation, low mood (Eres et al., 2023), deterioration in well-being (Öztekin, 2024), and many other adverse changes in an individual's functioning (Halidu & Kotera, 2024; Zheng et al., 2024). In addition, social anxiety is one of the risk factors in the cognitive-behavioral model of Internet abuse (Caplan, 2003; Liu et al., 2024; Luo, 2023).

When SA reaches a severity that impairs daily social functioning, it is considered a disorder (social anxiety disorder, SAD; American Psychiatric Association, 2013; DSM-5). The symptoms of SAD are divided into two broad categories (Liebowitz, 1987; Mattick & Clarke, 1998). One category is social performance (e.g.,

being the center of attention, especially in situations where the person expects to be evaluated), and the other is direct social interactions with one or more people. SAD symptoms usually appear in childhood or adolescence. Research indicates that social anxiety is most prevalent among adolescents (Erath et al., 2007; Jefferies & Ungar, 2020). Proper diagnosis allows for the mitigation of social functioning impairments in individuals affected by SAD through appropriate education or intervention. Therefore, screening during adolescence appears to be important.

The scales available for assessing social anxiety differ in their psychometric properties, the age groups in which they can be used (Caballo et al., 2013; Fergus et al., 2012), form (Liebowitz, 1987), and usefulness in clinical, screening, and research settings (Cook et al., 2022; Mattick, Clarke, 1998; Smith et al., 2021; Wong et al., 2016).

The Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS) developed by Mattick and Clarke (1998) are among the widely used self-report scales for assessing SA. The authors distinguished these two aspects of social anxiety, noting that they can occur together, but it is also possible for one to occur without an elevated level of the other, which justified the creation of two separate scales. The statements in the SIAS reflect the level of general anxiety associated with initiating and maintaining social interactions (e.g., meeting and talking to strangers, friends, or members of the opposite sex). The statements in the SPS examine the experience of anxiety associated with performing routine activities in the presence of others and the fear of being evaluated by others (e.g., working, eating, drinking, writing, using public restrooms).

The psychometric properties of the SIAS and SPS are fully satisfactory in numerous cultural adaptations (Mörtberg et al., 2017; Ouyang et al., 2020; Wong et al., 2019) as well as in scientific and clinical studies (Le Blanc et al., 2014; Smith et al., 2021; Wong et al., 2016). These scales are characterized by high discriminant and convergent validity and high reliability. Only their two-factor structure remains a subject of debate (Carleton et al., 2014).

The considerable length of the SIAS and SPS (39 items in total) has led to the development of several shortened versions of these scales (Mörtberg et al., 2017; Song et al., 2024). The most commonly used versions are those consisting of six items of the SIAS and six items of the SPS, developed by Peters et al. (SIAS-6P; SPS-6P; 2012) and by Fergus et al. (SIAS-6F; SPS-6F; 2012). Despite the same length, different items were selected for the scales (Table 2), due to the use of different selection criteria.

Fergus et al. (2012) used test item readability tools (McHugh & Behar, 2009). "The target readability characteristics included the percentage of monosyllabic words, the percentage of polysyllabic words, the ratio of syllables to words for each item, and the percentage of difficult words" (Fergus et al., 2014, pp. 1281). This makes the scales useful for people with lower reading and writing skills (even fifth and sixth graders; Fergus et al., 2014), as well as when it is necessary to reduce the time required to complete the test.

Peters et al. (2012) adopted different assumptions. In this case, the goal was to create short, more economical scales with accuracy comparable to their long versions. Item Response Theory (IRT) was used, which allowed for the selection of statements that differentiated respondents across a wide range of latent traits. To maintain the distinctiveness of SIAS and SPS, the selection was carried out separately for each of them.

The psychometric properties of both shortened versions (Fergus et al., 2012, and Peters et al., 2012) are fully satisfactory. Their correlations with the full versions of SIAS and SPS are high and for the short forms they have r_s in the range of .88–.92 for SIAS-6P; .92–.94 for SPS-6P (Peters et al., 2012), and .93–.94 for SIAS-6F and .92–.94 for SPS-6F (Fergus et al., 2012), respectively. Their fully satisfactory internal consistency and convergent validity (depression and anxiety: $r_s = .32$ –.56; loneliness, $r_s = .49$ –.54) and discriminant validity, as well as diagnostic and therapeutic sensitivity, both in the original English-language versions and in numerous cultural adaptations – Korean, Portuguese, Japanese, Chinese, and Hungarian (Carleton et al., 2014; Fergus et al., 2014; Ouyang et al., 2020; Zsido et al., 2021).

The aim of the present study was to comprehensively assess the psychometric properties of two shortened versions of the SIAS and SPS on a Polish sample: one developed by Peters et al. (SIAS-6P and SPS-6P), the other developed by Fergus et al. (SIAS-6F and SPS-6F), and to compare their usefulness in studies on a Polish non-clinical sample. The study assessed internal consistency, content and theoretical validity, measurement equivalence in terms of gender and age, convergent and discriminant criterion validity, and compared the consistency of the results obtained using the two shortened versions with the results obtained using the full versions of SIAS and SPS.

Method

Study group and procedure

The analysis used data collected for the adaptation of the full versions of SIAS and SPS (Cizkiewicz, 2025). The sample consisted of 698 people. In the first study, full-time and part-time students ($N = 514$; $M = 24.7$ years ± 5.5 SD; range 18–40 years) completed a questionnaire containing the SIAS, SPS, and a loneliness scale. They were mainly students of psychology, pedagogy, and computer science.

In the second study, data were collected online, with a request to participate in the study and a link to the questionnaire sent to people who knew the sender. In addition to the SIAS and SPS, the study examined depression, anxiety, and emotional well-being. Of the 232 people whose data were obtained ($M = 28.4$ years ± 11.5 SD; range 19–67 years), those who declared that they were undergoing mental health treatment ($N = 48$) were excluded from the main analysis. The data of these

individuals were used only to assess criterion discriminant validity. The studies were anonymous and participation was voluntary.

The study was approved by Kazimierz Wielki University’s Scientific Research Ethics Committee at the Department of Psychology (No. 1/04.09.2024).

Feelings of loneliness, depression, anxiety, and emotional well-being were used to verify the convergent validity of the two shortened versions (SIAS-6+SPS-6P and SIAS-6+SPS-6F). The equivalence of these scales was also established in terms of the respondents’ gender and age. The age of the respondents was divided into three categories using quartiles ($Q_1 = 21$; $Q_3 = 28$). The socio-demographic characteristics of the participants are presented in Table 1.

Table 1
Socio-demographic characteristics of the sample (N = 698)

Variables		Students N = 514		General sample N = 184		In total N = 698	
		n_1	%	n_2	%	N	%
Gender	men	219	42.6	92	50.0	311	44.6
	women	295	57.4	92	50.0	387	55.4
Place of residence	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
Level of education	< secondary			5	2.7		
	secondary			137	74.5		
	higher			42	22.8		

Tools

Social anxiety was measured using the full SIAS and SPS, consisting of 19 and 20 test items respectively (Cizkiewicz, 2025). Each item was rated on a five-point Likert scale ranging from 0 = “not at all” to 4 = “strongly agree”. Items 8 and 10 of the SIAS were reverse-coded. The SIAS and SPS scores were summed, with possible values ranging from 0 to 76 (SIAS) and 0 to 80 (SPS). A higher score indicated greater social anxiety.

The SIAS and SPS items were translated into Polish by two independent translators who were psychologists. The agreed versions were translated back into English by a native speaker. The back-translation was compared with the original SIAS and SPS items. To ensure the accuracy of the content, four non-psychologists were additionally asked to complete the questionnaires and provide any comments on the items, and two bilingual individuals were asked to compare the items in both language

versions. A logical analysis of the collected comments was conducted, which mainly concerned the non-obvious meaning of words or phrases. After minor corrections were made, linguistic and measurement equivalence of the scales was achieved.

Cronbach's α coefficients for the scales described below are presented in Table 3.

The shortened versions, SIAS-6+SPS-6P (Peters et al., 2012) and SIAS-6+SPS-6F (Fergus et al., 2012) each consisted of 12 statements (six items each) selected from the original SIAS and SPS (see Table 2). The response method was the same as in the full versions of SIAS and SPS. The reverse-coded SIAS items were not included in any of the shortened versions of the scales. The items and description of the SIAS-6+SPS-6P can be found in Appendix 1, and those of the SIAS-6+SPS-6F in Appendix 2.

Loneliness was measured using the 11-item De Jong Gierveld Loneliness Scale (DJGLS; De Jong Gierveld and Kamphuis, 1985; Grygiel et al., 2013). Respondents rated each item on a Likert scale ranging from 1 = "strongly disagree" to 5 = "strongly agree". Five items (1, 4, 7, 8, and 11) were reverse-coded. The higher the score, the greater the sense of loneliness.

Anxiety and depression were assessed using the 4-item Patient Health Questionnaire for Depression and Anxiety (PHQ-4) designed for screening. Participants indicated the frequency of their feelings over the past two weeks using a four-point ordinal scale from 0 = "not at all" to 3 = "almost every day". The first two questions related to anxiety, and the next two to depression. The total score ranged from 0 to 12. The higher the score, the more severe the anxiety and depressive disorders (Kroenke et al., 2009; Larionow & Mudło-Głagolska, 2023).

General emotional well-being was assessed using the 5-item World Health Organization Well-Being Index (WHO-5; Cichoń et al., 2020). Participants indicated how they had felt over the previous two weeks for each of the five statements, using a Likert scale from 0 = "never" to 5 = "all the time". The total score ranged from 0 to 25. The higher the score, the better the well-being.

Analysis plan

Statistical analyses were conducted using SPSS v. 29 (descriptive statistics, correlation coefficients, Cronbach's α ; test power), R packages (R Core Team, 2022; lavaan v. .6-10; Revelle, 2023; semTools v. .5-6; Jorgensen et al., 2022) and JASP v. 19.3. The data were checked for missing values, outliers, and normality of distributions (skewness < 3 and kurtosis < 8; Kline, 2015). Internal consistency was assessed using Cronbach's α ($\alpha > .7$ is acceptable). For the PHQ-4, stratified Cronbach's α was calculated (Rae, 2007). Content validity and convergent and discriminant validity of the SIAS-6+SPS-6P and SIAS-6+SPS-6F were examined. Effect sizes assessed using Cohen's d were interpreted as negligible ($d < .20$), small ($d < .50$), moderate ($d < .80$), and large ($d \geq .80$). Scale structure and measurement equivalence across gender and age were assessed using confirmatory factor analysis (CFA) with the MLM estimator.

The goodness of fit of the CFA models was assessed based on: χ^2 with Satorra-Bentler scaling, standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), confirmatory fit index (CFI), and Tucker-Lewis index (TLI). When SRMR and RMSEA < 0.05 and CFI and TLI > .95, the model fit was assessed as good, and when SRMR and RMSEA < .08 and CFI and TLI > .90, the fit was deemed acceptable (Hu, Bentler, 1999). For nested models, a change > .010 for CFI supplemented by a change > .015 for RMSEA indicates significant differences between the compared models (Chen, 2007). Local fit was estimated using modification indices (Schermelleh-Engel and Moosbrugger, 2003) and was acceptable when residual correlations did not exceed .1 (Kline, 2015).

The replicability of the study (Stanley et al., 2018) was assessed by analyzing the power of a priori tests assuming: Type I error = .05 and medium effect sizes. The power of the tests for bivariate correlations ($n_1 = 514$; $n_2 = 184$) was 1.00; for differences between groups ($n_1 = 184$; $n_2 = 48$) was .924; for CFA ($N = 698$) for all models ($df = 52$ to $df = 196$) was 1.00 This means that the replicability of the obtained results reaches 92% and above, which is higher than the required threshold value of 80.0% (cut off > .80; Arend and Schäfer, 2019; MacCallum et al., 1996).

Results

The scale items selected by Peter et al. (2012) and by Fergus et al. (2012) have response distributions close to normal (see Table 2). Only item 19 of the Social Phobia Scale included by Fergus et al. has stronger asymmetry and kurtosis.

Table 2
Descriptive statistics for full and short versions of SIAS and SPS items (N = 698)

Item no.	SIAS					Item no.	SIAS				
	<i>M</i> (<i>SD</i>)	<i>Sk.</i>	<i>Kurt.</i>	6P	6F		<i>M</i> (<i>SD</i>)	<i>Sk.</i>	<i>Kurt.</i>	6P	6F
si1	2.1(1.1)	-.02	-.72			si11	2.0(1.1)	.03	-.60		
si2	1.4(1.2)	.46	-.61	+		si12	1.3(0.9)	.69	.43	+	
si3	2.0(1.2)	.08	-.91		+	si13	1.6(1.2)	.47	-.75		
si4	1.2(1.0)	.83	.28	+		si14	1.6(1.1)	0.40	-0.67		
si5	1.0(1.1)	.95	.30	+	+	si15	1.7(1.1)	0.30	-0.64		+
si6	1.1(1.0)	.84	.26			si16	1.7(1.1)	0.36	-0.57		
si7	1.1(1.0)	.94	.54	+	+	si17	1.6(1.1)	0.32	-0.68		+
si8	1.9(1.3)	.15	-1.12			si18	1.3(1.0)	0.66	-0.05		+
si9	1.2(1.0)	.74	.08	+		si19	1.7(1.2)	0.26	-0.78		
si10	1.6(1.2)	.42	-.73								

cont. table 2

Item no.	SPS					Item no.	SPS				
	<i>M</i> (<i>SD</i>)	<i>Sk.</i>	<i>Kurt.</i>	6P	6F		<i>M</i> (<i>SD</i>)	<i>Sk.</i>	<i>Kurt.</i>	6P	6F
sp1	1.7(1.1)	.28	-.77			sp11	1.2(1.2)	.70	-.38		+
sp2	1.1(1.1)	.86	.04			sp12	1.4(1.1)	.54	-.51		
sp3	1.5(1.2)	.36	-.72			sp13	1.4(1.2)	.49	-.78		
sp4	1.1(1.1)	.97	.27	+	+	sp14	1.1(1.1)	1.05	0.66		
sp5	1.3(1.2)	.74	-.42		+	sp15	1.4(1.1)	0.73	-0.21	+	
sp6	1.7(1.2)	.23	-.88			sp16	1.2(1.1)	0.82	-0.09	+	
sp7	1.1(1.1)	1.00	.17	+	+	sp17	1.1(1.1)	1.10	0.58	+	
sp8	1.1(1.1)	.93	.26	+		sp18	1.9(1.2)	0.12	-0.96		+
sp9	1.1(1.1)	1.03	.55			sp19	0.7(0.9)	1.62	2.96		+
sp10	0.6(0.8)	1.58	2.68			sp20	1.6(1.2)	0.29	-0.73		

Note. 6P = items selected for the shortened version of Peters et al. (2012), 6F = items selected for the shortened version of Fergus et al. (2012), si = SIAS items; sp = SPS items: the content of the items can be found in Appendix 1 and Appendix 2, respectively.

Internal consistency

All scales used for assessing social anxiety and criterion variables had near-normal distributions, and internal consistency coefficients were mostly $\geq .80$ (see Table 3). Only the PHQ-4 subscale measuring anxiety had a lower value.

The discriminant powers for the SIAS-6+SPS-6P items ranged between .45 and .62. Only for SIAS item 12 (“I find it difficult not to agree with another person’s point of view”) was the discriminant power slightly lower (.34). For SIAS-6+SPS-6F, the discriminant powers ranged from .44 to .65.

Table 3
Descriptive statistics and Cronbach’s α coefficients for scales measuring social anxiety and criterion variables

Scale	<i>M</i> (<i>SD</i>)	<i>Sk.</i>	<i>Kurt.</i>	α (95%CI)	α_{strat}
SIAS	28.8(12.8)	.40	-.17	.91 (.90-.92)	
SPS	25.2(14.1)	.70	.59	.92 (.91-.93)	
SIAS+SPS	54.0(24.8)	.52	.21	.95 (.94-.95)	
SIAS-6P	7.3(4.2)	.85	.58	.78 (.75-.81)	
SPS-6P	6.9(4.9)	.89	.72	.83 (.80-.85)	
SIAS-6+SPS-6P	14.2(8.0)	.80	.52	.86 (.84-.88)	

cont. table 3

Scale	M(SD)	Sk.	Kurt.	α (95%CI)	α_{strat}
SIAS-6F	9.0(4.7)	.39	-.26	.81 (.79-.83)	.87
SPS-6F	7.3(4.7)	.71	.39	.79 (.76-.81)	
SIAS-6+SPS-6F	16.3(8.4)	.51	.18	.86 (.85-.88)	
DJGLS	25.3(8.8)	.58	-.27	.88 (.85-.88)	
PHQ-4	4.6(3.2)	.55	-.61	.84 (.79-.87)	
PHQ-4-anxiety	2.6(1.7)	.55	-.46	.70 (.55-.80)	
PHQ-4-dep	2.0(1.8)	.62	-.61	.86 (.81-.90)	
WHO-5	12.1(5.5)	-0.18	-0.77	.89 (.86-.91)	

Note. α_{strat} = α stratified; DJGLS = De Jong Gierveld Loneliness Scale; PHQ-4 = Patient Health Questionnaire for depression and anxiety; WHO-5 = World Health Organization Well-Being Index

Theoretical validity of the shortened versions of SIAS-6+SPS-6

For both shortened versions of SIAS-6+SPS-6, two models were tested: single-factor (M1) and two-factor (M2). Analysis of local fit in two-factor models resulted in the addition of one pair of residual correlations in both shortened versions (see Table 4; M3). The M3 models were adopted, with the SIAS-6+SPS-6P model being well-fitted and the SIAS-6+SPS-6F model being acceptably fitted.

Table 4
Fit indices for the shortened versions of the SIAS-6+SPS-6 measurement models (N = 698)

SIAS-6+SPS-6P

Model	$S-B\chi^2$	df	CFI	TLI	SRMR	RMSEA (90%CI)
M1-P	362.20	54	.829	.791	.072	.090 (.083-.098)
M2-P	133.33	53	.955	.944	.038	.047 (.038-.055)
M3-P	104.85	52	.971	.963	.033	.038 (.029-.047)

SIAS-6+SPS-6F

Model	$S-B\chi^2$	df	CFI	TLI	SRMR	RMSEA (90%CI)
M1-F	309.42	54	.854	.818	.064	.093 (.084-.102)
M2-F	220.91	53	.918	.898	.049	.067 (.059-.076)
M3-F	179.57	52	.938	.921	.045	.059 (.051-.068)

Note. M1 = single-factor model with 12 items; M2 = two-factor model (6 SIAS and 6 SPS); M3-P = M2-P + correlation sp8 ↔ sp16; M3-F = M2-F + correlation si17 ↔ si18; P = short version of Peters et al., (2012); F = short version of Fergus et al., (2012). $S-B\chi^2$ = chi-square with Satorra-Bentler correction; SRMR = standardized root mean square residual; TLI = Tucker-Lewis index; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.

In the adopted measurement models (M3), all factor loadings were significant ($p < .001$) and almost all were $> .50$. The exception was item 6 in SIAS-P (Table 5). Only for this item was the factor loading lower (.39).

Table 5
Standard factor loadings for shortened versions SIAS-6+SPS-6P and SIAS-6+SPS-6F

a) SIAS-6+SPS-6P			b) SIAS-6+SPS-6F		
Item no.	SIAS-P	SPS-P	Item no.	SIAS-F	SPS-F
1	.67	.75	1	.55	.67
2	.60	.65	2	.67	.52
3	.74	.73	3	.59	.74
4	.67	.677	4	.68	.66
5	.72	.79	5	.63	.57
6	.39	.68	6	.78	.59

Note. a) = shortened version of the M3 model by Peters et al. (2012); b) = shortened version of the M3 model by Fergus et al. (2012); all factor loadings are significant ($p < .001$); SIAS-P ↔SPS-P correlation = 0.68; sps8 ↔ sps16 = .19; SIAS-F ↔ SPS-F correlation = .75; si17 ↔ si18 = .21

Measurement equivalence

For the accepted models (M3), measurement equivalence tests were conducted with respect to gender and age (Table 6). Three nested models were tested, assuming the following equivalences: (1) configurational, ensuring an identical factor structure, (2) metric, requiring uniform factor loadings, (3) scalar, imposing uniform regression constants in all groups.

Table 6
Equivalence of the SIAS-6+SPS-6 short forms (N = 698) in terms of gender and age

SIAS-6+SPS-6P – gender									
Equivalence	$S-B\chi^2$	df	$\Delta\chi^2$	Δdf	p	CFI	ΔCFI	RMSEA	$\Delta RMSEA$
construct	222.41	104				.955		.057	
metric	236.97	114	14.56	10	.149	.953	.002	.056	.001
scalar	249.00	124	12.02	10	.284	.952	.001	.054	.002

SIAS-6+SPS-6P – age

Equivalence	$S-B\chi^2$	df	$\Delta \chi^2$	Δdf	p	CFI	ΔCFI	RMSEA	$\Delta RMSEA$
construct	286.47	156				.947		.060	
metric	305.86	176	19.39	20	.496	.947	.000	.056	.004
scalar	340.53	196	34.67	20	.022	.941	.006	.056	.000

SIAS-6+SPS-6F – gender

Equivalence	$S-B\chi^2$	df	$\Delta \chi^2$	Δdf	p	CFI	ΔCFI	RMSEA	$\Delta RMSEA$
construct	330.52	104				.918		.079	
metric	363.15	114	32.63	10	***	.910	.008	.079	.000
scalar	398.58	124	26.43	10	.003	.904	.006	.078	.001

SIAS-6+SPS-6F – age

Equivalence	$S-B\chi^2$	df	$\Delta \chi^2$	Δdf	p	CFI	ΔCFI	RMSEA	$\Delta RMSEA$
construct	377.21	156				.916		.078	
metric	414.78	176	37.56	20	.010	.909	.007	.076	.002
scalar	453.81	196	39.04	20	.007	.902	.007	.075	.001

Note. 6P = shortened version of Peters et al., (2012); 6F = shortened version of Fergus et al., (2012); gender ($n_f = 387$; $n_m = 311$); age ($n_{up\ to\ Q1} = 209$; $n_{from\ Q1\ to\ Q3} = 306$; $n_{from\ Q3} = 188$)

For both shortened versions of the social anxiety scales, measurement equivalence was confirmed for both gender and age. Measurement with these scales is equivalent in terms of construct, factor loadings, and regression constants. This conclusion is supported by the ΔCFI and $\Delta RMSEA$ values between the nested models (see Table 6). Due to the sensitivity of χ^2 to sample size, the significant $\Delta \chi^2$ between the nested models can be considered insufficient to reject measurement equivalence.

The confirmed level of measurement equivalence allows us to test hypotheses not only about relationships between the variables, but also about differences in means. Appendix 3 presents descriptive statistics of social anxiety scores in the shortened versions of the scales in groups of women and men and in the three age groups analyzed. In addition, factor loadings for each of these groups are provided.

Convergent and discriminant validity

The convergent validity of the Polish shortened versions of SIAS-6+SPS-6P and SIAS-6+SPS+6F was tested by calculating the covariance with the full version of SIAS+SPS and with the criterion variables: loneliness, well-being index, and patient health questionnaire (Table 7).

Pearson's correlation coefficients confirmed convergent validity. The correlations of both short versions with the full version of SIAS+SPS were high and did not differ significantly from each other. In addition, the correlations of SIAS-6+SPS-6P and SIAS-6+SPS-6F with the criterion variables were moderate and significant ($p < .001$) and positive for loneliness, depression, and anxiety and negative for overall emotional well-being. The exception is the relationship between SIAS-6P and PHQ-4-dep, which was weak and significantly lower than the relationship between SIAS-6F and PHQ-4-dep ($p = .012$).

Table 7
Pearson's correlation coefficients between the shortened and full versions of SIAS and SPS and criterion variables (N = 698)

Social anxiety scales									
Variables	SIAS-6P	SPS-6P	SIAS-6+SPS-6P	SIAS-6F	SPS-6F	SIAS-6+SPS-6F	SIAS	SPS	SIAS+SPS
SIAS-6P				.81	.53	.76	.88	.59	.79
SPS-6P				.59	.86	.82	.62	.93	.85
SIAS-6+SPS-6P				.79	.81	.90	.85	.88	.94
SIAS-6F							.90	.65	.84
SPS-6F							.63	.93	.86
SIAS-6+SPS-6F							.86	.89	.95

Criterion variables									
Variables	SIAS-6P	SPS-6P	SIAS-6+SPS-6P	SIAS-6F	SPS-6F	SIAS-6+SPS-6F	SIAS	SPS	SIAS+SPS
DJGLS ^a	.41	.40	.46	.44	.38	.46	.45	.43	.48
PHQ-4-anxiety ^b	.36	.56	.51	.43	.49	.52	.42	.63	.55
PHQ-4-dep ^b	.27	.54	.47	.39	.53	.52	.35	.56	.49
WHO-5 ^b	-.34	-.42	-.43	-.42	-.43	-.48	-.43	-.46	-.48

Note. SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; P = abbreviated version of Peters et al., (2012); F = abbreviated version of Fergus et al., (2012); DJGLS = De Jong Gierveld Loneliness Scale; PHQ-4 = Patient Health Questionnaire for depression and anxiety; WHO-5 = World Health Organization Well-Being Index; ^a = sample $n_1 = 514$; ^b = sample $n_2 = 184$; all correlations are significant $p < .001$.

Discriminative validity was assessed by testing the significance of differences between the level of social anxiety in the group of people undergoing psychiatric treatment and in the general population (Table 8).

Table 8
Descriptive statistics and intergroup differences for healthy individuals and those undergoing mental health treatment ($n_{\text{healthy}} = 184$; $n_{\text{ill}} = 48$)

Social anxiety	persons	<i>M</i>	<i>SD</i>	<i>Sk.</i>	<i>Kurt.</i>	<i>t</i> (230)	<i>d</i> Cohena
SIAS-6P	healthy	7.3	4.0	.77	.61	5.1***	.83
	ill	10.7	4.5	.24	1.52		
SPS-6P	healthy	7.1	4.8	.91	1.19	5.0***	.80
	ill	11.4	5.1	.19	-.51		
SIAS-6+SPS-6P	healthy	14.3	7.7	.64	.24	5.7***	.93
	ill	21.8	9.0	-.20	.25		
SIAS-6F	healthy	8.9	4.4	.21	-.38	5.4***	.88
	ill	12.8	4.7	-.40	1.56		
SPS-6F	healthy	7.3	4.5	.69	.59	4.3***	.70
	ill	10.1	5.4	.14	-.88		
SIAS-6+SPS-6F	healthy	16.2	8.0	.27	-.14	5.4***	.87
	ill	23.4	9.1	-.47	.06		

Note. SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; 6P–shortened version of Peters et al., (2012); 6F – shortened version of Fergus et al., (2012); *** = $p < .001$

People undergoing psychiatric treatment had significantly higher levels of social anxiety ($p < .001$) than people in the general population (Table 8). This applied to SIAS-6+SPS-6P, SIAS-6+SPS-6F, and their subscales. The effect sizes measured by Cohen’s *d* were large, and only the SPS-6F distinguished between sick and healthy individuals slightly less well (the effect size was average).

Discussion

The aim of the study was to compare the psychometric properties and measurement equivalence in terms of gender and age of two shortened versions of the SIAS and SPS scales in a Polish non-clinical sample. These scales, developed by Peters et al. (2012) and Fergus et al. (2012), are widely used in the study of social anxiety in clinical and non-clinical populations (descriptions of the scales and instructions for their use can be found in Appendix 1 and Appendix 2, respectively). Numerous cultural adaptations of these scales have also been published, allowing them to be used for cross-cultural comparisons (Wong et al., 2019; Zhong et al., 2023).

The study was conducted on a sample of 698 individuals ($M_{\text{age}} = 26.1$ $SD = 8.2$; range 18–67 years) who declared that they were not undergoing mental health treatment. The analyses revealed that:

- The discriminant power values of the items in the shortened versions of Peters et al. and Ferguson et al. were fully satisfactory ($> .44$). Only in SIAS-6P did item 6 have a slightly lower discriminant power (.34). This is consistent with the results obtained by Ferguson et al. (2012; $> .32$). Peters et al. (2012) used IRT.
- The reliability of the measurement was high. For SIAS-6+SPS-6P and SIAS-6+SPS-6F and their components, Cronbach's α was $> .78$ (Table 3). Cronbach's α values are similar and stable both in the original study (Fergus et al.: Cronbach's $\alpha > .77$) and in many other studies (Song et al. 2024: Cronbach's $\alpha > .79$).
- As a result of applying CFA to both shortened versions (SIAS-6+SPS-6P and SIAS-6+SPS-6F), first-order models with two correlated factors were adopted, each of which was supplemented with one pair of correlated residuals (see Table 4). In these models, all factor loadings were statistically significant ($p < .001$) and almost all had values $> .50$. Only one item in the shortened version of Peters et al. had a factor loading of .39 (see Table 5). The SIAS-6+SPS-6P measurement model was a good fit, and the fit for the SIAS-6+SPS-6F was acceptable.
- Full measurement equivalence in terms of age and gender was confirmed for the shortened version of Peters et al. and for the shortened version of Fergus et al. The changes in CFI and RMSEA between the nested models were so small that the measurement models proved to be equivalent at all three levels tested. Full construct, metric, and scalar equivalence was achieved (Table 6), allowing us to test not only hypotheses about relationships between variables, but also about differences between means.
- Convergent validity was confirmed by testing the correlation between the level of social anxiety obtained as a result of using the shortened versions and the full versions of the social anxiety scales. In addition, the correlation between SIAS-6+SPS-6P, SIAS-6+SPS-6F and SIAS+SPS with criterion variables, i.e., loneliness, depression, anxiety, and overall emotional well-being. Social anxiety measured with the shortened versions correlated highly with the results of the full version of the scale, and moderately and to a degree similar to the full version with each criterion variable, positively with loneliness, depression, and anxiety, and negatively with emotional well-being (Table 7). This was consistent with the assumptions (Fergus et al., 2012; Halidu & Kotera, 2024; Öztekin, 2024; Peters et al., 2012; Zheng et al., 2024). The exception was the SIAS-6P correlation with PHQ-4-dep, which was weak and significantly lower than the correlation between SIAS-6F and PHQ-4-dep ($p = .012$).
- Discriminant validity was also confirmed (Table 8). As expected, the level of social anxiety among individuals receiving mental health treatment was significantly higher ($p < .001$) than in the general population (Carleton et al., 2009; de Beurs et al., 2014; Mattick and Clarke, 1998). The effect sizes measured by Cohen's d were large.

In summary, the psychometric properties of SIAS-6+SPS-6P and SIAS-6+SPS-6F in the Polish non-clinical sample were fully satisfactory. The minor differences

in the quality of the two compared shortened versions do not create a preference for either of them. The results indicate that both the short version of Peters et al. (2012) and the short version of Fergus et al. (2012) can be used to assess general social anxiety with the possibility of interpreting interaction anxiety and social phobia. It is also possible to use the social interaction anxiety scale (SIAS-6) and the social phobia scale (SPS-6) separately. The use of these shortened versions, which retain similar psychometric properties to the full versions of the scales, facilitates the assessment of social anxiety severity by reducing the burden on respondents. Therefore, they should be useful as tools in scientific research and screening (Zhong et al., 2023). The scales can be used to study social anxiety in Polish adolescents and adults in general populations. The scales are available in the appendices (Appendix 1 and Appendix 2).

Limitations and future directions

The present study was conducted on a non-clinical sample of adolescents and adults, a significant proportion of whom were students. Many researchers also recognize the usefulness of shortened versions in clinical studies (Fergus et al., 2014; Le Blanc et al., 2014; Peters et al., 2012). However, in this application (people undergoing treatment for social anxiety), their shortcomings compared to the full versions have also been noted (Erceg-Hurn & McEvoy, 2018). Although the psychometric properties were fully satisfactory, the short forms were significantly less precise measures of social anxiety than the full scales (there was a ceiling effect, increased standard errors, and loss of statistical power). Therefore, the shortened versions of Peters et al. and Fergus et al. need to be tested on Polish clinical samples. In addition, the selection of items with increased legibility in the SIAS-6+SPS-6F lowered the age of people who can be tested using it (fifth and sixth graders). It would also be important to assess the usefulness of this scale on a Polish sample in this age group.

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