Symptom Checklist-90 (SCL-90) in a Thai Sample

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Background: *Symptom Checklist-90 (SCL-90) has been used on both normal and clinical samples in Thailand over a long period. However, its validity and reliability have not yet been systemically reported.*
Objective: *Survey the validity and reliability of SCL-90 in a more extensive way, using a normal sample of people throughout Thailand, and investigate the psychometric properties of the Thai version of SCL-90.*
Material and Method: *Four hundred forty eight subjects participated in the present study of which 50.4% were male and with ages ranging from eighteen to 90 years, by providing demographic data and completing the Thai version of SCL-90 and the 16-Personality Factor (16-PF) Questionnaire. The demographic data was analyzed using descriptive statistics, and Cronbach's alpha was used to determine its internal consistency. Factor and confirmatory factor analysis were performed to construct the validity, and convergent and discriminant validities were calculated to generate Pearson's correlation coefficients using the 16-PF subscales.*
Results: *The mean of the global symptoms index was found to be 0.70 $\pm$ 0.46, with the means of the symptoms ranging from 0.53 for Psychoticism to 0.98 for Obsessive-compulsive disorder. We found to be a significant difference in sub-scales across genders, age groups, geographic regions, educational levels, occupations, and incomes, but the symptom dimension patterns revealed were similar to those of previous studies. Depression and anxiety were the key components to show variance between the normal and clinical samples. The measurements demonstrated good internal consistency with Cronbach's alpha, at 0.97, but did not yield relevant correlations between some of the 16-PF sub-scales, as was expected. Moreover, factor analysis revealed that SCL-90 has a uni-dimensional construct.*
Conclusion: *The Thai version of SCL-90 showed a good internal consistency, but poor discriminant validity with most items occurring for the depression, anxiety and interpersonal sensitivity dimensions. It is recommended that some of the items be revised for clinical studies.*

Keywords: *Symptom checklist-90, SCL-90, Psychometric, Thai*

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Symptom Checklist-90 (SCL-90)[1] is a psychological measurement tool used for assessing psychiatric symptoms. It was first developed by Derogatis et al[2], primarily in order to measure symptom intensity during clinical drug trials. SCL-90 has been used to detect nine psychiatric symptom clusters, ranging from neurotic to mild degrees of psychosis, for example, anxiety, depression, somatization and paranoid ideation. Although the measurement tool has been revised (to SCL-90-R)[3], SCL-90 is widely accepted as an effective tool for assessing psychiatric symptoms or mental health abnormalities in both normal and psychiatric patients, especially to follow-up and manage clinical changes after psychological intervention[4].

In Thailand, the Thai version of SCL-90 was first introduced by Chooprayoon[4] in 1978 and was used on both normal people and in-patients that suffered from neurotic disorders (total = 591; 525 normal patients and 66 neurotic patients). A standardized T-score range 40 to 60 is considered normal, while a higher score than 60 is considered abnormal. Though SCL-90 has been widely used in Thailand[5,6], it has not been used to systematically study a population that represented the Thai norm, or an adult or elderly sample. Moreover, it has not yet been used to test its psychometric properties. Hence, the present study aimed to investigate the psychometric properties of the Thai version of SCL-90, as well as its concurrent validity with other related measurements. The present study also aimed to compare the means, standard deviations and demographic characteristics of

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Thai participants across different age groups and geographic areas.

Material and Method

Study population

The respondents were made up of 450 non-clinical participants whose ages ranged from eighteen years of age upwards (mean age = 49.3, SD = 20.57, min = 18, max = 93; and males = 50.4%). Four responses were excluded from the final data analysis due to incomplete questionnaires.

Sampling technique

A national survey using stratified sampling was conducted in order to represent the Thai norm, with the stratification carried out according to geographic region (north, upper-northeast, lower-northeast, south and central) and by size of the residential community. Proportional sampling was performed in each province in accordance with the population as reported on December 25, 2008, using information from the Department of Provincial Administration at the Ministry of Interior. A total sample size of 450 was used for the present study, made up of 226 males and 224 females and with 112 participants in each of the four different age groups. The authors excluded participants who had a previous history of either dementia or psychosis.

The Thai version of symptom checklist-90 (SCL-90 Thai version)

SCL-90[1] is a self-reporting mechanism that contains 90 items covering psychological problems and symptom distress. Each item assesses symptom severity on a 5-Likert scale, where '0' represents 'not at all' and '4' represents 'extremely'. It consists of three overall rating systems, the General Symptom Index (GSI), the Positive Symptom Total (PST) score and the Positive Symptom Distress Index (PSDI). The measurement can report nine symptom characteristics, which are, Somatization, Obsessive-compulsive, Interpersonal Sensitivity, Hostility, Depression, Anxiety, Paranoid Ideation, Phobic Anxiety and Psychoticism. For this study, the measurement tool was developed to be utilized on people aged between 15 and 67 years old.

Using SCL-90, abnormality can be analyzed using two methods, 1) by combining the total score with the score for each dimension and then converting the result into a standardized t-score, where a score of higher than 60 is considered abnormal and 2) by comparing the score for each dimension with the norm[4]. For the present, when measuring abnormality among the genders, the total score and the score for each dimension were calculated for each gender to establish the t-scores. To measure the level of abnormality for each age group, the t-score was calculated according to the norm for each group. Validity was tested using the known group technique, which shows good reliability[4].

Thai version of the 16 personality factors questionnaire (16 PF Thai version)

The 16 Personality Factors (16-PF) questionnair developed by Cattell[7] is a personality measurement tool, and categorizes personality into eight dimensions, or sixteen characteristics, including: reserved vs. outgoing, low intelligence vs. high intelligence, submissive vs. dominant and self-assured vs. apprehensive. These characteristics show each individual's level of adjustment, problem-solving ability and event perception. The 16-PF has 187 items with three choices for each item. The results are rated by giving a score of 1 or 2, then comparing the results with a standard score. Interpretation is reproduced using graphical sten scores.

The Thai version of 16-PF was developed by Cheuaphakdi P and Phornphatkul S[8] and has been widely used to assess personality and its relationship with clinical factors. The utilization of 16-PF in personnel selection is also common. The Cronbach's alpha for thepresent study was between 0.61 and 0.88 and certain sub-scales were chosen for testing the convergent and discriminant validity of SCL-90; for example, Perfectionism is expected to have a positive relationship with Obsessive-compulsive, likewise, Apprehension and Tension are positively correlated with Anxiety or Phobic-Anxiety. Hypervigilance, on the other hand, should demonstrate a more positive association with Paranoid ideation than other scales.

Procedure

One urban area in the selected province was chosen, and having signed the informed consent form, each participant completed a pack of questionnaires containing demographic data, the Thai version of SCL-90 and the Thai version of 16-PF.

Data analysis

The construct validity was analyzed using principal component analysis, which revealed eigen values > 1 and the 'rotate axis' using the varimax

method. The concurrent validity between SCL-90 and 16-PF was analyzed using Pearson correlation coefficients. The demographic data (*i.e.* age, gender etc.) and internal consistency were reported using descriptive data, means, and percentages. ANOVA analysis was used to compare differences between groups, that is age groups, gender and region, using post-hoc comparison, and the LSD method was employed with alpha set at the $p < 0.05$ level. SPSS 18 was used for statistical analysis.

Results

Means and standard deviations

The mean $\pm$ SD of the SCL sub-scales ranged from 0.53 ± 0.47 (Psychoticism) to (Obsessive-compulsive) 0.98 ± 0.64, with the overall symptom score being 6.33 ± 4.17. There was no difference in the total scores according to gender or age group, but there was a significant difference according to region, education level, occupation, and income (Table 1).

Table 2 shows the means and standard deviations according to demographic data and ANOVA. Women appeared to have more symptoms than the men, even though there was no significant difference in total score or GSI. With regard to age, there was a significant difference between the young and elderly for Somatization, Interpersonal Sensitivity and Hostility. Respondents in the capital city and its environs (Chachoengsao-less than 100 kilometers away) revealed higher scores on every scale compared to other regions, and the lower the education level, the more symptoms they displayed. As expected, separated and divorced respondents showed more severe symptoms than the single and married individuals, whereas for income, mixed results were found in terms of the link between income levels and the number of symptoms.

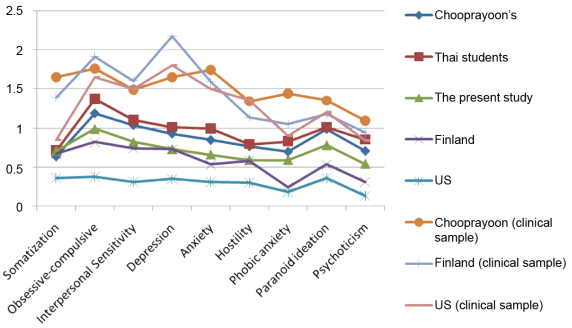

Fig. 1 Comparison of SCL-90 sub-scales across different studies

Clinical vs. normal sample

We compared data from this study with the data from previous studies in Thailand (Chooprayoon[4] and Chooprateep[19]) and from the US and Finland, as shown in Fig. 1. Higher scores were found in the clinical groups than that in the normal samples. The pattern of SCL sub-scales across all the studies produced similar results, that is, high levels of Obsessive-compulsive behavior. However, Depression, as measured using SCL-90, differed between the mentally ill and normal people (Fig. 1).

Reliability estimates, factor analyses; convergent and discriminant validity

Convergent validity/divergent validity

Table 4 shows the correlation between SCL-90 and 16-PF. The SCL scores for Tension and Apprehension correlated significantly with the all

Table 1. Means and standard deviations of total scores and sub-scale scores for SCL-90 (n = 450)

	Minimum	Maximum	Mean	Std. deviation
Somatisation (SOM)	0	2.75	0.71	0.54
Obsessive-compulsive (O-C)	0	2.80	0.98	0.64
Interpersonal sensitivity (INT)	0	3.22	0.81	0.57
Depression (DEP)	0	3.00	0.72	0.54
Anxiety (ANX)	0	2.60	0.66	0.50
Hostility (HOS)	0	2.83	0.58	0.51
Phobic-anxiety (PHO)	0	3.00	0.59	0.56
Paranoid ideation (PAR)	0	3.16	0.77	0.60
Psychoticism (PSY)	0	2.50	0.53	0.47
Grand total	0.08	22.68	6.34	4.17
Global symptom index (GSI)	0.01	2.52	0.70	0.46

Table 2. SCL-90 means, standard deviations and ANOVA of the demographic data

Categories	n (%)		SOM		O-C		INT		DEP		ANX		HOS		PHO		PAR		PSY		Grand total	
	n	%	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD
Gender																						
Male	226	50.44	0.66	0.50	0.94	0.63	0.79	0.57	0.66	0.51	0.61	0.49	0.55	0.49	0.54	0.52	0.77	0.59	0.54	0.50	5.96	3.81
Female	222	49.56	0.77	0.58	1.03	0.66	0.85	0.60	0.80	0.59	0.72	0.54	0.63	0.59	0.65	0.60	0.80	0.65	0.53	0.48	6.72	4.48
p-value			0.030		0.110		0.212		0.004		0.012		0.092		0.032		0.529		0.937		0.052	
Age (year old)																						
18-24	112	24.78	0.61	0.53	1.03	0.68	0.93	0.65	0.78	0.61	0.73	0.57	0.68	0.58	0.53	0.54	0.85	0.71	0.64	0.62	6.58	4.43
25-44	114	25.44	0.69	0.51	1.02	0.67	0.89	0.58	0.75	0.54	0.69	0.53	0.66	0.60	0.58	0.52	0.81	0.63	0.56	0.48	6.56	4.18
45-64	111	25	0.74	0.54	0.91	0.59	0.71	0.52	0.64	0.46	0.62	0.49	0.51	0.47	0.58	0.57	0.70	0.54	0.47	0.42	5.89	3.89
65-99	111	24.78	0.81	0.59	0.99	0.65	0.74	0.56	0.74	0.59	0.63	0.49	0.49	0.48	0.68	0.62	0.77	0.60	0.48	0.39	6.33	4.17
p-value			0.027		0.568		0.024		0.340		0.543		0.025		0.179		0.475		0.064		0.573	
Region																						
Central and Bangkok	189	42.22	0.81	0.58	1.16	0.69	0.95	0.63	0.85	0.61	0.78	0.55	0.68	0.58	0.71	0.64	0.89	0.66	0.63	0.53	7.47	4.65
Northeast	153	34.22	0.7	0.52	0.84	0.58	0.73	0.53	0.65	0.5	0.58	0.45	0.49	0.45	0.57	0.51	0.73	0.57	0.47	0.43	5.74	3.80
North	56	12.44	0.46	0.44	0.92	0.65	0.68	0.48	0.59	0.43	0.55	0.49	0.49	0.43	0.34	0.34	0.64	0.51	0.43	0.44	5.10	3.44
South	26	5.78	0.56	0.46	0.74	0.42	0.64	0.33	0.53	0.29	0.49	0.32	0.48	0.43	0.32	0.32	0.51	0.36	0.33	0.26	4.59	2.42
East	24	5.33	0.66	0.47	0.92	0.5	0.74	0.45	0.7	0.48	0.56	0.38	0.61	0.39	0.59	0.51	0.68	0.47	0.54	0.35	6.00	3.25
p-value			0.000		0.000		0.000		0.001		0.000		0.004		0.000		0.002		0.001		0.000	
Education completed																						
Less than junior high school	138	30.9	0.91	0.57	0.99	0.65	0.78	0.58	0.77	0.58	0.69	0.52	0.54	0.49	0.76	0.66	0.80	0.58	0.54	0.44	6.77	4.24
Junior high school	46	10.2	0.73	0.49	0.95	0.59	0.77	0.46	0.66	0.44	0.60	0.42	0.57	0.45	0.60	0.52	0.72	0.49	0.49	0.37	6.10	3.52
High school	87	19.3	0.67	0.51	0.93	0.64	0.82	0.55	0.69	0.53	0.64	0.51	0.59	0.54	0.58	0.51	0.79	0.64	0.56	0.52	6.26	4.24
Some college	42	9.3	0.66	0.54	1.07	0.66	0.98	0.65	0.78	0.59	0.79	0.59	0.63	0.49	0.58	0.58	0.85	0.66	0.69	0.62	7.03	4.76
4 yr college	108	24.2	0.57	0.48	1.10	0.62	0.86	0.55	0.75	0.51	0.67	0.46	0.62	0.52	0.45	0.44	0.79	0.60	0.50	0.45	6.30	3.88
Some grad school	22	4.9	0.38	0.47	0.73	0.71	0.56	0.63	0.51	0.54	0.43	0.48	0.54	0.63	0.32	0.43	0.53	0.55	0.34	0.38	4.33	4.41
Advance degree	4	0.9	0.21	0.22	0.30	0.24	0.22	0.24	0.13	0.04	0.08	0.05	0.12	0.16	0.07	0.08	0.21	0.25	0.08	0.15	1.4	0.75
p-value			0.000		0.039		0.033		0.091		0.026		0.494		0.000		0.186		0.036		0.034	
Marital status																						
Single	175	38.94	0.63	0.53	1.05	0.67	0.92	0.64	0.79	0.59	0.72	0.54	0.68	0.60	0.55	0.53	0.86	0.69	0.61	0.56	6.70	4.38
Married	203	45.58	0.70	0.51	0.87	0.58	0.68	0.47	0.60	0.44	0.57	0.45	0.52	0.45	0.55	0.51	0.67	0.50	0.45	0.41	5.61	3.58
Separated	9	1.99	1.26	0.75	1.36	0.79	1.28	0.55	0.99	0.68	1.08	0.74	0.66	0.45	1.17	0.84	1.24	0.91	0.69	0.46	9.72	5.59
Divorced	13	2.88	0.77	0.64	1.05	0.72	0.95	0.73	0.92	0.58	0.65	0.56	0.43	0.41	0.58	0.60	0.98	0.78	0.48	0.44	6.84	4.76
Widow	46	10.17	0.93	0.58	1.12	0.68	0.88	0.68	0.89	0.67	0.79	0.60	0.54	0.64	0.85	0.72	0.83	0.65	0.62	0.48	7.21	4.71
Others	2	0.44	1.29	0.06	2.25	0.35	1.05	0.24	1.65	0.92	0.90	0.71	1.50	0.23	0.43	0.60	1.41	0.35	1.20	0.14	11.67	2.74
p-value			0.000		0.001		0.000		0.000		0.006		0.004		0.001		0.002		0.009		0.002	

Table 2. SCL-90 means, standard deviations and ANOVA of the demographic data

Categories	n (%)		SOM		O-C		INT		DEP		ANX		HOS		PHO		PAR		PSY		Grand total	
	n	%	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD
Employment status/profession																						
Students	94	20.80	0.59	0.52	1.08	0.67	0.96	0.63	0.78	0.59	0.75	0.59	0.72	0.61	0.51	0.53	0.89	0.73	0.66	0.63	6.72	4.33
Government officer	43	9.51	0.45	0.45	0.76	0.63	0.54	0.44	0.50	0.45	0.46	0.41	0.36	0.41	0.35	0.38	0.51	0.52	0.27	0.35	4.20	3.55
Government employer	77	17.25	0.72	0.53	0.82	0.53	0.82	0.58	0.66	0.50	0.64	0.53	0.59	0.62	0.53	0.52	0.78	0.63	0.53	0.50	5.96	4.10
Private employer	56	12.61	0.80	0.60	1.24	0.79	0.99	0.65	0.88	0.59	0.78	0.54	0.72	0.54	0.72	0.66	0.94	0.67	0.66	0.48	7.72	4.68
Retired	37	8.41	0.49	0.45	0.73	0.50	0.51	0.41	0.45	0.28	0.41	0.34	0.35	0.31	0.46	0.46	0.54	0.47	0.35	0.32	4.29	2.91
Private	39	8.63	0.74	0.43	1.08	0.47	0.81	0.46	0.75	0.48	0.65	0.39	0.57	0.45	0.63	0.48	0.86	0.39	0.59	0.37	6.67	2.89
Unemployed	21	4.87	0.97	0.67	1.07	0.65	0.82	0.58	0.94	0.60	0.76	0.56	0.66	0.53	0.93	0.77	0.70	0.50	0.50	0.29	7.36	4.44
Others	81	17.92	0.94	0.53	1.03	0.66	0.83	0.59	0.80	0.61	0.72	0.54	0.56	0.50	0.73	0.60	0.81	0.62	0.53	0.44	6.94	4.24
p-value			0.000		0.000		0.000		0.000		0.002		0.001		0.000		0.002		0.000		0.000	
Income (Baht per month)																						
< 5,000	194	43.14	0.83	0.57	1.03	0.67	0.87	0.61	0.81	0.60	0.73	0.54	0.59	0.50	0.74	0.65	0.83	0.63	0.60	0.51	7.03	4.40
5,001-10,000	137	30.75	0.68	0.55	1.02	0.65	0.87	0.61	0.74	0.55	0.67	0.55	0.68	0.66	0.51	0.49	0.82	0.67	0.55	0.51	6.31	4.10
10,001-15,000	40	8.85	0.62	0.41	0.95	0.62	0.84	0.55	0.69	0.44	0.70	0.44	0.55	0.43	0.51	0.46	0.73	0.53	0.46	0.41	6.03	3.64
15,001-20,000	37	8.18	0.53	0.43	0.89	0.61	0.62	0.44	0.56	0.43	0.48	0.42	0.38	0.29	0.46	0.45	0.68	0.55	0.43	0.41	5.02	3.54
20,001-25,000	14	3.10	0.48	0.44	1.02	0.49	0.67	0.38	0.58	0.40	0.58	0.39	0.49	0.49	0.44	0.43	0.64	0.44	0.40	0.35	5.30	3.11
25,001-30,000	10	2.21	0.54	0.56	0.61	0.41	0.60	0.50	0.48	0.40	0.39	0.36	0.46	0.35	0.43	0.45	0.48	0.49	0.37	0.37	4.36	3.20
30,001-35,000	5	1.11	0.26	0.37	0.66	0.68	0.31	0.58	0.38	0.34	0.34	0.42	0.30	0.40	0.28	0.36	0.43	0.40	0.22	0.29	3.18	3.41
35,001-40,000	6	1.33	0.76	0.70	0.92	0.84	0.65	0.59	0.60	0.59	0.67	0.67	0.58	0.72	0.40	0.47	0.72	0.76	0.35	0.35	5.64	5.36
> 40,000	6	1.33	0.35	0.36	0.65	0.54	0.46	0.43	0.42	0.50	0.33	0.42	0.53	0.64	0.26	0.24	0.47	0.53	0.33	0.42	3.79	3.65
p-value			0.001		0.395		0.050		0.053		0.035		0.241		0.001		0.300		0.096		0.023	

Table 3. Comparison of Cronbach's alpha scores according to symptom dimensions for the present study and for previous studies

	SOM	O-C	INT	DEP	ANX	HOS	PHO	PAR	PSY	Overall
Community (Finland), n = 337	0.87	0.86	0.83	0.88	0.86	0.79	0.79	0.82	0.81	0.97
Patients (Finland), n = 249	0.90	0.86	0.84	0.90	0.79	0.77	0.83	0.82	0.79	0.97
Present study, n = 448	0.85	0.79	0.83	0.86	0.82	0.79	0.76	0.79	0.80	0.97
Hispanic College[10], n = 205	0.76	0.75	0.79	0.70	0.72	0.70	0.53	0.52	0.70	-

Table 4. Correlation between SCL-90 and some 16-PF sub-scales (n = 448)

	SOM	O-C	INT	DEP	ANX	HOS	PHO	PAR	PSY
Tension	0.107*	0.219**	0.170**	0.200**	0.202**	0.244**	0.121*	0.174**	0.204**
p-value	0.023	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000
Vigilance	0.108	0.084	0.106	0.093	0.081	0.116	0.118	0.116	0.038
p-value	0.021	0.074	0.024	0.047	0.086	0.013	0.012	0.014	0.423
Perfectionism	-0.048	-0.081	-0.069	-0.110	-0.083	-0.097	-0.053	-0.117	-0.104
p-value	0.313	0.085	0.143	0.019	0.078	0.039	0.257	0.013	0.028
Apprehension	0.143**	0.176**	0.196**	0.212**	0.206**	0.188**	0.183**	0.219**	0.210**
p-value	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

* Correlation significant at the 0.05 level (2-tailed)
** Correlation significant at the 0.01 level (2-tailed)

nine sub-scales of SCL-90 ($p < 0.05$) and this result supports the convergent validity of the scale. However, Vigilance was related more to Phobic Anxiety and Hostility than to Paranoid Ideation ($r = 0.116$-0.118, $p < 0.012$-0.01 and $r = 0.116$, $p < 0.014$) and Perfectionism was not related to Obsessive-compulsive but correlated with other sub-scales, indicating poor discriminant validity.

Factor analysis

Factor structure

Prior to conducting the EFA, data was screened to ensure no assumptions had been violated. The sampling adequacy was good, with a Kaiser-Meyer-Olkin (KMO) value of 0.94, and Bartlett's test of sphericity was significant ($p < 0.001$). To identify the factor structure, an EFA using a maximum likelihood (ML) method to extract eigenvalues greater than 1, was employed. The authors used an oblique rotation to account for correlations between the two factors ($r = 0.51$). The EFA extracted twenty factors accounting for 65% of the variances. The first component yielded an eigenvalue of 27.09, accounting for 30% of the variance. The communalities ranged from 0.108 to 0.598.

The item loadings ranged from 0.250 to 0.713, and most (87 out of 90) were loaded on the same factor-only items 44, 64 and 66 had cross-loadings on the second factor. At the scale level, nine dimensions acted as nine observed variables and it was found that only one factor had an eigenvalue of 6.51, accounting for 69% of the variance. Communality ranged from 0.73 to 0.91 and the Cronbach's alpha was 0.95 with a corrected item-total correlation of 0.72 to 0.90 (r^2 59% to 80%). Inter-item correlation among three dimensions: Depression, Anxiety and Interpersonal Sensitivity, ranged from 0.78 to 0.81.

Confirmatory factor analysis (CFA)

The author used CFA to determine the model fit and the number of factors to retain from the previously identified factor model. SPSS Amos 18[9] was used to compare the observed structure with the structure proposed in the theoretical model. The ML estimation method was used to test the covariance matrix and to determine how well the model fitted the sample data. When investigating the fit indices associated with an ML estimate, the one-factor model was tested and found to be suitable: [$\chi^2 = 38.019$ ($df = 20$, $n = 450$, $p < 0.009$)], with a Goodness-of-Fit

Index (GFI) of 0.982, a Non-Normed Fit Index (NNFI) of 0.990, a Normed Fit Index (NFI) of 0.990, a Comparative Fit Index (CFI) of 0.995, a Standardized Root Mean square Residual (SRMR) of 0.0148, and a Root Mean Square Error of Approximation (RMSEA) of 0.045 (90% CI 0.022-0.066).

Discussion

There was a significant difference in all the SCL-90 sub-scales between the sample from the central/Bangkok area and the other regions. These results make sense when considering the fact that people in capital/large cities may experience more stress than those in rural regions. However, findings from other studies using the same SCL-90 have given both supportive and contradictory results[10,11]. Further studies are therefore needed in order to provide a better explanation.

In terms of gender, females showed more anxiety and depression symptoms than the males and this finding has been supported by previous studies[12-14]. Findings from the clinical sample support a previous study-that somatic symptoms are commonly found in the elderly who have psychiatric problems[15-17]. Depression and anxiety symptoms seem to be able to distinguish normal from mentally ill people, and this may relate to factors such as unemployment and marital status (separated or divorced), but not advanced age. The findings show that there was no age-related depression, but there was age-related somatization, interpersonal sensitivity, and hostility. This latter finding supports the report by Nguen and Zonderman[18], that there are significant age-related increases in somatic symptoms, whereas symptoms related to depression and interpersonal problems remain stable with age. From the psychological perspective, this might indicate that the elderly develop inner inadequacy and self-deprecation issues (measured by interpersonal sensitivity), or even hostility, which commonly occurs in the elderly as expressed through somatic complaints. Although 'somatization' is normally viewed as an immature defense, it might help the elderly cope with their losses, or to put it another way, it might help prevent them from experiencing depression as long as this defense (somatization) exists.

Another interesting point is that when the authors compared the results with the previous study conducted by Chooprayoon[4] and with a study among science students[19], they turned out to reveal similar patterns (see Fig. 1) despite the 30-year time difference. This might indicate that psychiatric symptoms among the Thai population have been stable over time, or it may indicate that the measurements were not sensitive enough to detect differences. When comparing these results to those from studies in Finland and US[20,21], the latter reason seems to be outweighed, that is, the lack of sensitivity is the key issue.

For the clinical sample, the present study reveals similar findings to the US study[20], but reveals differences when compared to the results from Finland, especially for Depression, which is the only item that can be used to differentiate a normal population from the clinical sample[21]. This finding is supported by the results of this study, since Depression dimension items accounted for a high percentage of the variance when compared to other dimensions (the three dimensions that shared the highest factor loadings were Depression, Anxiety, and Interpersonal Sensitivity, with r^2 scores of 0.88, 0.87 and 0.85 respectively).

The Thai version of SCL-90 demonstrated a good internal level of consistency in the present study when compared to others. However, in terms of construct validity, the problem of discriminant validity still exists; for example, the magnitude of association between Obsession-compulsion and Perfectionism when using 16-PF was lower than expected; similarly, Paranoid Ideation should correlate more with Hypervigilance than other symptoms. Conceptually, they should be related more to each other than to other symptoms but the results of the present study were not in line with the theory; for example, it would have been expected for the score 0.081 to be higher (more than 0.176) because Obsession-compulsion and Perfectionism are in theory more closely related than Apprehension and Obsession-compulsion (Table 4).

For the factor analysis study, SCL-90 did not reveal the expected nine dimensions-only one factor model was demonstrated. This may be explained by the fact that most of the items or scales had a high correlation with one another. Although it has been reported elsewhere[22,23] that there are three or four factors, this seems to vary in terms of the symptoms groupings[21]. Thus, regardless of whether an item-level or dimension-level analysis was being carried out, it failed to demonstrate the expected factor structure. Confirmatory factor analysis showed that a uni-dimensional model yields the best fit, and since modification indices suggested correlated errors between a number of the scales, especially Anxiety, Phobic Anxiety, Paranoid Ideation and Hostility,

re-specification may be considered, which could include deleting or combining some items or scales.

Limitations and future research

In terms of future research, test-retest reliability should be investigated in order to measure its stability; moreover, other criterion measurements such as the clinician-rated depression scale, the PANSS scale and the Structure interview for DSM-IV have never been used to test for concurrent validity. As a result, it cannot conclude for sure to what extent SCL-90 is able to predict specific psychiatric disorders; however, to use it more efficiently and effectively, the Global Symptom Index should be considered. Finally, SCL-90 should be modified into a shorter version with the remainder of the relevant and salient items to clinical diagnostic system such as DSM or ICD.

In summary, the Thai version of SCL-90 Thai demonstrates a good internal consistency but also shows questionable validity-especially for construct validity, and this requires further study. However, the Depression sub-scale is particularly useful and when measuring change, it may be appropriate to use the global score, that is, the grand total or GSI.

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Potential conflicts of interest

None

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Symptom Checklist-90 (SCL-90) การศึกษาในกลุ่มตัวอย่างคนไทย

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ภูมิหลัง: *Symptom Checklist-90 (SCL-90) ได้มีการนำมาใช้มายาวนานในประเทศไทยทั้งในกลุ่มตัวอย่างที่เป็นผู้ป่วยและไม่ใช่ผู้ป่วย อย่างไรก็ตามยังไม่เคยมีการศึกษาความถูกต้อง และความเชื่อถือได้ของเครื่องมือดังกล่าวอย่างเป็นระบบ การศึกษาครั้งนี้มีเป้าหมายเพื่อสำรวจกลุ่มตัวอย่างในคนไทยปกติ รวมทั้งตรวจสอบคุณสมบัติทางจิตมิติ (psychometric properties) ของเครื่องมือดังกล่าวด้วย*

วัสดุและวิธีการ: *กลุ่มตัวอย่างจำนวน 448 คน เพศชายร้อยละ 50.4 อายุระหว่าง 18-90 ปี ได้เข้าร่วมการศึกษาในครั้งนี้ กลุ่มตัวอย่างได้ทำแบบสอบถามข้อมูลพื้นฐาน แบบสอบถาม SCL-90 ฉบับภาษาไทย และ 16–Personality Factor Questionnaire ฉบับภาษาไทย ข้อมูลพื้นฐานวิเคราะห์โดยใช้สถิติเชิงพรรณนา ค่าความเชื่อมั่นวิเคราะห์จากค่า Cronbach's alpha ในการวิเคราะห์ความถูกต้อง จะใช้การวิเคราะห์องค์ประกอบและหาความถูกต้องแบบ convergent and discriminant validity ด้วยการวิเคราะห์สัมประสิทธิ์ความสัมพันธ์แบบเพียร์สันกับสเกลย่อยของ 16-PF*

ผลการศึกษา: *ค่าเฉลี่ยของดัชนีอาการโดยรวม (global symptoms index) เท่ากับ 0.70 $\pm$ 0.46 โดยมีค่าตั้งแต่ 0.53 ในกลุ่ม psychoticism ถึง 0.98 ในกลุ่ม obsessive-compulsive มีความแตกต่างของสเกลย่อยอย่างมีนัยสำคัญเมื่อเปรียบเทียบระหว่างเพศ กลุ่มอายุ ภูมิภาคที่ศึกษา ระดับการศึกษา อาชีพ และรายได้ รูปแบบของมิติของอาการย่อยเหล่านี้คล้ายคลึงกับที่เคยศึกษามาก่อนหน้านี้ อาการซึมเศร้าและวิตกกังวล เป็นกลุ่มอาการหลักที่แยกระหว่างคนปกติออกจากกลุ่มผู้ป่วย การศึกษาพบว่าเครื่องมือมีความเชื่อมั่นอยู่ในเกณฑ์ดี (ค่า Cronbach's alpha เท่ากับ 0.97) ค่าสัมประสิทธิ์ความสัมพันธ์แบบเพียร์สันกับสเกลย่อยของ 16-PF ไม่ได้เป็นไปตามที่คาดหมายไว้ ส่วนการศึกษาความถูกต้องเชิงโครงสร้างพบว่าเป็นแบบมิติเดียว*

สรุป: *SCL-90 ฉบับภาษาไทยได้แสดงข้อมูลในกลุ่มตัวอย่างชาวไทย มีความสอดคล้องภายในที่ดี มีความถูกต้องเชิงโครงสร้างแต่อำนาจการจำแนกไม่ดีนัก น้ำหนักตัวแปรสัมพันธ์กับมิติของอาการซึมเศร้า ความวิตกกังวลและ interpersonal sensitivity ควรจะมีการปรับปรุงข้อความในแบบสอบถามใหม่ถ้าต้องใช้ในผู้ป่วยจิตเวช*