

Use of the Chinese (Taiwan) Version of the Social Phobia Inventory (SPIN) Among Early Adolescents in Rural Areas: Reliability and Validity Study

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Background: To assess the screening abilities of the Chinese (Taiwan) version of the Social Phobia Inventory (SPIN) for evaluating social phobia in an adolescent community sample.

Methods: A total of 3,393 students (1,669 boys, 1,724 girls), aged 13–15, completed the SPIN questionnaire. A total of 144 students were enrolled for validity. The Mini-International-Neuropsychiatric-Interview-Kid (MINI-Kid) was used to establish *Diagnostic and Statistical Manual of Mental Disorders-IV* diagnosis.

Results: The mean SPIN total score of all subjects was 14.2 ± 9.4 , which was higher in girls than in boys (14.7 ± 9.4 vs. 13.7 ± 9.1 ; $p < 0.01$). The 7th graders had the highest SPIN total scores compared with the 8th and 9th graders (15.4 ± 9.7 vs. 13.4 ± 9.1 and 14.0 ± 9.4 ; $p < 0.001$). Internal consistency (Cronbach's $\alpha = 0.85$) and test-retest reliability ($r = 0.73$) were both good. A cut-off score of 25 resulted in balanced sensitivity (80%) and specificity (77%).

Conclusion: The Chinese (Taiwan) SPIN has good screening abilities. The cut-offs are different from those in other countries, and highlight the importance of culturally adapted cut-offs. [*J Chin Med Assoc* 2009;72(8):422–429]

Key Words: adolescent, social anxiety, SPIN, Taiwan

Introduction

Social phobia is an anxiety disorder with a high lifetime prevalence rate ranging from 5% to 13%.^{1–4} The onset of social phobia has been reported to occur in early to mid-adolescence, with the mean age of onset being 10–16 years of age in epidemiological studies.⁵ In a 3-year panel study of mental disorders among adolescents in Taiwan, the prevalence of *Diagnostic and Statistical Manual of Mental Disorders-IV* (DSM-IV) social phobia was 1.8–3.4% among students in grades 7 through 9.⁶ These results were compatible with previous European adolescent community studies, which obtained prevalence rates of 2–3%.^{7,8} Aside from clinical social phobia, subclinical symptoms of social anxiety are also common among adolescents. In the aforementioned community studies, around 27–47% of adolescents reported at least 1 social fear, and the most frequently reported symptom was of speaking in public.^{7,8} Social phobia may lead to substantial impairment

in social, educational, interpersonal, and personal impairment in adolescents.^{9–11} It is often comorbid with depression, substance abuse, and other anxiety disorders,^{12–14} and is also an important risk factor for suicide.¹⁵ Therefore, early detection of social phobia in adolescence is important.

Various risk factors such as age and sex have been reported. A preponderance of social phobia has been found in girls, with a rate about twice as high as in boys.^{7,8} However, 1 recent study reported that a more pronounced intensification of social anxiety at mid-adolescence may occur among boys.¹⁶ German and Finnish studies reported a peak in social phobia among 14- to 15-year-olds,^{7,16} and previous community studies also suggest that early to mid-adolescence (about 11–14 years of age) was associated with higher levels of self-reported social anxiety in the U.S.^{17,18}

The Social Phobia Inventory (SPIN) is a brief self-reported instrument for measuring the severity of social phobia symptoms.¹⁹ In the original design, there



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are 3 subscales in SPIN that measure fear of social situations, avoidance of social situations, and physiological symptoms. The school systems and educational policy in Asia are different from those in Western countries. Nevertheless, there have been no published data pertaining to social anxiety in Asian adolescents. Since cultural differences may affect the evaluation of social anxiety,²⁰ more research is needed to determine the SPIN's psychometric properties in an Asian adolescent population.

The aims of this study were to: (1) examine the reliability and factorial structure of the SPIN in an Asian adolescent population; (2) study demographic differences in social anxiety symptoms; (3) find an optimal cut-off point for social phobia diagnosis; and (4) demonstrate the validity of the SPIN relative to DSM-IV social phobia diagnosis in a community sample of Taiwanese adolescents aged 13–15 years (grades 7–9).

Methods

Population

Education is obligatory from ages 6–15 in Taiwan. More than 90% of teenagers aged 13–15 attend public junior high schools (similar to grades 7–9 in the U.S.), and the remaining teenagers attend private schools. Participants were obtained using a convenience sample of 3 public junior high schools in rural areas in 2000 by random invitation.²¹ Considering the geographic distribution, we enrolled 3 schools from different parts of Taiwan. The 1st school is located in Hualien (eastern region), the 2nd in Yunlin (central region), and the 3rd in Pingtung (southern region). All of the 3,736 students in these 3 junior high schools were the target study population.

Survey procedures

Letters describing our study aims and methodology were mailed to the principals of the sample schools. After the schools agreed to participate, the students in these sampled schools answered a self-administered questionnaire. Among the participants, 275 students (127 boys, 148 girls) repeated the questionnaire 4 weeks later for test–retest reliability.

All the students were divided into the following groups: low-SPIN score group (0–11), medium-high SPIN (12–23), and high SPIN (≥ 24); they were selected for the validity study by a 1:1:2 ratio. Sex and grade were also matched for each group. We decided to categorize those with a score ≥ 24 into the high score group because a cut-off score of 24 points had previously been shown to differentiate adolescent subjects

with and without social phobia from the general population.²² In total, 144 students were enrolled for the face-to-face psychiatric interview 4 weeks after questionnaire completion.

Without knowing the SPIN scores, board-certified psychiatrists who are well trained by members of the Taiwan Mini-International Neuropsychiatric Interview development team interviewed the adolescents using the structured Mini-International Neuropsychiatric Interview-Kid for children and adolescents (MINI-Kid).²³ The MINI follows the DSM-IV (American Psychiatric Association)²⁴ and International Classification of Diseases–10 (WHO-ICD-10)²⁵ criteria for the diagnosis of psychiatric disorders and screens for 17 Axis I disorders. In this study, we assessed only depressive (major depression and dysthymia) and anxiety disorders (panic disorder, social phobia, obsessive compulsive disorder, and generalized anxiety disorder [GAD]). According to the rule of MINI, GAD was diagnosed for those who had anxiety symptoms not explained by other defined disorders, such as major depression. Other than for panic disorder, the MINI does not systematically inquire into lifetime-to-date psychiatric disorders; only currently active disorders were diagnosed and used for analysis in this study.

Chinese (Taiwan) version of SPIN

The SPIN is a 17-item self-administered questionnaire for estimating a wide range of social phobia symptoms.¹⁹ It is comprised of items that measure: (1) fear in social situations (6 items); (2) avoidance of performance or social situations (7 items); and (3) physiological discomfort in social situations (4 items). Participants were asked to grade the distress of each symptom on the following scale with respect to frequency during the past week: 0 (not at all); 1 (a little bit); 2 (somewhat); 3 (very much); or 4 (extremely). The range of the sum score is thus 0–68. The total is divided into 3 subscales: the fear, avoidance and physiological subscales. The SPIN questionnaire was translated into Chinese following the standard technique for cross-cultural research: translation, back translation, and bilingual expert panel evaluation.

Statistical analysis

All data were analyzed using SPSS version 13.0 (SPSS Inc., Chicago, IL, USA) for Windows. Continuous variables were compared between groups by *t* tests or ANOVAs for independent samples. The differences between grades were assessed by *post hoc* analysis with the least significant difference (LSD) test. Test–retest reliability of the SPIN was assessed by the Pearson correlation coefficient (*r*). Cronbach's α was used to

Table 1. Age and sex differences for the Social Phobia Inventory (SPIN) total scores, and the fear, avoidance, and physiological subscale scores in Chinese (Taiwan) adolescent participants

	Case no.	SPIN total scale	Subscale		
			Fear of social situations	Avoidance of social situations	Physiological symptoms
All	3,698	14.2±9.4	6.0±3.9	6.0±4.2	2.3±2.4
Boys	1,840	13.7±9.1	5.5±3.8	5.9±4.2	2.3±2.4
Girls	1,858	14.7±9.7	6.5±3.9	5.9±4.3	2.4±2.5
<i>p</i> (boys vs. girls)		<i>p</i> =0.002	<i>p</i> <0.001	<i>p</i> =0.63	<i>p</i> =0.17
7 th grade	1,200	15.4±9.7*†	6.5±4.1*†	6.6±4.4*†	2.5±2.5
Boys	619	14.5±9.1*	5.9±3.9*	6.5±4.2*†	2.3±2.4
Girls	581	16.3±10.3*†	7.1±4.2*†	6.7±4.6*†	2.6±2.6*†
<i>p</i> (boys vs. girls)		<i>p</i> =0.003	<i>p</i> <0.001	<i>p</i> =0.44	<i>p</i> =0.02
8 th grade	1,232	13.4±9.1*	5.7±3.8*	5.5±4.1*†	2.2±2.4
Boys	610	13.0±9.3*	5.2±3.8*	5.6±4.2*	2.2±2.4
Girls	622	13.8±9.0*	6.2±3.7*	5.3±4.0*	2.3±2.4*
<i>p</i> (boys vs. girls)		<i>p</i> =0.13	<i>p</i> <0.001	<i>p</i> =0.31	<i>p</i> =0.50
9 th grade	1,266	14.0±9.4†	5.9±3.8†	5.9±4.2†‡	2.3±2.4
Boys	611	13.7±9.0	5.5±3.6	5.9±4.0†	2.3±2.4
Girls	655	14.3±9.7†	6.3±3.9†	5.8±4.3†	2.2±2.5†
<i>p</i> (boys vs. girls)		<i>p</i> =0.25	<i>p</i> <0.001	<i>p</i> =0.73	<i>p</i> =0.21
<i>p</i> (ANOVAs among grades)					
For all	3,698	<i>p</i> <0.001	<i>p</i> <0.001	<i>p</i> <0.001	<i>p</i> =0.05
For girls	1,858	<i>p</i> <0.001	<i>p</i> <0.001	<i>p</i> <0.001	<i>p</i> =0.009
For boys	1,840	<i>p</i> =0.02	<i>p</i> =0.009	<i>p</i> =0.002	<i>p</i> =0.64

p value in post hoc analysis: *grades 7 and 8; †grades 7 and 9; ‡grades 8 and 9.

measure reliability, with a coefficient >0.7 indicating satisfactory scale reliability.²⁶ Principal component analysis with Varimax rotation was performed to determine component factors of the scale. One-way ANOVA with LSD analysis was used to investigate the differences among the 3 school groups. Criterion validity was investigated by computing sensitivity, specificity, and positive and negative predictive values (PPV and NPV) for various cut-off scores on the SPIN. DSM-IV diagnoses were used as the gold standard. Cut-off scores for the SPIN were obtained using receiver operating characteristic curves;²⁷ the balanced cut-off score was examined by demonstrating maximal sensitivity and specificity of ≥75%. A *p* value <0.05 was considered statistically significant.

Results

Descriptive statistics

In total, 3,393 students (1,669 boys and 1,724 girls; response rate, 90.8%) completed the questionnaire. The mean SPIN total score was 14.2±9.4, and girls had higher scores than boys (14.7±9.7 *vs.* 13.7±9.1;

p=0.002). Girls scored significantly higher than boys on the fear (*p*<0.001) but not the avoidance (*p*=0.63) or physiological (*p*=0.17) subscales (Table 1). The SPIN total scores and the 3 subscores were different among the different grades (all *p*<0.05, ANOVA; Table 1). In *post hoc* analyses, the 7th graders had the highest SPIN total scores and higher fear and avoidance subscores (when compared to 8th and 9th graders; all *p*<0.001). No differences were obtained between 8th and 9th graders in SPIN total scores or on the 3 subscores. The differences among grades persisted in the subgroup analyses of boys and girls separately, and the differences were larger in girls compared with boys.

Among the 3 school groups, there was neither grade nor sex difference. There were significant differences among the 3 schools in SPIN total score and in the 3 subscores by ANOVA (all *p*<0.001). LSD analysis showed that adolescents at the school located in the central region of Taiwan reported the highest SPIN total scores and also the highest scores for each subscale compared to adolescents in the eastern and southern regions (SPIN total score, 15.3±9.7 *vs.* 13.9±9.7 *vs.* 13.1±8.7; fear subscore, 6.4±3.9 *vs.* 5.7±4.0 *vs.* 5.7±3.8; avoidance subscore, 6.4±4.3 *vs.* 5.7±4.3 *vs.*

Table 2. Factor loadings of the Social Phobia Inventory (SPIN) items among Chinese (Taiwan) adolescents ($n = 3,393$) and the originally designed subscales and factors*

Item (subscale)	Factor 1 (Authority-criticism)	Factor 2 (Social contact)	Factor 3 (Physiological change)	Factor in the original version
1. Fear of people in authority (Fear)	0.515	0.108	0.302	IV (social inferiority)
2. Bothered by blushing (Physiology)	0.258	0.097	0.646	III (physiology)
3. Fear of parties and social events (Fear)	0.078	0.580	0.447	I (social inadequacy)
4. Avoids talking to strangers (Avoid)	0.458	0.596	-0.122	I (social inadequacy)
5. Fear of criticism (Fear)	0.688	0.127	0.175	II (self esteem)
6. Avoids embarrassment (Avoid)	0.550	0.266	0.302	II (self esteem)
7. Distressed by sweating (physiology)	0.212	0.193	0.651	III (physiology)
8. Avoids parties (Avoid)	-0.012	0.714	0.335	I (social inadequacy)
9. Avoids being the center of attention (Avoid)	0.199	0.638	0.254	V (attention to oneself)
10. Fear of talking to strangers (Fear)	0.440	0.628	-0.043	I (social inadequacy)
11. Avoids speeches (Avoid)	0.347	0.491	0.224	V (attention to oneself)
12. Avoids criticism (Avoid)	0.599	0.086	0.209	II (self esteem)
13. Distressed by palpitations (Physiology)	0.332	0.163	0.634	III (physiology)
14. Fear of others watching (Fear)	0.587	0.233	0.311	III, IV, V
15. Fear of embarrassment (Fear)	0.663	0.195	0.203	II (self esteem)
16. Avoids talking to authority (Avoid)	0.573	0.238	0.240	IV (social inferiority)
17. Distressed by trembling or shaking (Physiology)	0.275	0.176	0.636	III (physiology)
Eigenvalues	6.2	1.2	1.1	
% of variance	36.5	7.0	6.5	

*Bold type indicates Eigenvalues > 0.4.

5.5 ± 3.9 ; physiological subscore, 2.5 ± 2.6 vs. 2.4 ± 2.5 vs. 1.9 ± 2.2).

The most frequent and severe symptoms were "avoidance of making speeches" (20.2%), "fear of embarrassment" (16.3%), and "fear of criticism" (11.2%). Girls scored significantly higher than boys on the majority of items. The only 3 items on which boys scored significantly higher than girls were "bothered by blushing" (0.72 ± 0.86 vs. 0.65 ± 0.83 ; $p = 0.02$), "avoids parties" (0.44 ± 0.75 vs. 0.36 ± 0.68 ; $p = 0.003$) and "avoids speeches" (1.65 ± 1.19 vs. 1.45 ± 1.12 ; $p < 0.001$). There were no differences between sexes on "fear of parties and social events", "avoids embarrassment", "distressed by sweating" and "avoids being the center of attention".

Factor structure

Table 2 shows the factor structure of the Chinese (Taiwan) version of SPIN. Three factors (factor 1: authority-criticism; factor 2: social contact; factor 3: physiological changes) which accounted for 50% of the variance were identified.

Reliability

Pearson's correlation coefficients for SPIN total scores, fear subscale, avoidance subscale, and physiology subscale over the 4-week interval in the test-retest sample ($n = 275$) were 0.75, 0.75, 0.74, and 0.74, respectively (all $p < 0.001$). In the population sample ($n = 3,393$), Cronbach's α was 0.89.

Validity study

Among the 144 students who received a psychiatric interview, the mean SPIN total score was 17.8 ± 10.4 . Fifteen (10.4%) of the participants met the DSM-IV criteria for social phobia. A diagnosis of another anxiety disorder was demonstrated in 29 participants, and depressive disorder was diagnosed in 22 participants (Table 3). The mean SPIN scores of participants in the social phobia group were significantly higher than for those without social phobia (32.9 ± 10.4 vs. 16.0 ± 8.9 ; $p < 0.001$). These differences were also demonstrated in the 3 subscales of SPIN (all $p < 0.001$). Participants with anxiety disorders other than social phobia who had comorbid social phobia had higher SPIN scores than

Table 3. Diagnostic and Statistical Manual of Mental Disorders–IV diagnoses and mean total and subscale scores of Social Phobia Inventory (SPIN) among 144 Chinese (Taiwan) adolescents in grades 7–9*

	Case no.	SPIN total score	Subscale		
			Fear of social situations	Avoidance of social situations	Physiological symptoms
Total	144	17.8 ± 10.4	7.2 ± 4.1	7.1 ± 4.8	3.5 ± 3.2
Social phobia	15	32.9 ± 10.4	12.9 ± 4.0	13.4 ± 5.6	6.5 ± 3.5
Non-social phobia	129	16.0 ± 8.9	6.5 ± 3.5	6.4 ± 4.1	3.1 ± 3.0
<i>p</i>		<0.001	<0.001	<0.001	<0.001
Other anxiety disorder	29				
Comorbid with SP	6	37.2 ± 12.9	14.7 ± 4.4	14.7 ± 6.6	7.8 ± 4.7
Without SP	23	16.0 ± 7.9	6.2 ± 3.5	6.7 ± 4.0	3.2 ± 2.5
<i>p</i>		<0.001	<0.001	0.001	0.002
Depressive disorder	22				
Comorbid with SP	8	32.3 ± 7.3	13.3 ± 3.4	12.9 ± 4.1	6.1 ± 2.6
Without SP	14	17.1 ± 9.5	6.7 ± 3.3	6.9 ± 5.0	3.4 ± 3.0
<i>p</i>		0.001	<0.001	0.01	0.05

*Data presented as mean ± standard deviation. SP = social phobia.

those without comorbid social phobia (37.2 ± 12.9 vs. 16.0 ± 7.9 ; $p < 0.001$). Participants with depressive disorders who had comorbid social phobia had higher SPIN scores than those without comorbid social phobia (32.3 ± 7.3 vs. 17.1 ± 9.5 ; $p = 0.001$).

Sensitivity, specificity and optimum cut-offs

A receiver operating characteristic curve presenting sensitivity versus $1 - \text{specificity}$ values for SPIN total scores compared to a reference standard of social phobia diagnosis is presented in Figure 1. Table 4 presents the sensitivity, specificity, PPV and NPV over the selected cut-off scores. A cut-off score of 25 points produced balanced sensitivity (80.0%) and specificity (76.7%), with a PPV of 9.7% and a NPV of 99.2% based on a social phobia prevalence rate of 3%.⁶

Discussion

Our study provides evidence that the Chinese (Taiwan) version of the SPIN has good reliability and properties for the screening of social phobia among Taiwanese adolescents. The test–retest reliability and the internal consistency coefficients for SPIN in our study were similar to those of previous reports.^{22,28} With or without psychiatric comorbidity, the SPIN scores of adolescents with social phobia were higher than the scores of adolescents without social phobia, showing good structural validity properties.

Comparing the factor structures between the original version¹⁹ and ours (Table 2), Factor II (threat to

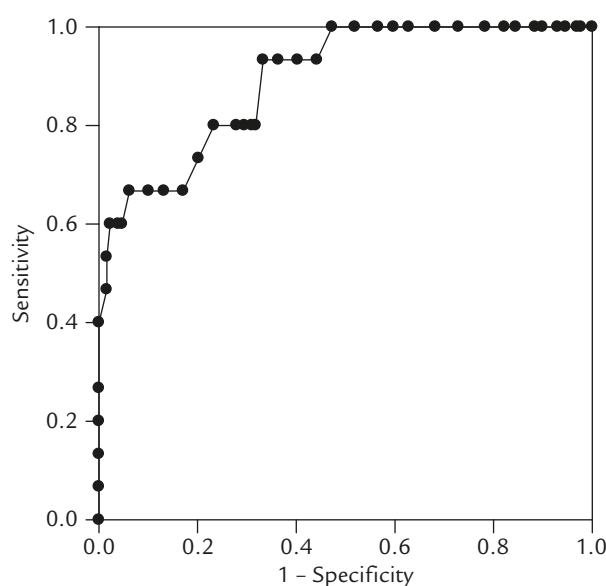


Figure 1. Receiver operating characteristic curve for Social Phobia Inventory (SPIN) global scores detecting social phobia diagnosis (cut-off, 25).

self-esteem) and Factor IV (social inferiority) in the original version were merged into Factor I “authority-criticism” in the current version. Factors I (social inadequacy) and V (avoidance of being the center of attention and of public speaking) in the original version were merged into Factor 2 “social contact” in the current version. Our subjects could not distinguish Factor II and IV, and also could not differentiate Factor I and V, which may suggest that threat to self-esteem is associated with social inferiority, and social inadequacy is

related to avoidance of being the center of attention in our Chinese population. Factor III (physiological changes) in the original version was maintained in the current version, and may reflect that “physiological change” is the most constant factor among different ethnicities.

Table 5 shows the optimal SPIN cut-off scores of previous reports conducted in adolescent populations. The mean SPIN score in the present study was higher than that of most of the Western adolescent samples. In addition, a cut-off score of 25 in our study was higher than the 19 for American adult subjects¹⁹ and 21 in an American adolescent sample,²⁹ and was similar to the cut-off score of 24 in a Finnish adolescent population.²² These studies showed similar sensitivity (range, 68–81%) and slightly higher specificity (range, 81–85%) than ours. The lower PPV in the current study might reflect the low prevalence of social phobia in the community-dwelling adolescents. Many studies have found that Asian adults have greater social anxiety symptoms than Westerners.^{30–35} Therefore, the cultural context may affect the detection of social phobia. Asian societies

seem to favor a less dominant and active self and to discourage self-promotion.^{36,37} Our data suggest that Asian adolescents tend to report a greater number of and more severe social anxiety symptoms, and some of them may not be diagnosed with social phobia due to cultural differences in normative behavior. It appears that the cut-off score varies in the adolescents of different ethnicities and suggests that the SPIN is satisfactory for screening, but not for diagnosis.

In Taiwan, after graduating from elementary school (grades 1–6), students enter a different school for middle school (grades 7–9). Therefore, students in grade 7 have to face a new environment, including novel teachers and classmates. This may explain why the 7th graders had significantly higher SPIN total scores than did the 8th or 9th graders in our study as well as in a previous Taiwanese study.⁶ Studies in Western populations have yielded different results. Two prior studies showed a peak of social phobia among 14- to 15-year-olds in German and Finnish adolescent participants,^{7,16} and 2 U.S. community studies suggested that adolescents aged 11–14 had higher levels of social anxiety than older adolescents.^{17,18} We could not find similar trends in Western reports; variations in the education systems of these countries might explain part of the differences. Further studies are needed to explore the discrepancy.

Our study found that girls reported higher levels of social anxiety symptoms than boys, which was consistent with results from previous studies.^{17,18,38,39} Boys reported higher scores on the items “bothered by blushing”, “avoids parties”, and “avoids speeches”, which implied that boys avoided more activities in public situations. Compared with other studies, we found a different pattern of sex variation in the items. We found more items on which boys displayed higher scores than girls and more items with equal scores in both sexes compared with the previous Western reports. It suggests that cultural influences on the interaction between sex and social anxiety symptoms may be important.²²

Table 4. Sensitivity, specificity, positive and negative predictive values for various cut-off scores of the Social Phobia Inventory for detecting *Diagnostic and Statistical Manual of Mental Disorders-IV* social phobia

Cut-off score	Sensitivity (%)	Specificity (%)	PPV* (%)	NPV* (%)
19	93	64	7.4	99.7
20	93	67	8.0	99.6
21	80	68	7.2	99.0
22	80	69	7.4	99.15
23	80	71	7.9	99.1
24	80	73	8.4	99.1
25	80	77	9.7	99.2
26	73	80	10.5	98.9

*Based on a 3% prevalence rate of social phobia. PPV = positive predictive value; NPV = negative predictive value.

Table 5. Social Phobia Inventory (SPIN) in different countries among community adolescents

	Tsai et al (this study)	Johnson et al ²⁹ (2006)	Ranta et al ²² (2007)
Country	Taiwan	U.S.	Finland
Total study number	3,393	174	752
Validity subject number	144	174	350
Age range (yr)	13–15	13–17	12–17
SPIN score in total study subjects (mean ± SD)	14.2 ± 9.4	16.8 ± 0.9	11.3 ± 8.1
Cut-off score	25	21	24

Our participants were sampled from 3 junior high schools located in different regions of Taiwan in rural areas, and the results show that those in the central-region school (Yunlin) had the highest level of social anxiety overall and in each subdomain (all significantly higher). Differences among geographic distribution were found in our study; further investigation of the factor of regional location is crucial to clarify this issue. Since urban–rural differences in psychiatric morbidity among adolescents have been reported in Taiwan, with rates of social phobia higher in rural than in urban youths,⁶ our study which focused on youths in rural areas is limited in its usefulness for youth who live in urban areas. The strengths of the current study included obtaining a community population, large sample size, and the utilization of a semi-structured diagnostic interview based on the MINI-Kid by psychiatrists. Nevertheless, only students completed the diagnostic interview; neither teachers nor family members reported on symptoms or attended the interview process. These limitations might affect the accuracy of the diagnoses.

In conclusion, SPIN is a reliable, discriminative and valid screening tool in a Taiwanese adolescent community population. We confirmed the 3 factor model of the SPIN as in other ethnic groups. Both the mean SPIN total scores and optimum cut-off scores were higher than those reported by Western studies, which might be due to cultural factors.

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