

The Validity of Inventory of Depressive Symptomatology, Self-report and the Association of Depression with Professional Help-seeking among Individuals with Social Anxiety Disorder

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Abstract

Objectives: Patients with social anxiety disorder (SAD) often have a fear of seeking professional help. In this study, we intended to validate the Taiwanese version of the Inventory of Depressive Symptomatology, Self-report (IDS-SR), and to investigate whether severity of depression and/or social anxiety is associated with professional help-seeking among Internet users with SAD. **Methods:** In the study part I, we recruited volunteers through the internet, assessed their social anxiety and depression, and examined the Taiwanese version of the IDS-SR. In study Part II, we again recruited volunteers from the Internet and outpatient clinic, and did the telephone or face-to-face interview to establish the validity of the IDS-SR. Finally, the results of both parts were integrated to analyze help-seeking behaviors. **Results:** We included 2,079 participants in study part I, which showed that the IDS-SR was reliable. In the Part II study, the IDS-SR was found to be valid from 104 participants. Among the study Part I participants who reached the threshold of SAD, a high prevalence (52.9%) of major depressive disorder was found. Multiple logistic regression analysis of scores of the participants who met the threshold of SAD ($n = 1,483$) revealed that the IDS-SR total score was significantly associated with professional help-seeking ($p < 0.001$), whereas the severity of social anxiety was not. **Conclusion:** The Taiwanese version of IDS-SR was valid and reliable. The severity of depression, rather than that of social anxiety, was associated with professional help-seeking behaviors among Internet users with SAD. Screening depression in people with SAD has the potential in identifying those who may seek professional help.

Key words: help-seeking behavior, Internet diagnostic screening, stigma for psychiatric disease, treatment barrier for social anxiety disorder

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Introduction

Social anxiety disorder (SAD) is one of the most common anxiety disorders, and the majority of those who are afflicted remain undiagnosed and untreated [1, 2]. Although public stigma endorsed for SAD [3] may be related to the

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underdetection, unfortunately, a recent pilot study using themes of literacy, stigma reduction, normative feedback, help-seeking information, and motivational interviewing to enhance help-seeking intentions for SAD showed a negative result [4]. One of the important barriers to approaching these patients is their resistance to face-to-face assessments [5], necessitating feasible strategies to find them through the Internet [5-7]. Using an Internet-based questionnaire, participants with high severity of social anxiety symptoms have been found to be more likely to seek help from mental health professionals [7]. But the potential influence of comorbidity, such as depression, on professional help-seeking, has not been examined in the study. Since previous studies suggested that patients with SAD are more likely to seek help when they were depressed [8, 9] and the prevalence of major depressive disorder (MDD) in patients with SAD is rather high, ranging from 33% to 58% [9-11], the potential rôle of comorbid MDD on their help-seeking should be elucidated, especially for those who use the Internet as their major source of information.

To assess depressive symptoms for Internet users, we widely use Internet-based depression-specific instruments [12-16]. A possible instrument of choice is the Inventory of Depressive Symptomatology, Self-report (IDS-SR), which is different from other copies of questionnaire because it gives an equivalent weighting for each depressive symptom and is designed to include all *the DSM-IV* diagnostic criteria for MDD [17, 18]. The IDS-SR has been shown to have a good diagnostic validity regarding MDD [19, 20], and has been used in large international studies [21]. But IDS-SR has never been validated through the Internet. Considering the sound psychometric properties of the IDS-SR [17, 18], a validated Internet-based application has the potential to increase the use of the Internet in providing health care services [22, 23].

In this Internet-based study, we intended to develop and validate the Internet-based Taiwanese version of the IDS-SR, for the use to detect comorbid depression among participants with SAD, and to determine whether the severity of social anxiety and/or severity of comorbid depression is associated with professional help-seeking behaviors. Unlike many published studies with clinical participants, we expected that using the Internet to recruit participants can allow us to include those with SAD who had never sought help previously. Our hypothesis was that the IDS-SR would be validly applied to people using the Internet, and that depression would be a crucial factor associated with professional help-seeking of participants with SAD.

Methods

This study comprised two parts. Study part I was to investigate the characteristics and professional help-seeking experiences of the Internet-recruited participants, along with assessments of social anxiety and depression and to examine the reliability of the IDS-SR. Study part II was to investigate for the diagnostic validity of the IDS-SR, consisting of two groups of participants – the Internet group and the clinical group, where participants received telephone or face-to-face interviews, respectively, to establish their diagnoses.

Study participants

Participants in this study were volunteers who were recruited mainly from the Internet, except that those in the clinical group of study part II were recruited from the outpatient clinic. The Internet part of this study was conducted on PsychPark, which was a popular website in Taiwan on mental health problems for the public and consisted of more than 30,000 members.

Registration on PsychPark was free. A membership of PsychPark was required for each Internet-recruited participant, ensuring that the participant was a real person and avoided one to join the study repetitively. In contrast, the clinical participants in this study were those with SAD recruited from the outpatient psychiatric clinic at National Taiwan University Hospital.

For all participants, the inclusion criterion was age between 18 and 65 years. Participants who could not complete all procedures were excluded. This study was approved by the institutional review board at National Taiwan University Hospital (assigned IRB protocol number = 200703007M and date of approval = May 24, 2007). As stipulated by the IRB, all study participants gave either an online or a written informed consent on paper before participating in the study.

Instruments

The IDS-SR is a 30-item self-rated questionnaire for assessing depressive symptoms [17]. Each item consists of four descriptive sentences, scaling from 0 to 3 points, where higher scores correspond to more severe symptoms. Take the item “falling asleep” for example, the meaning of each score is shown as the following: 0 (I never take longer than 30 min to fall asleep), 1 (I take at least 30 min to fall asleep, less than half the time [i.e., three days or less in the past week]), 2 (I take at least 30 min to fall asleep, more than half the time [i.e., more than three days in the past week]), and 3 (I take more than 60 min to fall asleep, more than half the time). Because a validated version of the IDS-SR for the target population in Taiwan had been lacking, we developed a Taiwanese version for this study. Translation and back-translation of the questionnaire were done by two bilingual psychiatrists and a professional translation company. Two bilingual psychiatrists resolved the discrepancies to obtain the final Taiwanese version of IDS-SR. An expert committee comprising eight experienced psychiatrists reviewed the Taiwanese version of IDS-SR, wherein all items were rated as “quite relevant” or “highly relevant” to the original English one, yielding a content validity index of 100% [24].

The Social Phobia Inventory (SPIN) is a 17-item self-rated questionnaire designed to screen and measure the severity of SAD [25]. Each of the items is rated on a scale from “not at all” to “extremely,” yielding a score of 0–4 points. The SPIN has been shown to have a good diagnostic validity for SAD and a Taiwanese version of it has been developed and validated online [7].

Design and procedures

In study part I, we recruited study participants through the Internet. The introductory material, informed consent,

data collection forms, and instruments were programmed as interactive web pages placed on the website of PsychPark. E-mail invitations were sent to all members of PsychPark and recruitment materials were publicly available on the study website, allowing the Internet users to spread the study information.

We introduced the purpose of the study in recruitment materials, but emphasized that this study was open and not limited to those who might have mental health problems. After reading the information, study participants had to log in and sign the online consent to join the study, then they were asked to provide their personal information, including age, gender, education, marital and employment status, and status of experience in seeking professional help. Previous experience of seeking professional help was defined as having formal contact with mental health service providers including assessment or treatment by psychiatrists or psychologists for any issue regarding their mental health. The study participants were then asked to complete the SPIN and IDS-SR assessments on the Internet. To examine the test-retest reliability of the IDS-SR, we sent them E-mail invitations for asking to repeat the assessment on the Internet within two weeks.

In study part II, the recruiting process for the Internet group was similar to that of study part I, with the exception that the study participants of the Internet group were invited for telephone interviews within two weeks. A structured diagnostic interview based on the Mini-international Neuropsychiatric Interview (MINI) and the assistance of social phobia module of the structured clinical interview for *the DSM-IV* was used as the standard diagnostic procedure according to the *DSM-IV* criteria [26, 27]. On the other hand, the clinical group participants who had a diagnosis of SAD were recruited from the psychiatric outpatient clinic at NTUH. The face-to-face administration of the MINI was done to verify their diagnoses and comorbid conditions. They were then asked to give their personal information, and to complete questionnaire in paper hard copies. The recruitment period for study Part I was from October 2007 to May 2011. The recruitment periods for the Internet-based and the clinical parts of study part II were from September 2008 to February 2010 and from November 2007 to April 2010, respectively. All the diagnostic interviews in study Part II were done by board-certified psychiatrists.

Statistical analysis

Pearson's Chi-square test was used to compare gender, marital and employment status as well as experience of seeking professional help, whereas Student's *t*-test was used to compare age, education, and questionnaire scores between groups.

For study part I data, Cronbach's α reliability coefficient was used to examine the questionnaire for internal consistency, corrected correlation coefficient was used for item-total correlations, and the intraclass correlation coefficient (ICC) with two-way mixed average measures was used for the test-retest reliability. A principal component analysis using varimax rotation was conducted for the number of components that underlie the IDS-SR. Parallel analysis was used for

determining the number of components. This method has been shown to be superior to traditionally used extraction techniques [28, 29].

For study part II data, a receiver operating characteristic (ROC) curve analysis with a maximized Youden's index was used to determine the optimal cut-off point of the Taiwanese version of the IDS-SR total score regarding MDD [30]. To investigate the factors related to the professional help-seeking of study Part I participants, all the demographic variables and questionnaire scores were included as independent variables in a multiple logistic regression analysis, and the backward stepwise method was used to select the variables.

All statistical analyses were performed using PASW Statistics (formerly Statistical Package for the Social Science) version 18.0 (SPSS Inc., Chicago, Illinois, USA). The differences between groups were considered significant if *p* values were smaller than 0.05.

Results

Participant characteristics

In study Part I, 2,234 participants were recruited through the Internet, of which 2,079 fulfilled the inclusion criteria and completed the study procedures. Most of them were unmarried, well-educated, young females (Table 1), and 1,342 (64.6%) of them had no previous experience of seeking professional help. Among the 2,079 study part I participants, 323 (15.5%) completed the retest in two weeks. The comparison of characteristics between participants who completed the retest and those who did not complete the retest revealed that female participants were significantly more to perform the retest (78.0% vs. 65.7%, $\chi^2 = 18.86$, $p < 0.001$). Comparisons of the remaining variables, including their age (27.5 ± 7.4 vs. 26.9 ± 7.0 years), education years (15.8 ± 2.1 vs. 15.6 ± 2.3), marital (13.6% vs. 14.5%) and employment (41.8% vs. 45.2%) status, IDS-SR total score (32.9 ± 14.1 vs. 32.6 ± 13.9), and SPIN total score (33.8 ± 15.4 vs. 33.1 ± 15.6), all yielded no significant differences.

In study Part II, 96 Internet-recruited participants completed the study protocol on the Internet and complied with the request to provide their telephone numbers, but 26 of them did not receive interviews because of persistent nonresponses or difficulties associated with time availability. Finally, 70 participants received structured telephone interviews (Table 1). On the other hand, the clinical group consisted of 34 patients who were recruited from the outpatient clinics and diagnosed to have SAD. The characteristics of study part II participants in these two groups were compared (Table 1). The only significantly different variable was the SPIN total score ($t = 4.40$, $p < 0.001$) that the clinical group had a higher mean score than the Internet group.

Psychometric properties of the Inventory of Depressive Symptomatology, Self-report

In study Part I, the internal consistency reliability of the Internet-based IDS-SR (Cronbach's α coefficient = 0.91)

Table 1. Characteristics and questionnaire scores of participants

Group of participants	Study part I (<i>n</i> = 2079) <i>n</i> ± SD	Study part II	
		Internet group (<i>n</i> = 70) <i>n</i> ± SD	Clinical group (<i>n</i> = 34) <i>n</i> ± SD
Age, years	27.7 ± 7.0	29.4 ± 7.6	29.9 ± 10.4
Female, <i>n</i> (%)	1406 (67.6)	41 (58.6)	16 (47.1)
Education, years	15.6 ± 2.3	15.2 ± 2.1	14.7 ± 2.1
Married, <i>n</i> (%)	298 (14.3)	16 (22.9)	7 (20.6)
Employed, <i>n</i> (%)	929 (44.7)	42 (60.0)	15 (44.1)
SPIN total score	33.2 ± 15.6	30.2 ± 14.8	43.1 ± 12.2***
IDS-SR total score	32.7 ± 14.0	32.2 ± 14.1	33.3 ± 13.4

p* < 0.05; *p* < 0.01; ****p* < 0.001 for comparing SPIN total scores between the two groups of study Part II participants using Pearson's Chi-square test or Student's *t*-test when appropriate (*n* = 104).

IDS-SR, Inventory of Depressive Symptomatology (Self-report); SPIN, social phobia inventory; MDD, major depressive disorder

Table 2. Distribution of scores and the corrected item-total correlation of each item of Inventory of Depressive Symptomatology, Self-report in study Part I participants (*n* = 2,079)

Item	Percentage of ratings by score				Corrected item-total correlation
	0	1	2	3	
1. Onset insomnia	27	35	23	15	0.44
2. Middle insomnia	46	22	24	8	0.26
3. Morning insomnia	53	12	28	8	0.37
4. Hypersomnia	31	40	15	13	0.28
5. Sad mood	11	32	39	17	0.68
6. Irritable mood	14	44	37	6	0.56
7. Anxious mood	8	37	44	11	0.58
8. Reactivity of mood	42	22	31	5	0.56
9. Mood variation	41	44	6	8	0.29
10. Quality of mood	46	20	23	11	0.56
11/12. Decreased/increased appetite	33	38	17	11	0.48
13/14. Decreased/increased weight	37	36	18	10	0.34
15. Concentration	11	40	29	20	0.61
16. Self-outlook	21	19	25	34	0.52
17. Future outlook	7	43	29	22	0.59
18. Suicidal ideation	34	36	22	8	0.56
19. Involvement	23	33	31	13	0.63
20. Energy	25	59	13	3	0.58
21. Pleasure	33	38	24	6	0.61
22. Sexual interest	48	31	16	5	0.38
23. Psychomotor slowing	36	30	30	4	0.54
24. Psychomotor agitation	35	41	16	8	0.50
25. Somatic complaints	33	49	15	3	0.45
26. Sympathetic arousal	32	48	16	4	0.49
27. Panic/phobic	16	48	26	9	0.49
28. Gastrointestinal	38	38	20	4	0.39
29. Interpersonal sensitivity	16	39	16	30	0.51
30. Lead paralysis	12	45	28	14	0.65

SD, standard deviation

was excellent, and all the corrected item-total correlations in the IDS-SR ($r = 0.26-0.68$) were moderate to high (Table 2). In addition, the test-retest reliability ($n = 323$) of the Internet-based IDS-SR (ICC = 0.88) was good [31]. For the principal component analysis, three components were extracted using parallel analysis (Table 3). Component 1 had a strong positive loading for 10 items of the IDS-

SR such as “sad mood,” “suicidal ideation,” and “future outlook,” representing the mood/cognition dimension. Component 2 had a strong positive loading for nine items such as “anxious mood” and “sympathetic arousal,” representing the anxiety/arousal dimension. Component 3 has a strong positive loading for nine items such as “middle insomnia,” “decreased/increased appetite,” and “energy,”

Table 3. Results of the principal Component analysis for the Inventory of Depressive Symptomatology, Self-report scores of study part I participants ($n = 2,079$)

Item	Component			Result reported by Rush et al. [18] [§]
	1	2	3	
21. Pleasure	0.696	0.139	0.249	1
17. Future outlook	0.683	0.253	0.094	1
8. Reactivity of mood	0.653	0.102	0.248	1
19. Involvement	0.649	0.214	0.259	1
5. Sad mood	0.644	0.404	0.159	1
18. Suicidal ideation	0.585	0.208	0.209	1
16. Self-outlook	0.558	0.414	-0.072	1
10. Quality of mood	0.522	0.245	0.243	1
23. Psychomotor slowing	0.418	0.369	0.229	<u>2</u>
9. Mood variation	0.262	0.097	0.191	
27. Panic/phobic	0.105	0.687	0.160	2
7. Anxious mood	0.332	0.658	0.086	2
6. Irritable mood	0.339	0.540	0.180	2
26. Sympathetic arousal	0.042	0.499	0.474	2
24. Psychomotor agitation	0.271	0.498	0.192	2
29. Interpersonal sensitivity	0.431	0.496	-0.021	2
15. Concentration	0.450	0.463	0.191	2
30. Lead paralysis	0.349	0.453	0.445	2
4. Hypersomnia	0.111	0.316	0.129	<u>3</u>
2. Middle insomnia	0.067	-0.091	0.599	3
25. Somatic complaints	0.006	0.386	0.570	<u>2</u>
28. Gastrointestinal	0.087	0.258	0.475	<u>2</u>
11/12. Decreased/increased appetite	0.252	0.217	0.463	<u>1</u>
20. Energy	0.342	0.316	0.462	<u>1</u>
22. Sexual interest	0.402	-0.116	0.456	<u>1</u>
3. Morning insomnia	0.182	0.101	0.452	3
1. Onset insomnia	0.206	0.225	0.446	3
13/14. Decreased/increased weight	0.155	0.106	0.431	<u>1</u>
Eigenvalue in real data	8.661	1.548	1.236	
Eigenvalue randomly generated	1.244	1.209	1.185	

The item number is shown before each item label. Bold-face type indicates those items with higher factor loadings on each component.

[§]The number in this column corresponds to the principal components of a psychometric study of the IDS-SR [18]: 1, mood/cognition component; 2, anxiety/arousal component; 3, sleep component; the underlined, different item loads to this study.

IDS-SR, Inventory of Depressive Symptomatology (Self-report)

representing vegetative symptoms. The first and the second extracted components were similar to the corresponding components of the original English version of IDS-SR [18, 29]. The third component of the IDS-SR used in this study was less consistent to that of the original study but still covered most items of the third component of the original IDS-SR [18, 29].

In study part II, the demographic data of participants in the Internet and clinical groups were comparable (Table 1), and therefore they were treated as one group of 104 participants for further analysis. Of these participants, 26 (25.0%) of them fulfilled the *DSM-IV* diagnostic criteria for MDD by structured interviews, and the discriminant validity of the IDS-SR total score for MDD (42.7 ± 10.6 vs. 29.2 ± 13.1 for those with vs. without MDD, $t = 4.77$, $p < 0.001$) was strong. The ROC curve analysis of the IDS-SR with reference to MDD showed an area under the curve (AUC) of 0.78. The

optimal cut-off point of the IDS-SR total score regarding MDD was determined to be 36 by a maximized Youden's index of 0.51 [30]. This cut-off point provided a sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of 84.6%, 66.7%, 45.8%, and 92.9%, respectively. The overall accuracy of this cut-off point of the IDS-SR total score was 71.2%.

Social anxiety disorder, major depressive disorder, and professional help-seeking behaviors

Using the optimal cut-off point of 24 for the SPIN total score [7], 1,483 of the study part I participants (71.3%) were found to reach the threshold of SAD. Among these, 785 (52.9%) also reached the threshold of MDD using the optimal cut-off point of 36 for their IDS-SR total scores, the percentage of which was significantly higher than those without SAD (16.1% for those without SAD, $\chi^2 = 236.11$, $p < 0.001$). In addition, those who reached the threshold of MDD had

a significantly higher proportion of seeking professional help than those who did not (46.8% vs. 27.5%, $\chi^2 = 58.26$, $p < 0.001$). The result for other part I participants whose SPIN total scores did not reach the threshold of SAD, was similar regarding their professional help-seeking (45.8% vs. 26.8% for those depressed vs. not depressed, $\chi^2 = 13.93$, $p < 0.001$). Despite the evidence that participants were more likely to have sought professional help when they reached the threshold of MDD, of the part I participants whose scoring results reached both the thresholds of SAD and MDD, there were still 418 (53.2%) participants who had never sought professional help before joining the study.

For all study part I participants whose SPIN total scores reached the threshold of SAD, we analyzed the factors relating to their professional help-seeking using multiple logistic regression (Table 4). It revealed that participants who were older, male, and with higher IDS-SR total scores were more likely to have sought professional help. The associations of their education, marital and employment status, and SPIN total scores with experience of seeking professional help were nonsignificant.

Discussion

In the present study, we mainly investigated whether the associations of the severity of comorbid depression and the severity of social anxiety would exist with professional help-seeking among people with SAD. This kind of study was rarely done on a large scale before this study, particularly among Internet users. As shown in Table 4, the result of the study supported our hypothesis that depression would be a significant crucial factor associated with professional help-seeking in participants with SAD ($p < 0.001$). A common restriction of this kind of study is that patients with SAD without comorbid depression are often not available in clinical settings. To our knowledge, this is the first study to use the advantage of the Internet to overcome this problem of recruitment and had recruited a large number of participants with SAD who were not recognized before this study. In addition, this study is also the first to administer and validate the IDS-SR through the Internet.

Table 4. Multiple logistic regression analysis for factors influencing professional help-seeking of the study part I participants whose Social Phobia Inventory total scores reached the threshold of social anxiety disorder

Significant factor	Odds ratio (adjusted)	95% confidence interval
Age***	1.06	1.04-1.09
Gender (male)*	1.30	1.03-1.64
IDS-SR total score***	1.05	1.04-1.05

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ ($n = 1,483$).

IDS-SR [17], Inventory of Depressive Symptomatology (Self-report); SPIN, Social phobia inventory

Internet-recruited participants

In the study, more than half (59.7%) of the participants in part I were newly recruited members of PsychPark, and most of these new members (89.0%) completed copies of the questionnaire on the same day as they registered on PsychPark, indicating that not only the existing members but also newcomers were attracted to the study information. Without the use of the Internet, it is difficult to recruit study participants with SAD on such a large scale. This result suggests that the Internet-based recruiting model is applicable for those with SAD who seek mental health information on the Internet.

The estimated prevalence of SAD in the part I participants (71.3%) and prevalence of MDD in those with SAD (52.9%) were quite high. This high prevalence may be related to the open nature of the study and the self-selection effect from participants. But the prevalence of SAD is similar to that of our previous Internet study [7], in which the prevalence is 70.3%. This finding reflects that the results of two similar studies in different times have been consistent. Additionally, Huang et al. in 2016 reported that an association exists between Internet addiction and depression [32]. It is worthy of further investigation whether the high comorbidity of MDD and SAD in our study is related to the high percentage of Internet addiction among participants with SAD.

Psychometric properties and the Internet adaption of the Inventory of Depressive Symptomatology, Self-report

In this study, we demonstrated that the Taiwanese version of the IDS-SR was reliable and valid as a self-assessment tool for MDD when applied on the Internet (Tables 2 and 3). Our results were comparable to the original English version of the IDS-SR [17, 18] in Internal consistency reliability ($\alpha = 0.91$ vs. $\alpha = 0.85$) and item-total correlations ($r = 0.26-0.68$ vs. $r = 0.15-0.72$). In addition, the Internal consistency reliability and item-total correlations of the Internet-based IDS-SR used in this study were numerically higher than a Chinese version of the IDS-SR in the paper format ($\alpha = 0.81$, $r = -0.05-0.64$) [33]. These comparisons suggested that the internal reliability of the Taiwanese version of the IDS-SR was not affected by the translation process.

On the other hand, regarding the predictive validity, the discriminative power of the IDS-SR in this study (AUC = 0.78) was comparable to those in other studies, including the Portuguese version of the IDS-SR (AUC = 0.80) [34], the Center for Epidemiologic Studies Depression Scale (AUC = 0.84), and the Kessler Psychological Distress Scale (AUC = 0.81) [14]. With the high levels of sensitivity and negative predictive value, the Taiwanese version of the IDS-SR is suitable for screening of depression. But people with a positive result should be subjected to a diagnostic interview from a psychiatrist because of the lower specificity and positive predictive value, i.e., they may be false positives.

Comorbid major depressive disorder in study participants with social anxiety disorder

For study participants recruited through the Internet, we demonstrated a significantly higher estimated prevalence of MDD in participants with SAD than those without (52.9% vs. 16.1%), according to their SPIN and IDS-SR scoring result. The estimated prevalence of MDD in participants with SAD is close to the previously reported results (33.0%-58.0%) of patients with SAD [9-11], reflecting a common feature of high comorbidity of MDD with SAD.

Factors associated with professional help-seeking of patients with social anxiety disorder

For those Internet-recruited participants with SAD, a major finding from our multiple logistic regression analysis was that their IDS-SR total scores were significantly associated with their experiences of seeking professional help (odds ratio [OR] for IDS-SR total score: 1.05, $p < 0.001$, Table 4). The result indicated that for patients with SAD, the more severe their depression was, the more likely they would seek professional help. Nonetheless, in the participants whose symptom severity reached both the thresholds of SAD and MDD, more than half of them (53.2%) had never sought professional help before the study, and thus had been undiagnosed. The result suggests that detecting depression through the Internet may provide a useful avenue for those untreated patients with SAD to seek help, and is thus worthy of further investigation.

This study also addressed a limitation of a previous study that did not examine comorbid depression with SAD [7]. The previous study suggested that the Internet participants who have had higher severity of social anxiety symptoms are more likely to seek professional help [7]. But in this study, we found that considering the severity of their comorbid depression, the significance of the severity of social anxiety symptoms on professional help-seeking did not show. Therefore, we suggest that depression is an important factor associated with the help-seeking behavior of people with SAD, whereas the severity of social anxiety symptoms might be associated with the severity of comorbid depression in patients with SAD in the previous study. A clinical study of 819 psychiatric outpatients provides support for this explanation [8].

Other than the factor of depression, this study (Table 4) also found that older males with SAD were more likely to seek professional help (ORs for age and male: 1.06, $p < 0.001$, and 1.3, $p < 0.05$). The result is consistent with the findings of a study that males are more likely to seek treatment than females [35]. In addition, our findings may be explained by the Eastern culture that women who are shy and stay at home are sometimes regarded as normal or showing strong moral standard. The higher prevalence of SAD in women implies that numerous untreated female patients require extra attention [36]. In this study, more female participants were recruited from the Internet, and they tended to take the retests of the questionnaire more than men. Women have also been reported to be more likely to use the Internet to seek help in another study [37].

Therefore, using the Internet is potentially a promising method to help women with SAD.

Study limitations

The readers are cautioned not to over-interpret the study results to generalize because this study has three major study limitations:

- In the current study, we recruited study participants from the Internet. Therefore, the study population was definitely different from that in the general population. For this reason, generalizing these results to other populations who do not use the Internet must be done with caution.
- The determinations of SAD and MDD in this study part I were based purely on self-rating scales of SPIN and IDS-SR, respectively. In the absence of a face-to-face assessment interview on the study participants, we think that the proven reliability and diagnostic validity of both scales are still not ascertained.
- Despite the numerically significant association between severity of depression and professional help-seeking was established in the study, their causal relationship should be confirmed in a prospective study in the future.

Summary

The study proved our hypothesis that the Taiwanese version of IDS-SR could be reliable and valid for Internet users. Furthermore, with the evidence that depression was a crucial factor affecting the professional help-seeking behavior for people with SAD.

This study finding gives a chance in the screening of depression and SAD at the same time, suggesting that the potential patients for prompting patients to seek professional help. Because using Internet is an indispensable part of daily life for most people, other methods through the Internet to facilitate the help-seeking behavior for those with detected comorbidity of depression and SAD online are well-worthwhile further study.

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Conflicts of Interest

All authors declare that they have no conflicts of interest.

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