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Original article

A study of the discriminative validity of a screening tool (MINI-SPIN) for social anxiety disorder applied to Brazilian university students

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Abstract

Objective. – This study aimed to evaluate the discriminative validity of MINI-SPIN (MS) as a screening tool for social anxiety disorder (SAD) in a group of Brazilian university students.

Method. – SPIN was collectively applied to 2320 university students. Among them, 656 individuals who fulfilled the criteria for positive MS ($N = 473$) and negative MS ($N = 183$) were selected and divided into two groups. The selected subjects were interviewed by telephone using the SAD module of the SCID-IV, used as the gold standard. In order to check interrater reliability, a group of university students ($N = 57$) was reinterviewed by telephone by a second rater, and another group ($N = 100$) participated in a face-to-face interview.

Results. – The Kappa coefficient among the telephone interviews was 0.80, and a coefficient of 0.84 ($P < 0.001$) was obtained between the telephone interview and the face-to-face one. For a cut-off score of 6, suggested in the original English version of the instrument, sensitivity was 0.94, specificity 0.46, the positive predictive value (PPV) was 0.58, and the negative predictive value (NPV) was 0.92. For a cut-off score of 7, we observed an increase in the specificity and in the PPV (0.68 and 0.65) while the sensitivity and NPV (0.78 and 0.80) remained high.

Discussion/Conclusion. – MS showed quite satisfactory psychometric qualities. The cut-off score of 6 seemed to be the most suitable to attest the tracking value of the tool. However, the cut-off score of 7 was the most suitable as a minimum parameter for the studied group, with psychometric values more similar to those of the original study.

Keywords: Validity; Reliability; Psychometrics; Social phobia; Social anxiety disorder; Diagnostic screening

1. Introduction

Social anxiety disorder (SAD) or social phobia is one of the most common anxiety disorders. It is characterized by fear in situations in which the person feels exposed and possibly judged by others, fearing to behave in an improper or embarrassing way [1]. The principal fears associated with SAD are: to look silly/ridiculous, to say foolish things, to be observed by others, to interact with strangers or people of the opposite sex, to be the center of attention, and to eat, drink, write and speak in public [1]. The lifetime prevalence rate of this disorder is high, 5–13.3% on average, with early signs usually being observed at the beginning of adolescence [13,15,19,21]. Its evolution is often chronic, causing social, educational, professional and personal impairment [8,11,12,14,18,20] since it is also associated with high rates of comorbidity, the most common being depression and substance abuse, among other anxiety disorders [2,10,14,19,20]. These comorbidities, at least from the chronological viewpoint, generally occur secondary to the development of SAD.

SAD has proven to respond well to pharmacological and psychotherapeutic treatments [19,21], and thus an early and systematic detection is essential [16,24]. However, the rate of detection of this disorder is commonly low (about 3%), both on the part of physicians and of the affected subjects

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[6], and people usually seek help due to the comorbidity rather than to the disorder itself [19]. In this respect, screening can help to track SAD in the general population, contributing to the diagnosis and quick treatment of this disorder, with consequent lower functional impairment and a better prognosis, in addition to helping to avoid the development of associated complications.

Among the tools available for the identification and tracking of SAD, there is the MINI-SPIN (MS). This instrument, described by Connor et al. [4], is a self-administered screening tool derived from the Social Phobia Inventory (SPIN), also developed by the same group [3]. MS is made up of three items, which, in an empirical study, have reached the highest sensitivity and specificity for the diagnosis of SAD. The items were those derived from SPIN (items 6, 9 and 15) that better distinguished individuals with SAD from those without SAD, covering avoidance of speaking or performing activities. The items are evaluated on a *lickert* scale ranging from zero to four, in which 12 is the maximum score and 6 is the cut-off score suggested for SAD diagnosis. The MS items are: *item 6—''Fear of embarrassment causes me to avoid doing things or speaking to people''; item 9—''I avoid activities in which I am the center of attention''; item 15—''Being embarrassed or looking stupid are among my worse fears''*.

As a screening tool, MS has several advantages, i.e., it is quick and easy to rate and to evaluate, properties that may favor its use on a large scale, mainly in contexts of primary care.

The Portuguese version of MS is presented in Table 1.

In the original study [4], MS was tested in a group of 7165 adult North-American individuals and revealed a sensitivity of 0.89, a specificity of 0.9, a positive predictive value (PPV) of 0.53, a negative predictive value (NPV) of 0.99, and an efficiency of diagnosis of 0.9 for a cut-off score equal to or greater than 6. Wilson [23], in Australia, also evaluated the discriminative power of MS in 666 university students and detected a 30% prevalence of SAD cases using a cut-off score of 6 and an 18.3% prevalence when the cut-off score was 7. Since the latter cut-off score showed a prevalence rate more similar to the recent literature [24], the author suggested that MS requires further studies to determine the best cut-off score for SAD diagnosis, thus improving the psychometric study of the validity of this instrument.

It can be seen that MS may be used in SAD screening. We agree with Wilson [23] when he says that more psychometric studies are needed, especially because the current tools used for SAD diagnosis, such as Structured interviews, are considered to be the ''gold standard''. The most contradictory results presented by the Australian study may be due to the absence of such a ''gold standard'', in contrast to the study by Connor et al. [4], who used the SCID-IV and achieved more reliable results on the prevalence of SAD in the North-American population. Connor et al. [4] also pointed out that further studies are needed about the applicability of this tool for the identification of the SAD population according to the DSM-IV diagnostic criteria, and in non-English speaking populations.

In Brazil, the SPIN was translated and adapted to a group of university students by Osório et al. [17]. The SPIN was translated from the original English into Portuguese by two psychiatrists and one psychopharmacologist specializing in anxiety disorders with experience in rating scales. All were Brazilians by birth and proficient in the English language. The three versions were compared and a single final version was obtained after reaching a consensus. The final Portuguese-language version was back-translated by a bilingual psychiatrist who did not have access to the original English version, and the authors of the original version then compared the back-translation to the original. However, no psychometric study of this tool has been carried out thus far using the adult university population as a parameter.

2. Objective

This objective of the present study was to evaluate the discriminative validity of the MS in a population of Brazilian university students using as reference the evaluation by the SCID-IV - Social Phobia module, applied over the telephone and in a face-to-face interview.

3. Method

3.1. Subjects

Students ($N = 656$) from a private and a public university in a city in the interior of the State of São Paulo-Brazil were randomly selected for the study. The subjects were enrolled in Exact, Human, or Biological Science courses and had previously participated in a broader ongoing study concerning the prevalence of SAD. Of the selected subjects, 59 could not be located and 7 said they were no longer interested in participating in the study. Hence, the final sample consisted of 590 subjects; 422 presented a positive MS and 168 presented a negative MS.

3.2. Procedures

Data collection was done in two phases. In the first phase, as part of the prevalence study, the SPIN was administered to 2320 students. The study was approved by the local Research

Table 1
The Brazilian Portuguese version of MINI-SPIN (MS) Por favor, indique quanto os seguintes problemas incomodaram você durante a ***última semana***. Marque somente um item para cada problema, e verifique se respondeu a todos os itens

	nada	um pouco	moderadamente	bastante	extremamente
1. Evito fazer coisas ou falar com certas pessoas por medo de ficar envergonhado	(0)	(1)	(2)	(3)	(4)
2. Evito atividades nas quais sou o centro das atenções	(0)	(1)	(2)	(3)	(4)
3. Ficar envergonhado ou parecer bobo são os meus maiores temores	(0)	(1)	(2)	(3)	(4)

Ethics Committee, and the authorization for data collection was obtained from the institution and from the professor responsible for the class. All subjects gave written informed consent after being fully informed of the research procedure.

Based on the proposal by Connor et al. [4] (a response equal to or above six to items 6, 9 and 15 of the SPIN), the researchers identified all subjects who met the criteria for a positive MS ($N = 473$; 20.4% of the studied sample). As a comparison group, 183 subjects with negative MS were selected (7.9% of the studied group). The criteria used to select these subjects were giving negative responses to items 6, 9, and 15, and having the lowest scores in the complete SPIN (17 items). The comparison group (negative MS) was matched to the positive MS group for gender, age, institution and study field. A total of 656 subjects (28.1% of the total studied group) were selected to participate in the second phase of data collection. In the first phase of the study ($N = 2320$) the mean score for the subjects was 16.61 (SD = 11.43) for the SPIN and 3.31 (SD = 2.87) for MS. For the MS-positive group, the mean score was 33.16 (SD = 9.65) for the SPIN and 7.94 (SD = 1.75) for MS. In contrast, for the MS-negative group the mean score was 8.48 (SD = 5.30) for the SPIN and 0.70 (SD = 0.87) for MS.

In the second phase, the subjects were contacted by telephone in order to answer the SCID-IV SAD (module F) [7,22], which was used as a gold standard for SAD diagnosis. The raters ($N = 4$) were mental health professionals with previous experience in using rating scales and the SCID-IV in clinical and research contexts. The raters, who did not know the score of the subjects in the previously administered tools, introduced themselves as members of the research group and asked the students about their availability to continue participating in the study. Those who agreed to participate received a brief explanation about the aims of the interview and were then interviewed according to the SAD module questions. When scheduling the telephone assessment, the interviewer set up a time when the participants could talk in private, with nobody else being present during the assessment. The duration of the interviews ranged from three to five minutes.

In order to check the reliability of the tool, 57 randomly selected subjects were contacted for a second telephone interview by a different rater who followed the aforementioned procedures. For these second evaluations, the raters were not informed about the type and level of symptoms presented by the participant or about the diagnosis made by the previous rater. Thirty-three of these subjects were females and 22 were males, with a mean age of 21.05 years (SD = 2.57). One hundred additional randomly selected subjects also participated in the face-to-face interview with a clinical psychologist, in which the procedures were the same as those of the telephone interview. This rater was also well versed and experienced in the use of SCDI-IV. Sixty three of these subjects were females and 37 were males, with a mean age of 20.8 years (SD = 2.06). Both subgroups ('telephone/face-to-face' and 'telephone/telephone') were representative of the total sample of the initial study ($N = 2320$) and of the selected sample for the MS study ($N = 656$) in terms of demographic characteristics.

3.3. Data analysis

Using Receiver Operating Characteristics (ROC) analyses, we examined cut-off values that corresponded to a diagnosis of SAD (distinguishing subjects with SAD from normal subjects). We determined cut-off values that: (a) maximized both sensitivity (Sn) and specificity (Sp); (b) maximized Sn (without reducing Sp below chance level); and (c) maximized Sp (without reducing Sn below chance level).

4. Results

4.1. Demographic profile

Table 2 shows the socio-demographic characterization of the study group. Most subjects were females, with a mean age of 17–25 years. Most individuals studied in the private institution and were Biology students.

4.2. Reliability of the raters for SAD diagnosis

The degree of concordance between the first and the second telephone interview was 0.91. The degree of concordance was 92% for the evaluation of the positive MS subjects and 89% for the negative MS subjects. The Kappa correlation coefficient [5] was 0.80 ($P < 0.001$), the benchmark indication of an excellent level of agreement [13].

Table 2
Social and demographical characteristics of the study group ($N = 590$)

		MINI SPIN+ ($N = 422$)	MINI SPIN− ($N = 168$)	Total ($N = 590$)	Statistics
Gender	Female	275	102	377	$\chi^2 = 0.95$
	Male	147	66	213	(NS)
Age	Mean	21.0	21.0	21.0	$t = -0.83$
	(SD)	(2.97)	(2.74)	(2.83)	(NS)
Institution	Private	231	97	328	$\chi^2 = 0.50$
	Public	191	71	262	(NS)
Course field	Biological sciences	239	98	337	$\chi^2 = 0.42$
	Exact sciences	124	45	169	(NS)
	Human sciences	59	25	84	

+, positive; −, negative; NS, not significant; χ^2 = chi-square; SD = standard deviation.

The overall concordance between the first telephone interview and the face-to-face interview was 87%. The degree of concordance for the MS-positive and MS-negative subjects was 89% and 95%, respectively. The value of the Kappa correlation coefficient [5] was 0.84 ($P < 0.001$), the benchmark indication of excellent agreement [9].

4.3. MS discriminative validity

Based on the SCID-IV, SAD diagnosis was confirmed for 58% of those who met the criterion for positive MS (N++ = 242), and SAD diagnosis was refuted for 42% (N+− = 177). A lack of SAD diagnosis was confirmed for 92% of the negative MS (N−− = 155) and the presence of SAD was confirmed for 8% (N−+ = 13).

The total sample was submitted to ROC analysis. The area under the curve (AUC) for this ROC analysis was 0.81 and was significant versus chance or a random ROC line ($P < 0.001$) (Fig. 1).

Thus, it was observed that, for a cut-off score of 6, the MS presented an Sn of 0.94, an Sp of 0.46, a positive predictive value (PPV) of 0.58, a negative predictive value (NPV) of 0.92 and an incorrect classification rate (ICR) of 0.32.

Table 3 presents the Sn, Sp, PPV, NPV and ICR values for this and other cut-off scores. As shown in Table 3, for a cut-off score of 7 there was an increase in Sp and in PPV of the scale, whereas the Sn and NPV rates remained high. For a cut-off score of 8, there was an even more expressive increase in Sn and PPV, with a decrease in NPV and especially in Sn, whereas ICR remained the same. As to the other cut-off scores, there was a significant increase in Sp and PPV. Regarding SAD prevalence, the number of subjects identified was 242 (10.4%) for a cut-off score of 6, and 199 (8.6%) for a cut-off score of 7.

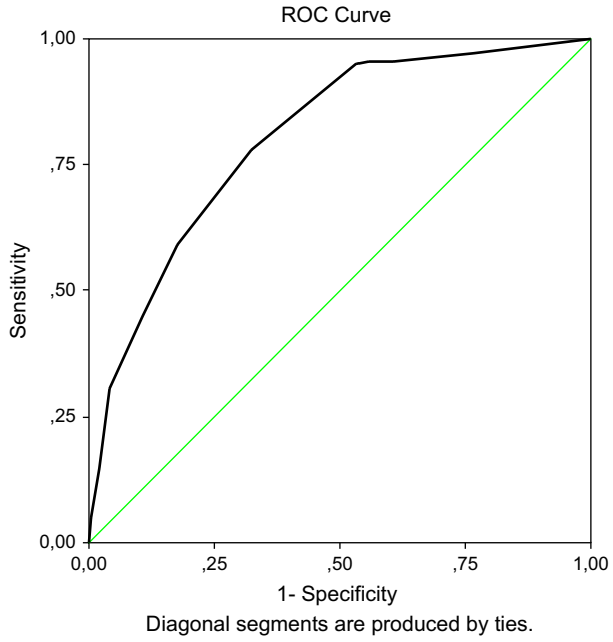

Fig. 1. Mini-SPIN receiver operating characteristic curve (ROC).

Table 3
Sensitivity (Sn), Specificity (Sp), Positive predictive value (PPV), Negative predictive value (NPV) and the Incorrect classification rate (ICR) for several cut-off scores of the MINI-SPIN items

Cut-off score	Sn	Sp	PPV	NPV	ICR
6	0.94	0.46	0.58	0.92	0.32
7	0.78	0.68	0.65	0.80	0.28
8	0.59	0.83	0.72	0.72	0.28
9	0.44	0.89	0.77	0.68	0.30
10	0.30	0.96	0.86	0.64	0.33

5. Discussion

In general, MS showed satisfactory psychometric qualities in terms of its discriminative validity. In comparison to the original study [4], and using a cut-off score of 6, the values found in the present study are different mainly in terms of specificity, considering that the values obtained were lower and less significant. Cut-off scores of 9 and 10 showed values close to those of the original study [4] although with significant impairment of sensitivity.

In the present study, a cut-off score of 6 showed better sensitivity and seemed to be more suitable to attest the screening value of the instrument. The cut-off score of 7 revealed psychometric values similar to those of the original study [4], with no major discrepancies in terms of specificity, and it is the value that best balances the indicators of the discriminative validity of the MS. This value apparently is the most suitable cut-off score for Brazilian university students. Cut-off scores of 8 and 9 caused a significant increase in specificity and PPV of the scale, which favored a more accurate identification of SAD.

It is difficult to make any comparisons with the Australian study [23] since the SAD diagnosis was *not* confirmed with the use of a different tool in that study, such as SCID. Thus, if we evaluate the positive MS percentage solely for a cut-ff score of 6, the prevalence rates are 30% for the Australian study [23] and 20.4% for the present study. These data may suggest a lower SAD prevalence among Brazilian university students, or the existence of cultural differences, or differences in the way the tool was administered. In addition, different demographic characteristics of the samples may account for this discrepancy.

Some limitations of the present study should be highlighted. For example, the sample was composed only of university students, impairing the generalization of our findings to other samples or to the general population. Therefore, future studies enrolling larger and more heterogeneous samples seem to be necessary. Another limitation is the fact that the subjects were not systematically assessed in terms of psychiatric comorbidities, which are commonly associated with SAD, such as depression, alcohol use and other anxiety disorders in general and agoraphobia in particular. These comorbidities may mask or enhance the damage occurring in SAD. It should also be mentioned that extracting the MINI-SPIN items from the entire SPIN, as opposed to having participants only fill out the MINI-SPIN itself, may not produce exactly the same results. Thus, a cross-validation study would be necessary

and desirable. However, our data acquisition procedure was the same as used in both the original study of this instrument and in the Australian study with the university student sample. Finally, in our study we included two contrasted subgroups (high MS scores and very low MS scores), without moderate scores (which were fewer than 6). The consequence of this selection method would be to artificially enhance the sensitivity of the questionnaire, minimizing the ''false negative'' subjects in the comparison with the gold standard. Thus, since our objective was to explore the validity of several cut-off scores, the population involved should ideally be normally distributed around these potent cut-off scores.

Regarding possible future studies, in view of the sociocultural differences between the samples studied, it would be interesting to determine whether the items of the original version of the MS would correspond in the Brazilian context to the SPIN items that showed a higher sensitivity in differentiating individuals with SAD from individuals without SAD, supporting the validity of the instrument for use in the Brazilian context, or whether the instrument should be adapted to the Brazilian reality.

6. Conclusions

MS has proven to be a tool of quick and easy administration, which may be used in large-scale epidemiological studies of the general population, and in primary health care settings, since it may be useful to identify possible SAD cases. The instrument can confirm the diagnosis of these patients, who can then receive early treatment, which may avoid the impairments associated with the disorder, especially comorbidities and worsened prognoses.

Unlike the results from the original study [4], in the present study a cut-off score of 7 was considered to be the most suitable for the Brazilian population. The validity values found in this study, as well as in previous ones [4,23] which evaluated this psychometric quality of the MS, indicated more expressive screening characteristics of the tool rather than diagnostic ones. As recommended by Connor et al. [4], in clinical practice a positive MS evaluation should be merely a stimulus for health professionals to systematically investigate the presence of characteristic SAD symptoms, thus combining the self-evaluation resources used by the subject with the systematic hetero-evaluation made by the clinician.

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