



Psychometric Properties and Factor Structure of the Colombian Version of the Short Health Anxiety Inventory (SHAI)

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Keywords

Adolescent; assessment; health anxiety; hypochondria; SHAI; reliability

Abstract

Aim: The SHAI is a well-established, brief, valid, and reliable self-report measure of health anxiety (HA) widely used worldwide in medical and non-medical contexts. **Subjects and methods:** The psychometric properties, internal consistency, and fit indices of the scale's structure were examined in 867 Colombian adolescents (458 women and 409 men; $M = 15.97$; $SD = 1.37$). **Results:** The high reliability for SHAI was confirmed. Three models were tested, and the best-fitting model was the original

two-factor structure (Fear of Illness and Negative Consequences of an Illness). Fit indices supported the two-factor model with a Comparative Fit Index (CFI) = 0.961 and Root Mean Square Error of Approximation (RMSEA) = 0.047 (90 % CI: .041–0.052). The total reliability of the scale was $\alpha = 0.82$, which can be considered significant and high, with reports of $\alpha = 0.80$ and $\alpha = 0.68$ for the factors of Fear of Disease and Negative Consequences of Disease, respectively. While reliability was excellent, the model's fit was also adequate and consistent with the original structure. **Conclusion:** The Colombian version of the SHAI is a valid and reliable tool for assessing health anxiety in clinical practice and the research field.

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Introduction

Health anxiety (HA) is a serious problem that considerably reduces the quality of life of those who suffer from it and overloads primary care and specialized health services through demand for psychotherapeutic and/or psychiatric treatment [1–3]. Concordantly, a high incidence of HA has been identified in individuals with cardiac, neurological, respiratory and even viral medical conditions, such as AIDS [4–8]. Besides, HA usually presents comorbidity with psychological disorders, such as chronic fatigue syndrome, generalized anxiety disorder, panic disorder, obsessive-compulsive disorder and mood disorders [9–12].

Health anxiety is characterized by the presence of fears and concerns related to potential suffering from a serious illness in objectively healthy people. This syndromatic set results from biases in the interpretation of unusual bodily sensations or ambiguous medical information, which results in the identification of signs of disease [5,7,13]. In most cases, the beliefs are unjustified [14–16]. Their clinical presentation is characterized by a persistent concern for the cause of the bodily changes and the maladaptive behaviours emerging from these erroneous cognitive contents, which persist despite making an adequate medical evaluation [17]. Such a presentation causes distress and significantly impacts multiple areas of patient functioning.

According to DSM-5, HA is conceptualized as a continuum with the diagnosis of “illness anxiety disorder”, classified under the heading “Somatic Symptom and Related Disorders” [10]. Hypochondriasis — recognized as a diagnostic category until DSM-IV-TR — is considered the most severe form of HA [18–20]. Unlike in somatic symptom disorder, in HA, the central component is the concern for being sick, although minimal somatic symptoms may occur [10].

HA usually appears for the first time at the beginning of adulthood, although children and adolescents also experience concerns about their health and that of people close to them [11,18,21]. Because of HA’s serious impact on health and psychosocial development, as well as the associated economic cost, it is necessary to explore the course and risk factors of this disorder in the childhood-adolescent period to inform its prevention and early intervention [22]. Thus, early diagnosis becomes greatly relevant in reducing its impact and deterring its consequent abuse of resources/associated medical services [23].

During the COVID-19 pandemic, anxiety disorders increased significantly, highlighting the need for specific tools to distinguish it from other anxiety disorders [24,25]. Therefore, the evaluation of HA demands tools that allow for good discrimination among emotional

symptoms and along the spectrum of anxiety and somatic problems. In this sense, instruments with binary measures (i.e., those that measure the presence or absence of HA) are insufficient and imprecise. In this regard, various authors suggest that dimensional assessments constitute a more efficient approach to the continuum of Generalized Anxiety Disorder, without losing specificity and sensitivity to specific symptoms [26,27]. Some of the instruments used for the evaluation of HA or hypochondriacal attitudes are the Whiteley Index, the Anxiety Sensitivity Index-Revised, the Somatosensory Amplification Scale and the Childhood Illness Attitude Scales [28–31]. However, the most widely used test internationally is the Short Health Anxiety Inventory (SHAI) because it provides greater coverage of the associated symptoms, contributes with parameterization in terms of intensity and has robust empirical and psychometric support [16,23,27].

Based on the Health Anxiety Inventory (HAI), it was proposed a short version of 18 items (SHAI) [16]. This short version assesses health anxiety based on two dimensions: *Fear of Disease* (items 1–14) and *Fear of Negative Consequences* (items 15–18). Extensive empirical evidence has confirmed the two-factor model and reliability of the inventory at the international level ($\alpha = 0.80$ and 0.95) [26,32]. The SHAI was validated and is currently used in European countries, such as Holland, Poland, Portugal, Spain, Germany and Hungary [23,26,33–36]. The SHAI was also validated in Asian countries such as China, Iran and Japan [32,37,38]. In America it was validated in the United States (39) and Canada [39,40]. However, we still do not have a version that addresses the specific requirements of the Latin American population to reduce the bias of the measure associated with cultural aspects [41]. It may constitute an optimal tool for evaluation, both in the population’s contexts of origin and in those where their representation in the immigrant community is significant. For these reasons, special considerations are required in the health services of the recipient countries, given the heterogeneity of the Hispanic subgroups and their particularities in the clinical presentation of this type of disorder [42]. The objective of this study was to validate the Colombian version of SHAI and analyse its psychometric properties.

Subjects and Methods

All procedures performed in this study were carried out preserving the autonomy of the participants and guaranteeing the principles of respect, beneficence, and justice, in line with the ethical standards of the institution, and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The informed consent was obtained from all par-

ents or legal guardians for those individual participants under 18 years old, and with the informed consent of the adolescents themselves under 16 years old, according to the national guidelines of the Colombian School of Psychologists.

As shown in Table 1, 867 students (458 women and 409 men) from the cities of Bogotá (n = 467) and Barranquilla (n = 400), aged between 14 and 19 years (M = 15.97 years; SD = 1.37), participated. The participants were selected using inci-

idental non-probabilistic sampling. The inclusion criteria were as follows: knowing how to read and write, being between 14 and 19 years old, being of Colombian nationality, having informed consent from parents or legal guardians for those under 18 years of age, with informed consent from the adolescents themselves and being enrolled in one of the educational centres that agreed to participate in the research.

Table 1. Sociodemographic characteristics of the sample

Characteristics	Men	Women
Age, M (SD)	16.07 (1.42)	15.88 (1.33)
Socioeconomic level, N (%)		
Low	45 (11.0)	76 (16.6)
Medium-Low	96 (23.5)	103 (23.0)
Medium	233 (57.1)	255 (55.8)
Medium-High	29 (7.1)	20 (4.4)
High	6 (1.5)	2 (0.4)
Family status, N (%)		
Married parents	218 (55.9)	261 (56.5)
Separated parents	127 (32.6)	142 (30.7)
Parents live together in civil union	33 (8.7)	42 (9.1)
Single father or mother	6 (1.5)	13 (2.8)
Orphan of one parent or both	6 (1.5)	4 (0.9)
Religion, N (%)		
Christian	93 (23.7)	106 (22.9)
Catholic	224 (57.1)	301 (65)
Buddhist	1 (0.3)	2 (0.4)
Muslim	4 (1.0)	0 (0)
None	57 (14.5)	45 (9.7)
Other	13 (3.3)	9 (1.9)
Sexual orientation, N (%)		
Asexual	22 (5.5)	6 (1.3)
Exclusively heterosexual	354 (87.8)	392 (85.6)
Mainly heterosexual, with some sporadic homosexual contact	9 (2.2)	31 (6.8)
Mainly heterosexual, with several sporadic homosexual contacts	2 (0.5)	11 (2.4)
Approximately the same homosexual and heterosexual contacts	8 (2.0)	10 (2.2)
Mainly homosexual, with several sporadic heterosexual contacts	1 (0.2)	1 (0.2%)
Mainly homosexual, with some sporadic heterosexual contact	1 (0.2)	2 (0.4)
Exclusively homosexual	6 (1.5)	5 (1.1)
Current in relationship, N (%)		
Yes	141 (34.5)	161 (35.2)
No	268 (65.5)	297 (64.8)

There are fifteen missing cases for which the family situation was not reported, twelve missing cases for which religion was not reported, and twelve missing cases for which sexual orientation was not reported.

Instruments

Short Health Anxiety Inventory (SHAI) (16). It was applied using the validated version from Spain [34]. It is a self-report measure used to evaluate concerns about health, concerns about bodily sensations, and fears about the negative consequences of suffering from an illness. It consists of 18 items with four response options scored as follows: 0 (absence of symptoms), 1 (mild symptoms), 2 (severe symptoms) or 3 (very serious symptoms). An example of an item would be: "Thoughts of being sick are so strong that I do not even try to resist them anymore." In general, the SHAI has shown good psychometric properties with both clinical and non-clinical populations [43,44].

Sociodemographic questionnaire. Different characteristics of the participants were measured employing a semi-structured survey prepared ad hoc. Age, sex, education level, religion, socioeconomic status, sexual orientation, and current family situation were evaluated.

Initially, the Spanish version of the SHAI was preliminarily adapted to the Colombian context [34]. This process was carried out following national and international guidelines on translation and transcultural adaptation in the same language [41,45]. Adaptation was performed by four Colombian grad-level psychologists who reported having lived in Spain for at least six months.

The content validity was established from the judgment of five experts, specialists in clinical and health psychology, who evaluated each item on base of the "Table of Specifications" (which included the semantic definition and components of the construct to be evaluated), through the Typeform platform and using the five criteria suggest by Osterlind [46]. They are:

1. Representativeness: contribution of the items to the construct (Health Anxiety).
2. Belong: Identification of the construct component that is considered to belong to the item, according to the version validated for Spain (fear to disease or fear to the consequences).
3. Comprehension: This property determines whether the item in its adapted version is properly understood.
4. Interpretation: Ambiguity level of the item.
5. Clarity: how direct and concise the item is.

The study of psychometric properties was evaluated positively by the ethics committees of the participating institutions and was carried out with students from 12 Colombian educational centres. The data were collected only for the students who met the age and nationality requirements and who provided their explicit consent accompanied by the written consent of their legal representatives, under current national regulations. The instruments were administered with paper and pencil, within the educational centres, under appropriate environmental conditions. The evaluations were carried out by psychologists and final-year psychology students, and the personal or sensitive data of the participants and their institutions of origin were codified and archived.

The content validity analysis was calculated using the V Aiken confidence interval for each item, using Icaiken program [47]. This confidence interval allows us to test whether the obtained magnitude of the coefficient is greater than one established as minimally acceptable [48–50]. Its value ranges from 0 to 1. The value 1 is indicative of a perfect agreement between the judges regarding the highest validity score of the evaluated contents. The minimum point of validity is limited to 0.50 based on Aiken's scales, using a 95 % confidence interval.

To examine the evidence of construct validity of the Colombian version of the SHAI, three models were tested: unifactorial, bifactorial [two factorial?] with independent factors and bifactorial [two factorial?] with related factors, using Confirmatory Factor Analysis (CFA), performed with the EQS tool 6.1. The first model was used to discard the one-dimensionality structure of the scale, and the last two were used to specify the interdependence, or not, of the factors. The two additional models evaluated whether the subscales were independent or interrelated. Given that the data did not meet the assumption of multivariate normality ($Mardia = 34.84$), the robust extraction method (i.e., Maximum Likelihood, Robust—ML, R) was used and, considering the categorical nature of the response scale, a polychoric correlation matrix was used for factor analysis in studies of clinical variables. Fit indices were used to evaluate the models, including the scaled chi-square between degrees of freedom ($S-B\chi^2 / df$), the Non-Normed Fit Index (NNFI), the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA) along with its corresponding confidence interval (CI 90 %). An $S-B\chi^2 / df$ ratio between 1 and 3 is indicative of a good fit [51-55]. CFI and NNFI values greater than 0.95 and RMSEA values less than .06 indicate a good fit [56].

The internal consistency analyses of the instrument with the items were performed with SPSS 22.0. Values greater than or equal to .30 were considered adequate for the item-total correlation. For the estimation of reliability, Cronbach's alpha index was used, Values greater than 0.80 were considered optimal.

Results

Table 2 content validity of the SHAI items was assessed by five experts in psychometry and psychology. Although Aiken's V index was below 50% for some items, adjustments were made to the wording based on the judges' recommendations. Overall, most items showed agreement levels ≥ 80 %, with items 1, 2, 3, 4, 5, 6, 7, 11, 15, 16, 17, and 18 achieving 100% agreement regarding their theoretical factor. Detailed results can be found in Table 2 (see Appendix A).

Confirmatory Factor Analysis

Of the three models put to the test (table 3), the two-dimensional model (Fear of Disease and Negative Consequences of a Disease), with both factors interrelated,

Table 2. Evaluation of the characteristics of the items of the Short Health Anxiety Inventory by experts

Items	Criteria	E1	E2	E3	E4	E5	M	Aiken's	% agreement	LI-UL	95 %	
Item 1	Rep	4	4	4	3	4	3.8	0.93	100 %	0.74	0.98	
	Bel	1	1	1	1	1						
	Com	4	4	4	4	3	3.8	0.93			0.74	0.98
	Int	4	4	4	4	4	4	1			0.84	1
	Cla	4	4	4	4	4	4	1			0.84	1
Item 2	Rep	4	4	3	3	4	3.6	0.86	100 %	0.66	0.95	
	Bel	1	1	1	1	1						
	Com	3	4	3	4	4	3.6	0.86			0.66	0.95
	Int	4	4	3	3	4	3.6	0.86			0.66	0.95
	Cla	4	4	4	4	3	3.8	0.93			0.74	0.98
Item 3	Rep	4	4	4	2	3	3.4	0.8	100 %	0.59	0.91	
	Bel	1	1	1	1	1						
	Com	4	4	4	2	3	3.4	0.8			0.59	0.91
	Int	4	4	4	2	4	3.6	0.86			0.66	0.95
	Cla	4	4	4	2	3	3.4	0.8			0.59	0.91
Item 4	Rep	4	4	4	4	1	3.4	0.8	100 %	0.59	0.91	
	Bel	1	1	1	1	1						
	Com	3	4	4	2	2	3	0.66			0.45	0.82
	Int	4	4	4	3	2	3.4	0.8			0.59	0.91
	Cla	4	4	4	2	2	3.2	0.73			0.52	0.87
Item 5	Rep	4	4	4	3	3	3.6	0.86	100 %	0.66	0.95	
	Bel	1	1	1	1	1						
	Com	4	4	4	3	3	3.6	0.86			0.66	0.95
	Int	4	4	4	4	4	4	1			0.84	1
	Cla	4	4	4	3	4	3.8	0.93			0.74	0.98
Item 6	Rep	4	4	4	3	3	3.6	0.86	100 %	0.66	0.95	
	Bel	1	1	1	1	1						
	Com	4	4	4	2	2	3.2	0.73			0.52	0.87
	Int	4	4	4	4	2	3.6	0.86			0.66	0.95
	Cla	4	4	4	2	2	3.2	0.73			0.52	0.87
Item 7	Rep	4	4	4	3	2	3.4	0.8	100%	0.59	0.91	
	Bel	1	1	1	1	1						
	Com	4	4	4	3	2	3.4	0.8			0.59	0.91
	Int	4	4	4	4	2	3.6	0.86			0.66	0.95
	Cla	4	4	4	2	3	3.4	0.8			0.59	0.91
Item 8	Rep	4	4	4	3	3	3.6	0.86	60 %	0.66	0.95	
	Bel	2	2	1	1	1						
	Com	4	4	4	3	3	3.6	0.86			0.66	0.95
	Int	4	4	4	4	4	4	1			0.84	1
	Cla	4	4	3	2	2	3	0.66			0.45	0.82
Item 9	Rep	4	4	4	4	4	4	1	80 %	0.84	1	
	Bel	2	1	1	1	1						
	Com	4	4	4	4	4	4	1			0.84	1
	Int	4	4	4	4	4	4	1			0.84	1
	Cla	4	4	4	4	4	4	1			0.84	1
Item 10	Rep	4	4	4	4	3	3.8	0.93	60 %	0.74	0.98	
	Bel	2	2	1	1	2						
	Com	4	4	4	4	3	3.8	0.93			0.74	0.98
	Int	4	4	4	4	4	4	1			0.84	1
	Cla	4	4	4	4	3	3.8	0.93			0.74	0.98

Table 2. (continued)

Items	Criteria	E1	E2	E3	E4	E5	M	Aiken's	% agreement	LI-UL	95 %
Item 11	Rep	4	4	4	4	3	3.8	0.93	100 %	0.74	0.98
	Bel	1	1	1	1	1					
	Com	4	4	4	4	2	3.6	0.86		0.66	0.95
	Int	4	4	4	4	2	3.6	0.86		0.66	0.95
	Cla	4	4	4	2	2	3.2	0.73		0.52	0.87
Item 12	Rep	4	4	4	4	4	4	1	80 %	0.84	1
	Bel	1	1	1	2	1					
	Com	4	4	4	4	4	4	1		0.84	1
	Int	4	4	4	4	4	4	1		0.84	1
	Cla	4	4	4	4	4	4	1		0.84	1
Item 13	Rep	4	4	4	3	3	3.6	0.86	60 %	0.66	0.95
	Bel	2	2	1	2	1					
	Com	4	4	4	2	2	3.2	0.73		0.52	0.87
	Int	4	4	4	4	3	3.8	0.93		0.74	0.98
	Cla	4	4	4	2	2	3.2	0.73		0.52	0.87
Item 14	Rep	4	4	4	4	4	4	1	60 %	0.84	1
	Bel	2	2	1	1	1					
	Com	2	4	4	4	3	3.4	0.8		0.59	0.91
	Int	4	4	4	4	4	4	1		0.84	1
	Cla	4	4	4	4	3	3.8	0.93		0.74	0.98
Item 15	Rep	4	4	4	4	3	3.8	0.93	100 %	0.74	0.98
	Bel	2	2	2	2	2					
	Com	4	4	4	4	3	3.8	0.93		0.74	0.98
	Int	4	4	4	4	4	4	1		0.84	1
	Cla	4	4	4	4	3	3.8	0.93		0.74	0.98
Item 16	Rep	4	4	4	3	2	3.4	0.8	100 %	0.59	0.91
	Bel	2	2	2	2	2					
	Com	4	4	4	3	2	3.4	0.8		0.59	0.91
	Int	4	4	4	4	3	3.8	0.93		0.74	0.98
	Cla	4	4	4	2	2	3.2	0.73		0.52	0.87
Item 17	Rep	4	4	4	4	3	3.8	0.93	100 %	0.74	0.98
	Bel	2	2	2	2	2					
	Com	4	4	4	4	3	3.8	0.93		0.74	0.98
	Int	4	4	4	4	4	4	1		0.84	1
	Cla	4	4	4	3	4	3.8	0.93		0.74	0.98
Item 18	Rep	3	4	4	4	2	3.4	0.8	100 %	0.59	0.91
	Bel	2	2	2	2	2					
	Com	2	4	4	4	3	3.4	0.8		0.59	0.91
	Int	2	4	4	4	4	3.6	0.86		0.66	0.95
	Cla	4	4	4	4	3	3.8	0.93		0.74	0.98

I – Item; Rep: representativeness; Bel – belong; Com-comprehension; Int – interpretation; Exp – expert; M – mean; LI – lower limit; UL – upper limit.

Table 3. Fit indices of the three analysed models

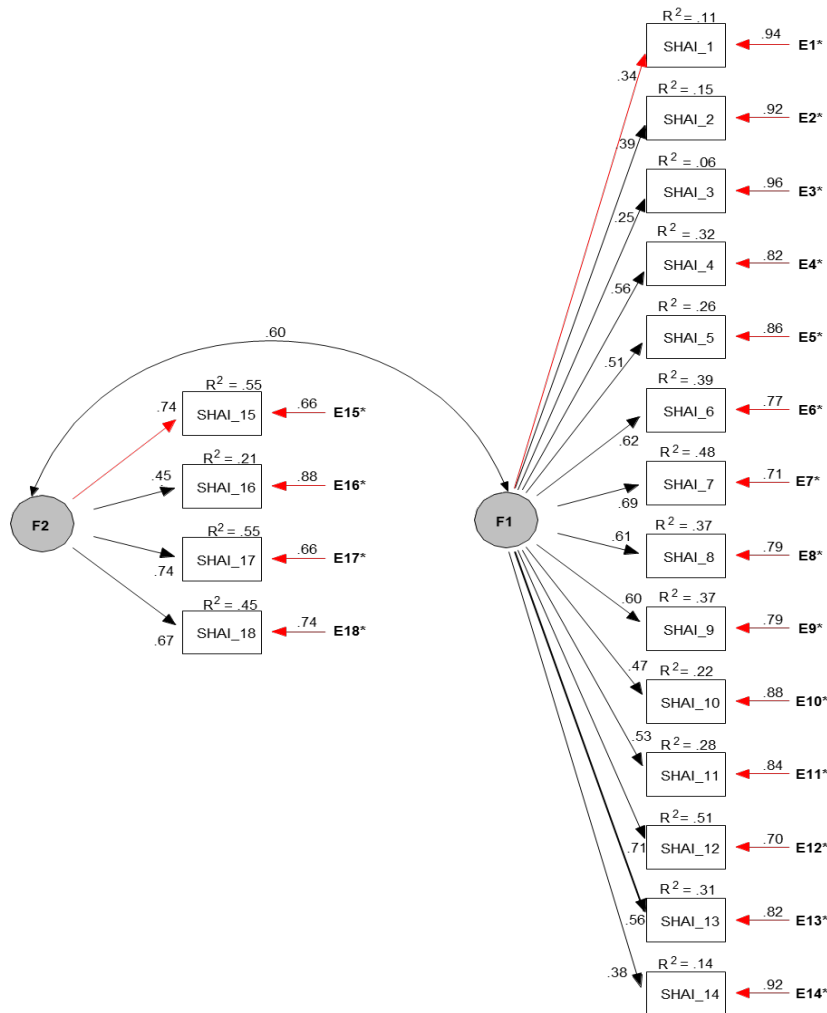
Models	S-B χ^2	df	RMSEA (90% CI)	CFI	NNFI
One-dimensional	655.89	135	0.067 (0.062, 0.072)	0.919	0.908
Two-dimensional, independent factors	495.22	135	0.056 (0.50, 0.061)	0.944	0.937
Two-dimensional, related factors	384.94	134	0.047 (0.041, 0.052)	0.961	0.956

SB χ^2 – Satorra-Bentler Scaled Chi-Square (2001); df – Degrees of freedom; RMSEA (90 % CI) – Root Mean Square Error of Approximation and its 90 % confidence interval (Steiger, 2016); CFI – Comparative Fit Index (Bentler, 1990); NNFI – Non-Normed Fit Index by Bentler-Bonett (1980).

was the sole model showing an adequate fit index. Fit indices included Comparative Fit Index (CFI) = 0.961, Root Mean Square Error of Approximation (RMSEA) = 0.047 (90 % CI: .041–0.052), and Satorra-Bentler Scaled Chi-Square (S-B χ^2 /df) = 2.87. Figure 1 shows the

path diagram with the standardized weights. In general, weights consistently greater than .30 were observed for the loadings of each item onto its corresponding factor, except for item 3 ($\lambda = 0.25$). The correlation between the two factors (G = 0.60) is relatively high and suggests a

Figure 1. Two-factor model and value of standardized parameters. Note: F1 – Factor Fear of disease; F2 – Factor Negative consequences of disease; R^2 – multiple correlation coefficient.



strong relationship between Fear of Disease and Negative Consequences of Disease. This correlation underscores the importance of the two-factor structure but may also reflect some conceptual overlap between these dimensions.

Item Analysis: Factor Loadings and Communalities

Table 4 presents the standardized factor loadings and communalities (R^2) of the items comprising the Colombian version of the Short Health Anxiety Inventory (SHAI), evaluated using the two-factor model with related factors: Fear of Illness and Negative Consequences of an Illness. Consequently, the results confirm the bidimensional structure of the instrument and the psychometric adequacy of the items-within each factor.

The first factor includes 14 items (1–14) that assess concerns about health and fear of developing an illness. In this regard, the standardized factor loadings ranged from 0.55 (item 3) to 0.80 (item 7), indicating a moderate

to high relationship of the items with this factor. The average communality was 0.49, suggesting that the model explains, on average, 49 % of the variance in the items under this factor. Indeed, items 6 (0.78) and 7 (0.80) stood out with the highest factor loadings, reinforcing their importance in representing this construct.

On the other hand, the second factor consists of 4 items (15-18), which evaluate the negative perceptions associated with the impact of an illness on daily life. The factor loadings ranged from 0.62 (item 15) to 0.71 (item 18), indicating an adequate relationship between the items and this factor. The average communality for this factor was 0.44, which reflects a lower proportion of explained variance compared to the first factor, though sufficient to ensure the model's validity. It is worth noting that item 18 showed the highest factor loading (0.71) and communality (0.50) within the factor.

In summary, both factors presented standardized factor loadings above the minimum acceptable crite-

Table 4. Psychometric properties of the factors and item loading

Items	M (SD)	r_{it}^c	$\alpha-i$
Fear of disease ($\alpha-f = 0.80$, $M = 14.03$, $SD = 6.13$)			
1. Concern for health	1.50 (0.72)	0.34	0.79
2. Perception of pain compared to peers	1.12 (1.03)	0.32	0.79
3. Awareness of changes or bodily sensations	1.50 (0.81)	0.27	0.79
4. Perceived ability to resist illness concerns	0.96 (0.82)	0.46	0.78
5. Fear of having a disease	1.30 (0.94)	0.41	0.78
6. Images associated with having a disease	0.83 (0.80)	0.48	0.78
7. Ability to control intrusive thoughts about health	0.84 (0.87)	0.58	0.77
8. Relief as a result of negative medical reports regarding the presence of disease	0.66 (0.80)	0.45	0.78
9. Thoughts of suffering from a disease when it gets mentioned	0.56 (0.65)	0.42	0.78
10. Health concerns when experiencing sensations or body changes	1.04 (0.95)	0.43	0.78
11. Perceived risk of contracting a disease	1.15 (0.91)	0.41	0.78
12. Belief of having a serious illness	0.57 (0.70)	0.52	0.78
13. Ability to think of something else when in the presence of unexplained bodily sensations	0.98 (0.83)	0.47	0.78
14. Perception of family and friends about an individual's health problems	1.01 (0.65)	0.31	0.79
Negative consequences of disease ($\alpha-f = 0.68$, $M = 2.86$, $SD = 2.29$)			
15. Ability to enjoy life if diagnosed with a disease	0.69 (0.82)	0.53	0.57
16. Perception of the probability of cure if suffering from a serious disease	0.90 (0.68)	0.33	0.69
17. Perception of potential effect on functioning areas if suffering from a serious illness	0.69 (0.87)	0.53	0.57
18. Potential loss of dignity due to contracting a disease	0.58 (0.78)	0.48	0.61

M – Media; SD – Standard deviation; r_{it}^c – Corrected item-total correlation; $\alpha-i$ – Cronbach's Alpha if item deleted; $\alpha-f$ – Factor Cronbach's Alpha

Table 5. Item Analysis: Factor Loadings and Communalities

Items	F. Disease	NC. Disease	R ²
1	0.68	-	0.46
2	0.72	-	0.52
3	0.55	-	0.3
4	0.63	-	0.4
5	0.74	-	0.55
6	0.78	-	0.61
7	0.8	-	0.64
8	0.6	-	0.36
9	0.65	-	0.42
10	0.7	-	0.49
11	0.67	-	0.45
12	0.73	-	0.53
13	0.76	-	0.58
14	0.69	-	0.48
15	-	0.62	0.38
16	-	0.65	0.42
17	-	0.68	0.46
18	-	0.71	0.5

FD – Fear of Disease, Negative Consequences of Disease, Community (R)

tion of 0.30, indicating that all items significantly contribute to the evaluation of their respective factors. Similarly, the communalities show that a considerable portion of the variance in the items is explained by the two-factor model. As a result, these findings support the bidimensional structure of the SHAI, consistent with previous validations conducted in other populations and cultural contexts.

Psychometric properties of the factors and item loading

Finally, Table 5. presents the results of the internal consistency analysis. Considering the models of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), the SHAI demonstrated high overall consistency ($\alpha = 0.82$), indicating strong reliability of the instrument. For the factor “Fear of Illness,” an $\alpha = 0.80$ was obtained, reflecting an adequate level of consistency, while for the factor “Negative Consequences of an Illness,” the α value was 0.68 (see Appendix B).

Discussion

The objective of this study was to validate the Colombian version of the SHAI for the first time. The results provide empirical evidence about the psychometric properties of the SHAI in the Colombian adolescent population (content validity, AFC, reliability, and internal consistency) and suggest that this is a useful tool to assess health anxiety in the general adolescent population. The reactions produced by the SHAI items provide an assessment of cognitions related to HA, regardless of the health status of the respondent, the specifically feared diseases, or the behaviours related to HA, in research and clinical practice.

The analyses showed an adequate fit for the two-factor model proposed by the original authors of SHAI based on the principle of parsimony [16]. Previous studies selected a two-factor model instead of a three-factor model, which includes: Disease Probability, Negative Consequences and Gravity Due to Illness [34,39]. The two-factor structure of the SHAI has also been confirmed in the United States with clinical and university patients, in Japan, Hungary, and China with undergraduate students, and in Spain, Portugal, and the Netherlands with adolescent students [23,26,32,34,39,57]. Additionally, this model has been corroborated in general or mixed Iranian population, and clinical and non-clinical populations in Germany, Canada, and Poland [33,35,37,40].

Based on recommendations for Cronbach’s alpha, the coefficients should be ≥ 0.80 for the SHAI to be acceptable as a basic research tool [58]. In this sense, the SHAI’s reported reliability ($\alpha = 0.82$) is supported by the literature and is similar to studies conducted in China, Hungary, Canada, Japan, Iran, and the United Kingdom, whose indices have oscillated between $\alpha = 0.74$ and $\alpha = 0.89$ [16,32,36–38,40]. In other countries, such as Poland, Spain, Germany, and the United States, the reliability has been found to be slightly higher (between $\alpha = 0.92$ and $\alpha = 0.96$) [33–35,39]. This could be due to the use of larger mixed samples (clinical and non-clinical) and/or cultural, social, and economic factors. Future cross-cultural studies would provide more support on the sources of such variation.

This study presented several limitations and identified recommendations for future research. The Colombian version of the SHAI was validated with a non-clinical sample. Therefore, it would be necessary to carry out a study to test the psychometric properties of this inventory with patients whose diagnoses are associated with the HA spectrum. Furthermore, it is important to note that the state of health of the participants was not controlled in this study. This constitutes a limitation because the responses to the SHAI items might vary depending on the health status of the respondents. Additionally, the

internal consistency for the ‘Negative Consequences of an Illness’ factor ($\alpha = 0.68$) was below the commonly recommended threshold of 0.80. Although this does not compromise the overall reliability of the SHAI, it suggests that adjusting this factor could improve the consistency of the instrument. As a result, future studies should consider including a control for health status to ensure more accurate assessments of health anxiety and its related cognitions. Moreover, although adolescents from two areas of the country (central and coastal) participated in this study, expanding to other geographic areas would favour the generalization of results. In addition, we propose that future studies should provide evidence of the convergent validity of the Colombian version of the SHAI with other HA measures, as well as temporal stability. Similarly, this study did not assess sex invariance. While not mandatory, such an analysis could provide additional evidence of the psychometric validity of the SHAI. Future research should address this aspect to strengthen the robustness of the results. Finally, some studies, when discriminating between patients with and without HA and other anxiety problems, have suggested that patients with HA usually have cognitive biases or dysfunctional attributions [9]. For this reason, it is also suggested that convergence analyses should be carried out with scales that measure cognitive content (schemas, attributions and attitudes), deficits in social skills, or other variables that are empirically related to HA. In this way, the external validity of the instrument could be verified and strengthened (if warranted), considering the brevity and specificity of the measure.

Despite its limitations, the findings of this work provide evidence of the latent structure and reliability of the Colombian version of the SHAI to evaluate HA in Colombian adolescents. This is the first study to culturally adapt this widely and globally recognized instrument for use in the Latin American population. In this sense, this study constitutes an empirical contribution supporting the use of SHAI as a valid and reliable tool for assessing health anxiety in clinical practice and the research field. It can effectively support the epidemiological surveillance of this population, the prevention of relapses, and, thus, the quality of primary care and the patient’s prognosis.

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Conflict of Interest

None to declare.

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