



## Original article



## Validation of the suicidal history self-rating scale (SHSS) in young adults: A bifactor model approach to suicide risk assessment

Alberto Sanchez<sup>a,\*</sup>, Marco Innamorati<sup>b</sup>, Nicole Bungaro<sup>b</sup>, Simone Belli<sup>c,d</sup>,  
Chiara Castelletti<sup>e</sup>, Adriana García-Ramos<sup>e,f</sup>, Wala Ayad Ahmed<sup>g</sup>,  
Alejandro de la Torre-Luque<sup>f,g</sup>

<sup>a</sup> Department of Clinical Psychology, and Psychobiology, Faculty of Psychology, University of Barcelona (UB), Passeig de la Vall d'Hebron, 171, 08035 Barcelona, Spain

<sup>b</sup> Department of Health and Life Sciences, European University of Rome, Via degli Aldobrandeschi, 190, 00163 Rome, Italy

<sup>c</sup> Department of Social Anthropology and Social Psychology, Complutense University of Madrid (UCM), Campus de Somosaguas, 28223 Pozuelo de Alarcón, Madrid, Spain

<sup>d</sup> Universidad ECOTEC, Campus de Samborondón, Vía Samborondón, Km 13.5, 092302 Samborondón, Ecuador

<sup>e</sup> Department of Psychiatry, School of Medicine, Autonomous University of Madrid (UAM), Calle Arzobispo Morcillo, 4, 28029 Madrid, Spain

<sup>f</sup> Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Instituto de Salud Carlos III, Av. Monforte de Lemos, 3-5, 28029 Madrid, Spain

<sup>g</sup> Department of Legal Medicine, Psychiatry and Pathology, School of Medicine, Complutense University of Madrid (UCM), Ciudad Universitaria, 28040 Madrid, Spain

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## ABSTRACT

**Background and objectives:** Accurately assessing suicide risk requires tools that capture both its multidimensional nature and its temporal course. This study analyzes the psychometric properties of the Spanish version of the Suicidal History Self-Rating Scale (SHSS), a self-reported, multidimensional instrument designed to assess suicidal ideation and behavior across two time frames: the last 12 months and the lifetime before.

**Methods:** Confirmatory factor analysis (CFA) was performed to compare unidimensional, two-factor, and bifactor models. Reliability was assessed using Omega coefficients, and concurrent validity was evaluated through correlations with the Paykel scale. The study used a convenience sample of 817 Spanish young adults (18–35 years old).

**Results:** The bifactor models provided the best fit, identifying a prominent general suicide risk factor. Specific factors varied by period: suicidal ideation performed better in the 12-month frame, while suicidal behavior was more stable in the lifetime frame. The SHSS demonstrated excellent internal consistency ( $\omega_T = 0.96 - 0.97$ ) and strong concurrent validity with the Paykel scale ( $\rho = 0.645 - 0.695$ ).

**Conclusions:** These findings support the SHSS as a reliable, valid, and efficient self-report tool for screening suicide risk in young adults. Its 12-month subscale might be valuable in emergency psychiatry for predicting imminent risk. Simultaneously, the lifetime assessment allows for the identification of historical “acquired capability” and long-term risk trajectories.

## Introduction

Previous self-injurious thoughts and behaviors (SITB) are established as some of the most robust longitudinal predictors of suicide risk. Meta-analytic evidence indicates that suicidal ideation and previous attempts are significantly associated with a higher likelihood of future ideation (OR = 2.07) and subsequent attempts (OR = 2.14)<sup>1</sup> In adolescent and young adult populations, this association is notably more pronounced: any prior history of SITB is linked to a very strong OR of 22.53 for suicide

death and an OR of 3.48 for future attempts<sup>2</sup> Recent research emphasizes that exposure to the suicidal behavior of others also increases risk, with exposure to suicide linked to higher odds of both suicide (OR = 3.23) and suicide attempts (OR = 2.91) in the general population<sup>3</sup> Consequently, assessing the lifetime course of suicidality is a clinical requirement because past behavior instantiates an ‘acquired capability’ for lethal self-injury through habituation to fear and pain, representing a risk factor that remains significant even when current psychological distress is controlled<sup>4</sup>

\* Corresponding author at: Department of Clinical Psychology and Psychobiology, Faculty of Psychology, University of Barcelona (UB), Passeig de la Vall d'Hebron, 171, 08035 Barcelona, Spain.

E-mail address: [a.sanchez.f.q@ub.edu](mailto:a.sanchez.f.q@ub.edu) (A. Sanchez).

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Accurate assessment of suicide risk is a major topic for both research and clinical practice<sup>5</sup> Some instruments focus primarily on suicidal ideation, like the Beck Scale for Suicide Ideation (BSI),<sup>6</sup> while others focus both on suicidal ideation and suicide attempts, like the Columbia-Suicide Severity Rating Scale (C-SSRS)<sup>7</sup> However, these traditional tools are often limited by the need for extensive training to be applied by clinicians or their length, which makes them difficult to administer in time-constrained settings. Beyond these practical barriers, a critical challenge lies in the dimensionality of the construct. While unidimensional approaches provide parsimony, evidence indicates that single-item screeners may miss up to two-thirds of youth with passive suicidal ideation, whereas multi-item tools reveal more complex clinical profiles<sup>8</sup>

Despite the existence of several suicide risk measures, a significant gap persists in the availability of tools that are multidimensional, self-reported and sensitive to the temporal course of suicidality in Spanish-speaking populations. While single-item screeners are common, meta-analytic evidence indicates they share only a modest core with multi-item instruments and often fail to capture critical dimensions such as control over thoughts and protective factors<sup>9</sup> The exact contribution of this work is to address this gap by providing the first validation in Spanish of the Suicidal History Self-Rating Scale (SHSS)<sup>10</sup>

Unlike traditional scales, the SHSS presents a dual-timeframe structure to identify suicide risk in the near term (last 12 months) but also in the lifetime (before the last 12 months). It is important to contrast this with other dual-timeframe instruments, such as the clinical interview format of the C-SSRS, which focuses on a 3-month proximal window and lifetime history. The unique clinical advantage of the SHSS is its fully self-reported format combined with a wider 12-month proximal window. The SHSS offers a comprehensive framework for evaluating general suicide risk as well as ideation and behavior across the two distinct time frames. This temporal differentiation allows for a more detailed understanding of suicidal risk trajectories, enhancing both clinical decision-making and research on the progression of suicidality. In this context, the SHSS proves to be a promising tool. This dual focus aligns with contemporary theoretical frameworks and offers practical advantages for clinicians and researchers seeking to identify those individuals who are at risk more precisely.

Given the theoretical importance of distinguishing suicidal ideation from suicidal behavior, and the practical need for robust and integrated assessment tools, the present study aims to examine the latent structure of the SHSS in Spanish young adults. Specifically, we compare unidimensional, two-factor, and bifactor models of suicidality, evaluating their fit and interpretability across both lifetime and 12-month reporting periods. Our structural baseline hypothesis was that the unidimensionality of the original 16-item scale would hold when evaluated independently within each of the two newly introduced temporal subscales, serving as a comparative foundation for the multi-factor and bifactor structures. By integrating confirmatory factor analysis and bifactor indices, we seek to clarify whether suicide risk is best represented as a general construct, as distinct ideation and behavior dimensions, or as a bifactor structure.

## Method

### Participants

A convenience sample of 817 Spanish young adults was recruited through an online survey and institutional media channels at the Complutense University of Madrid (Spain). The inclusion criteria were being aged between 18 and 35, Spanish nationality, having Internet access and providing informed consent. Exclusion criteria included presence of sensory deficits that could interfere with the assessment. All participants were from the general population and none reported a diagnosis of a severe mental disorder at the time of the study. This sampling strategy, while common in validation studies, introduces a potential selection bias

that is discussed in the limitations section.

### Instruments

Socio-demographic data were collected using a self-report questionnaire ad hoc for this study, collecting age, gender, nationality and health issues.

This study utilized a Spanish adaptation of an expanded version of the Suicidal History Self-Rating Scale (SHSS). The SHSS was originally developed in Italian as a 16-item screening tool designed to identify individuals at high risk of suicide in the near term<sup>10</sup> In its original validation, the scale utilized a true-false response format and demonstrated excellent internal consistency (Kuder-Richardson-20 = 0.95) and ROC curve analysis indicated superior discriminative power in identifying suicide attempters (AUC = 0.91).

The version utilized in the current study is an expanded 32-item adaptation developed in collaboration with the original author. This version duplicates the 16 original items to assess two distinct time frames: recent risk (the last 12 months) and historical risk (lifetime before the last 12 months). Unlike the original version, this adaptation uses a 4-point Likert scale ranging from 0 (Never/Absolutely false) to 3 (Always/Absolutely true) to increase the granularity of the responses. The purpose of the SHSS is to provide a self-reported comprehensive, multidimensional screening of suicidality across different temporal perspectives. The Spanish version was developed using a standard back-translation procedure from Italian to Spanish.

The Paykel scale<sup>11</sup> is a five-item screening instrument with a dichotomous response system (0 = No; 1 = Yes) designed to assess suicidal ideation and behavior. It is considered to indicate the presence of suicidal ideation when answering "Yes" to the third or fourth item, and suicidal behavior when answering "Yes" to the fifth item. This scale has been widely used in epidemiological studies and clinical settings due to its brevity and effectiveness in identifying individuals at risk.

### Procedure

For this cross-sectional study, all subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Complutense University of Madrid (protocol code C.I. 20/089-E was approved on March 11, 2020). No financial assistance or compensation was offered to participants. This study was not pre-registered.

### Data analysis

We employed a model-comparison approach to evaluate the latent structure of the SHSS. Although this study was not pre-registered, we followed a pre-defined two-stage psychometric evaluation to clarify whether suicide risk is best represented as a general construct, as distinct ideation and behavior dimensions, or as a bifactor structure.

In the first stage, a preliminary item screening was conducted using a sub-sample consisting of the first 400 participants to evaluate the structural stability of the Spanish translation, to identify structure and items with poor discriminative power or significant cross-loadings.

In the second stage, the structural validity of the scale was tested on the full sample ( $N = 817$ ) using Confirmatory Factor Analysis (CFA). Descriptive analyses were obtained using SPSS 29.0, while the CFA was performed using R software version 4.3.0 and the *psych* and *lavaan* packages<sup>12-14</sup>

The WLSMV (Weighted Least Squares Mean and Variance adjusted) estimator was utilized to account for the categorical nature of the data. Three competing models were compared for each reporting period: (1) a unidimensional model for general suicide risk; (2) a two-factor model distinguishing between Suicidal Ideation and Suicidal Behavior; and (3) a bifactor model featuring one general suicide risk factor and two

specific factors.

Internal consistency was assessed using Omega coefficients ( $\omega_T$  and  $\omega_H$ ). Concurrent validity was evaluated via Spearman's correlations between the SHSS total scores and the Paykel scale. Model fit was evaluated using multiple indices, with good fit defined as Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) > 0.95, Root Mean Square Error of Approximation (RMSEA) < 0.06, and Standardized Root Mean Square Residual (SRMR) < 0.08. Following established psychometric conventions, 90% confidence intervals were reported specifically for the RMSEA to ensure comparability with existing validation literature<sup>15</sup>

**Results**

*Sample characteristics*

A total of 817 young adults participated in the study, consisting of 425 (52.02%) females, 380 (46.51%) males, 10 (1.22%) non-binary, and 2 (0.24%) who identified themselves as other gender. The mean age of the sample was 21.6 years (SD = 4.07). The majority of the participants were born in Spain (86.66%), were currently students (61.81%), and were pursuing higher education (76.62%). At the time of data collection, 12.61% of the sample were receiving psychological assistance. Complete sociodemographic characteristics are presented in Table 1.

*Item screening and selection*

The preliminary item screening and theoretical review led to the exclusion of two items from each time frame. Item 7 (“Did the thoughts quickly disappear?”) was excluded following consultation with the original author and empirical evidence of poor performance in the Spanish sample. Although intended as a reverse-scored indicator of ideation intensity, it exhibited a direct positive loading ( $\lambda = 0.58$ ), suggesting that participants misinterpreted its directionality. Item 9 (“Would you have carried out these thoughts?”) was removed due to significant cross-loadings that compromised the distinction between ideation and behavior. These exclusions resulted in a final structure of 28 items (14 per timeframe) used for the subsequent CFA.

*Descriptive statistics*

Descriptive statistics of the SHSS are presented in Table 2. All the items violated assumptions of univariate and multivariate normality ( $p < 0.05$ ), which is common in a low-frequency phenomenon like suicide

**Table 1**  
Sociodemographic characteristics.

Characteristic	N (%) / M (SD)
Age (years)	23.45 (4.12)
Gender	
Male	380 (46.51%)
Female	425 (52.02%)
Non-Binary	10 (1.22%)
Other	2 (0.24%)
Country of birth	
Spain	708 (86.66%)
Others	109 (13.34%)
Current Situation	
Students	505 (61.81%)
Working	123 (15.06%)
Both (Studying and Working)	173 (21.18%)
Unemployed (not studying)	12 (1.47%)
Other	4 (0.49%)
Education level	
No studies / Primary	4 (0.49%)
Secondary (High School)	187 (22.89%)
Higher Education (University)	626 (76.62%)
Clinical History	
Previous Psychological Assistance	103 (12.61%)

**Table 2**  
Descriptive statistic and  $h^2$  for the SHSS items.

Item	Descriptives				CFA $h^2$
	Mean	SD	Skew	Kurtosis	
SHSS1_1	0.23	0.51	2.38	5.69	0.93
SHSS1_2	0.16	0.44	3.32	12.94	0.76
SHSS1_3	0.16	0.46	3.40	12.53	0.74
SHSS1_4	0.17	0.47	3.09	10.40	0.89
SHSS1_5	0.13	0.45	4.02	18.16	0.95
SHSS1_6	0.09	0.38	5.14	29.35	0.97
SHSS1_8	0.23	0.63	2.81	7.11	0.83
SHSS1_10	0.04	0.24	7.18	59.27	0.94
SHSS1_11	0.05	0.26	6.39	45.86	0.96
SHSS1_12	0.04	0.25	7.88	70.11	0.93
SHSS1_13	0.03	0.25	9.21	93.92	0.84
SHSS1_14	0.06	0.36	6.28	40.67	0.93
SHSS1_15	0.05	0.31	7.60	60.46	0.86
SHSS1_16	0.06	0.36	6.28	40.67	0.94
SHSS2_1	0.26	0.54	2.15	4.63	0.96
SHSS2_2	0.22	0.51	2.68	7.81	0.82
SHSS2_3	0.22	0.54	2.75	7.91	0.78
SHSS2_4	0.21	0.50	2.55	6.86	0.96
SHSS2_5	0.17	0.49	3.25	11.35	0.98
SHSS2_6	0.13	0.43	3.78	15.56	0.94
SHSS2_8	0.31	0.73	2.32	4.20	0.82
SHSS2_10	0.07	0.33	5.70	35.48	0.96
SHSS2_11	0.07	0.34	5.45	33.08	0.91
SHSS2_12	0.05	0.29	6.40	46.43	0.95
SHSS2_13	0.05	0.34	6.91	49.36	0.88
SHSS2_14	0.09	0.42	5.15	26.80	0.89
SHSS2_15	0.07	0.39	5.86	35.01	0.86
SHSS2_16	0.09	0.43	5.06	25.42	0.88

Note: SHSS: Suicidal History Self-Rating Scale; SD: Standard Deviation; Skew: Skewness;  $h^2$ : Estimated communalities derived from the CFA (Bifactor model).

when assessed in the general population. A notable finding was the presence of a strong floor effect across all items, with means below 0.31 and high skewness and kurtosis.

*Confirmatory factor analysis*

Results for the CFA are presented in Table 3. The 1-factor models and the bifactor models demonstrated acceptable fit to the data, with the bifactor models showing a better fit to the observed data. When analyzing the bifactor model, items loaded significantly on the general factor (Suicide Risk) for both sections (see Figs. 1 and 2), while the respective factor loadings on the group factors (Suicidal Ideation and Suicidal Behaviors) were lower, although sometimes significant. The results are consistent with the presence of a strong global dimension and the use of a total score for each section; however, the general factor was not able to explain all the common variance between items.

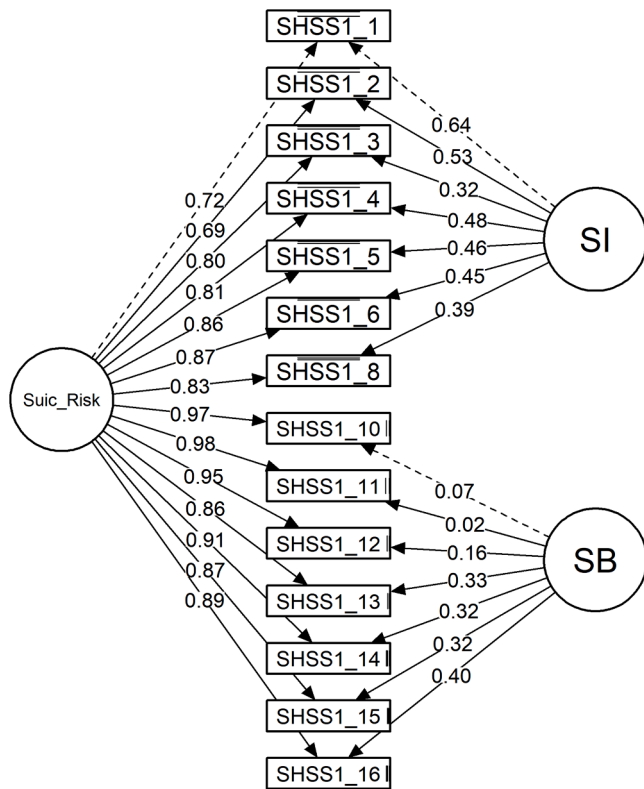
*Reliability*

The scale demonstrated excellent reliability, with a total omega ( $\omega_T$ ) of 0.96 for the 12-month section and 0.97 for the lifetime section. The hierarchical omega coefficient ( $\omega_H$ ) was 0.77 and 0.87, respectively, indicating that the general factor explains a substantial portion (77% and 87%) of the reliable variance in the total scores. The CFA validated the structure of the 12-month and Lifetime sections as two separate assessments, each best represented by a bifactor model with a strong general factor. Therefore, concurrent validity was assessed by correlating the total scores of each temporal section with the Paykel scale. The relationship between the SHSS and the Paykel scale was evaluated using Spearman's correlation, revealing high and significant correlations: SHSS-12 months ( $\rho = 0.695$ ), SHSS-LifeTime ( $\rho = 0.645$ ), and total SHSS ( $\rho = 0.686$ ). These strong correlations provide robust evidence for the concurrent validity of the SHSS, demonstrating that it measures similar constructs to an established screening instrument.

**Table 3**  
Fit indices for the confirmatory factor models.

Model	$\chi^2$	df	p	$\chi^2/df$	RMSEA [90% CI]	CFI	TLI	SRMR
<i>12-months</i>								
Unifactor	278.36	77	< 0.001	3.62	0.057 [0.050, 0.064]	0.991	0.990	0.089
2-factor	4344.17	77	< 0.001	56.42	0.261 [0.254, 0.267]	0.813	0.779	0.502
Bifactor	99.13	63	0.002	1.57	0.027 [0.016, 0.036]	0.998	0.998	0.024
<i>Life-Time</i>								
Unifactor	306.35	77	< 0.001	3.98	0.060 [0.053, 0.068]	0.993	0.992	0.067
2-factor	8089.50	77	< 0.001	105.06	0.357 [0.351, 0.364]	0.769	0.728	0.531
Bifactor	133.87	63	< 0.001	2.12	0.037 [0.028, 0.046]	0.998	0.997	0.027

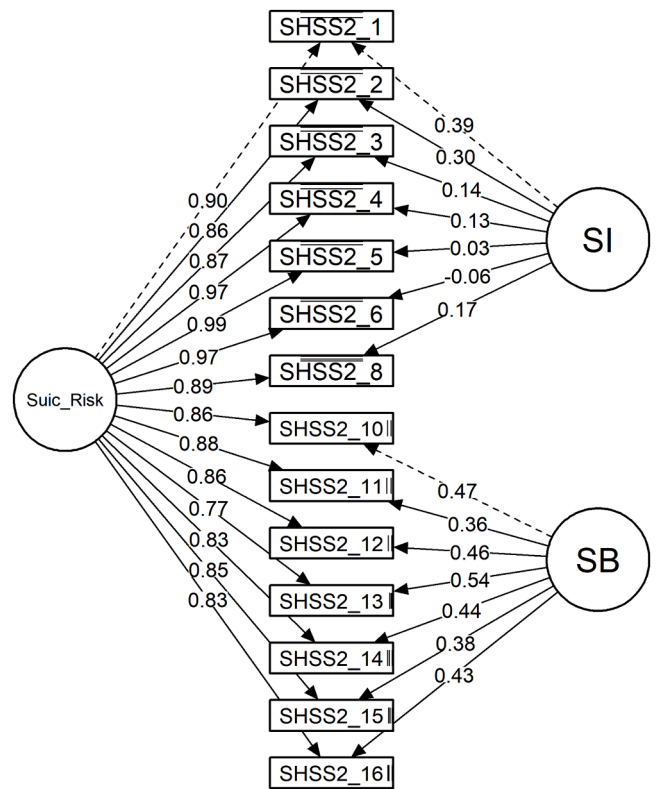
Note:  $\chi^2$ : Chi-square statistic; df: Degrees of freedom; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation; CI: Confidence Interval; SRMR: Standardized Root Mean Square Residual.



**Fig. 1.** Standardized factor loadings for the bifactor model of the SHSS in the 12-month time frame. Note: All loadings are standardized; ellipses represent latent factors; rectangles represent observed items; Suic\_risk = Suicide risk; SB = Suicidal Behavior; SI = Suicidal Ideation.

**Discussion**

The present study validated the Spanish version of the Suicidal History Self-Rating Scale (SHSS<sup>10</sup>;) in a sample of young adults, fulfilling the objective of providing a self-reported, multidimensional and temporalized suicidal risk assessment tool. A major contribution of this scale lies in its unique integration of a self-report format with a dual-timeframe structure, evaluating both the recent 12-month period and historical lifetime risk. Our findings support a bifactor structure as the most adequate representation of the scale’s latent structure, identifying a prominent general suicide risk factor that confirms the multidimensionality of the construct. A key discovery in this validation is the scale’s temporal asymmetry: while suicidal ideation retains unique variance in the 12-month frame, suicidal behavior emerges as a more stable and distinct dimension in the lifetime assessment. This dual structure allows the SHSS to address two distinct clinical needs: providing an index of global suicide risk while distinguishing between recent acute distress and established chronic behavioral history.



**Fig. 2.** Standardized factor loadings for the bifactor model of the SHSS in the lifetime time frame. Note: All loadings are standardized; ellipses represent latent factors; rectangles represent observed items; Suic\_risk = Suicide risk; SB = Suicidal Behavior; SI = Suicidal Ideation.

A significant floor effect was observed across all items, reflecting the low base rate of suicidal thoughts and behaviors in a non-clinical sample of Spanish young adults. However, this finding must be interpreted with caution due to the potential selection bias inherent in our convenience sample and online recruitment methodology. It is possible that the prevalence of suicidality in this cohort is skewed, as digital engagement may fail to reach individuals in acute distress or with lower digital literacy. Nevertheless, this floor effect does not indicate a lack of psychometric sensitivity; rather, it accurately reflects the epidemiological distribution of suicidality in the general population, where even minimal scores on the SHSS carry high clinical significance for early intervention and triage.

The superiority of the bifactor model underscores the necessity of assessing suicidality through multi-item tools rather than single-item screenings. Our results demonstrate that while suicide risk can be viewed as a cohesive global construct, supported by hierarchical omega values ( $\omega_H = 0.77-0.87$ ) that show the general factor explains the majority of the reliable variance, this general dimension does not account

for all common variance among items. This structural complexity suggests that while a ‘total suicide risk’ exists, the specific dimensions of ideation and behavior retain clinical information that is not redundant. This aligns with evidence indicating that single-item screeners often fail to capture significant clinical profiles, such as passive ideation or the specific loss of control over suicidal thoughts, which multi-item instruments like the SHSS identify with greater granularity<sup>8</sup> By providing a more comprehensive assessment tool, the SHSS achieves robust incremental validity, as evidenced by its strong concurrent performance with established measures such as the Paykel scale ( $\rho = 0.645 - 0.695$ ).

When benchmarked against clinician-rated “gold standard” tools such as the C-SSRS, the SHSS demonstrates a significant competitive advantage in its efficiency as a shorter, self-rating instrument. While the C-SSRS is a fundamental benchmark, its administration requires specialized training and time, which are often scarce in high-volume screening settings or busy emergency departments. The SHSS provides a time-efficient alternative that mirrors the depth of comprehensive assessments without the same administrative burden. Furthermore, the 12-month subscale is particularly valuable in emergency psychiatry, as recent history is a significantly more potent predictor of imminent risk than remote lifetime history, while the latter remains the most robust indicator of long-term lethal potential and acquired capability.<sup>16,17</sup>

Despite these contributions, several limitations must be acknowledged. The sample was primarily composed of university students and their relatives, which limits generalizability to clinical populations with higher base rates of mental illness or lower educational attainment. The cross-sectional design prevents the evaluation of the scale’s longitudinal predictive validity or its sensitivity to clinical changes over time. The floor effects observed in this study suggest that the SHSS may be most appropriate for populations with elevated suicide risk, and future research should examine the scale’s performance in clinical samples where higher base rates of suicidal phenomena would be expected. Additionally, the exclusion of items 7 and 9 from the original scale may limit comparability with other validation studies. While these items showed poor psychometric properties in this sample, their exclusion should be considered when comparing results across different populations or cultural contexts. While the SHSS demonstrates excellent psychometric properties, its incremental validity over existing clinician-rated tools should be further discussed to justify its adoption in busy clinical or screening settings.

In conclusion, the Spanish version of the SHSS is a reliable and valid multidimensional instrument for screening suicide risk in young adults. Its unique temporal structure provides clinically relevant information that informs both immediate crisis intervention and long-term risk monitoring, ultimately supporting more targeted and effective suicide prevention strategies in Spanish-speaking contexts.

### Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Complutense University of Madrid. All participants provided informed digital consent.

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### Data and availability statement

The data and code that support the findings of this study are available from the corresponding author upon reasonable request.

### Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work, the authors used Gemini (Google) to improve the readability and grammatical accuracy of the manuscript. After using this tool, the authors reviewed and edited the content as needed and takes full responsibility for the content of the publication.

### Declaration of competing interest

none.

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