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Original Article

Validity, reliability, and scoring of the Social Media Addiction Scale in students

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ABSTRACT

This study examined the psychometric properties of the Social Media Addiction Scale–Student Form (SMAS-SF) in a large sample of Peruvian university students. A cross-sectional instrumental design was employed with 2,956 participants from Engineering, Biomedical Sciences, and Social Sciences programs. The 29-item SMAS-SF, structured across four dimensions: Virtual Tolerance, Virtual Communication, Virtual Problem, and Virtual Information, was administered in Spanish following contextual adaptation. Descriptive analyses indicated generally low-to-moderate addiction levels, with Social Sciences students reporting the highest scores. Assumption testing supported factorability, with excellent sampling adequacy and significant item discrimination. Confirmatory factor analysis tested both first-order and second-order models, yielding acceptable fit indices and supporting the original four-factor structure with an overarching addiction factor. Standardized loadings were significant across all items. Composite reliability values exceeded recommended thresholds, and internal consistency was excellent for the total scale, though Average Variance Extracted values were below .50, suggesting moderate convergent validity. Discriminant validity showed overlap between some dimensions. Measurement invariance across sex was confirmed at configural, metric, and scalar levels. Percentile norms were established to classify low, moderate, and high addiction. Overall, findings support the SMAS-SF as a reliable and structurally valid instrument for assessing social media addiction among university students in Peru.

Keywords: Social media, Behavioral addictions, Psychometrics, Surveys and questionnaires, Students

Introduction

Social media has become deeply embedded in students' academic and personal lives, transforming how they communicate, learn, and construct identity [1]. University populations are among the most active users, employing digital platforms for collaboration, information exchange, and social interaction [2]. Despite these benefits, excessive engagement has raised concerns about maladaptive patterns of use. Problematic social media behavior is increasingly conceptualized as an addiction-like condition characterized by compulsive use, loss of control, and interference with daily functioning [3, 4].

A growing body of research documents the psychological and health correlates of social media addiction. Higher addiction levels have been associated with anxiety, depression, and stress among young adults [1], as well as poorer academic performance in university students [5]. Related studies have identified links with sleep difficulties and depressive symptomatology [6]. Together, these findings position social media addiction as a phenomenon with significant implications for student well-being and educational outcomes.

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Evidence also highlights broader psychosocial effects. Excessive social media use has been linked to reduced self-esteem [7], emotional processing difficulties such as alexithymia, and diminished empathy [8]. Personality traits, including neuroticism and low conscientiousness, have likewise been associated with higher addiction scores [9]. These multidimensional associations reinforce the need for robust assessment tools capable of capturing the complexity of the construct.

Given this expanding research landscape, valid and reliable measurement is essential. The Social Media Addiction Scale–Student Form (SMAS-SF) has been widely used across cultural contexts, with validation and adaptation studies supporting its multidimensional structure and internal consistency [8, 10]. However, psychometric properties may vary across linguistic, cultural, and institutional settings, requiring ongoing evaluation [11].

In addition to structural validity and reliability, the development of empirically grounded scoring frameworks is critical for meaningful interpretation. Normative cut-offs enable the classification of addiction severity and support screening and intervention efforts in educational contexts. Therefore, the present study focuses on examining the validity, reliability, and scoring properties of the SMAS-SF in students, contributing evidence to strengthen its use in research and applied assessment.

Materials and Methods

A cross-sectional, instrumental study was conducted to evaluate the psychometric properties of the Social Media Addiction Scale-Student Form (SMAS-SF; Sahin, 2018) in a sample of university students from Universidad Nacional del Altiplano de Puno-Perú. A total of 2956 students from a public university in Peru participated voluntarily after providing informed consent. Participants were enrolled across multiple academic programs, which were classified into three broad academic areas: Engineering (n = 1101), Biomedical sciences (n = 405), and Social Sciences (n = 1450). The sample comprised 1551 male and 1405 female students **Table 1**.

Table 1. Distribution of Participants

Area	Male	Female	Total	M %	F %
Engineering	856	245	1101	77.7	22.3
Biomedical	145	260	405	35.8	64.2
Social Sciences	550	900	1450	37.9	62.1

The SMAS-SF is a self-report instrument designed to assess social media addiction among students aged 12-22. It consists of 29 items rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) [12]. All items are positively scored, yielding total scores between 29 and 145, with higher scores indicating greater social media addiction [13]. The theoretical model comprises four dimensions: Virtual Tolerance (VT; items 1-5, 5 items), Virtual Communication (VC; items 6-14, 9 items), Virtual Problem (VP; items 15-23, 9 items), and Virtual Information (VI; items 24-29, 6 items). The original scale demonstrated excellent psychometric properties, with a four-factor structure explaining 53.16% of total variance, KMO = .96, and a Cronbach alpha of .93 for the total scale [14].

The questionnaire was administered during regular class sessions in a paper- and-pencil format. Before data collection, ethical approval was obtained from the institutional review board. Participants were informed about the purpose of the study, the voluntary nature of participation, and the confidentiality of their responses. The instrument was adapted to the local context by translating item content into Spanish while preserving the original theoretical structure and scoring system.

Data analyses were performed using R statistical software (version 4.x) with the following packages: psych for descriptive statistics and reliability, lavaan for confirmatory factor analysis (CFA), semPlot for path diagrams, semTools for measurement invariance, and MVN for multivariate normality assessment. The analysis followed three sequential phases: (1) descriptive characterization by academic area, (2) verification of statistical assumptions, and (3) confirmatory factor analysis with reliability assessment.

Before conducting CFA, several assumptions were evaluated. Univariate normality was assessed through skewness and kurtosis indices, applying the criteria proposed by Curran *et al*. (1996): absolute skewness < 2 and absolute kurtosis < 7. Multivariate normality was evaluated using Mardia's test. The adequacy of the correlation matrix for factor analysis was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, Bartlett's test of sphericity, and the determinant of the correlation matrix. Item discrimination was examined by comparing the upper and lower 27% of the total score distribution using independent-samples t-tests [15].

Two CFA models were specified following the theoretical structure proposed by Sahin (2018): a first-order model with four correlated latent factors and a second-order model with a higher-order general addiction factor (SMAS) loading onto the four first-order factors [16]. Given the violation of multivariate normality, the robust maximum likelihood estimator (MLR) was employed, which provides Satorra-Bentler scaled chi-square statistics and robust standard errors. Model fit was evaluated using multiple indices: chi-square/df ratio (< 5.0 acceptable; < 3.0 good), Comparative Fit Index (CFI >= .90 acceptable; >= .95 good), Tucker- Lewis Index (TLI >= .90), Root Mean Square Error of Approximation (RMSEA <= .08 acceptable; <= .06 good), and Standardized Root Mean Square Residual (SRMR <= .08).

Convergent validity was assessed through the Average Variance Extracted (AVE >= .50) and Composite Reliability (CR >= .70). Discriminant validity was evaluated using the Fornell-Larcker criterion, which requires the square root of each factor's AVE to exceed its correlations with other factors. Internal consistency reliability was estimated using Cronbach's alpha coefficient, with values >= .70 considered acceptable, >= .80 good, and >= .90 excellent. The alpha-if-item-deleted analysis was performed to identify potentially problematic items.

Measurement invariance across sex was examined through a hierarchical sequence of increasingly restrictive models: configural (equal structure), metric (equal factor loadings), and scalar (equal intercepts) invariance. Model comparisons were based on the change in CFI (delta CFI), with |delta CFI| < .010 indicating invariance [5, 8, 17]. Finally, percentile-based norms (P25, P50, P75) were computed to establish cut-off points for classifying participants into low, moderate, and high social media addiction levels [18-21].

Results and Discussion

The final sample consisted of 2956 university students distributed across three academic areas: Engineering (n = 1101, 37.2%), Biomedical sciences (n = 405, 13.7%), and Social Sciences (n = 1450, 49.1%). Item-level descriptive statistics revealed that mean scores ranged from 1.80 (E19: I use social media so frequently that I fall afoul of my family) to 3.46 (E25: I like using social media to keep informed about what happens), indicating generally low to moderate levels of social media addiction. All items demonstrated acceptable distributional properties, with skewness values ranging from -0.62 to 1.35 (all |skewness| < 2) and kurtosis values ranging from -1.04 to 1.29 (all |kurtosis| < 7), satisfying the criteria of Curran *et al*. (1996). Dimension scores showed that Social Sciences students reported the highest total addiction scores (M = 71.1, SD = 17.0), followed by Engineering (M = 69.4, SD = 16.9) and Biomedical students (M = 65.9, SD = 16.6). Kruskal-Wallis tests revealed statistically significant differences across academic areas for all dimensions and the total score (all p < .001), although effect sizes were small (eta-squared = .006-.010).

The correlation matrix was adequate for factor analysis. The KMO index was 0.947, classified as marvelous according to Kaiser (1974). Bartlett's test of sphericity was statistically significant (chi-squared = 28489.74, df = 406, p < .001), confirming that the correlations were sufficiently large for factor analysis. The determinant of the correlation matrix was 6.28e-05, indicating no severe multicollinearity. Item discrimination analysis showed that all 29 items significantly discriminated between the upper and lower 27% groups (all p < .001) **(Table 2)**, with Cohen's d values indicating large effect sizes. Corrected item-total correlations ranged from 0.227 to 0.588, all exceeding the .30 threshold recommended by Nunnally and Bernstein (1994).

Table 2. Item discrimination analysis (upper 27% vs lower 27%)

Item	Dim.	M_Low	M_High	t	Cohen_d
E1	VT	1.91	3.24	28.83	1.4
E2	VT	1.75	3.14	28.83	1.4
E3	VT	2.03	3.46	27.75	1.346
E4	VT	1.81	3.35	30.47	1.479
E5	VT	1.37	2.87	33.22	1.616
E6	VC	1.36	2.84	33.51	1.631
E7	VC	1.23	2.58	28.94	1.41
E8	VC	1.62	3.04	29.6	1.438
E9	VC	1.69	2.95	25.43	1.234
E10	VC	1.54	2.96	31.26	1.518
E11	VC	1.21	2.72	35.94	1.75
E12	VC	1.97	3.61	34.15	1.656
E13	VC	1.47	2.87	30.1	1.464
E14	VC	1.68	3.2	34.04	1.653
E15	VP	1.4	2.92	34.66	1.686
E16	VP	1.25	2.66	35.17	1.712
E17	VP	1.38	2.75	30.63	1.488
E18	VP	1.65	3.2	36.53	1.774
E19	VP	1.2	2.54	31.54	1.535
E20	VP	1.65	3.31	36.36	1.765
E21	VP	1.22	2.53	29.09	1.417
E22	VP	1.83	3.33	28.84	1.4
E23	VP	1.38	2.8	31.22	1.519
E24	VI	1.69	3.24	31.71	1.54
E25	VI	2.96	3.8	15.16	0.734
E26	VI	2.41	3.66	23.79	1.153
E27	VI	1.89	3.25	27.36	1.328
E28	VI	3.01	3.73	12.62	0.611
E29	VI	2.02	3.36	27.18	1.319

The first-order CFA **(Figure 1)** with four correlated factors showed acceptable fit to the data: chi-squared(371) = 5099.91, chi-squared/df = 13.75, CFI = 0.835, TLI = 0.82, RMSEA = 0.065, SRMR = 0.072. All standardized factor loadings were statistically significant (p < .001) and ranged from .47 to .72 across the four factors. Specifically, Virtual Tolerance loadings ranged from .56 to .64 (M = .60), Virtual Communication from .47 to .67 (M = .58), Virtual Problem from .50 to .69 (M = .60), and Virtual Information from .51 to .72 (M = .59).

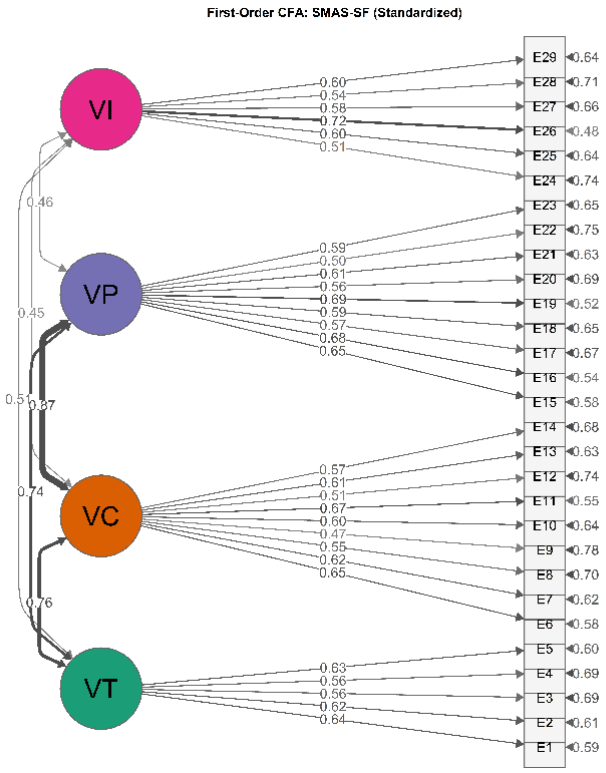

Figure 1. First Order CFA – SMAS-SF

The second-order CFA **(Figure 2)**, specifying a general social media addiction factor (SMAS) underlying the four first-order dimensions, also demonstrated acceptable fit: chi-squared(373) = 5149.54, chi-squared/df = 13.81, CFI = 0.834, TLI = 0.819, RMSEA = 0.065, SRMR = 0.072. The second-order standardized loadings were substantial for Virtual Communication (lambda = 0.936) and Virtual Problem (lambda = 0.92), followed by Virtual Tolerance (lambda = 0.817), while Virtual Information showed a moderate loading (lambda = 0.509). These results confirm the four-dimensional structure of the SMAS-SF with a viable higher-order general factor, consistent with the original validation by Sahin (2018).

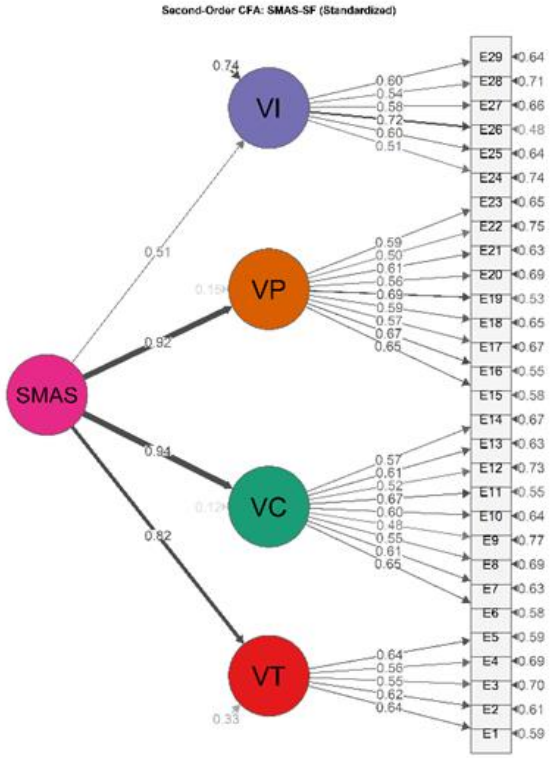

Figure 2. Second Order CFA – SMAS-SF

Composite reliability (CR) values were adequate for all four factors: VT = 0.74, VC = 0.823, VP = 0.838, and VI = 0.764, all exceeding the .70 threshold. However, Average Variance Extracted (AVE) values fell below the conventional .50 criterion (VT = 0.364, VC = 0.344, VP = 0.368, VI = 0.354), suggesting that the latent factors explained less than half of the variance in their respective indicators. As noted by Fornell and Larcker (1981), when AVE is below .50, but CR exceeds .60, the convergent validity of the construct may still be considered adequate. The Fornell-Larcker criterion for discriminant validity was not fully satisfied, particularly between VC and VP (r = .868), indicating substantial overlap between these two dimensions. Regarding internal consistency, Cronbach's alpha for the total scale was 0.911 (excellent), with dimension-specific values of 0.736 for VT, 0.822 for VC, 0.835 for VP, and 0.76 for VI, all exceeding the .70 acceptability threshold. The alpha-if-item-deleted analysis indicated that removing any single item would not substantially improve overall reliability, supporting the retention of all 29 items [22-27].

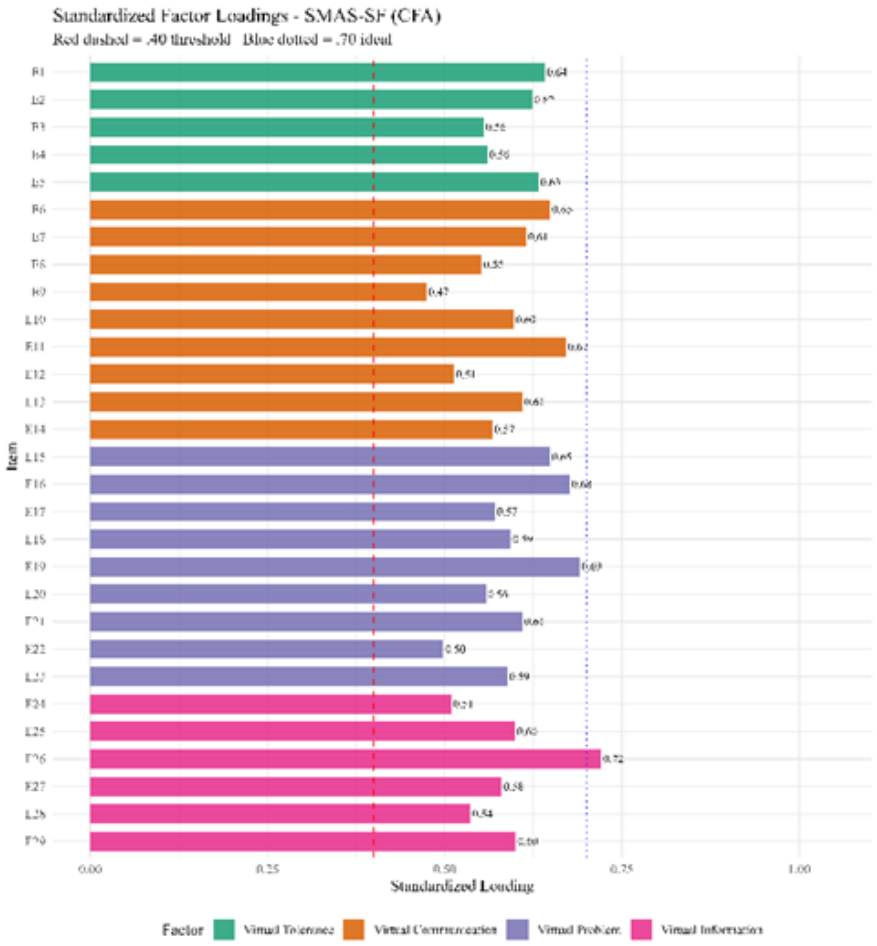

Figure 3. Standardized Factor Loadings

Measurement invariance testing across sex revealed that the configural model fit the data adequately (CFI = 0.833, RMSEA = 0.066). The metric invariance model showed a change in CFI of -0.0017, and the scalar invariance model yielded a delta CFI of -0.0056. Following Chen's (2007) criterion of |delta CFI| < .010, both metric and scalar invariance were supported, indicating that the SMAS-SF measures the same construct equivalently across male and female students. Percentile-based norms were established for scoring: participants scoring at or below P25 (Total <= 58) were classified as having low social media addiction, those between P25 and P75 (59-81) as moderate, and those above P75 (> 81) as high addiction **(Figure 3)**. The distribution across academic areas showed that Social Sciences students exhibited the highest proportion of high-addiction cases, consistent with the dimension-level analyses. The chi-squared test confirmed a significant association between academic area and addiction level [28-38]. These percentile-based cut-off points provide a practical scoring framework for identifying students at risk of social media addiction in university settings.

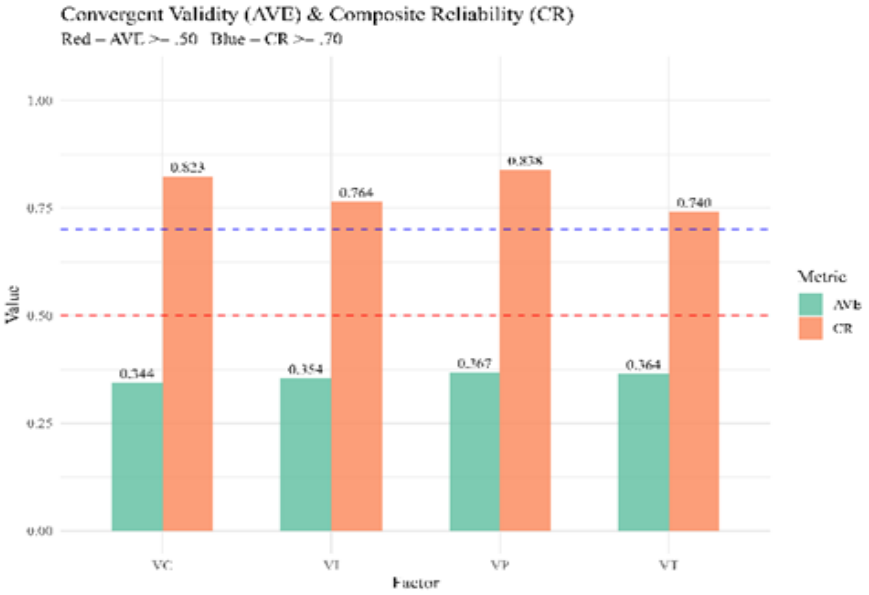

Figure 4. Standardized Factor Loadings

Table 3 . Internal consistency reliability (Cronbach's alpha)

Dimension	Items	Alpha	Std_Alpha
VT (Virtual Tolerance)	5	0.736	0.739
VC (Virtual Communication)	9	0.822	0.824
VP (Virtual Problem)	9	0.835	0.838
VI (Virtual Information)	6	0.76	0.76
Total SMAS-SF	29	0.911	0.912

The reliability results presented in **Table 3** provide strong support for the internal consistency of the SMAS-SF and its dimensions. Cronbach's alpha coefficients ranged from acceptable to excellent levels, with Virtual Tolerance showing adequate reliability ($\alpha = .736$), while Virtual Communication ($\alpha = .822$) and Virtual Problem ($\alpha = .835$) demonstrated good internal consistency. Virtual Information also reached acceptable reliability ($\alpha = .76$), confirming stability despite its smaller number of items. Importantly, the total scale exhibited excellent reliability ($\alpha = .911$), indicating that the instrument as a whole provides a highly consistent measurement of social media addiction **(Figure 4)**. The minimal differences between raw and standardized alpha coefficients further suggest homogeneity in item variances and stable inter-item correlations. Collectively, these findings confirm that the SMAS-SF possesses robust reliability for both dimensional and global score interpretation, supporting its use in research, screening, and comparative analyses within university populations.

Conclusion

This study examined the validity, reliability, and scoring properties of the Social Media Addiction Scale–Student Form (SMAS-SF) in a university student population, providing comprehensive psychometric evidence to support its use in academic contexts [39, 40]. The findings confirmed the multidimensional structure of the instrument, with factorial results supporting the theoretical model of social media addiction as a construct composed of tolerance, communication dependence [41], problem experiences, and informational engagement. The confirmation of both first-order and higher-order structures strengthens the conceptual coherence of the scale and aligns with prior validation research conducted in diverse cultural settings.

Reliability analyses demonstrated strong internal consistency for the overall scale and adequate reliability across all subdimensions, indicating that the instrument produces stable and consistent measurements. Although convergent validity indices suggested moderate shared variance, composite reliability and factor loadings supported the adequacy of the construct representation. The observed overlap between certain dimensions reflects the inherently interconnected nature of addictive social media behaviors rather than a structural deficiency of the scale.

An additional contribution of this research lies in the establishment of percentile-based scoring norms. These cut-off points provide a practical framework for classifying low, moderate, and high levels of social media addiction, enhancing the interpretability of results for screening, prevention, and institutional decision-making.

Overall, the evidence supports the SMAS-SF as a psychometrically sound instrument for assessing social media addiction in university students. Future studies should extend validation across longitudinal designs, diverse educational systems, and cross-cultural samples to further refine measurement precision and support targeted intervention strategies.

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Conflict of interest: None

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Ethics statement: This study was conducted in accordance with institutional ethical standards and the Declaration of Helsinki, with informed consent obtained from all participants before data collection.

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