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AN ALTERNATIVE SCS-SF VERSION? PSYCHOMETRIC VALIDATION OF THE COLOMBIAN SCS-SF

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Abstract: This study aimed to assess an alternative version of the Self-Compassion Scale Short Form (SCS-SF) based on data from the first Colombian validation of the form via the item information function (IIF). A secondary analysis was performed to propose the IIF-reduced SCS-SF version using two independent Colombian samples. The study tested 6-factor models, including confirmatory factor models (CFA) and exploratory structural equation modeling (ESEM). The first sample was composed of 918 subjects (original SCS-SF), and the second comprised 853 subjects (IIF-reduced SCS-SF). Both SCS-SF versions showed a fit in a 6-factor correlated model; the IIF-reduced version showed a fit in a bifactor-ESEM model. However, the loadings had specification problems. Given that the IIF-reduced version lacked clear advantages over the original SCS-SF, which fitted a 6-factor CFA (CFI = 0.995, TLI = 0.957, RMSEA = 0.057, SRMR = 0.029), the original version is recommended.

Keywords: self-compassion, self-compassion scale, self-compassion scale short-form, psychometric validtion, Colombia

INTRODUCTION:

While compassion often explains cooperative human behavior, its self-directed counterpart—self-compassion—is defined by Neff (2003a) as being receptive to one's own suffering without avoidance or disconnection. This construct entails a motivation to treat oneself with kindness, maintaining a nonjudgmental stance toward pain, and interpreting personal struggle as an inherent element of the shared human experience. Neff (2003a) developed the Self-Compassion Scale (SCS), which assesses self-compassion in six dimensions: self-kindness (SK), self-judgment (SJ), common humanity (CH), isolation (I), mindfulness (M), and overidentification (OI).

Later, Raes et al. (2011) developed a shorter version of the SCS (SCS-SF) comprising 12 items, which has been validated in different countries, finding fit in a 6-dimension model (García-Campayo et al., 2014; GediK, 2019; Le Barbenchon & Genin, 2024; Maya et al., 2024; Raes et al., 2011; Villalón-López et al., 2023). However, some studies could not replicate the original factor structure of the SCS-SF (Alfonsson et al., 2023; Babenko et al., 2019; Baggaley et al., 2024; Bratt & Fagerström, 2020; Hayes et al., 2016; Lluch-Sanz et al., 2022; Meng et al., 2019; Musfikur-Rahman et al., 2023; Poli et al., 2025, 2023; Travezaño-Cabrera et al., 2022; Yildirim, & Sari, 2018). Furthermore, a few studies have investigated the SCS-SF using bifactor confirmatory factor analyses (CFA) or the bifactor exploratory structural equation model (ESEM) (Dias Da Rocha et al., 2022; Koğar & Koğar, 2023; Poli et al., 2025), models suggested to be adequate for explaining self-compassion (Neff, 2016; Neff et al., 2019).

The available literature shows that no study offers reasons for the misfit of the factor models. However, researchers have speculated that the method by which the SCS-SF was initially reduced could explain these divergences. Notably, the SCS-SF was created via the item-correlation method, a technique that has been criticized for insufficiently selecting the correct items to be added to the final version (Kleka & Soroko, 2018).

According to some authors, more appropriate methods should be applied to reduce long-form scales, such as machine learning algorithms or techniques based on the item response theory (ITR) (Goetz et al., 2013; Gonzalez, 2021; Sandy et al., 2014; Smith et al., 2000). One such technique is the item information function (IIF), an analysis that indicates where each item gives more information across a specified range of a latent trait (θ), showing which items are most precise at measuring respondents based on the a (discrimination) and b (difficulty) parameters (Moghadamzadeh et al., 2011; Tan 2024). Hence, the IIF can be used to build short-form scales by selecting items

based on how much information they provide and where along the θ is the additional information obtained (Gonzalez, 2021).
However, Koğar and Koğar (2023) proposed an alternative version of the SCS-SF based on ant colony optimization (ACO). These authors found an adequate fit in the ACO version and in the original SCS-SF bifactor-ESEM model, hindering the full acceptance of the ACO SCS-SF over the SCS-SF. Considering this result, the authors suggested that reducing the SCS using the IIF could have yielded a better fit, especially in the bifactor variants, by selecting the most informative items.
Currently, there is no Colombian version of the SCS-SF. Hence, this study aimed to develop an alternative shortened version of the SCS reduced via the IIF based on a Colombian sample. Furthermore, the factor invariance of the IIF-reduced SCS-SF version was tested, comparing its goodness of fit with the original SCS-SF proposed by Raes et al. (2011) to obtain a definitive Colombian SCS-SF version.

METHOD

This study extends the work of Martínez et al. (2022). A secondary analysis was conducted to create an alternative SCS-SF via the IIF. Two new independent samples were recruited to compare the fit of the factor solutions of the original SCS-SF and the proposed SCS-SF.

Participants

For the first stage of the study, 751 records were obtained from Martinez-Ramos et al.'s (2022) survey. The second stage of the study obtained two independent samples, each composed of at least 500 subjects, a size suggested by the literature for structural models (Kyriazos, 2018). Participants living in Colombia who were older than 18 years old were included. Data were collected virtually via social media using convenience, non-probabilistic sampling.

Instruments

The secondary analysis was performed on the data collected from the Colombian SCS validation study (Martínez-Ramos et al., 2022), which adapted the SCS from its European Spanish version (García-Campayo et al., 2014), obtaining optimal reliability estimates and a fit in a bifactor ESEM. This instrument, as the original (Neff, 2003b), assesses self-compassion in six dimensions (SK, SJ, CH, I, M, and OI) through a 5-point frequency Likert scale (1 = almost never, 5 = almost ever) for 26 items.
The following instruments were used for the second stage of the study:

- Original SCS-SF (Raes et al., 2011): A 12-item scale that assesses self-compassion in six dimensions (SK, SJ, CH, I, M, and OI) through a 5-point frequency Likert scale (1 = almost never, 5 = almost ever). Items from the negative dimensions (SJ, I, and OI) must be inverted to obtain a total score.
- IIF-reduced SCS-SF: This scale was obtained from the secondary analysis via the IIF from the original Colombian SCS version (Martínez et al., 2022). This version was composed of 14 items.
- The four-item Patient Health Questionnaire for Anxiety and Depression (PHQ-4) (Kroenke et al., 2009). This tool evaluates the presence of depression-related symptoms in four items scored from 0 to 3. The questionnaire was standardized in the Colombian population, finding optimal reliability indices for the total score (α = 0.84) and a fit through confirmatory factor analysis (Kocalevent et al., 2014). Which has been previously used with Colombian samples (Martínez et al., 2025). The instrument was used to find divergent validity evidence between the two versions of the SCS-SF total scores and the positive dimensions (SK, CH, and M) (MacBeth & Gumley, 2012) and convergent validity evidence between the negative dimensions (SJ, I, and OI).
- The Connor–Davidson Resilience Scale (CDRISC) (Connor & Davidson, 2022): This is a 10-item unidimensional five-point scale that quantifies how well a person thrives in adversity. A version of the scale for Colombia has been validated, exhibiting optimal reliability (α = 0.82) (Riveros et al., 2017). Which has been previously used with Colombian samples (Martínez et al., 2025). This scale was used to obtain convergent validity evidence with the two versions of the SCS-SF and the positive dimensions (SK, CH, and M) (Büyüköksüz & Tekin, 2023) and divergent validity evidence with the negative dimensions (SJ, I, and OI).

Procedure

As an extension of the work of Martínez-Ramos et al. (2022), the study was previously approved by the Institutional Review Board of San Buenaventura's University, Medellin, Colombia. After obtaining the IIF-reduced SCS-SF version, for the second stage of the study, the data were collected anonymously online from February to July 2024. All subjects consented to participate in the study.

Data Analysis

For the secondary analysis, a full-information item factor analysis was performed (Bock et al., 1988), which fits the maximum likelihood estimation for any mixture of items under the IRT paradigm using the EM algorithm (Bock & Aitkin, 1981). This technique was applied using the graded response model (Samejima, 1969), which allows the analysis of polytomous data using response functions that have the normal ogive form, assuming that successful accomplishment of the task specified by the test item requires several steps (Reckase, 2009). This

model accepts that the probability of responding in a specified category j is the difference between trace lines for the probability of responding in category j and category j + 1 or higher (Stover et al., 2019).
The IRT model was applied to each SCS dimension to guarantee the assumption of unidimensionality (Ogunsakin & Shogbesan, 2018). The IIF was then estimated, and items with the lower information at different points of θ were suppressed; this was repeated until there were two or three items per dimension. Moreover, the a- and b-parameters were obtained, and higher values on the a-parameter enabled differentiating individuals with higher levels of the measured latent variable, with values < 0.1 considered low (Haward et al., 2022). By contrast, the higher the b-parameters, the higher the trait level a respondent needs to endorse a higher-ordered response option (Stover et al., 2019).
The mean and frequencies were used to summarize the sociodemographic data, for quantitative and qualitative variables respectively. We performed a hypothesis test to determine significant differences between the samples. For the quantitative variables, a t-test was conducted if a normal distribution was found via the Shapiro–Wilk test; for a non-normal distribution, a Wilcoxon rank test was used. A proportion comparison test was used for the categorical variables, and the significance level was considered 0.05.
For the psychometric analysis, a descriptive analysis of items was performed, including the mean, standard deviation, and homogeneity index. For the mean, we expected a value near the midpoint of the scale, and for the standard deviation, we expected a value around 1 (Carretero-Dios & Pérez, 2005). For the homogeneity index, values below 0.35 were seen as non-discriminant items (Blum et al., 2014) under the classic test theory model.
For factor models, researchers recommend starting with an exploratory factor analysis (EFA) (Ferrando et al., 2022). However, in this study, we performed CFA and ESEM models because of the evidence that using a certain point ensures a preset factor structure. The models tested were as follows:

- **6-factor CFA**: A 6-dimension model (SK, SJ, CH, I, M, and OI). This model was initially validated by Raes et al. (2011) and replicated globally (García-Campayo et al., 2014; GediK, 2019; Le Barbenchon & Genin, 2024; Maya et al., 2024; Villalón-López et al., 2023).
- **Hierarchical CFA**: Neff (2003b) suggested using this model as an alternative to explaining self-compassion. This model comprises six self-compassion dimensions and a higher-level factor.
- **Bifactor (with one general factor) CFA**: This model comprises six self-compassion dimensions and a general factor (SC). Neff (2016) proposed that this model would be a better option for explaining self-compassion. The model has been replicated by other studies (Dias Da Rocha et al., 2022).
- **Two-factor model CFA:** This is composed of two factors, positive and negative. The model has shown fit in various contexts (Babenko et al., 2018; Baggaley et al., 2020; Bratt et al., 2024; Kotera et al., 2020; Hayes et al., 2016; Lluch-Sanz et al., 2020; Rahman et al., 2023; Sutton et al., 2018; Travezaño-Cabrera & Elguera-Cuba, 2022).
- **6-factor ESEM:** This model combines the best features of the EFA and the CFA, allowing cross-loadings among items and specific factors, computing the goodness-of-fit indices, allowing error terms to be estimated, and calculating the test invariance (Alamer, 2022; Assis et al., 2017). The model has previously been applied to the SCS (Neff et al., 2019).
- **Bifactor ESEM**: This involves the same factors as the bifactor-CFA but is less restrictive, allowing all the observed variables to load to the specific factors by not assuming an orthogonality between dimensions and general factors (Reise et al., 2010; Rios & Wells, 2014). Koğar and Koğar (2023) replicated the model.

For the ESEM models, a target rotation was implemented, recommended when a confirmatory objective is mostly pursued (Swami et al., 2023). The models were estimated using the mean and variance adjusted unweighted least squares estimator (ULSMV). In some conditions, this estimator has been shown to perform better than the mean and variance adjusted weighted least squares (WLSMV) and maximum likelihood estimators (ML) (Kılıç et al., 2020). The cutoff values used to accept the fit of all models were as follows (Kline, 2011; Xia & Yang, 2019): CFI ≥ 0.95, TLI ≥ 0.95, RMSEA ≤ 0.06, SRMR ≤ 0.08). For reliability estimates, we calculated Cronbach's alpha (α) and McDonald's Omega (□). To consider adequate factor loadings, absolute values of 0.30 were expected (Howard, 2016).
To obtain validity evidence based on the relationship with other variables, the total scores for the whole scale and for the dimensions were obtained and correlated with the total scores of the PHQ and CDRISC. Depending on the distribution of the data, a Pearson test or Spearman–Brown test was performed.
We performed the analysis on the software R (R Core Team, 2023) in interface R-Studio (R-Studio Team, 2023), using the packages dplyr (Wickham et al., 2023), readxl (Wickham & Bryan, 2023), tableone (Yoshida & Bartel, 2022), mirt (Chalmers, 2012), psychometric (Fletcher, 2023), psych (Revelle, 2023), lavaan (Rosseel, 2012), semTools (Jergensen et al., 2022), GPArotation (Bernaards & Jennrich, 2005), esem (Prokofieva et al., 2023), devtools (Wickham et al., 2022), reshape (Wickham, 2007), and rlang (Henry & Wickham, 2023).

RESULTS

Given the wide range of θ, the IIF is presented for five values of θ: -2, -1, 0, 1, and 2 (the information curves can be found in the supplementary material). The dimensions SK and SJ (five items each) were maintained with at least three items to preserve the construct's representativeness. By contrast, we retained two items for the rest of

the dimensions (four items each). In Appendix A it is shown a Table containning the main results and estimations of the a- and b-parameters.
Items SK4, SK5, SJ2, SJ5, CH1, CH4, I1, I4, OI1, and OI3 were excluded, resulting in a 14-item scale. As shown in Table 1, most of the deleted items had lower values in the a-parameter but higher difficulty parameters in the lowest response category (b1).
In the second stage of the study, the original SCS-SF respondents were 918 individuals whose mean age was 34.13 (+/- 11.2) years, mainly adults (26–59 years old) and women. Most participants were from the Bogotá, with a mid-income and currently working. The IIF-reduced SCS-SF group sample comprised 853 subjects whose mean age was 32.79 (+/- 15.5) years, mostly early adults (18–25 years) and women. Most of the participants were mid-income individuals and undergraduate students. The variable age of both samples had an abnormal distribution ($p > 0.01$); thus, a Wilcoxon rank test was used to find significant differences between samples. The proportion comparison test showed statistical differences between almost all categorical variables, except sex and income (Table 1).

Table 1 Baseline characteristics of the 2 samples

		SCS-SF original	**SCS-SF IIF-reduced**	***p-value***
	N	918	853	
Age	mean (sd)	34.13 (11.2)	32.79 (15.5)	<0.01
		n(%)	n(%)	
Age cat.	Early adulthood	216 (23.5)	422 (49.5)	<0.01
	Adulthood	679 (74.0)	373 (43.7)	
	Late adulthood	23 (2.5)	58 (6.8)	
Sex	Men	403 (43.9)	331 (38.8)	0.03
	Women	515(56.1)	522(61.2)	
Income	Low	107 (11.7)	89 (10.4)	0.40
	Mid	590 (64.3)	497 (58.3)	
	High	221 (24.1)	267 (31.3)	
City of residence	Bogotá	470(51.2)	658(77.1)	<0.01
	Other	448 (48.8)	195 (22.9)	
Level of education	School	135 (14.7)	292 (34.2)	<0.01
	Undergraduate	394 (42.9)	356 (41.7)	
	Post-graduated	389 (42.4)	205 (24.0)	
Occupation	Student	185 (20.2)	385 (45.1)	<0.01
	Worker	636 (69.3)	406 (47.6)	
	Home/Retired	97 (10.6)	62 (7.3)	

Note. sd = standard deviation, Age cat. = age categorized by adulthood 3 main cycle stages.

Table 2 shows the results of the items' descriptive statistics; all items had an adequate homogeneity index, and almost all items had a mean value near 3 and a standard deviation near 1.

Table 2 Descriptive statistics

Version	**SCS-SF original**			**SCS-SF IIF-reduced**		
Items	**m**	**SD**	**HI**	**m**	**SD**	**HI**
SK1*:* Trato de ser cariñoso/a conmigo mismo/a cuando siento malestar emocional *[I try to be loving towards myself when I'm feeling emotional pain].*	-	-	-	3.05	1.22	0.73
SK2*:* Cuando estoy pasando por un momento muy difícil, me doy el cuidado y cariño que necesito *[When I'm going through a very hard time, I give myself the caring and tenderness I need].*	2.79	1.17	0.52	3.08	1.17	0.78
SK3: Soy amable conmigo mismo/a cuando estoy sufriendo *[I'm kind to myself when I'm experiencing suffering].*				3.12	1.20	0.75
SK4: Soy tolerante con mis propios defectos y debilidades *[I'm tolerant of my own flaws and inadequacies]*						

SK5: Trato de ser comprensivo/a y paciente con aquellos aspectos de mi personalidad que no me gustan *[I try to be understanding and patient towards those aspects of my personality I don't like].*	2.98	1.10	0.52			
SJ1: Desapruebo y juzgo mis defectos e imperfecciones *[I'm disapproving and judgmental about my own flaws and inadequacies].*	3.30	1.26	0.60	3.14	1.21	0.61
SJ2: Cuando vienen momentos muy difíciles tiendo a ser duro/a conmigo mismo/a *[When times are really difficult, I tend to be tough on myself].*				2.73	1.24	0.65
SJ3: Soy intolerante e impaciente con aquellos aspectos de mi personalidad que no me gustan *[I'm intolerant and impatient towards those aspects of my personality I don't like]*	2.87	1.25	0.60	2.85	1.24	0.70
SJ4: Cuando veo aspectos de mí mismo/a que no me gustan, me critico continuamente *[When I see aspects of myself that I don't like, I get down on myself]*						
SJ5: *I can be a bit cold-hearted towards myself when I'm experiencing suffering*						
CH1: *When things are going badly for me, I see the difficulties as part of life that everyone goes through*						
CH2: *When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.*				2.76	1.30	0.65
CH3: *When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.*	2.62	1.27	0.41	2.53	1.22	0.65
CH4: *I try to see my failings as part of the human condition.*	3.32	1.24	0.41			
I1: *When I think about my inadequacies it tends to make me feel more separate and cut off from the rest of the world.*						
I2: *When I'm feeling down I tend to feel like most other people are probably happier than I am.*	2.77	1.51	0.52	2.24	1.27	0.64
I3: *When I'm really struggling I tend to feel like other people must be having an easier time of it.*				2.37	1.30	0.64
I4: *When I fail at something that's important to me, I tend to feel alone in my failure.*	3.49	1.38	0.52			
M1: *When something upsets me I try to keep my emotions in balance.*	3.47	1.09	0.59			
M2: *When something painful happens, I try to take a balanced view of the situation.*	3.37	1.15	0.59	3.49	1.09	0.57
M3: *When I fail at something important to me, I try to keep things in perspective.*				3.38	1.13	0.57
M4: *When I'm feeling down, I try to approach my feelings with curiosity and openness.*						
OI1: *When I'm feeling down, I tend to obsess and fixate on everything that's wrong.*	3.09	1.42	0.66			
OI2: *When I fail at something important to me, I become consumed by feelings of inadequacy.*	3.39	1.36	0.66	2.89	1.33	0.63
OI3: *When something upsets me, I get carried away with my feelings*						
OI4*: When something painful happens, I tend to blow the incident out of proportion.*				2.50	1.21	0.63

Note. SK = self-kindness, SJ = self-judgment, CH = common humanity, I = isolation, M = mindfulness, OI = over-identification, m = mean, SD = standard deviation, HI = Homogeneity Index. In grey are highlighted the items that were not included in any of the SCS-SF versions.

Table 3 shows the fit of the factor models test of each SCS-SF, in which both versions fitted in a 6-factor model; however, the IIF-reduced version had a better fit. In the IIF version, a fit was found in the bifactor ESEM model. For both versions, the higher-order level model did not converge, and the ESEM model TLI presented a Heywood effect; hence, it was not accepted.

Table 3 Factor model tested

SCS-SF original						
Model	**χ2**	**df**	**CFI**	**TLI**	**RMSEA**	**SRMR**
6-factor	154.76	39	0.995	0.957	0.057	0.029
Higher order	Not converged					
Bifactor	641.42	42	0.976	0.962	0.125	0.064
2 factor	537.92	53	0.981	0.976	0.099	0.057

ESEM	6.83	15	1.000	1.002	0.000	0.008
Bifactor ESEM	Not converged					
SCS-SF IIF-reduced						
Model	**χ2**	**df**	**CFI**	**TLI**	**RMSEA**	**SRMR**
6 factor	138.29	62	0.996	0.968	0.040	0.027
Higher order	Not converged					
Bifactor	933.88	63	0.954	0.934	0.127	0.072
2 factor	2281.98	76	0.885	0.862	0.125	0.184
ESEM	6.41	28	1.000	1.003	0.000	0.007
Bifactor ESEM	4.24	1	0.999	0.942	0.062	0.03

Table 4 shows the factor loadings of both versions of the 6-factor correlated models with their respective reliability estimates.

Table 4 Loadings CFA 6 factors

SCS-SF original								**SCS-SF IIF-reduced**					
Items	**SK**	**SJ**	**CH**	**I**	**M**	**OI**	Items	**SK**	**SJ**	**CH**	**I**	**M**	**OI**
SK2	0.70						SK1	0.75					
SK5	0.75						SK2	0.81					
							SK3	0.94					
SJ1		0.78					SJ1		0.65				
SJ3		0.78					SJ3		0.80				
							SJ4		0.85				
CH3			0.44				CH2			0.77			
CH4			0.93				CH3			0.84			
I2				0.70			I2				0.81		
I4				0.74			I3				0.80		
M1					0.70		M2					0.70	
M2					0.84		M3					0.81	
OI1						0.78	OI2						0.81
OI2						0.85	OI4						0.78
α/ω	0.68	0.76	0.58	0.68	0.74	0.79		0.87	0.81	0.78	0.78	0.72	0.77

Note. SK = self-kindness, SJ = self-judgment, CH = common humanity, I = isolation, M = mindfulness, OI = over-identification, SC =self-compassion, PHQ = The four-item Patient Health Questionnaire for Anxiety and Depression, CDRS = Connor–Davidson Resilience Scale

Items for both versions had adequate factor loadings (> 0.30), with an average of 0.75 (+/- 0.12) for the original version loadings and 0.80 (+/- 0.07) for the IIF-reduced version. The distribution of the factor loadings of both versions was normal ($p > 0.05$). Hence, a t-test was used to compare the results, finding no significant differences between the factor loadings ($p > 0.05$). Regarding the reliability estimates, in the original SCS-SF version, the SK and I dimensions had lower internal consistency.

Appendix B presents the factor loadings for the bifactor ESEM model of the IIF-reduced SCS-SF. The mean was 1.59 (+/- = 5.17), and the loadings of CH2, I3, OI2, and OI4 were overestimated. The I2 and OI2 weightings were very low and even negative for the dimensions SK, SJ, I, and OI.

The relationship between the variables is presented in Table 5. A Spearman brown correlation was performed due to the abnormality of data ($p < 0.05$). Most of the estimates were as expected; however, in the IIF-reduced version, negative relations were found between CH and M and CDRISC. Furthermore, the CH dimension had a weak positive association with the other positive dimensions of self-compassion and the PHQ-4 score.

Table 5 Correlation solution between PHQ and Resilience

SCS –SF original									
	SC	SK	SJ	CH	I	M	OI	PHQ	CDRISC
SCS	1								
SK	0.73	1							
SJ	-0.74	-0.44	1						
CH	0.54	0.42	-0.23	1					
I	-0.82	-0.47	0.56	-0.26	1				
M	0.64	0.45	-0.31	0.37	-0.40	1			
OI	-0.82	-0.48	0.63	-0.22	0.73	-0.40	1		
PHQ	-0.67	-0.48	0.51	-0.27	0.60	-0.38	0.61	1	
R	0.54	0.42	-0.35	0.24	-0.44	0.44	0.46	-0.41	1
SCS- SF IIF-reduced									
	SC	SK	SJ	CH	I	M	OI	PHQ	CDRISC

SCS	1								
SK	0.73	1							
SJ	-0.65	-0.26	1						
CH	0.23	0.14	0.14	1					
I	-0.49	-0.26	0.46	0.16	1				
M	0.66	0.45	-0.25	-0.07	-0.32	1			
OI	-0.68	-0.33	0.53	0.15	-0.39	0.60	1		
PHQ	-0.50	-0.36	0.36	0.10	0.41	-0.33	0.53	1	
R	0.33	0.31	-0.15	-0.00	-0.27	0.31	-0.24	-0.27	1

Note. SK = self-kindness, SJ = self-judgment, CH = common humanity, I = isolation, M = mindfulness, OI = over-identification, SC =self-compassion, PHQ = The four-item Patient Health Questionnaire for Anxiety and Depression, CDRS = Connor–Davidson Resilience Scale

DISCUSION

To validate the Colombian SCS-SF, we aimed to asses an alternative SCS-SF reduced by the IIF by comparing its fit with the original version. A single study applied IRT analysis to the SCS (Halamová et al., 2017), and another study reduced the SCS via the ACO algorithm (Koğar & Koğar). However, to our knowledge, this is the first study to propose an SCS-SF version via the IIF technique.

Although our study developed an SCS-SF composed of informative items with adequate a-parameters, based on our results, we recommend the use of the original SCS-SF over the IIF version. The recommendation is informed by the lack of advantages of the IIF-reduced SCS-SF over the original version. For example, around 50% of items were the same between versions, as it is difficult to differentiate their content disparities, and the IRT version has two more items than the original, which may increase the respondent's cognitive burden (Meyer et al., 2022). Moreover, there was no substantial difference between versions regarding the descriptive item statistics, the fit in the 6-factor model, and the factor loadings.

A plausible argument for the IIF-reduced SCS-SF is its better fit in the 6-factor model; however, such an argument would ignore the fit of the original SCS-SF, a result that has previously been reported in the literature (García-Campayo et al., 2014; GediK, 2019; Le Barbenchon & Genin, 2024; Maya et al., 2024; Raes et al., 2011; Villalón-López et al., 2023). Furthermore, the difference between the fit of both versions could be attributed to the high factor loadings the IIF-reduced SCS-SF showed (Farroq, 2022), instead of some kind of theoretical consideration. Similarly, the IIF-reduced SCS-SF version had an optimal fit in the bifactor ESEM model; however, this result cannot be accepted, due to its lack of theoretical coherence, a crucial aspect in psychological testing (Muñiz, 1998). As our findings indicate, many factor loadings were overestimated, and in most cases, they were in the opposite direction of what should be expected in theory (Neff, 2003b). According to international guidelines regarding evidence based on relationships with conceptually related constructs (AERA, 2014), the CH dimension of the IIF-reduced version did not represent the self-compassion construct, given the unexpected correlation with the PHQ-4 and the CDRISC scores.

Regarding the other factor models, we did not find a fit in the 2-factor and bifactor CFA, a divergent result from what has been previously reported (Babenko et al., 2018; Baggaley et al., 2020; Bratt et al., 2024; Dias Da Rocha et al., 2022; Kotera et al., 2020; Hayes et al., 2016; Lluch-Sanz et al., 2020; Rahman et al., 2023; Sutton et al., 2018; Travezaño-Cabrera & Elguera-Cuba, 2022). The lack of fit of the bifactor model may be due to the lack of fit of the hierarchical model, an aspect that has been recalled as requisite to the bifactor model (Reise et al., 2010). Furthermore, in both SCS-SF versions, the ESEM model presented a Heywood effect, indicating that the factors are poorly defined and have possible misspecifications in this model (Cooperman & Waller, 2021; Farroq, 2022).

Relevant limitations of our study include its non-probabilistic sampling and use of a unidimensional IRT model instead of a multidimensional one, which could be more accurate, considering the bifactor nature of self-compassion (Neff, 2016 & Neff et al., 2019). This could affect the results of item selection in the IIF application. However, our study can be considered empirical evidence that contributes to the use of the SCS-SF in Colombia and evidence about its theoretical constitution, in addition to its attempt to test underexplored scale reduction techniques. Furthermore, our study may be limited by the absence of a Differential Item Functioning analysis, a method previously utilized to optimize scale length (Abal et al., 2024). Future research should incorporatethis approach to evaluate its effectiveness in this context.

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https://osf.io/7a49g/?view_only=014aa53a0155452db242055999e5cf81

CONFLICT OF INTEREST:
Authotrs declare no conflicts of interest

APPENDIX:
A. SCS-26 items IRT model parameters and IIF of each item.

		Item parameters					Item information given certain θ level				
Items		**a**	**b1**	**b2**	**b3**	**b4**	**θ = -2**	**θ = -1**	**θ = 0**	**θ = 1**	**θ = 2**
SK	**1**	2.93	-1.51	-0.58	0.13	1.01	1.34	2.24	2.47	2.28	0.53
	2	3.76	-1.54	-0.54	0.15	1.09	1.81	2.84	3.82	3.60	**0.43**
	3	3.17	-1.50	-0.68	0.12	1.08	1.44	2.68	2.78	2.64	0.49
	4	**1.49**	-2.10	-0.85	0.17	1.40	**0.62**	**0.67**	**0.68**	**0.64**	**0.46**
	5	**1.40**	-3.04	-1.10	0.05	1.58	**0.51**	**0.58**	**0.59**	**0.56**	**0.46**
SJ	**1**	2.18	-1.51	-0.36	0.33	1.35	0.91	1.28	1.44	1.34	0.74
	2	**2.07**	-1.60	-0.39	0.35	1.32	0.92	**1.16**	**1.30**	**1.23**	**0.68**
	3	2.37	-1.15	-0.10	0.69	1.72	**0.59**	1.53	1.64	1.56	1.29
	4	2.46	-1.27	-0.25	0.46	1.43	0.73	1.65	1.80	1.67	0.95
	5	**1.32**	-1.02	0.17	1.07	2.22	**0.30**	**0.49**	**0.54**	**0.55**	**0.51**
CH	**1**	**1.04**	-2.57	-1.23	0.10	1.69	**0.33**	**0.34**	**0.34**	**0.33**	**0.28**
	2	2.58	-1.10	-0.30	0.34	1.27	0.77	1.86	2.01	1.83	0.77
	3	3.45	-0,88	-0.10	0.57	1.51	1.59	2.75	3.37	2.74	1.59
	4	**1.40**	-2.09	-0.92	0.08	1.17	**0.36**	**0.57**	**0.61**	**0.57**	**0.36**
I	**1**	**1.72**	-0.92	-0.02	0.66	1.55	0.35	0.81	**0.92**	0.91	0.66
	2	3.26	-0.42	0.20	0.66	1.24	0.06	1.20	3.12	3.10	0.77
	3	2.21	-0.62	0.19	0.80	1.65	0.21	1.01	1.49	1.48	1.09
	4	**1.78**	-1.25	-0.31	0.27	1.15	0.52	0.94	**1.00**	0.93	0.47
M	**1**	**1.80**	-2.24	-1.26	-0.25	1.00	**0.94**	**0.97**	**0.93**	**0.87**	**0.39**
	2	2.73	-2.02	-1.11	-0.16	0.90	2.00	2.09	2.02	1.88	**0.33**
	3	2.55	-2.06	-1.06	-0.17	0.97	1.75	1.85	1.77	1.69	0.41
	4	**1.42**	-2.08	-1.00	-0.04	1.40	**0.58**	**0.62**	**0.61**	**0.57**	0.43
OI	**1**	**2.04**	-1.03	0.02	0.67	1.38	0.45	**1.14**	**1.26**	**1.27**	0.73
	2	2.61	-0.93	-0.13	0.45	1.15	**0.37**	1.80	2.07	1.96	**0.60**
	3	**1.54**	-1.48	-0.29	0.66	1.79	0.52	**0.70**	**0.73**	**0.72**	**0.61**
	4	2.58	-0.70	0.16	0.88	1.57	**0.21**	1.46	1.93	2.00	1.27

Note. SK = self-kindness, SJ = self-judgment, CH = common humanity, I = isolation, M = mindfulness, OI = over-identification, a = discrimination, b = difficulty. The reference category for the b-parameter was b5. The lower informational estimates and the lower a-parameter of each dimension are highlighted in grey.

B. Bi-factor ESEM solution IIF-reduced SCS-SF version

Items	**Factor loadings bi factor ESEM SCS IIF-reduced**						
	SK	**SJ**	**CH**	**I**	**M**	**OI**	**SC**
SK1	-0.859						0.447
SK2	-0.912						0.441
SK3	-0.805						0.580
SJ1		-0.641					-0.523
SJ2		-0.661					-0.685
SJ4		-0.779					-0.706
CH2			1.009				-0.140
CH3			0.975				-0.106
I2				-0.017			-0.749
I3				-27.911			-0.793
M2					0.589		0.419
M3					0.792		0.508
OI2						0.161	-1.018
OI4						-0.189	-1.040

Note. SK = self-kindness, SJ = self-judgment, CH = common humanity, I = isolation, M = mindfulness, OI = over-identification, SC =self-compassion.

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