Measurement properties of the Sense of Coherence (SOC) scale: a narrative review[1]

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Recibido para publicación: 13-02-2026. Versión corregida: 8-04-2025. Aprobado para publicación: 29-04-2025.

Modelo de citación:
Vélez Álvarez C., Sánchez Palacio N., Betancurth Loaiza D.P. **Measurement properties of the Sense of Coherence (SOC) scale: a narrative review**. Arch Med (Manizales). 2026;26(1).
https://doi.org/10.30554/archmed.26.1.5595.2026

Abstract

Introduction: *The Sense of Coherence (SOC) scale has been widely used in health research, supported by evidence regarding its psychometric properties across diverse populations and sociocultural contexts. However, inconsistencies persist in the assessment and reporting of these properties, highlighting the need for a critical and integrative synthesis. This study aimed to synthesize and interpret the available evidence on the measurement properties of the SOC scale, with an emphasis on its validity, reliability, and structural characteristics.* **Methodology**: *A narrative review with an interpretive approach was conducted. The search was carried out in PubMed, Scopus, SciELO, ScienceDirect, the Virtual Health Library, and Google Scholar. Studies were selected based on their thematic relevance and their contribution to the analysis of the scale's psychometric properties. The analysis focused on identifying*

1 This article is derived from the main author's master's thesis entitled "Content validity of the Sense of Coherence Scale (SOC-29) in young Colombian university students" and from the microproject: "Psychometric properties of the Sense of Coherence Scale (SOC-29) in young university students in the municipality of Manizales."

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patterns, consistencies, and variations in the findings, without applying formal quality assessment frameworks. **Results:** *The SOC scale demonstrated consistent structural validity, high internal consistency, and adequate cross-cultural validity across multiple contexts. Criterion and construct validity were supported by consistent associations with variables related to mental health, coping, and well-being. Responsiveness was adequate in the studies that assessed it. However, reliability varied according to context and population, and measurement error was poorly assessed or inconsistently reported. Content validity was scarcely addressed, constituting a significant gap.* **Conclusion:** *The SOC scale demonstrates adequate overall psychometric performance and remains useful in health research. However, some properties—especially reliability, measurement error, and content validity—require cautious interpretation. Strengthening methodological rigor and expanding its validation in diverse contexts are recommended.*

Keywords: *Review, Scientific evidence; Sense of coherence; Public health; Evaluation Studies as Topic; Surveys and Questionnaires; Holistic Health; Community Health Indicators.*

Propiedades de medición de la escala de Sentido de Coherencia (SOC): una revisión narrativa

Resumen

Introducción: *La escala de Sentido de Coherencia (SOC) se ha utilizado ampliamente en investigación en salud, respaldada por evidencia sobre sus propiedades psicométricas en diversas poblaciones y contextos socioculturales. Sin embargo, persisten inconsistencias en la evaluación y el reporte de dichas propiedades, lo que evidencia la necesidad de una síntesis crítica e integradora. Este estudio tuvo como objetivo sintetizar e interpretar la evidencia disponible sobre las propiedades de medición de la escala SOC, con énfasis en la validez, la fiabilidad y sus características estructurales.* **Metodología:** *Se realizó una revisión narrativa con enfoque interpretativo. La búsqueda se llevó a cabo en PubMed, Scopus, Scielo, ScienceDirect, Biblioteca Virtual en Salud y Google Académico. Los estudios fueron seleccionados según su relevancia temática y su contribución al análisis de las propiedades psicométricas de la escala. El análisis se centró en identificar patrones, consistencias y variaciones en los hallazgos, sin aplicar marcos formales de evaluación de calidad.* **Resultados:** *La escala SOC mostró una validez estructural consistente, alta consistencia interna y adecuada validez transcultural en múltiples contextos. La validez de criterio y de constructo se respaldó mediante asociaciones coherentes con variables relacionadas con salud mental, afrontamiento y bienestar. La capacidad de respuesta fue adecuada en los estudios que la evaluaron. No obstante, la fiabilidad presentó variabilidad según contexto y población, y el error de medición fue poco evaluado o reportado de manera inconsistente. La validez de contenido fue escasamente abordada, constituyendo una brecha relevante.* **Conclusión:** *La escala SOC presenta un desempeño psicométrico global adecuado y continúa siendo*

útil en investigación en salud. Sin embargo, algunas propiedades —especialmente la fiabilidad, el error de medición y la validez de contenido— requieren interpretación cautelosa. Se recomienda fortalecer el rigor metodológico y ampliar su validación en diversos contextos.

Palabras clave: *Revisión, Evidencia científica; Sentido de coherencia; Salud pública; Estudios de evaluación como tema; Encuestas y cuestionarios; Salud holística; Indicadores de salud comunitaria.*

Propriedades de mensuração da escala de Senso de Coerência (SOC): uma revisão narrativa

Resumo

Introdução: *A escala de Senso de Coerência (SOC) tem sido amplamente utilizada em pesquisas na área da saúde, com o respaldo de evidências sobre suas propriedades psicométricas em diversas populações e contextos socioculturais. No entanto, persistem inconsistências na avaliação e na apresentação dessas propriedades, o que destaca a necessidade de uma síntese crítica e integrativa. Este estudo teve como objetivo sintetizar e interpretar as evidências disponíveis sobre as propriedades de mensuração da escala SOC, com ênfase em sua validade, confiabilidade e características estruturais.* **Metodologia:** *Foi realizada uma revisão narrativa com abordagem interpretativa. A busca foi feita nas bases de dados PubMed, Scopus, SciELO, ScienceDirect, Biblioteca Virtual em Saúde e Google Scholar. Os estudos foram selecionados com base em sua relevância temática e sua contribuição para a análise das propriedades psicométricas da escala. A análise focou na identificação de padrões, consistências e variações nos achados, sem a aplicação de estruturas formais de avaliação da qualidade.* **Resultados:** *A escala SOC demonstrou validade estrutural consistente, alta consistência interna e validade transcultural adequada em múltiplos contextos. A validade de critério e de construto foi comprovada por associações consistentes com variáveis relacionadas à saúde mental, ao enfrentamento e ao bem-estar. A responsividade foi adequada nos estudos que a avaliaram. No entanto, a confiabilidade variou de acordo com o contexto e a população, e o erro de mensuração foi mal avaliado ou relatado de forma inconsistente. A validade de conteúdo foi pouco abordada, constituindo uma lacuna significativa.* **Conclusão:** *A escala SOC demonstra desempenho psicométrico geral adequado e permanece útil em pesquisas na área da saúde. Contudo, algumas propriedades — especialmente a confiabilidade, o erro de mensuração e a validade de conteúdo — requerem interpretação cautelosa. Recomenda-se o fortalecimento do rigor metodológico e a expansão de sua validação em diversos contextos.*

Palavras-chave: *Revisão, Evidência científica; Senso de coerência; Saúde pública; Estudos de avaliação como tema; Inquéritos e questionários; Saúde holística; Indicadores de saúde comunitária.*

Introduction

Instruments are operational tools for collecting information that contribute to indirectly quantifying and measuring a phenomenon of interest in the most transparent, accurate, relevant and consistent way possible. Therefore, before use, validation of the quality of scientific evidence is necessary for understanding and adaptation to the objects or subjects studied, since research conducted with poor-quality outcome measurement instruments is a waste of time and resources and results in unreliable or unethical inferences [1].

In 1979, Aaron Antonovsky introduced the salutogenic theory based on the "Sense of Coherence (SOC)" as a global orientation to see the world and the individual environment as understandable (ability to understand what is happening around), manageable (ability to handle the situation by oneself or through other important people in one's social network) and meaningful (ability to make sense of the situation) [2].

The salutogenic model represents a paradigm shift from the traditional pathogenic approach, as it focuses on health-promoting resources rather than disease, emphasizing how individuals mobilize internal and external resources to maintain and improve their well-being [3]. In this framework, the three dimensions of SOC—comprehensibility, manageability, and meaningfulness—should not be understood as isolated components, but as interrelated elements that together shape a global orientation toward life. This integrated functioning allows individuals to interpret their environment as structured, perceive available resources as sufficient to cope with demands, and attribute meaning to life experiences, which has been associated with better health outcomes, resilience, and adaptive capacity across populations [4].

Meanwhile, another central concept is General Resilience Resources (GRR) [2], such as self-identity, knowledge, intelligence, coping strategies, social support, commitment and cultural stability. SOC becomes a lasting and dynamic manifestation of an individual's confidence in their use of the resources they need to cope with the stimuli present at throughout their life, and the GRR that provide the prerequisites for the development of SOC are those material or intangible resources inherent to the individual or present in their immediate and distant environment [5].

The theory presented is a paradigmatic approach that goes beyond risk factors—a pathogenic approach—by arguing that the way people view their lives has a positive influence on their health. Therefore, ten years later, Antonovsky developed the "Life Orientation Scale" (OLQ), also called the "Sense of Coherence Scale," and examined its properties. It measures functioning capacity and is a positive and fundamental element for both individual and collective health, that is, people with a high sense of coherence may have healthy practices and lifestyles and a lower burden of disease [6].

The Sense of Coherence Scale (SOC) has been validated in different languages, regions and populations, including studies in the Colombian context [7] .The results have shown that it is valid and reliable for application. Some systematic reviews of SOC have focused on validity and reliability [2]; on the salutogenic concept, Sense of Coherence (SOC) and its correlation with quality of life (QoL) [2]; on the sense of coherence in adolescents, health and reliability of the meaning of the scale versions [5,6]; empirical evidence on the association between SOC and oral health behaviours, as well as on oral health in relation to quality of life [8,9]. More recent studies have examined SOC in university populations during the COVID-19 pandemic, highlighting its role in coping and mental health [10].

Recent evidence shows the systematic review of the association between SOC, burden and mental health outcomes in informal carers [11]; dental caries [12] and finally a review that

analyses possible correlations with different individual and work-related variables [13,14].

As a result of the above, there is interest in conducting studies using the SOC, whose validity is characterised by its robustness and high quality, based on the evaluation of its measurement properties, the result of a detailed methodology, such as a literature review whose results contribute to demonstrating its psychometric properties. Despite the widespread use of the SOC scale, inconsistencies remain regarding its psychometric properties across different populations and versions. Therefore, a comprehensive synthesis of evidence on its reliability, validity, and factor structure is needed to support its appropriate use and selection in health research.

The objective of this study is to synthesize and critically interpret the available evidence on the measurement properties of the Sense of Coherence (SOC) scale, focusing on validity, reliability, and structural characteristics across diverse contexts and populations.

Methodology

A narrative review with an interpretative approach was conducted to examine the measurement properties of the Sense of Coherence (SOC) scale across its different versions. Given the heterogeneity in study designs, populations, and reported psychometric outcomes, this approach allowed for a critical synthesis of the available evidence. The analysis focused on identifying patterns, consistencies, and methodological variations in the validation processes of the instrument. To ensure methodological rigor and transparency in the narrative synthesis, the review was assessed using the Scale for the Assessment of Narrative Review Articles (SANRA), which is appropriate for evaluating the quality of narrative reviews [15].

Information search strategy

The literature search was conducted to identify studies that addressed the validation of the Sense of Coherence (SOC) scale in its different versions. Given the nature of this review, the search was designed to be comprehensive yet flexible, allowing for the inclusion of diverse approaches and contexts in which the instrument has been applied (table 1).

Time-limited searches were conducted in Spanish and English in the Virtual Health Library (VHL), Scielo, PubMed, Scopus, ScienceDirect databases, and the Google Scholar search engine. For the search process across the different specialized databases, keywords were defined using the Boolean operators AND and OR. Some of these terms were validated in the DeCS and MeSH thesauri, while others were not; however, they were included to ensure a broader identification of studies related to the construct and its measurement.

The following terms were used: Sense of coherence (DeCS/MeSH), Validation Study (DeCS/MeSH), Validation (no DeCS/no MeSH), Young (not DeCS/not MeSH), SOC/SOC (not DeCS/not MeSH), Orientation to life (no DeCS/no MeSH), and OLQ/OLQ (not DeCS/not MeSH), which were combined using the Boolean operators AND and OR according to the requirements of each database (table 1).

Studies were selected based on their relevance to synthesizing evidence on the validation processes and measurement properties of the Sense of Coherence (SOC) scale. The selection of studies was guided by thematic relevance and saturation of information regarding measurement properties. Inclusion criteria for manuscripts were as follows: they had to be written in English or Spanish and report on the validation of the scale in any of its versions. In keeping with the nature of this review, no specific restrictions were imposed, without compromising rigor, regarding population, geographic location, or measurement properties, thus allowing for a broader and more inclusive understanding of the contexts in which the instrument has been validated.

Table 1. Search strategies

Google Scholar	Biblioteca Virtual de Salud (BVS)
Strategy #1: Advanced search: allintitle: validation "sense of coherence" Interval: Any year Results: 3 Strategy #2: Advanced search: allintitle: "sense of coherence" Interval: Any year Results: 73 Strategy #3: Advanced search: allintitle: young people "sense of coherence" Results: 5 Strategy #4: Advanced search: allintitle: "sense of coherence" validation Interval: Any year Results: 10 Strategy #5: allintitle: "SOC" Interval: Any year Results: 15 Strategy #6: allintitle: Colombia "sense of coherence" Interval: Any year Results: 0 Strategy #7: allintitle: validation "life orientation" Interval: Any year Results: 1	Strategy #1: (ti:(sense of coherence)) AND (ti:(validation)) AND (instance:"regional") Results: 3 Strategy #2: (ti:(sense of coherence)) AND (instance:"regional") Results: 25 Strategy #3: tw:((ti:(soc-29))) AND (instance:"regional") Results: 3 Strategy #4: tw:((ti:(life orientation))) AND (instance:"regional") Results: 10 Strategy #5: tw:((ti:(soc-13))) AND (instance:"regional") Results: 7 Strategy #6: (ti:(Sense of coherence)) AND (ti:(validity)) Results: 3
Pubmed	**Scielo**
Strategy #1: sense of coherence [Title] AND validation [Title] Results: 9 Strategy #2: SOC-29[Title] Results: 2 Strategy #3: OLQ-29 Results: 0 Strategy #4: ORIENTATION TO LIFE[Title] Results: 15	Strategy #1: (ti:(Sense of coherence)) AND (validation) Results: 0 Strategy #2: (sense of coherence) AND (validation) Results: 4 Strategy #3: (ti:(SOC-29)) Results: 0 Strategy #4: (ti:(SOC)) Results: 10 Strategy #5: (ti:(LIFE ORIENTATION)) Results: 3
Scopus	**Science Direct**
Strategy #1: (TITLE (sense AND of AND coherence) AND TITLE (validation)) Results: 15 Strategy #2: TITLE ("SOC-29") Results: 3 Strategy #3: TITLE ("orientation to life") Results: 11 Strategy #4: TITLE-ABS-KEY ("SOC-29") Results: 174	Strategy #1: "validation sense of coherence" Results: 0 Strategy #2: "sense of coherence" "validation". year: 2008-2019 – title, abstract, keywords: validation Results: 35 Strategy #3: "orientation to life". – title, abstract, keywords: validation Results: 7

Source: own elaboration

Analysis of Measurement Properties

The psychometric properties reported in the included studies were analyzed to provide a comprehensive understanding of the validation processes of the Sense of Coherence (SOC) scale. The analysis focused on key properties such as structural validity, internal consistency, reliability, measurement error, construct validity, cross-cultural validity, criterion validity, and responsiveness.

Patterns, consistencies, and variations were identified in how these properties were assessed and reported across different contexts and populations. This interpretive approach allowed for a critical understanding of the instrument's strengths and limitations without applying rigid evaluation frameworks. Although quantitative indicators reported in the studies were considered, the analysis did not aim to produce a formal quality rating, but rather to support an interpretative understanding of the evidence.

Ethical considerations

This study, focused on evaluating the quality of the psychometric tests of the Sense of Coherence Scale (SOC), adheres to the ethical guidelines established by Colombian Resolution 08430 of 1993 [16] and the principles of the Declaration of Helsinki [17]. In addition, it was approved by the institution's ethics committee under code CBCS-060. A thorough analysis of published scientific articles was conducted, ensuring confidentiality and respect for copyright. This ethical approach is essential to guarantee the integrity and validity of the results.

Results

The results were synthesised according to measurement properties, allowing identification of convergences and inconsistencies across studies rather than isolated descriptions, allowing an interpretative synthesis of patterns and variations across studies.

In the first search filter, 123 articles were selected based on their title. The databases from which most of the manuscripts were selected were Google Scholar and Scopus, with 39% and 32%, respectively. Eleven duplicate articles were excluded, and the full abstracts of those that continued the process were reviewed. This analysis resulted in the elimination of 47 manuscripts that did not meet the established inclusion criteria.

The final selection filter allowed for the exclusion of documents whose content or language did not meet the inclusion criteria defined for the study. The final analysis was performed on 24 manuscripts, corresponding to 19.5% of the total initially selected (Figure 1).

Characteristics of the articles analysed

The characteristics of the included articles reveal heterogeneity in publication dates, geographical contexts, languages, sample types and versions of the SOC scale, elements that contextualise the subsequent analysis of measurement properties. As shown in Table 3, most manuscripts (58%) were published between 2015 and 2022, although 2011 was the year with the highest concentration of validations (16.6%), reflecting periods de interés investigativo en la escala. Geographically, 62.5% of validations were conducted in European countries—particularly Spain, which contributed studies across different age groups—while 25% originated in the Americas, and a smaller proportion in Asia and Oceania.

English predominated as the publication language (70.8%), which is consistent with the global diffusion of studies using the SOC-13 and SOC-29 versions originally proposed by Antonovsky. Other adaptations such as FSOC-S and SOC-R also appeared, expanding the range of constructs and contexts evaluated.

The distribution of populations studied contributes to understanding the breadth de

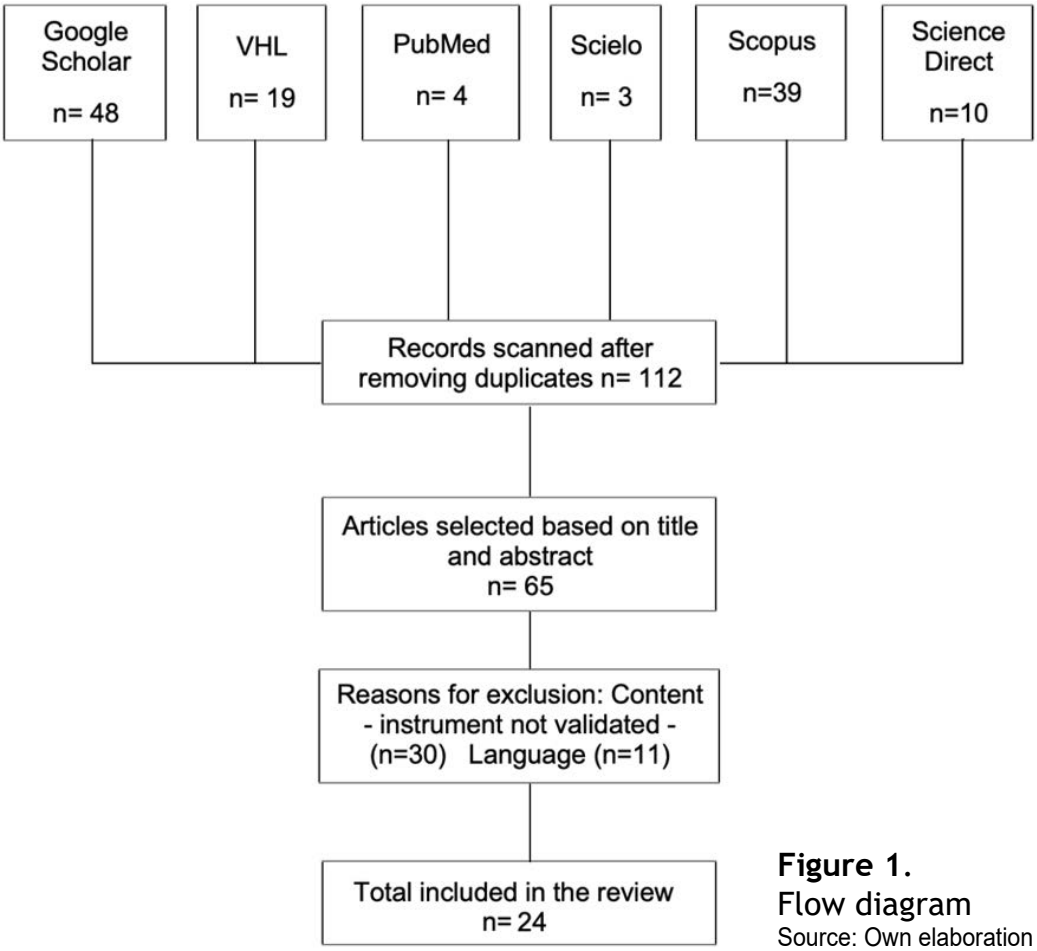

Figure 1.
Flow diagram
Source: Own elaboration

aplicación de las propiedades psicométricas: nine studies included adolescents or university students, eight involved adults and older adults, and the remaining studies focused on specific health conditions, nursing professionals, indigenous communities or families. Although most validations supported the adequacy of the scale, one study did not demonstrate the validity of the 29-item version in Spanish adolescents, an aspect relevant for interpreting variability in structural validity and reliability results across contexts. (table 3).

Analysis of measurement properties

The review evaluated eight key measurement properties: structural validity, internal consistency, cross-cultural validity, reliability, measurement error, criterion validity, construct validity, and responsiveness.

Regarding the quality of the psychometric tests, structural validity , criterion validity, construct validity, and responsiveness were

evaluated as “very good” in all the manuscripts reviewed in the research.

Although the methodological quality assessment of structural validity and criterion validity was “very good,” when applying the commonly reported psychometric indicators and thresholds used to quantitatively analyse each test (results column in table 4), not all results were sufficiently “+.” For the previous Confirmatory Factor Analysis (CFA), values were found. Comparative Fit Index (CFI) or Tucker-Lewis Index (TLI) values lower than 0.95; Root Mean Square Error of Approximation (RMSEA) equal to or greater than 0.06 or Standardised Residual Mean Ratio (SRMR) greater than 0.082, and for the second, Area Under the Curve (AUC), Pearson or Spearman values lower than 0.70. In some cases, these data were not identified, so the result appeared as indeterminate (?). For Construct Validity and responsiveness, all results were sufficient “+” when hypothesis agreement was recognised in the research.

A general analysis of risk of bias showed variability in methodological quality across the studies, particularly in the assessments of internal consistency, cross-cultural validity, reliability and measurement error. Among these properties, internal consistency and cross-cultural validity demonstrated comparatively stronger performance, with predominantly positive results. Internal consistency was consistently supported by acceptable Cronbach alpha values (≥0.70), while cross-cultural validity showed no significant differences across the groups in which the scale was evaluated. In contrast, reliability and measurement error presented greater methodological limitations, reflecting inconsistencies in reporting and weaker adherence to recommended criteria.

Reliability and measurement error were the psychometric properties with the weakest performance across the reviewed studies. In the analysis of reliability, both qualitative and quantitative assessments frequently showed limitations: although some studies reported acceptable ICC or KMO values, a considerable proportion did not reach the recommended thresholds of 0.70, resulting in several insufficient (–) or indeterminate (?) ratings. This inconsistency indicates variability in the temporal stability and reproducibility of the SOC across settings and populations.

A similar pattern was evident for measurement error. More than half of the studies assessing this property presented methodological shortcomings, largely due to the absence of key indicators such as Limits of Agreement or Smallest Detectable Change. As a result, quantitative outcomes were often rated as indeterminate (?) or insufficient (–), limiting the capacity to draw firm conclusions about precision and minimal detectable change.

In contrast, a smaller subset of studies demonstrated consistently high methodological quality across properties, with sufficient results in most psychometric tests. However, the overall pattern reveals substantial variability among studies, with some showing strong performance and others presenting doubtful or inadequate methodological quality. This heterogeneity underscores the need for cautious interpretation of the reliability and measurement error evidence, particularly when applying the SOC scale in diverse populations and contexts.(table 3).

Table 3. General characteristics of the items

Article	Year	Country	Original language	Version Scale	Population	Validation Result
[18]	2018	Spain	Spanish	SOC-13	University nursing students	Proven validity
[19]	2017	Ecuador	Spanish	SOC-29	University students	Proven validity
[20]	2014	Mexico	Spanish	SOC-29 SOC-13	University students	Proven validity
[21]	2016	Spain	Spanish	SOC-13	University students	Proven validity
[22]	2007	Spain	Spanish	SOC-13	Adults over 70 years of age	Proven validity
[23]	2011	Spain	Spanish	SOC-29	Adolescents	No validity demonstrated
[24]	2011	Brazil	Spanish	SOC-29	Nursing Professionals	Proven validity
[25]	2018	Norway	English	SOC-13	Adults and Older Adults	Proven validity
[26]	2015	Portugal	English	SOC-29	Older Adults	Proven validity
[27]	2014	Brazil	English	SOC-29 SOC-13	Cardiac patients	Proven validity
[28]	2015	Peru	English	SOC-13	University students	Proven validity
[29]	2016	United States	English	SOC-13	American Indian population	Proven validity
[30]	2019	Slovenia	English	SOC-13	Patients with Multiple Sclerosis	Proven validity
[31]	2012	Italy	English	SOC-13	Adults	Proven validity
[32]	2011	China	English	FSOC-S	Family	Proven validity
[33]	2018	Australia Finland Turkey	English	SOC-13	Young people	Proven validity
[34]	2010	Iran	English	SOC-13	University students	Proven validity
[35]	2017	Greece	English	SOC-29	Patients with diabetes, chronic obstructive pulmonary disease and rheumatic diseases	Proven validity
[36]	2020	Italy	English	SOC-R	Adults	Proven validity
[37]	2019	Sweden	English	FSOC-S	Family	Proven validity
[38]	2015	Norway	English	SOC-29	Elderly	Proven validity
[39]	2011	Netherlands	English	SOC-13	Adults	Proven validity
[40]	2016	Denmark	English	SOC-13	Adults	Proven validity
[41]	2012	Netherlands	English	SOC-13	Young adolescents	Proven validity

Source: own elaboration

Quality of scientific evidence

Structural validity was examined through different statistical indicators, including CFI (n=14), RMSEA (n=12), MDSM (n=6), CFA (n=4), and TLI (n=1). Among these, the SRMR and TLI indices showed the most consistent performance across studies. The remaining indicators, such as CFI, RMSEA and CFA, displayed wider variability, with some studies reporting values aligned with expected standards of model fit and others showing less favourable results.

Despite this variation, the overall set of findings—derived from a large cumulative sample of 29,605 participants—suggests that the SOC scale generally presents an acceptable factorial structure across different populations and adaptations, as summarised (table 4).

The internal consistency of the SOC scale showed a strong and consistent performance

across the studies that assessed this property. In a cumulative sample of 30,062 participants, all reported Cronbach's alpha values above 0.70, indicating that the items tended to correlate positively and measure a coherent underlying construct across different versions and populations.

Cross-cultural validity was examined in nine studies with a total of 4,020 participants. These analyses explored whether the scale functioned similarly across groups defined by gender, language, country and specific health conditions. Overall, the results indicated that the SOC scale maintained stable performance across these groups, with no significant differences reported in the comparisons. This suggests that the instrument demonstrates a satisfactory degree of measurement invariance across diverse populations.

Reliability, assessed through indicators such as KMO and ICC in 23 studies with a combined sample of 29,149 participants, showed mixed results. Although several studies reported values above 0.70, the findings were not consistent across all analyses. Differences in the performance of the indicators suggested variability in the temporal stability and reproducibility of the SOC scale, with some studies showing stronger reliability and others reporting weaker or inconclusive outcomes.

Measurement error, examined in 18 studies, also presented considerable variation. In many cases, essential information required to estimate this property such as indicators related to agreement or detectable change, was not fully reported, which limited the ability to determine the precision of the scale. As a result, the overall patterns across studies reflected inconsistent reporting and limited evidence regarding the magnitude of measurement error.

Criterion validity was examined in 20 studies with a combined sample of 27,366 participants. Across these studies, the SOC scale tended to show positive associations with external measures, as reflected in AUC, Pearson and Spearman coefficients generally above 0.70. These findings suggest that the scale demonstrates an adequate level of correspondence with related constructs, supporting its use in diverse contexts.

Construct validity was explored through correlations with a wide range of established instruments, including measures of lifestyle, functioning, anxiety, depression, psychological distress, traumatic stress, suicide risk and resilience. The consistently significant associations observed across these comparisons indicate that the SOC scale behaves in line with theoretical expectations, particularly regarding its links with mental health, coping and resilience. This convergence supports the interpretative coherence of the construct.

Responsiveness was evaluated in five studies involving 2,038 participants. Although different methodological approaches were used, all studies examined whether the SOC scale could detect changes over time, typically through pre–post assessments. In each case, the results showed significant differences between measurement points, suggesting that the scale has the capacity to capture meaningful changes when they occur.

Content validity was addressed in only one study, which focused on an adaptation of the short Family Sense of Coherence Scale. This evaluation was based on expert judgement and comprehension testing, providing useful but limited evidence. Because content validity was not assessed more broadly, general conclusions about this property cannot be drawn from the available studies.

Table 4. Table of study results by measurement property

Article	Language in which the questionnaire was evaluated	Structural validity			Cronbach's internal consistency (alpha(s))			Cross-cultural validity Measurement invariance			Reliability			Measurement error		
		n	Quality	Reported findings	n	Quality	Result (rating)	n	Quality	Result (rating)	n	Quality	Reported findings	n	Quality	Reported findings
1	Spanish	384	Very good	CFI 0.975 (+) RMSEA 0.041 (+) SRMR 0.041 (+)	384	Very good	0.809 (+)	384	Very good	(+)	384	Doubtful	KMO 0.91 (+)	384	Doubtful	(?)
2	Spanish	415	Very good	CFI 0.8 (-)	415	Very good	0.71 (+)	415	Very good	(+)	415	Doubtful	KMO 0.80 (+)	415	Doubtful	(?)
3	Spanish	523	Very good	CFA 0.77 (-)	523	Very good	0.914 (+)	523	Doubtful	(?)	523	Doubtful	KMO 0.912 (+)	523	Doubtful	(?)
4	Spanish	508	Very good	CFI 0.973 (+) RMSEA 0.039 (+)	508	Very good	0.81(+)		NA		508	Very good	ICC 0.61 (-)	508	Very good	(+)
5	Spanish	419	Very good	RMSEA 0.043 (+)	419	Doubtful	0.80 (+)	419	Very good	(+)	419	Doubtful	KMO 0.80 (+)	419	Doubtful	(-)
6	Spanish	7580	Very good	CFI 0.95 (+) RMSEA (+) SRMR (+)	7580	Very good	0.82 (+)		NA		7580	Inadequate	KMO 0.90 (+)	7580	Doubtful	(-)
7	Spanish	211	Very good	CFA 0.97 (+)	211	Very good	0.87 (+)		NA		211	Inadequate	(?)		NA	
8	English	6951	Very good	CFI >0.95 RMSEA <0.06 (+)	6951	Very good	>0.70 (+)		NA		6951	Inadequate	(?)	6951	Doubtful	(?)
9	English	1291	Very good	RMSEA 0.046 (+) CFI 0.972 (+) TLI 0.957 (+)	1291	Very good	0.930 (+)		NA		1291	Inadequate	(?)	1291	Very good	(+)
10	English		NA		203	Very good	0.86 (+)	203	Very good	(+) SOC-13 (-) SOC-29	203	Inadequate	(?)		NA	
11	English	448	Very good	CFI 0.92 (-) RMSEA 0.06 (-)	448	Very good	0.80 (+)		NA		448	Very good	ICC 0.59 (-)	448	Very good	(+)
12	English	1016	Very good	SRMR 0.07 (+)	1016	Very good	0.84 (+)		NA		1016	Inadequate	(?)	1016	Very good	(+)
14	English	134	Very good	CFI 0.953 (+) RMSEA 0.059 (+) SRMR 0.065 (+)	134	Very good	0.88 (+)		NA		134	Very good	ICC >0.70 (+)		NA	

Article	Language in which the questionnaire was evaluated	Structural validity			Cronbach's internal consistency (alpha(s))			Cross-cultural validity Measurement invariance			Reliability			Measurement error		
		n	Quality	Reported findings	n	Quality	Result (rating)	n	Quality	Result (rating)	n	Quality	Reported findings	n	Quality	Reported findings
15	English	913	Very good	(?)	913	Very good	0.825 (+)	913	Very good	(+)		NA			NA	
16	English	256	Very good	CFI 0.71 (-)	256	Very good	0.83 (+)	256	Very good	(+)	256	Very good	ICC 0.75 (+)		NA	
17	English	556	Very good	CFI >0.95 (+) RMSEA >0.06 (-)	556	Very good	0.70-0.92 (+)	556	Very good	(+)	556	Very good	ICC 0.39-0.77 (-)		NA	
18	English	375	Very good	CFI > 0.95 (+)	375	Very good	0.77 (+)		NA		375	Very good	KMO 0.81 (+)	375	Very good	(+)
19	English	374	Very good	CFI 0.97 (+)	374	Very good	0.89 (+)		NA		474	Very good	ICC 0.97 (+)	374	Doubtful	(?)
20	English	689	Very good	CFA 0.83 (-) CFI (0.78) (-)	689	Very good	0.70 (+)		NA		689	Very good	ICC 0.51 (-)	689	Very good	(+)
21	English	351	Very good	CFA 0.80 (-)	351	Very good	0.92; 0.93 (+)	351	Very good	(+)	351	Very good	KMO (0.89) (+) ICC 0.64 (-)	351	Doubtful	(-)
22	English	2069	Very good	SRMR 0.052 (+) RMSEA 0.049 (+)	2069	Very good	0.91 (+)		NA		2069	Very good	ICC 0.56 (-)	2069	Doubtful	(?)
23	English	1361	Very good	CFI 0.723; 0.941 (-) RMSEA 0.055; 0.115 (?)	1361	Very good	0.80 (+)		NA		1361	Very good	ICC 0.75 (+)	1361	Doubtful	(?)
24	English		NA		254	Very good	0.84 (+)		NA		254	Very good	ICC 0.75 (+)	254	Very good	(+)
25	English	2781	Very good	RMSEA <0.015 (+)	2781	Very good	0.78 (+)		NA		2781	Very good	ICC 0.93 (+)	2781	Doubtful	(?)
Grouped or summarised result (overall rating)		29605		CFI 0.71-0.975 RMSEA 0.015-0.115 SRMR 0.041- 0.07 CFA 0.77 - 0.97 TLI 0.957 (+)	30062		0.70-0.93 (+)	4020		8 (+) 1(?) 1(-) (+)		29149	KMO 0.80–0.91 ICC 0.39–0.97 (?)	27789		7(+) 3 (-) 8(?) (?)

Table 4. Table of study results by measurement property (part 2)

Article	Language in which the questionnaire was evaluated	Criterion validity			Construct validity			Responsiveness		
		n	Study characteristics	Reported findings	n	Study characteristics	Result or (classification)	n	Quality	Result or (ranking)
1	Spanish	384	Very good	AUC 0.84 (+)	384	Very good	(+)		NA	
2	Spanish	415	Very good	AUC 0.71 (+)		NA			NA	
3	Spanish	523	Very good	AUC 0.78 (+)		NA			NA	
4	Spanish	508	Very good	AUC 0.753 (+)		NA		508	Very good	(+)
5	Spanish	419	Very good	(?)	419	Very good	(+)		NA	
6	Spanish	7580	Very good	AUC 0.80 (+)		NA			NA	
7	Spanish		NA		211	Very good	(+)	211	Very good	(+)
8	English	6951	Very good	(?)		NA			NA	
9	English	1291	Very good	AUC 0.72 (+)		NA			NA	
10	English	203	Very good	AUC 0.61 (-)	203	Very good	(+)		NA	
11	English	448	Very good	Pearson >0.70 (+)		NA			NA	
12	English		NA		1016	Very good	(+)		NA	
14	English	134	Very good	Pearson 0.77 (+)	134	Very good	(+)		NA	
15	English		NA			NA			NA	
16	English	256	Very good	Pearson 0.75 (+)	256	Very good	(+)	256	Very good	(+)
17	English		NA			NA			NA	
18	English	375	Very good	(-)		NA			NA	
19	English	374	Very good	Pearson -0.530; 0.652 (-)	374	Very good	(+)	374	Very good	(+)
20	English	689	Very good	(?)	689	Very good	(+)	689	Very good	(+)
21	English	351	Very good	Spearman 0.85 (+)		NA			NA	
22	English	2069	Very good	Spearman 0.35-0.66 (-)		NA			NA	
23	English	1361	Very good	Spearman 0.71 (+)		NA			NA	
24	English	254	Very good	Spearman 0.92 (+)		NA			NA	
25	English	2781	Very good	Spearman 0.82 (+)		NA			NA	
Grouped or summarised result (overall rating)		27366		AUC 0.61-0.84 Pearson -0.530-0.75 Spearman 0.35-0.92 (+)	3686		9(+)	2038		5 (+)

"+" sufficient, "-" insufficient, "?" indeterminate // AUC - area under the curve // CFA - confirmatory factor analysis // CFI - comparative fit index // ICC - intraclass correlation coefficient // RMSEA: root mean square error of approximation // SRMR: standardised root mean square residuals // TLI - Tucker-Lewis index // KMO - Kaiser-Meyer-Olkin index

The symbols (+), (–), and (?) are used for descriptive purposes within the narrative synthesis and should not be interpreted as a formal methodological quality assessment

Source: own elaboration

Discussion

This review evaluated the measurement properties reported in 24 studies that analysed the psychometric properties of the Sense of Coherence Scale (SOC). The aim of this work was to provide a theoretical and methodological contribution through the analysis of the results corresponding to each psychometric criterion evaluated.

Structural validity in this study, assessed in 22 articles, demonstrated high methodological quality with representative samples. In this regard, Guilbert, cited by Baladrón et al. [42], suggests that validity should be understood as the degree of precision with which an instrument measures what it intends to measure, including aspects such as reliability, objectivity, and content relevance. Similarly, Hernández and Domínguez [43] argue that structural validity is based on the analysis of the homogeneity of the items included in an instrument, as this analysis provides statistical evidence supporting whether the instrument measures the construct it intends to assess and whether each item corresponds appropriately to its respective theoretical dimension.

These findings are consistent with recent psychometric studies that confirm the structural stability of the SOC scale across different populations and cultural contexts. Several validation studies conducted in Europe, Asia, and Latin America have reported acceptable factorial fit indices for the SOC-13 version and confirmed the theoretical components proposed by Antonovsky [44-46].

Regarding internal consistency, the results indicate that the SOC-13 demonstrated adequate psychometric properties. Specifically, the scale showed that all items measure the same underlying construct, reflecting a single latent theoretical dimension in which items are correlated with one another [47]. According to Vega Martínez et al. [18], the analysis of consistency through Cronbach's alpha is central when evaluating the reliability of an instrument, with acceptable values typically ranging between 0.70 and 0.90. In the present study, internal consistency values for the items analysed were greater than 0.70, supporting the reliability of the scale.

Recent studies have reported similar reliability values for the SOC-13 scale in diverse contexts, reinforcing the stability of this measurement property across populations. For example, Domínguez-Salas et al en 2022 [48] and Mafla et al. [49] en 2021 reported Cronbach's alpha values above 0.80 in clinical and community populations. Likewise, other studies conducted in university and working populations have reported similar reliability results, supporting the robustness of the instrument in different sociodemographic contexts [50].

According to the description by Le et al. [51], intercultural validity allows for the evaluation of the relationships between the different components that constitute an instrument and how these components function across cultural contexts. In this sense, the methodological quality of the studies included in this review was generally very good, and in terms of risk of bias, only one article was classified as doubtful.

Reliability and measurement error were properties whose qualitative and quantitative evaluations showed comparatively lower results when analysing the different measurement parameters. In this regard, methodological quality was often rated as doubtful, indeterminate, or insufficient. Some authors argue that new analytical approaches should be considered for evaluating measurement error, such as the use of confidence intervals to provide more precise estimates [52]. Measurement error is also inherent in self-report instruments, which may introduce a certain degree of subjectivity in participants' responses [53]. Likewise, other studies emphasize the importance of conducting further analyses to obtain more accurate estimates of these measurement properties [54].

Recent methodological studies also recommend complementing traditional reliability analyses with additional indicators such as the standard error of measurement and minimal detectable change, which allow for a more precise interpretation of measurement error in psychometric instruments [55].

The results of this review also demonstrated high-quality evidence for criterion validity in the instruments analysed. This finding is consistent with Evers et al., cited by Nóblega et al. [56], who argue that although different types of validity evidence are important and complementary when adapting an instrument, criterion validity becomes particularly relevant when the objective is to make predictions or analyse behavioural responses to specific phenomena. Furthermore, this type of validity allows researchers to examine not only the measurement of a single construct but also its relationship with other relevant variables [57].

Recent research supports these findings by demonstrating significant associations between sense of coherence and health-related outcomes such as mental well-being, resilience, and quality of life. Several studies have shown that higher SOC scores are associated with lower levels of stress, anxiety, and psychological distress, highlighting its role as a protective psychosocial resource [58].

Construct validity was also supported by the results of this study. This was evidenced through statistically significant correlation coefficients ($p < 0.05$) with other instruments designed to analyse constructs conceptually related to the Sense of Coherence. According to Di Luciano et al. [59], this type of validity is essential, as it requires verification through comparisons with other measures that assess similar constructs, demonstrating statistical correspondence between them.

Finally, the evaluation of responsiveness in the analysed articles was rated as high quality. For García et al. [60], this psychometric property is necessary insofar as it allows for the estimation of responsiveness to change and sensitivity (ability to detect changes), mainly in instruments that seek to analyse specific health states [61, 62].

Overall, the findings of this review reinforce the evidence that the Sense of Coherence Scale presents adequate psychometric properties across different populations and contexts, supporting its continued use as a reliable instrument in health promotion, mental health research, and public health studies.

Conclusions

This narrative review achieved its objective by synthesizing and critically interpreting the available evidence on the measurement properties of the Sense of Coherence (SOC) scale across diverse populations and contexts. More explicitly, the findings indicate that the scale demonstrates consistent structural validity, supported by adequate model fit indices in most studies; high internal consistency, with Cronbach's alpha values generally above 0.70; and adequate cross-cultural validity, reflected in its stable performance across different contexts and population groups. In addition, criterion and construct validity were consistently supported, showing coherent associations with variables related to mental health, coping, and well-being, while responsiveness was also found to be adequate, confirming the scale's ability to detect changes over time. Overall, these findings confirm a globally adequate psychometric performance and support the SOC scale as a robust instrument for health research.

However, the synthesis of evidence also reveals important methodological limitations and gaps in the literature. In particular, reliability showed heterogeneous results across studies, reflecting variability in the temporal stability of the instrument, while measurement error was insufficiently assessed or inconsistently reported, limiting the precision of its estimates. Furthermore, content validity was rarely evaluated,

representing one of the most significant gaps identified in the current evidence.

In this context, although the SOC scale is widely applicable across different populations and settings, some of its measurement properties require cautious interpretation, particularly in methodologically heterogeneous contexts. Therefore, future research should prioritize strengthening the methodological rigor of psychometric evaluations, including more standardized and robust assessments of reliability and measurement error, as well as the systematic incorporation of content validity analyses. Expanding validation efforts in underrepresented populations and contexts is also essential.

Addressing these gaps will contribute to consolidating the psychometric evidence of the SOC scale and enhancing its application in public health and mental health research.

Limitations

This review has inherent limitations in narrative designs, such as potential selection bias and limited reproducibility compared to systematic approaches. However, efforts were made to ensure transparency in study selection by explicitly describing the search strategy, inclusion criteria, and selection process. Furthermore, SANRA were applied to enhance rigor, the heterogeneity of the included studies in terms of populations, instrument versions, and reported psychometric properties may have affected the comparability of the results.

CRediT authorship contribution statement:

Consuelo Vélez Álvarez: Conceptualisation, Data curation, Formal analysis, Research, Methodology, Resources, Software, Writing – original draft, Writing, revision and editing. **Natalia Sánchez Palacio:** Conceptualisation, Data curation, Formal analysis, Research, Methodology, Resources, Software, Writing – original draft, Writing, revision and editing. **Diana Paola Betancurth Loaiza:** Conceptualisation, Data curation, Formal analysis, Research, Methodology, Resources, Software, Writing – original draft, Writing, revision and editing.

Conflict of interest: The authors have declared that there is no conflict of interest.

Funding: This research was supported by the University of Caldas, code 0278120

AI Usage Statement: No artificial intelligence was used in this research.

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