


VALIDATION OF THE COSTA RICAN APPRAISAL OF SELF-CARE AGENCY SCALE

VALIDACIÓN COSTARRICENSE DE LA ESCALA DE VALORACIÓN DE LA CAPACIDAD DE AUTOCUIDADO

VALIDAÇÃO DA ESCALA DE AVALIAÇÃO DA AGÊNCIA DE AUTOCUIDADO DA COSTA RICA

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Palabras clave

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Palavras-chave

Autocuidado; Escala de Avaliação da Capacidade de Autocuidado; Estudante universitário; Ciências da saúde; Análise fatorial; Confiabilidade e validade.


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ABSTRACT

Objective: To evaluate the construct validity and reliability of the Appraisal of Self-Care Agency Scale among university students majoring in health-related fields. **Material and Method:** An instrumental design was employed using a convenience sample of health-sciences students from two Costa Rican universities. Data was collected via an online survey in October 2023, sent to all eligible students (response rate: 30.16%; final sample: n= 361; mean age= 23.61 ± 5.30 years). Participants under 18 were excluded. A Confirmatory Factor Analysis was conducted to assess the fit of different models. **Results:** After respecification, the model showed good fit to a three-factor structure ($\chi^2 = 240$, $df = 72$, $p < .001$; CFI= .90, TLI= .88, RMSEA= .08, SRMR= .06). **Conclusions:** The respecified three-factor model proved to be a better solution than the traditional unifactorial model for health-related students. The alignment between the designations used for the three factors and the original theoretical model of the instrument was also discussed.

RESUMEN

Objetivo: Evaluar la validez de constructo y la confiabilidad de la Escala de Valoración de la Capacidad de Autocuidado en universitarios de carreras relacionadas con la salud. **Material y Método:** Se empleó un diseño instrumental mediante una muestra por conveniencia de estudiantes de ciencias de la salud de dos universidades costarricenses. Los datos se recolectaron a

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través de una encuesta en línea realizada en octubre de 2023, distribuida a todos los estudiantes elegibles (tasa de respuesta: 30,16%; muestra final: $n = 361$; edad promedio = $23,61 \pm 5,30$ años). Se excluyó a participantes menores de 18 años. Se realizó un Análisis Factorial Confirmatorio para evaluar el ajuste de distintos modelos. Resultados: Tras la reespecificación del modelo se encontró un ajuste adecuado a la estructura de 3 factores ($\chi^2 = 240$, $df = 72$, $p < .001$; $CFI = .90$, $TLI = .88$, $RMSEA = .08$, $SRMR = .06$). Conclusión: El modelo reespecificado de tres factores demostró ser una mejor solución que el modelo tradicional unifactorial en el caso de los estudiantes de carreras relacionadas con la salud. Se discute finalmente la concordancia entre las designaciones utilizadas para los tres factores y el modelo teórico original del instrumento.

RESUMO

Objetivo: Avaliar a validade de construto e a confiabilidade da Escala de Avaliação da Capacidade de Autocuidado em universitários de cursos relacionados à saúde. Material e Método: Utilizou-se um desenho instrumental por meio de uma amostra à conveniência de estudantes de Ciências da Saúde de duas universidades da Costa Rica. Os dados foram coletados por meio de uma pesquisa on-line realizada em outubro de 2023, distribuída a todos os estudantes elegíveis (taxa de resposta: 30,16%; amostra final: $n = 361$; média de idade = $23,61 \pm 5,30$ anos). Participantes menores de 18 anos foram excluídos. Em seguida, realizou-se uma Análise Fatorial Confirmatória para avaliar o ajuste entre os diferentes modelos. Resultados: Após a reespecificação do modelo, foi encontrado um ajuste adequado à estrutura de 3 fatores ($\chi^2 = 240$, $df = 72$, $p < .001$; $CFI = .90$, $TLI = .88$, $RMSEA = .08$, $SRMR = .06$). Conclusão: O modelo reespecificado de três fatores demonstrou ser uma melhor solução do que o modelo tradicional unifatorial no caso dos estudantes de cursos relacionados à saúde. Finalmente, discute-se a concordância entre as designações utilizadas para os três fatores e o modelo teórico original do instrumento.

INTRODUCTION

University students are in a process of development characterized by new responsibilities and challenges that impact on their physical, mental and social well-being⁽¹⁾, while evidence shows that students with healthier self-care behaviors report improved sleep quality, increased physical activity, and better nutritional habits⁽²⁾. A meta-analysis of data from 29 different studies found that burnout among university students negatively affects their academic performance⁽³⁾ and predicts higher levels of depression⁽⁴⁾. Self-care practices are associated with lower levels of both burnout⁽⁵⁾ and depression^(2, 6) and play an important role in how students manage academic stress⁽⁷⁾. This relationship is particularly relevant in health sciences programs, where female students - who report higher levels of academic stress⁽⁸⁾, constitute most of the student population. Additionally, various studies have raised concerns about the mental health indicators of students in the Health Sciences⁽⁹⁾.

Orem's Self-Care Deficit Theory is one of the most widely recognized theories in Health Sciences and especially in Nursing Science⁽¹⁰⁾. Self-care is a fundamental aspect of any health-

care system which, in the case of college students, closely relates to the actions that they take to care of themselves. This theory evaluates patients' awareness of their health needs while promoting a holistic view of self-care⁽¹¹⁾. From Orem's perspective, the concept of self-care as a behavior aims at regulating factors that affect one's own development and functioning during specific life situations, for the benefit of one's life, health, or well-being⁽¹²⁾.

Orem's Self-Care Deficit Theory serves as the theoretical foundation for the Appraisal of Self-Care Agency Scale. Originally developed in English, the scale comprises 24 generic items that assess whether an individual can meet their self-care needs⁽¹³⁾. Although it was originally conceived as a unidimensional instrument, the underlying dimensions of the scale have not been clearly defined in the Latin American^(14, 15) and Costa Rican contexts^(16, 17). Díaz de León et al.⁽¹⁴⁾ compared various unifactorial and three-factor models for the instrument with Mexican adolescents, demonstrating a better factorial solution with a three-factor structure based on a reduced 14-item version of the instrument. In Costa Rica, only exploratory psychometric

studies^(16,17) have provided evidence for structures composed of five factors. Hence, it is necessary to conduct a confirmatory psychometric study with a Costa Rican sample to provide more evidence for the validity of the Appraisal of Self-Care Agency Scale, one of the most widely used instruments in Nursing Sciences.

This study is expected to strengthen the operational and empirical foundation of the theory within the Latin American region. Previous research has established a robust association between self-care assessment and self-care actions⁽¹⁸⁾, suggesting that an evidence-based use of this brief instrument could enhance clinical practice by several aspects, such as evaluating a patient's recovery risk, supporting more reliable decision-making regarding care plans, and guiding tailored educational interventions based on individual self-care levels. The quality of research, as well as the information obtained and the decisions based on that information, directly depend on the quality of the instruments used. Instruments with inadequate properties can harm examined individuals and other parties based on these decisions. It is therefore essential that these instruments have sufficient validity for their intended purposes⁽¹⁹⁾.

All the above justifies the importance of evaluating the psychometric properties of this instrument, especially since it appears to exhibit different behaviors based on various characteristics of the sample⁽²⁰⁾. Given the challenges faced by Health Sciences students in general, the objective of this article was to evaluate the construct validity and reliability of the Appraisal of self-care agency scale in university students pursuing health-related careers.

MATERIAL AND METHOD

Design: This research adheres to a post-positivist paradigm. A non-experimental instrumental design was used to analyze the psychometric properties of the instrument⁽²¹⁾ with a correlational scope and a quantitative approach, organized sequentially.

Participants: The study population in this case consists of students of Health Sciences in

Costa Rica. In this sense, the sample included 361 university students: 260 (72%) from the Universidad de Iberoamérica (UNIBE) and 101 (28%) from the Occupational Health Engineering program at the Universidad Técnica Nacional (UTN), with an overall average age of 23.61 ($SD= 5.30$). The latter group was included in the study to account for bias that could arise from having all students from a single university with its specific characteristics, as well as to include students from the public system. Students from UTN were significantly older than those from UNIBE ($t(359)= 5.94, p= .01$), with a mean age of 26.15 ($SD= 7.44$). Twenty-eight percent of the students were enrolled in an Occupational Health and Environment Engineering program, 24.6% in Pharmacy, 23.8% in Psychology, 13.3% in Medicine, and 10.2% in Nursing. On average, the students were in the sixth semester of their program ($SD= 3.28$). Eighty percent of the participants were women and 19.4% were men. In the Occupational Health and Environment Engineering program, 76.2% of the participants were women. For other Health Sciences disciplines, this percentage rose to 82.3%.

As an inclusion criterion, any student enrolled in the respective semester of the university programs detailed below was considered. The only exclusion criterion was the student's age (below 18), which was explicitly stated in the informed consent form and reconfirmed during questionnaire administration.

Instruments: A series of questions were used to gather sociodemographic data such as gender, age, program, and level of progress within the program. The Appraisal of Self-Care Agency Scale (ASAS) was originally created to assess whether individuals consider themselves able to meet their self-care needs⁽¹³⁾. In the Latin American context, the 14-item version of the scale demonstrates a good model fit⁽¹⁴⁾ (ASA-3F). The authors provided evidence supporting the structural validity of this measure ($\chi^2= 147.70, df= 74, p< .001$; CFI= .912, SRMR= .07, y RMSEA= 0.061), however, they found internal consistency below .70 for its factors (ranging from .57 to .67). No additional item-level adjustments, data cleaning procedures, or preliminary analyses were undertaken in this regard.

Data collection procedures: Data were collected using an online questionnaire through the Lime Survey platform, which did not allow the questionnaire to be completed without answering all the questions, thus avoiding missing data.

For the data collection the link was sent to all students in the Psychology, Medicine, Nursing and Pharmacy degree programs at UNIBE and Occupational Health at UTN via the university's official communication channels of each program in October 2023, for a total of 1197 students, thus obtaining a response rate of 30.16%.

Data analysis procedures: Descriptive statistics were computed. To seek evidence of validity based on the structure of the instrument, multivariate statistical analysis, specifically Confirmatory Factor Analysis, was employed to demonstrate that the empirical covariation of the items reflects the model. This was conducted using the statistical software Jamovi.

For the model fit indicators, the Comparative Fit Index (CFI) was used, which is considered acceptable when it is equal to or greater than .90⁽²²⁾. Additionally, the Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) were used. Both are considered adequate if they are less than or equal to .08⁽²³⁾. Regarding the recommended sample size for the analyses conducted, various authors suggest that either 200 participants or between 5 and 10 cases per parameter is adequate for evaluating model fit through Confirmatory Factor Analysis⁽²⁴⁾. Both assumptions would be satisfactorily met with the 24-item version of the scale. Regarding its implementation, the Confirmatory Factor Analysis was applied under statistical assumptions, including the use of interval scales, multivariate normal distribution, a linear model, and homoscedasticity with independent errors⁽²⁵⁾.

Cronbach's Alpha and McDonald's Omega were used to assess the reliability of the factors. Student's t-test and analysis of variance (ANOVA) were performed to examine significant differences across the measures based on various sample characteristics with a significance level of 0.05⁽²⁶⁾.

Ethical considerations: The project was reviewed

by the Ethics Committee of the Universidad de Iberoamérica, which approved it during its 38-2023 session. This research was conducted in accordance with international research ethics guidelines (CIOMS)⁽²⁷⁾, as well as the Costa Rican regulations, following Biomedical Research Regulation Law 9234 and Decree 39533-S. Each participant was provided with the questionnaire along with the informed consent form, emphasizing the voluntary nature of participation and ensuring anonymity and confidentiality regarding the provided data as well as its use solely for academic research purposes.

RESULTS

Inadequate model fit was obtained by testing the original unidimensional model fit of the instrument ($\chi^2= 1023$, $df= 252$, $p< .001$; $CFI= .73$, $TLI= .71$, $RMSEA= .09$, $SRMR= .08$). Thereafter, the five-factor models proposed by Leiva et al.^(16, 17) for Costa Rican samples were tested. Both solutions showed unsatisfactory fit in the study sample, in relation to the authors' initial proposal ($\chi^2= 780$, $df= 242$, $p< .001$; $CFI= .81$, $TLI= .79$, $RMSEA= .08$, $SRMR= .07$)⁽¹⁶⁾, and the model subsequently proposed for populations with chronic illnesses ($\chi^2= 871$, $df= 243$, $p< .001$; $CFI= .78$, $RMSEA= .08$, $SRMR= .07$)⁽¹⁷⁾.

Thus, the best solution found by Díaz de León et al.⁽¹⁴⁾ among the different models for the instrument in Mexican adolescents was tested. This proposal involved 14 items to form a three-factor instrument, which resulted in a better fit than the previously evaluated models, although it still did not constitute an adequate fit to the data ($\chi^2= 312$, $df= 74$, $p< .001$; $CFI= .86$, $TLI= .83$, $RMSEA= .09$, $SRMR= .06$). Thus, the model was re-specified by covarying the errors of Items 14 and 15, as well as those of Items 18 and 19, which ultimately resulted in an adequate fit ($\chi^2= 240$, $df= 72$, $p< .001$; $CFI= .90$, $TLI= .88$, $RMSEA= .08$, $SRMR= .06$). The comparisons between the fit indices of the different models are presented in Table 1.

The results for the re-specified three-factor model are presented in greater detail in Table 2. The mean of the ASA-3F was 3.76 (SD= .68), with the 25th percentile at a score of 3.29 and the

75th percentile at 4.29. The internal consistency coefficients and descriptive statistics for the three factors are presented in greater detail in Table 3.

No significant differences in self-care were found by gender, both in the overall measure and

factors. In contrast, a significant relationship was found between self-care and age ($r = .14$, $p = .01$), indicating that higher self-care is associated with older age. An exception was found with the third factor, where no significant relationship was observed.

Table 1. Fit Indices for the Estimated ASA Models in Costa Rican Health Sciences Students, October 2023 (n = 361).

Estimated Model	χ^2	(gl)	p	CFI	RMSEA	SRMR
One-factor model (24 ítems)	1023	252	.001	.73	.09	.08
Five factor model(16)	780	242	.001	.81	.08	.07
Five factor model(17)	871	243	.001	.78	.08	.07
Three factor model(14)	312	74	.001	.86	.09	.06
Re-specified three factor model(14)	240	72	.001	.90	.08	.06

Table 2. Items and standardized factor loadings for the ASA-3F in Costa Rican Health Sciences Students, October 2023 (n = 361).

Factor designation	Items	β
Habilidades estimativas (estimation skills)	1. A medida que cambian las circunstancias de mi vida, yo voy haciendo ajustes para mantener mi salud	.670
	9. Para mantener el peso que me corresponde, hago cambios en mis hábitos alimenticios	.543
	14. Cuando obtengo información sobre mi salud, pido explicaciones sobre lo que no entiendo	.590
	15. Yo examino mi cuerpo para ver si hay algún cambio	.592
	16. He sido capaz de cambiar hábitos que tenía muy arraigados con tal de mejorar mi salud	.783
Operaciones productivas (productive operations)	5. Hago en primer lugar lo que sea necesario para mantenerme con salud	.721
	7. Yo puedo buscar mejores acciones para cuidar mi salud que las que tengo ahora	.295
	18. Soy capaz de tomar medidas para garantizar que mi familia y yo no corramos peligro	.533
	19. Soy capaz de evaluar qué tanto me sirve lo que hago para mantenerme con salud	.640
	21. Si mi salud se ve afectada, yo puedo conseguir la información necesaria sobre qué hacer	.517
Recursos personales (personal resources)	10. Cuando hay situaciones que me afectan, me manejo de manera que pueda mantener mi forma de ser	.592
	13. Puedo dormir lo suficiente como para sentirme descansado	.668
	23. Puedo sacar tiempo para mí	.765
	24. Aun cuando tuviera dificultades para movilizarme, sería capaz de cuidarme como a mí me gusta	.548

Table 3. Internal consistency coefficients and descriptive statistics for the ASA-3F factors in Costa Rican health sciences students, October 2023 (n = 361).

Factor	Items	n	α	ω	M	DE	1	2	3
Factor 1	1, 9, 14, 15 y 16	361	.77	.77	3.76	.83	—		
Factor 2	5, 7, 18, 19 y 21	361	.72	.74	4.02	0.69	.68***	—	
Factor 3	10, 13, 23 y 24	361	.72	.74	3.44	.87	.56***	.57***	—

* $p < .05$ / ** $p < .01$ / *** $p < .001$ / Mín.= 1/ Máx.= 5.

After conducting Levene's test and assuming homogeneity of variances, the only difference based on the respective Health Sciences programs was found between Occupational Health and Nursing programs, with students in the latter showing significantly higher levels ($F(4) = 2.62$, $p < .04$). No significant differences were found when comparing individual factors. Finally, no significant relationships were found between self-care and academic level (progress within the program), either overall or in relation to individual factors.

DISCUSSION

The objective of this research was to evaluate the psychometric properties of the Appraisal of Self-care Agency Scale (ASAS) among university students in health-related fields. There is no evidence supporting the adequacy of the original unidimensional version of the instrument for use with university students in the Health Sciences in Costa Rica. The same applies to solutions for the instrument proposed by Leiva et al.^(16, 17). The only solution that has shown a good fit to the data is the 14-item version of the instrument distributed into three factors (ASA-3F)⁽¹⁴⁾. However, re-specification was performed by covarying the errors of Items 14 and 15, as well as Items 18 and 19. In contrast to the low reliability reported for the factors in the comparative study conducted with Mexican adolescents⁽¹⁴⁾, the present study found reliability coefficients exceeding .72 for the factors, as measured by both Cronbach's alpha and McDonald's omega, positioning the ASA-3F as the most robust option for a widely used instrument for assessing self-care in Latin America.

It is important to note that an instrument may demonstrate adequate reliability in one context, but not in another⁽²⁸⁾. These differences between both studies may stem from variations in age, educational level, and health sciences knowledge; attributes more closely related to self-care^(29, 30). However, it should be noted that validation articles aim to provide evidence for the validity of a theoretical construct. In other words, the goal is to seek correspondence between the theoretical model and the data found⁽³¹⁾. While it is true that model fit indices and other psychometric indicators are adequate to previously established standards or cut-off points in the literature, clarity about the theory behind the instrument is a fundamental element of validity⁽³²⁾, which constitutes a central pursuit of this investigation.

As the validity of an instrument is not determined solely by data from statistical analyses⁽¹⁹⁾, without a clear theoretical model, it is challenging to argue that the measure accurately assesses what it claims to measure through its factors.

A necessary aspect to discuss regarding the measure is the influence of Orem's theory on the authors' 14 item solution designation of factors⁽¹⁴⁾. In this regard, the use of the term proactivity in the designation of the first factor by the original authors and self-satisfaction for the third factor do not pertain to the conceptual or theoretical framework of Orem's Self-Care Deficit Theory and introduce terms that are external to it.

The Self-Care Deficit Theory encompasses two fundamental elements^(33, 34): 1) self-care estimation and 2) productive self-care operations. Self-care estimation is based on specific personal skills; on the other hand, productive self-care

operations would involve skills for organizing relevant personal and environmental resources for self-care.

Considering that factor designations should, as much as possible, adhere to the terminology of their theoretical framework and fundamental elements, it is considered more appropriate to name the first factor estimation skills and the third factor personal resources (for self-care). For the second factor, the designation "self-care capacity" is seen as too broad and potentially confusing regarding what the instrument measures. The designation "Productive Operations" (for self-care) appears to be more suitable.

Thus, it is ultimately considered that the ASA-3F assesses the extent to which an individual believes they can meet their self-care needs⁽¹³⁾; which is measured through three aspects: 1) estimation skills, 2) productive operations, and 3) personal resources. By linking the theoretical model of the instrument to the statistical indicators of the model, it is possible to substantiate that the ASA-3F for Costa Rican university students in Health Sciences programs constitutes a valid and reliable measure.

With respect to the predominant female representation in the sample (80%), this distribution does not constitute a methodological bias but rather corresponds to the documented gender distribution among international trends in health sciences education, where female representation exceeds 70% of the field⁽³⁵⁾.

Nevertheless, the post-positivist epistemological framework guiding this study acknowledges that observations cannot be entirely objective, as they are inherently influenced by values⁽³⁶⁾ and are context dependent. Consequently, while empirical and statistical methods were employed, the findings remain subject to fallibility⁽³⁷⁾. In this regard, caution is advised when considering broader applications. The purposive sampling approach precludes claims of representativeness, and the gender imbalance may limit generalizability to other populations and contexts. Future research should examine the instrument's psychometric properties in more diverse cultural and gender-balanced contexts to further establish its cross-population validity.

Finally, another limitation of this study is the

absence of additional psychometric instruments to assess external validity, either through scales measuring self-care or scales evaluating similar constructs. Consequently, the validity evidence for this instrument could be further refined or expanded in future research.

CONCLUSION

The only solution that has shown a good fit to the data of university students from health-related sciences in Costa Rica is the 14-item version of the instrument, distributed into three factors (ASA-3F) in which items 14 and 15, as well as 18 and 19, were re-specified. According to this theory, this instrument measures the extent to which an individual believes they can meet their self-care needs, which is assessed through three aspects: 1) estimative skills, 2) productive operations, and 3) personal resources, designations reworked to better align with Orem's theory. In addition, each of the three factors in this version has demonstrated adequate reliability independently.

However, it is still necessary to provide external validity evidence for the ASA-3F in Costa Rica by applying this instrument alongside other tools to measure self-care or similar constructs. Additionally, it should be noted that this instrument has various factorial solutions for different populations, which have been previously highlighted in literature as a characteristic to consider regarding the structural variability of the measure.

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Responsibility of the author:

Rafael Román-Quirós: Conception and design of the work, data collection and acquisition, analysis and interpretation of results, manuscript writing, critical revision of the manuscript and approval of the final version.

Priscilla Meza-Castro: Conception and design of the work, manuscript writing, critical revision of the manuscript and approval of the final version.

David Torres-Fernández: Critical revision of the manuscript, approval of the final version and technical and methodological assistance.

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