

The Acute Stress Scale in Healthcare Professionals Caring for Patients with COVID-19. Validation Study

José Joaquín Mira (✉ jose.mira@umh.es)

<https://orcid.org/0000-0001-6497-083X>

Angel Cobos

San Cecilio Clinical University Hospital

Olga Martínez García

San Cecilio Clinical University Hospital

Maria Jose Bueno Domínguez

SAGESSA Group

María Pilar Astier-Peña

"La Jota" Health Center

Pastora Pérez Pérez

Spanish Society for Quality of Care

Irene Carrillo

Universidad Miguel Hernandez de Elche

Mercedes Guilabert

Universidad Miguel Hernandez de Elche

Maria Virtudes Perez Jover

Universidad Miguel Hernandez de Elche

Cesar Fernandez Peris

Universidad Miguel Hernandez de Elche

Maria Asuncion Vicente Ripoll

Universidad Miguel Hernandez de Elche

Matilde Lahera Martin

Servicio Navarro de Salud - Osasunbidea

Carmen Silvestre Busto

Servicio Navarro de Salud - Osasunbidea

Susana Lorenzo Martínez

Hospital Universitario Fundacion Alcorcon

Ascension Sanchez Martinez

General University Hospital Reina Sofia

Jimmy Martin Delgado

Fundacio per al Foment de la Investigacio Sanitaria i Biomedica <https://orcid.org/0000-0003-4384-9197>

Aurora Mula

Fundacio per al Foment de la Investigacio Sanitaria i Biomedica

Bárbara Marco-Gomez

Calatayud Health Area

Cristina Abad-Bouzan

Calatayud Health Area

Carlos Aibar-Remon

Hospital Clinico Universitario Lozano Blesa

Jesús Aranaz-Andres

Hospital Universitario Ramon y Cajal

Research article

Keywords: SARS-CoV-2 virus, CoVID-19 outbreak, medical staff, Acute stress, Moral Injury, Post-traumatic stress

Posted Date: July 16th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-39710/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: This study designed and validated a scale to measure acute stress experienced during the care of patients with COVID-19 (EASE scale).

Methods: The COSMIN recommendations were followed in the design and validation of the EASE scale. Internal consistency was calculated using Cronbach's Alpha and McDonald's Omega. Qualitative research was conducted to assess content validity. Exploratory and Confirmatory Factorial Analysis were used to assess construct validity. Mann-Whitney-Wilcoxon test and Lineal Regression were applied to assess criterion validity. Responsiveness and interpretability were also assessed.

Results: A total of 228 health professionals from the Spanish public health system responded to the ten items, of the EASE scale. Internal consistency was 0.87 (McDonald's Omega). Two factors explaining 55% of the variance were isolated. Goodness-of-fit indices confirmed this factor structure. The highest level of stress was found among professionals working in health services who accumulated a higher number of deaths from COVID-19 ($P < .05$). By means of translation-counter-translation, it was adapted to Latin American Spanish, Brazilian Portuguese, and English.

Conclusions: EASE gathers adequate metric properties. Its systematic use would allow the identification of professionals with a higher risk of developing affective/anxiety disorders and Moral injury that could limited that patients received safety and integrated care.

Background

The rate of reproduction, lethality and social alarm that accompanies SARS-CoV-2 (1, 2) poses a challenge to health systems in all countries. The Spanish health system has been overwhelmed by the number of patients with COVID-19, as of May 26th, 236.259 cases and 27.117 deaths. In addition, 20.4% of COVID-19 patients were health professionals (3).

The physical and mental effort involved in caring for patients with COVID-19 has caused acute stress, compassionate fatigue, and other affective pathologies which, together with psychosomatic reactions, have affected work morale (4–6). Integrated care has been jeopardized. Healthcare professionals have been reassigned to areas where they have no expertise or preparation, protocols made overnight and constantly changing and continuity of care interrupted at all levels.

Under these conditions, healthcare has been compromised (7). Secondary and tertiary prevention (effects in the 6 months at the end of the current care pressure) is difficult because most of these professionals are reluctant to seek help (8).

The aim of this study was to design and validate a self-applied Acute Stress Scale for those people who were in direct care of patients with COVID-19 (EASE). The utility of this instrument focuses on facilitating awareness of the level of stress endured in order to assess the impact of organizational changes in the

healthcare systems to cope with the professionals' Moral Injury (9) as consequence of limited resources available to treat patients during the first times of this pandemic and the interrupted care for Non-COVID19 patients, and contribute to secondary prevention of emotional and anxiety responses once the critical phase of the pandemic is over.

Methods

The study was conducted between March 20 and April 19, 2020 in Spain. Healthcare providers could reply using a website page and a mobile app (Fig. 1).

This study design and validation procedure followed COSMIN (10) recommendations considering reliability, validity, responsiveness, and interpretability. This study was approved by the Research Commission of the Sant Joan D'Alacant University Hospital.

Participants. A convenience sample of physicians, nurses, and other health personnel. The sample size was adjusted according to the number of items (maximum of 10), applying the criterion of a minimum of 20 subjects with valid responses per item. To preserve complete anonymity, no information on age or experience in the workplace was requested.

Reliability. Internal consistency was calculated using Cronbach's Alpha and McDonald's Omega. A value greater than .70 was considered acceptable for this analysis.

Content validity. A pragmatic literature review of items assessing acute stress in healthcare professionals was conducted for possible inclusion. Eight physicians, four nurses, five psychiatrists, six psychologists and 10 safety responsible from 10 hospitals and four health centres participated collecting and grouping by similarity the categories of problem situations (content validity). These professionals presented the resulting scale to colleagues to assess their representativeness and understanding (Face Validity). They also assessed the understanding of the response options (four-point-scale).

Construct validity. Exploratory factor analysis (EFA) was used to determine the factorial structure of this scale (Construct Validity). The Principal Components technique followed by Varimax rotation was applied. Eigen values greater than .40 and factor loading greater than .5 were considered an acceptable level of missing data. The suitability for this EFA of the inter-item correlation matrix was calculated using the Bartlett's Sphericity test and the Kaiser-Meyer-Olkin test. Additionally, a confirmatory factor analysis (CFA) was used to confirm the underlying structure, estimating several fit indices to test which CFA model best represented the dataset.

The translation-counter-translation method was used to ensure equivalence between the Latin American Spanish, Brazilian Portuguese and English versions (cross-cultural validity).

Criterion validity. Using the Mann-Whitney-Wilcoxon test and linear regression analysis, Enter Method, the capacity to classify the responses of the professionals in the EASE was assessed, according to the

number of deaths registered in the geographical area where the health centre was located during the period from March 10 to April 19.

Responsiveness. We compared the EASE scores in two different periods of the evolution of the pandemic (March 25 to April 1, and between April 14 and 19, 2020) marked by a different daily number of cases and deaths by COVID-19 (between 800–900 versus < 500/deaths per day). The data published by the Ministry of Health on 22 April 2020 were taken as a reference.

Results

A total of 228 health professionals responded. Forty-two per cent were physicians, 28 per cent were nurses and 30 per cent were health support staff (nursing assistants and care attendants). They mostly worked in Madrid (28.9%), Andalusia (21.9%), Valencia (17.5%) and Catalonia (6.6%).

Content and Face Validity. The most relevant sources of acute stress, pointed out by the professionals experiences were: constant changes in instructions; shortage of material to avoid contagion; reduction in the number of staff due to risk exposure or contagion; bitter feelings when seeing patients die lonely; fear of infecting their families; making decisions reserved for situations of major catastrophes with a high component of ethical conflict; and the passing away of colleagues. These issues were represented into 17 possible reactive items. This number was finally reduced to 10 items (version 0 of the scale) once participants considered their representativeness and comprehension (Supplementary material).

Reliability. Internal consistency values were adequate, Cronbach's Alpha score was .85 and McDonald's Omega was .87.

Construct Validity. Two factors explaining 55% of the variance were isolated by EFA. The first factor measured affective responses and the second fear and anxiety responses. The CFA, in the second stage of the study, indicated an acceptable fit to the data (Table 1, Fig. 2).

Table 1
Acute Stress Scale in professionals in care of patients with COVID-19. Construct Validity

Items	Mean ^a (CI 95%)	SD	Factor 1 Affective responses	Factor 2 Fear and anxiety responses
I keep my distance, I resent dealing with people, I am irascible even at home.	1.1 (1.0– 1.2)	0.9	0.83	
I have completely lost the taste for things that used to bring me peace of mind or well-being.	1.1 (1.0– 1.2)	0.9	0.72	
I feel that I am neglecting many people who need my help	0.9 (0.8– 1.0)	0.9	0.71	
I cannot help but think of recent critical situations. I can't get out of work.	1.3 (1.2– 1.4)	0.1	0.60	
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	0.9 (0.8– 1.0)	0.9	0.58	
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anaesthesia).	0.7 (0.6– 0.8)	0.9	0.48	
Worrying about not getting sick causes me a strain that is hard to bear.	0,8 (0,7– 0,9)	0.9		0.86
I am afraid I'm going to infect my family.	1,3 (1,2 – 1,4)	1.0		0.70

N = 228

^aRange of scores from 0 to 3

Method of extraction: Main components. Rotation: Varimax with Kaiser Standardization.

Goodness-of-fit indices. CFI-Comparative Fix Index; AGFI- Jöreskog-Sörbom Fit Index-Goodness of Fix Index; SRMR- Standardised Root Mean Square Residual; GFI- Jöreskog-Sörbom Fit Index Goodness of Fix Index; NFI- Normed Fit Index

Items	Mean ^a (CI 95%)	SD	Factor 1 Affective responses	Factor 2 Fear and anxiety responses
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues or myself at risk.	0,9 (0,8– 1,0)	0.9		0.66
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	1,0 (0,9– 1,1)	0,9		0.55
Total score directly on the scale	10.0 (9.2– 10.8)	6.1		
Factor 1. Affective response	6.0 (5.5– 6.5)	3.9		
Factor 2. Fears and anxiety	4.0 (3.6– 4.4)	2.8		
Variance explained (%)			29.5	25.5
Total variance (%)			55.0	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)			0.88	
Barlett's test of sphericity			P < 0.001	
Goodness-of-fit indices				
Absolute adjustment rates		SRMR	0.06	
		GFI	0.92	
		AGFI	0.90	

N = 228

^aRange of scores from 0 to 3

Method of extraction: Main components. Rotation: Varimax with Kaiser Standardization.

Goodness-of-fit indices. CFI-Comparative Fix Index; AGFI- Jöreskog-Sörbom Fit Index-Goodness of Fix Index; SRMR- Standardised Root Mean Square Residual; GFI- Jöreskog-Sörbom Fit Index Goodness of Fix Index; NFI- Normed Fit Index

Items	Mean ^a (CI 95%)	SD	Factor 1 Affective responses	Factor 2 Fear and anxiety responses
Relative adjustment rates		NFI	0.90	
		CFI	0.93	
N = 228				
^a Range of scores from 0 to 3				
Method of extraction: Main components. Rotation: Varimax with Kaiser Standardization.				
Goodness-of-fit indices. CFI-Comparative Fix Index; AGFI- Jöreskog-Sörbom Fit Index-Goodness of Fix Index; SRMR- Standardised Root Mean Square Residual; GFI- Jöreskog-Sörbom Fit Index Goodness of Fix Index; NFI- Normed Fit Index				

Cross-cultural validity for the version of the scale is shown in supplementary material (Latin American Spanish, Brazilian Portuguese and English version).

Criterion validity

Scores were higher among professionals working in health services that accumulated a higher number of deaths (10.6, CI 95% 9.5–11.7 vs 8.2, CI 95% 6.5–9.9) ($P < .05$). Lethality rate was positively related to the EASE scores (Beta coefficient 1.07, CI 95% 1.00–1,15, $P < .05$). (Table 2)

Table 2
Acute Stress Scale in professionals in care of patients with COVID-19. Criterion validity and Responsiveness

Items	Mean ^a (CI 95%)			
	First period 800–900 deaths per day ^b	Second period < 500 deaths per day ^b	Geographical area more impact ^c	Geographical area less impact ^c
I can't help but think of recent critical situations. I can't get out of work (V1)	1.5 (1.2–1.8)	0.8 (0.4–1.2)	1.4 (1.2–1.6)	1.2 (0.9–1.5)
I have completely lost the taste for things that gave me peace of mind (V2)	1.5 (1.2–1.8)	1.2 (0.8–1.6)	1.2 ^d (1.1–1.3)	0.8 ^d (0.5–1.1)
I keep my distance, I resent dealing with people, I'm irascible even at home (V3)	1.6 ^d (1.0–2.2)	0.8 ^d (0.4–1.2)	1.2 (1.0–1.4)	0.9 (0.6–1.2)
I feel that I am neglecting many people who need my help (V4)	1.3 (0.7–1.9)	0.8 (0.4–1.2)	0.9 (0.8–1.0)	0.8 (0.5–1.1)
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage (V5)	1.5 ^d (0.9–2.1)	0.6 ^d (0.2–1.0)	1.0 (0.8–1.2)	0.7 (0.4–1.0)
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis. (V6)	1.5 (0.9–2.1)	1.1 (0.7–1.5)	1.1 (0.9–1.3)	0.8 (0.5–1.1)
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues or myself at risk (V7)	1.6 (0.8–2.4)	0.8 (0.4–1.2)	0.9 (0.7–1.1)	0.6 (0.4–0.8)
Worrying about not getting sick causes me a strain that is hard to bear (V8)	1.1 (0.4–1.8)	0.7 (0.3–1.1)	0.9 (0.8–1.0)	0.6 (0.3–0.9)

N = 228

^a Range of scores from 0 to 3

^b Two subsamples are obtained considering period between 25/03/2020, 28/03/2020 and 01/04/2020 between 800–900 deaths and second period less than 500 deaths per day between 14/04/2020, 18/04/2020 and 19/04/2020S

^c Two subsamples are obtained considering: geographical areas with higher mortality per 1000 inhabitants (Madrid, Catalonia, Basque Country, Aragon, Castile and Leon and Valencia) as the most affected geographical areas (more than 1000 deaths) and considering Asturias, Canary Islands, La Rioja, Murcia and Navarre as the least affected geographical areas (less than 1000 deaths)

^d p < .05

Items	Mean ^a (CI 95%)			
	First period 800–900 deaths per day ^b	Second period < 500 deaths per day ^b	Geographical area more impact ^c	Geographical area less impact ^c
I'm afraid I'm going to infect my family (V9)	1.3 (0.8–1.8)	0.9 (0.5–1.3)	1.4 (1.2–1.6)	1.3 (1.0–1.6)
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anaesthesia) (V10)	1.4 (0.6–2.2)	0.6 (0.1–1.1)	0.7 (0.6–0.8)	0.6 (0.3–0.9)
Total score (scale 0–30)	14.3 ^d (10.5–18.1)	8.3 ^d (5.3–11.3)	10.6 ^d (9.5–11.7)	8.2 ^d (6.5–9.9)
N = 228				
^a Range of scores from 0 to 3				
^b Two subsamples are obtained considering period between 25/03/2020, 28/03/2020 and 01/04/2020 between 800–900 deaths and second period less than 500 deaths per day between 14/04/2020, 18/04/2020 and 19/04/2020S				
^c Two subsamples are obtained considering: geographical areas with higher mortality per 1000 inhabitants (Madrid, Catalonia, Basque Country, Aragon, Castile and Leon and Valencia) as the most affected geographical areas (more than 1000 deaths) and considering Asturias, Canary Islands, La Rioja, Murcia and Navarre as the least affected geographical areas (less than 1000 deaths)				
^d p < .05				

Responsiveness. The EASE score was higher in the first period (25 March to 1 April) compared to the second period (14 to 19 April 2020), in which the number of deaths per day decreased by half (14.3, CI 95% 10.5–18.1 vs 8.3, CI 95% 5.3–11.3) (P < .05). (Table 2)

Interpretability. The following score ranges were established: 0–9 points, good emotional adjustment; 10–14 points, emotional distress; 15–24 points, medium-high emotional overload; > 25 points, extreme acute stress. Most of the respondents were in the first range (50.4%), 28.9% in the second. Only 2.6% were in the fourth bracket.

Discussion

This instrument has adequate metric properties and seems useful for professionals to become aware of their level of stress supported caring COVID-19 patients. The average level of self-reported stress was between 9 and 11 points up to 30. This level of distress was measured during the phase of an

unprecedented care pressure. In this period there was relevant organizational changes, uncertainty about the evolution of patients, a lack of personal protective equipment and the number of professionals infected increased. It is expected that by decreasing this pressure the emotional response of the professionals will increase as they become fully aware of their experience (9, 11).

In the forthcoming months we can expect professionals be affected by the so-called Moral Injury as consequence of having seen their professional codes violated (9) due to insufficient resources to care for COVID-19 patients, contradictory instructions or the interruption in continuity of care of other non COVID19 patients. Also, we can expect an increase of affective and anxiety reactions and symptoms, including in some cases post-traumatic stress among the professionals who saw their health and that of their loved ones threatened (12, 13). This scale can help to identify and prevent such progression in health professionals, the second victims of SARS-CoV-2. Its mayor utility is expected in the next 3 to 6 months after the worst of the current health crisis has been overcome.

These same professionals should continue to care for patients with COVID-19, patients with sequelae from COVID-19 and all patients whose care processes have been interrupted during the acute phase of the pandemic. In this scenario, if rapid action is not taken, the capacity of professionals and therefore the quality and safety of patients may be compromised.

This scenario may be a valuable opportunity to consolidate integrated care, now it's the time to consider appropriate strategies to introduce measures to increase well-being at work, strengthen clinical leadership, and commit to a model such as the Quadruple Aim that invites consideration of patient outcomes as dependent on how caregivers are cared for.

The Quadruple Aim recognizes this focus within the context of the broader transformation required in our healthcare system towards high value care. While the first three aims provide a rationale for the existence of a health system (14), the fourth aim becomes a foundational element for the other goals to be realized (15). The key is the fourth aim: creating the conditions for the healthcare workforce to find joy and meaning in their work and in doing so, improving the experience of providing care (16). For this reason, it seems that "caring for the caregiver" (17) is necessary in the transformation of the health system and having instruments to be able to monitor the effects of measures implemented can be very useful: "caring for the caregiver in times of pandemic".

A limitation of this study is that it does not discriminate between professional categories, nor does it consider separately critical services during this crisis such as Critical Care and Resuscitation, Internal Medicine, Pneumology and Infectious Diseases.

Conclusion

The EASE scale meets adequate metric properties to be considered a reliable and valid scale. Its usefulness can be twofold. To help professionals to become aware of the emotional overload supported

and, secondly, to measure the degree of affectation in order to avoid the progression towards more severe psychopathological conditions.

Abbreviations

COSMIN

Consensus-based Standards for the selection of health Measurement INstruments.

Declarations

Ethics approval and consent to participate: The study was approved by the Research Commission of the Sant Joan D'Alacant University Hospital (08/04/2020). Written informed consent was waived by the Research Commission in accordance with the Spanish Science Act, only verbal consent was necessary by participants.

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Acknowledgements: to all the health professionals who, faced with an unprecedented healthcare challenge, have taken a step forward to face this healthcare crisis.

José Joaquín Mira*, Alicante-Sant Joan Health Department, Miguel Hernández University, Alicante. **Ángel Cobos-Vargas, Olga Beatriz Martínez-García**, San Cecilio Clinical University Hospital, Granada. **M^a José Bueno-Domínguez**, SAGESSA Group, Reus. **Astier-Peña MP**, "La Jota" Health Centre, Zaragoza. **Pastora Pérez Pérez**, Spanish Society for Quality Care. **Irene Carrillo-Murcia, Mercedes Guilabert, Virtudes Pérez-Jover, César Fernández-Peris, M. Asunción Vicente-Ripoll**. Miguel Hernández University, Elche. **Matilde Lahera-Martín, Carmen Silvestre-Busto**, Osasunbidea, Pamplona. **Susana Lorenzo-Martínez**, Alcorcon Foundation University Hospital, Madrid. **Ascensión Sánchez-Martínez**, General University Hospital Reina Sofía, Murcia. **Jimmy Martín-Delgado, Aurora Mula**, FISABIO, Alicante. **Bárbara Marco-Gómez, Cristina Abad-Bouzan**, Calatayud Health Area, Zaragoza. **Carlos Aibar-Remón**, Lozano Blesa University Clinical Hospital, Zaragoza. **Jesús Aranaz-Andrés**, Ramón y Cajal University Hospital, Madrid.

Funding: none.

Consent for publication: Not applicable

Competing interest: authors declare no conflict of interest.

Authors contributions: JJM, IC, MG, AP, AC and PP designed the study. VP, OB, MJB, BM and CA reviewed literature and ALL describe experiences of front-line professionals. ALL contributed to re-defined and improved the scale and collected responses. CF and AV designed the platforms to collect responses. JM, AM participated in the analysis of data. JJM, IC, MG, JM prepared a first draft of this manuscript. ALL contributed and approved the final version of this manuscript.

References

1. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395:497–506.
2. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med*. 2020;382:727–33.
3. European Centre for Disease Prevention and Control. Coronavirus disease 2019 (COVID-19) in the EU/EEA and the UK – ninth update, 23 April 2020. Sweden: Stockholm; 2020.
4. Liu C-Y, Yang Y, Zhang X-M, Xu X, Dou Q-L, Zhang W-W. The Prevalence and Influencing Factors for Anxiety in Medical Workers Fighting COVID-19 in China: A Cross-Sectional Survey. *SSRN Electron J*. 2020.
5. Dai Y, Hu G, Xiong H, Qiu H, Yuan X. Psychological impact of the coronavirus disease 2019 (COVID-19) outbreak on healthcare workers in China. *medRxiv*. 2020;2020.03.03.20030874.
6. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Netw Open*. 2020;3:e203976.
7. Ibáñez-Vizoso JE, Alberdi-Páramo Í, Díaz-Marsá M. International Mental Health perspectives on the novel coronavirus SARS-CoV-2 pandemic. *Rev Psiquiatr Salud Ment*. 2020. doi:10.1016/j.rpsm.2020.04.002.
8. Siyu C, Xia M, Wen W, Cui L, Yang W, Liu S, et al. Mental health status and coping strategy of medical workers in China during The COVID-19 outbreak. *medRxiv*. 2020;2020.02.23.20026872.
9. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ*. 2020;m1211.
10. Mokkink LB, Terwee CB, Patrick DL, Alonso J, Stratford PW, Knol DL, et al. The COSMIN checklist for assessing the methodological quality of studies on measurement properties of health status measurement instruments: an international Delphi study. *Qual Life Res*. 2010;19:539–49.
11. Borges LM, Bahraini NH, Holliman BD, Gissen MR, Lawson WC, Barnes SM. Veterans' perspectives on discussing moral injury in the context of evidence-based psychotherapies for PTSD and other VA treatment. *J Clin Psychol*. 2020;76(3):377–91.
12. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. *The Lancet Psychiatry*. 2020;7:e15–6.
13. Kang L, Ma S, Chen M, Yang J, Wang Y, Li R, et al. Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: A cross-sectional study. *Brain Behav Immun*. 2020.
14. Berwick DM, Nolan TW, Whittington J. The Triple Aim: Care, Health, And Cost. *Health Aff*. 2008;27:759–69.
15. Sikka R, Morath JM, Leape L. The Quadruple Aim: care, health, cost and meaning in work. *BMJ Qual Saf*. 2015;24:608–10.

16. Bodenheimer T, Sinsky C. From Triple to Quadruple Aim: Care of the Patient Requires Care of the Provider. *Ann Fam Med.* 2014;12:573–6.
17. Karb R, Natsui S. Reflections: Addressing the Quadruple Aim in Social Emergency Medicine. *Ann Emerg Med.* 2019;74:31–2.

Figures

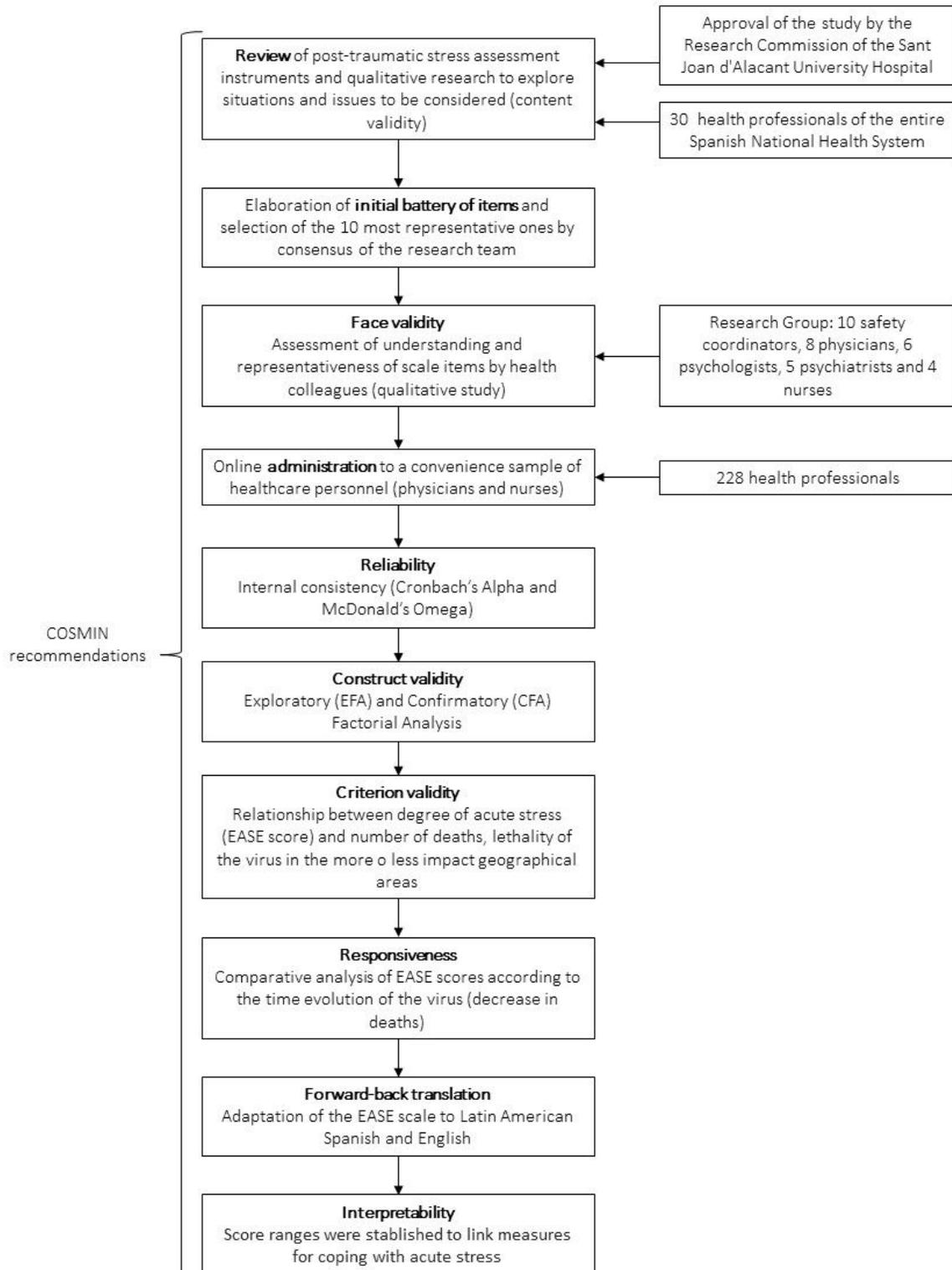


Figure 1

Flow diagram of the EASE Scale validation process.

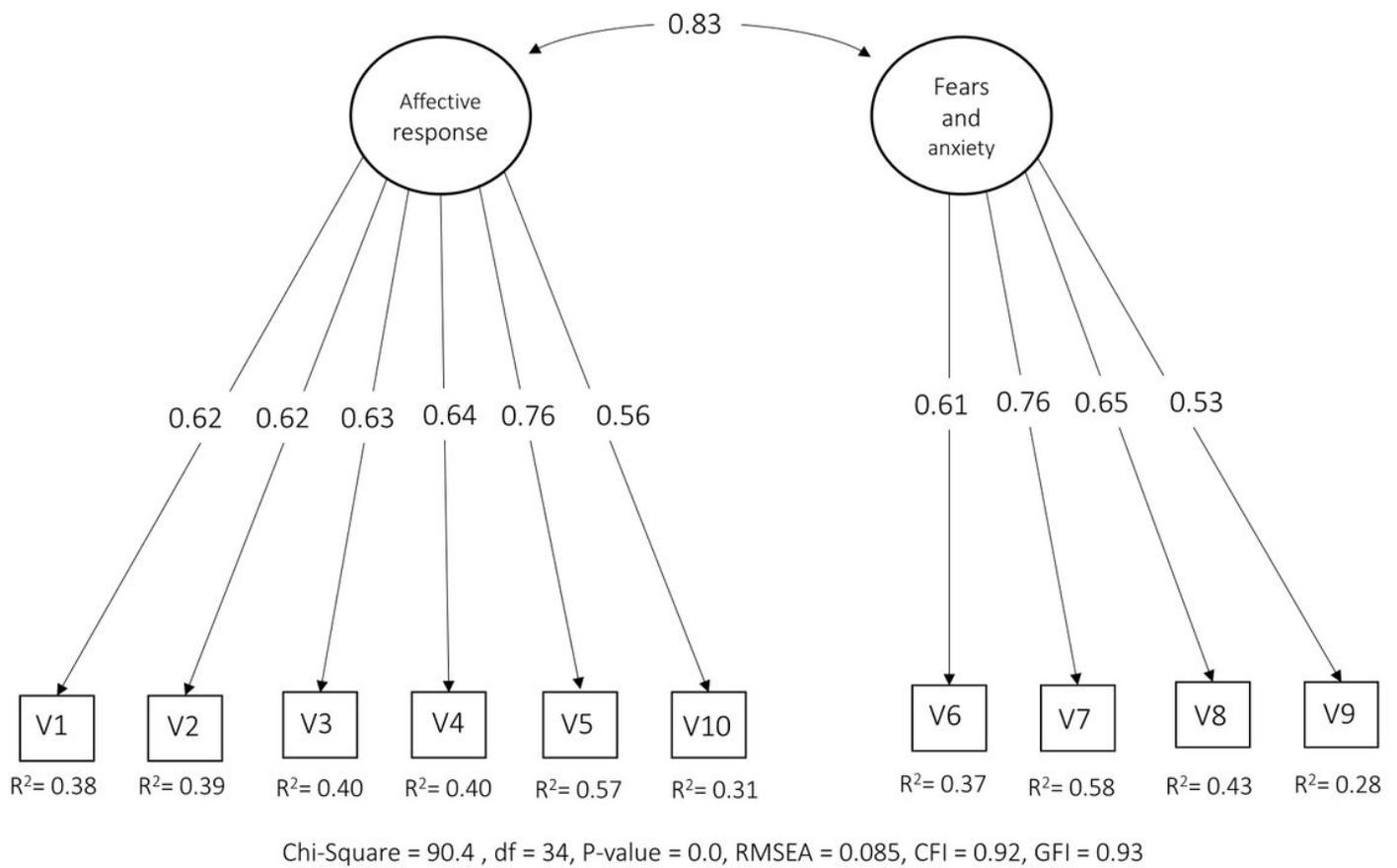


Figure 2

Factorial structure based on CFA.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [S1EASEScale.docx](#)