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Psychometric properties of Farsi version of the nurses' global assessment of suicide risk: Exploratory graph analysis approach

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Abstract

To best of our knowledge, this is the first study that assessed psychometric properties of Farsi version of the nurses' global assessment of suicide risk (NGASR) in sample of patients under hemodialysis. In this methodological study that was done in 2019, 280 patients were gathered. The NGASR scale was translated from English to Persian using the forward-backward translation method. To evaluate the scale's construct validity, Maximum Likelihood Exploratory Factor Analysis (MLEFA) with Varimax Rotation and Exploratory Graph Analysis were used to extract the factor structure. The mean age of cancer patients was 56.97 (SD=13.48; 95%CI: 55.38 to 58.55). Using the Varimax rotations revealed two independent factors (named history of suicide and suicide plan) and that explained 32.1% of the total variance. Also, McDonald's omega for these two factors were 0.728 and 0.824 respectively. Based on the results, NGASR has good validity and reliability. So, it can be used in Iranian patients on hemodialysis in future studies.

Keywords: Psychometrics, Factor Analysis, Renal Dialysis, Suicide, Iran.

1 │ Introduction

Suicide risk in patients on hemodialysis is a serious and complex issue that requires attention from healthcare providers, as well as support from mental health professionals and caregivers. Hemodialysis is a life-saving treatment for individuals with end-stage renal disease (ESRD) who have significant kidney dysfunction and are unable to filter waste products and excess fluids from their blood adequately [1]. While it can prolong life, hemodialysis also comes with physical and emotional challenges that can increase the risk of suicide in some patients. Hemodialysis patients often suffer from multiple comorbidities and complications related to ESRD [2]. Dealing with the physical symptoms and limitations can lead to feelings of hopelessness and despair. The demanding treatment schedule of hemodialysis, which typically involves several sessions per week, can lead to social isolation [3]. Patients may feel disconnected from friends and family, leading to feelings of loneliness and depression. The nurses' global assessment of suicide risk (NGASR) is a tool used in the field of healthcare and mental health to assess a patient's risk of suicide. It is typically administered by nurses or other healthcare professionals who are responsible for assessing and caring for patients in clinical settings [4]. The NGASR is designed to help healthcare providers gauge the level of suicide risk in patients under hemodialysis and make informed decisions about their care and treatment. To best of our knowledge, this is the first study that assessed psychometric properties of Farsi version of NGASR in sample of patients under hemodialysis.

2 │ Methods

2.1 │ Study design and subjects

In this methodological study that was done in 2019, sample size of 280 participants was determined using a minimum sample size for methodological studies. Many experts suggested various methods for calculating sufficient sample size for methodological

studies [5-7]. It can be noted that psychometrical studies require at least 200 individuals as a sample size. In total, 400 patients from a major comprehensive hemodialysis center in Sari, Iran, were approached to participate in the study between March and May 2019. The inclusion criteria were that participants must be able to read and write in Farsi and be at least 18 years of age. Exclusion criteria included alcoholism, self-reported mental, emotional, or verbal problems, decreased level of consciousness, gastrointestinal diseases like peptic ulcer and gastroesophageal reflux disease, and congestive heart failure. During the three-month data collection period, a total of 400 patients were admitted to the medical center. However, 120 patients were excluded from the study due to various reasons, including mental disorders (64 patients), alcoholism (16 patients), gastroesophageal reflux (32 patients), and congestive heart failure (8 patients).

2.2 │ Original scale

In 2004, Cutcliffe introduced the NGASR, an assessment tool specifically designed to identify psychosocial stressors that have a strong association with suicide risk [8]. This scale comprises 15 items, and the total score on this scale ranges from 0 to 25. Interpreting the scores, a total score of 5 or lower indicates a low level of suicide risk, while scores between 6 and 8 suggest an intermediate level of risk. A score falling between 9 and 11 signifies a high risk of suicide, and a score of 12 or higher indicates a very high risk of suicide.

2.3 │ Ethical Considerations

This study received approval from the Ethics Committee of Mazandaran University of Medical Sciences located in Sari, Iran (IR.MAZUMS.REC.1398.609). Prior to participating in the study, patients were duly informed that their involvement was entirely voluntary. They were presented with a comprehensive explanation of the study's aims and procedures. Additionally, each participant received a written and fully informed consent form to review and sign. Furthermore, all participants were assured that their data and the subsequent research findings would be treated with the utmost privacy and confidentiality when shared and published.

2.4 │ Validation procedure

Written authorization from Professor Cutcliffe, the scale's inventor, was obtained. The NGASR scale was translated from English to Persian using the forward-backward translation method according to the World Health Organization recommendations [9]. In next phase, quantitative content validity was assessed by

calculating the content validity ratio (CVR) and content validity index (CVI) for the items. Fifteen specialists who worked on the qualitative content validity were asked to rate the essentiality of the NGASR scale items on a three-point scale as follows: Not essential: 1; Useful but not essential: 2; and Essential: 3 [10, 11]. The CVR was calculated using the following formula: CVR = (ne – [N/2])/(N/2). In this formula, N and ne are respectively equal to the total number of experts and the number of experts who rate the intended item as 'Essential'. When the number of panelists is 15, the minimum acceptable CVR is equal to 0.49 [12]. The CVI shows the degree to which the items of the intended scale are relevant and can be calculated for each item (Item-level or I-CVI) and for all items (Scale-level or S-CVI). Thus, we asked the same 15 panelists to rate the relevance of the NGASR items on a four-point scale from 1 to 4. The CVI of each item was calculated by dividing the number of panelists who had rated that item as 3 or 4 by the total number of the panelists.

To evaluate the scale's construct validity, Maximum Likelihood Exploratory Factor Analysis (MLEFA) with Varimax Rotation was used to extract the factor structure [13]. Also, exploratory graph analysis (EGA) was used in the initial stage to extract the latent factors. In the field of network psychometrics, EGA is a new method that determines the number of factors underlying multivariate data. EGA generates a network plot, which is a visual guide that displays how many dimensions should be kept, which items cluster together, and how strongly they are related [14]. In first EGA run a network estimation by a community detection algorithm for weighted networks. EGA has been shown to be as accurate or more accurate than more traditional factor analytic methods such as parallel analysis [15]. To determine the internal consistency of the NGASR, the average inter-item correlation (AIC), Cronbach's alpha, and McDonald's omega were calculated [16]. It was deemed appropriate to use a scale with an internal consistency of at least 0.7 [17].

2.5 │ Statistical analysis

The statistical calculations were performed using SPSS-AMOS27 and JASP0.17.1.0. All other approaches for analyzing the construct validity and reliability are provided above.

3 │ Results

The mean age of cancer patients was 56.97 (SD=13.48; 95%CI: 55.38 to 58.55). The reviewers conducted a qualitative examination of its content validity. They found that all scale items were present as the CVR value was higher than 4.9 for every item. All items on the scale had a sufficient relationship with the

instrument's concept, according to the obtained scores (CVI and K coefficients of the items). The CVI of the entire instrument was determined to be 0.91 using the mean method (S-CVI/Ave), and the S-CVI/UA universal consensus method yielded an exponent of 0.79. All experts agreed that the instrument's content validity was satisfactory and gave the tool careful consideration.

a good model fit. Using the Varimax rotations revealed two independent factors: history of suicide (items 10 to 15), suicide plan (items 6 to 8). The cumulative variance explained by these two factors was 32.1%. Figure 1 shows the scree plot from EFA. Figure 2 shows the estimated dimensionality of the NGASR among Iranian patients under hemodialysis.

3.1 │ Validity

Table 1 displays the results of MLEFA with Varimax rotation on NGASR. KMO value of 0.626 and the significance of the Bartlett's test of Sphericity ($P<0.001$, $X2$: 1587.32; df=105) indicate

3.2 │ Reliability

Reliability indices for factor 1 (α=0.705, McDonald's omega=0.728, AIC=0.459), and factor 2 (α=0.821, McDonald's omega=0.824, AIC=0.434) showed appropriate ranges.

Table 1. Exploratory factor analysis report for NGASR.

| Factors	Items	Uniqueness	Factor Loading	$\acute{K}$	Variance (%)
History of suicide	**Q13.** History of socio-economic deprivation	0.455	0.738	2.94	19.6
	Q12. Prior suicide attempt	0.428	0.726		
	Q14. History of substance use	0.485	0.669		
	Q11. Widow/widower	0.604	0.581		
	Q15. Terminally ill	0.672	0.560		
	Q10. History of psychosis	0.698	0.549		
Suicide plan	**Q7.** Evidence of a specific plan	0.211	0.888	1.86	12.5
	Q6. Verbalization of suicidal intent	0.555	0.657		
	Q8. Family history of mental illness or suicide	0.701	0.514		
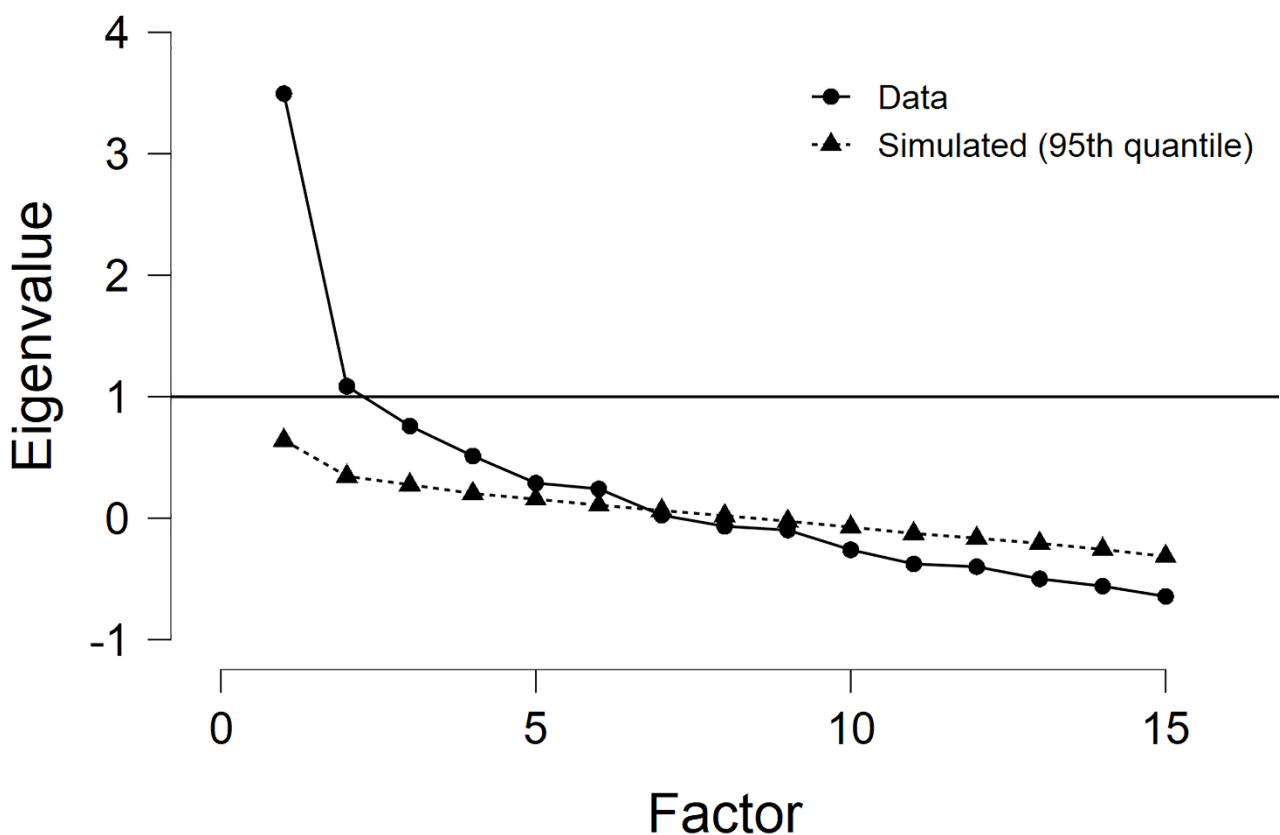
Figure 1. Scree plot.
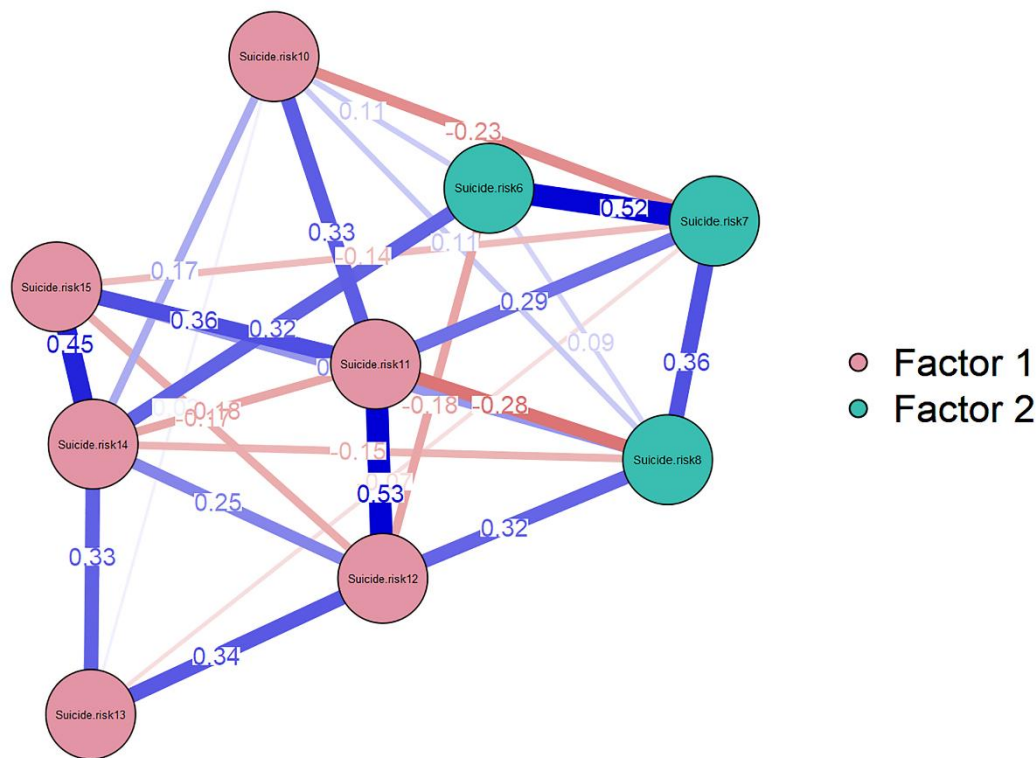
Figure 2. EGA.

4 │ Discussion

Based on main findings from EFA, two independent factors were extracted. Factor 1 named history of suicide. Patients undergoing hemodialysis who have a history of past suicide attempts represent a particularly vulnerable subgroup. Patients with a history of past suicide attempts are at a significantly higher risk of future suicide attempts or suicidal ideation. The presence of a prior attempt is one of the most robust predictors of future suicidal behavior [18]. A history of a suicide attempt indicates underlying psychological distress and vulnerability. It suggests that the patient has experienced significant emotional pain and hopelessness in the past. For patients on hemodialysis, the chronic nature of their illness and the demanding treatment regimen can exacerbate psychological distress [18]. The physical and emotional toll of ESRD and hemodialysis may intensify feelings of despair. Many patients with a history of suicide attempts also have underlying mental health conditions, such as depression or anxiety, which can be exacerbated by the challenges of ESRD and hemodialysis. The physical discomfort and fatigue experienced during and after hemodialysis sessions can further contribute to emotional

distress, particularly for patients already struggling with a history of suicide attempts [19].

Factor 1 named suicide plan. When a patient on hemodialysis presents with a suicide plan, it indicates a particularly acute and immediate risk of self-harm. A suicide plan refers to a specific, organized, and detailed intention or strategy for ending one's life. It may involve the selection of a method, time, and location for carrying out the act. A patient with a suicide plan is at high immediate risk of attempting suicide [20]. Having a concrete plan makes it more likely that they will act on their suicidal thoughts. The presence of a suicide plan underscores the patient's severe psychological distress and emotional pain. They may feel overwhelmed and see suicide as their only way to escape suffering. Healthcare providers should conduct a thorough assessment to identify the specifics of the patient's suicide plan, including the chosen method, timeframe, and any available means [21].

4.1 │ Limitations

While the validation of the Farsi version of the NGASR for use in patients on hemodialysis is a valuable contribution to healthcare research, it's essential to acknowledge its limitations.

Understanding these limitations helps in interpreting the study's findings accurately and guides future research efforts. While the Farsi version of NGASR is culturally tailored for Iranian patients, cultural factors can still influence responses to assessment questions. It's important to recognize that even with cultural adaptation, some nuances may not be fully captured. Translation and adaptation of assessment tools across languages and cultures can be complex. Differences in language and cultural interpretations may introduce challenges in maintaining the tool's reliability and validity. Hemodialysis patients, especially those who are aware of being assessed for suicide risk, might respond in ways they believe are socially desirable, potentially leading to response bias.

4.2 │ Implications

The development and validation of a Farsi version of NGASR specifically tailored to hemodialysis patients can enhance the accuracy and reliability of suicide risk assessments in this population. This is particularly important given the unique challenges and stressors faced by individuals undergoing hemodialysis. The validation of the Farsi version ensures that suicide risk assessment tools are culturally sensitive and relevant to the Iranian population. This allows healthcare providers to better understand and address suicide risk factors that may be specific to this cultural context. The NGASR is a valuable tool for early identification of suicide risk. Its validation in the context of hemodialysis patients means that healthcare providers can more effectively identify patients who may be at risk and intervene promptly to prevent suicide attempts. Healthcare providers working with hemodialysis patients can receive training in the use of the Farsi version of NGASR to enhance their skills in assessing suicide risk. This can lead to more effective patient care and support.

5 │ Conclusions

Farsi version of the NGASR had two independent factors with appropriate structure. Also, this scale had acceptable reliability. More researches around suicide in patients on hemodialysis or other chronic disease are suggested.

Ethics approval and consent to participate

This study received approval from the Ethics Committee of Mazandaran University of Medical Sciences located in Sari, Iran (IR.MAZUMS.REC.1398.609). Prior to participating in the study, patients were duly informed that their involvement was entirely voluntary. They were presented with a comprehensive explanation of the study's aims and procedures. Additionally, each participant received a written and fully informed consent form to review and sign. Furthermore, all participants were assured that their data and the subsequent re-search findings would be treated with the utmost privacy and confidentiality when shared and published.

Competing interests

We do not have potential conflicts of interest with respect to the research, authorship, and publication of this article.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on request.

Using artificial intelligent chatbots

None.

References

1. Chen CK, Tsai YC, Hsu HJ, Wu IW, Sun CY, Chou CC, et al. Depression and suicide risk in hemodialysis patients with chronic renal failure. *Psychosomatics*. 2010;51(6):528-528.

2. Jassim NF, Nsg B, Mohammed TR. Psychological Effect of Hemodialysis on Patients in Dialysis Unit. *Ann Romanian Soc Cell Biol*. 2021;25(6):18823-18829.

3. Korkut S. Evaluation of psychopathological symptoms, death anxiety, coronavirus anxiety, suicide risk, and associated risk factors among hemodialysis patients in the COVID-19 pandemic. *Ther Apher Dial*. 2022;26(5):941-949.

4. Ferrara P, Terzoni S, D'Agostino A, Cutcliffe JR, Pozo Falen Y, Corigliano SE, et al. Psychometric properties of the Italian version

of the Nurses' Global Assessment of Suicide Risk (NGASR) scale. *Riv Psichiatr*. 2019;54(1):31-36.

5. MacCallum RC, Widaman KF, Zhang S, Hong S. Sample size in factor analysis. *Psychol Methods*. 1999;4(1):84-99.

6. Anthoine E, Moret L, Regnault A, Sébille V, Hardouin JB. Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. *Health Qual Life Outcomes*. 2014;12:176.

7. Gilbert GE, Prion S. Making sense of methods and measurement: Sample size issues for psychometric studies. *Clin Simul Nurs*. 2016;12(11):482-483.

8. Cutcliffe JR, Barker P. The Nurses' Global Assessment of Suicide Risk (NGASR): developing a tool for clinical practice. *J Psychiatr Ment Health Nurs*. 2004;11(4):393-400.

9. World Health Organization. Process of translation and adaptation of instruments. WHO; 2009. Available from: https://scholar.google.com/scholar?hl=en&lr=&as_sdt=0%2C5&q=Process+of+translation+and+adaptation+of+instruments&btnG=.

10. Cook DA, Beckman TJ. Current concepts in validity and reliability for psychometric instruments: theory and application. *Am J Med*. 2006;119(2):166.e7-166.e16.

11. Sharif Nia H, Pahlevan Sharif S, Lehto RH, Boyle C, Yaghoobzadeh A, Kaveh O, et al. Development and psychometric evaluation of a Persian version of the Death Depression Scale-Revised: a cross-cultural adaptation for patients with advanced cancer. *Jpn J Clin Oncol*. 2017;47(8):713-719.

12. Lawshe CH. A quantitative approach to content validity. *Pers Psychol*. 1975;28(4):563-575.

13. Strauss ME, Fritsch T. Factor structure of the CERAD neuropsychological battery. *J Int Neuropsychol Soc*. 2004;10(4):559-565.

14. Golino HF, Epskamp S. Exploratory graph analysis: A new approach for estimating the number of dimensions in psychological research. *PLoS One*. 2017;12(6):e0174035.

15. Golino H, Lillard AS, Becker I, Christensen AP. Investigating the structure of the Children's Concentration and Empathy Scale using exploratory graph analysis. *Psychol Test Adaptation Dev*. 2021;2(1):35-49.

16. Javali SB, Gudaganavar NV, J SM. Effect of varying sample size in estimation of reliability coefficients of internal consistency. WebmedCentral Biostatistics. 2011;2(2):WMC001572.

17. Mayers A. Introduction to statistics and SPSS in psychology. London: Pearson Higher Ed; 2013.

18. Taebi M, Cutcliffe JR, Jafari A, Hatef Matbue Y, Bagheri Nesami M, Goudarzian AH. Investigation of Suicide Risk in Hemodialysis Patients in Mazandaran Province (Northern of Iran) in 2019. *Tabari Biomed Stu Res J*. 2020;2(3):1-5.

19. Jesalpura V, Chauhan H, Desai P, Gediya AJ, Patel DV, Gandhi HA, et al. Depression, Hopelessness and Risk of Suicide in patients Undergoing Hemodialysis: A Cross Sectional Study. *Indian J Appl-Basic Med Sci*. 2021;23(36):355-366.

20. Salvatore T. Self-Directed Death by ESRD Patients: Suicide vs. Voluntary Termination of Hemodialysis. *Patient Safety*. 2020;2(1):10-14.

21. Shim EJ, Jeong D, Jung S, Oh KH, Oh BM, Cho HJ, et al. Suicidal behaviors in patients with chronic physical illness: A test on the interpersonal theory of suicide. *Suicide Life Threat Behav*. 2023;53(3):470-483.