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ORIGINAL ARTICLE

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Translation and psychometric properties of the Persian version of the Health of the Nation Outcome Scales for Elderly People (HoNOS65+)

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Abstract

Objectives: This study aimed to evaluate the validity and reliability of the Persian version of Health of the Nation Outcome Scales for Elderly People (HoNOS65+) in Iran's elderly population.

Methods: The scale English version translated to Persian using a forward and backward translation method. The scale was filled for two elderly population groups (inpatient and outpatients) (N = 300). Simultaneously with HoNOS+65, the Clinical Global Impressions Scale (CGI) was completed. Two separate therapists were filled HoNOS+65 for thirty-one patients (inter-rater reliability test). In general, content validity, consistency, confirmatory factor analyses (CFA), convergent validity, and criterion validity were examined.

Results: Using exploratory factor analysis, three factors were extracted. Inter-rater reliability in some items has a slight agreement. Content validity ratio (0.75) and index (0.90) were calculated for each item. Cronbach's alpha total score was 0.82. According to the largest modification indices, CFA showed satisfactory fit indices. The convergent validity between HoNOS +65 and CGI was (r = 0/71, sig = 0.000). Finally, the optimal cut-off point was achieved 13. Sensitivity and specificity for the HoNOS +65 were 88.89% and 81.16%, respectively, with the Youden index of 0.7005.

Conclusion: The Persian version of HoNOS65+ has high reliability, validity, specificity, and sensitivity in multidimensional assessment of Iranian geriatric mental health.

KEYWORDS

care of older people, gerontology, mental health, psychological assessment

1 | INTRODUCTION

One of the most important problems of the present century is the aging and the increasing rate of the geriatric population. The World Health Organization in 2012 estimated that the number of older people in the world would increase from 605 million to 2 billion by 2050, with the most massive increase in developing countries.[1,2] It is predicted that by 2050, one in five people will be geriatric, and Iran is no exception to this rule. Based on estimations, Iran's geriatric population from 2040 will grow faster compared to the world average. By 2050, Iran's geriatric population is expected to reach more than 25 million people faster than other population groups.[3] Evidence has shown that in the last 30 years, the geriatric population of Iran has been doubled, and approximately 7.8% of the current population are people over 60 years old.[4]

The aging onset is different in each country. In Iran, aging begins at 60 years,[5] and according to research, about 8% of the population is geriatric. Communities with a geriatric rate of more than 7% are introduced among the countries that are moving towards aging. Therefore, the aging in Iran is considered an important phenomenon. Since aging is associated with body function changes that make it challenging to adapt to the environment, physical, and mental health, this period is more critical than other periods of life.[6,7]

Psychological problems are abundant in old age. About 15 to 25 percent of older people have significant mental health issues that potentially impact their physical illness.[8] This age group is considered one of the riskiest age groups. Also, due to living alone, living with a geriatric husband, in a nursing home, or having multiple nurses, late diagnosis or misdiagnosis of psychological signs and symptoms could occur. There are not many tools specifically for this particular age group. Among the tools that specifically cover a specific disease, the geriatric depression scale (GDS) assesses the severity of depression in the geriatric[9] and anxiety (Geriatric Anxiety Inventory).[10] These valid and reliable tools in Iran are currently used to evaluate the severity of a particular disease. Tools or scales that can have a general and comprehensive view of geriatric mental health are low in number. The health of the nation outcome scales (HoNOS) is a heterogeneous scale. Because of its heterogeneity, it can assess a wide range of disorders, which is why it is used in conjunction with the therapist's clinical judgment. The health of the nation outcome scales is a tool for monitoring psychiatric patient performance and an indicator for comparing the efficiency and effectiveness of services provided to patients.[11,12]

On the other hand, since geriatrics is considered a particular group and their psychiatric evaluation is different from other populations, the HoNOS+65 scale has been prepared specifically for this age. Since this scale's validity and reliability have not been determined in Iran before, the decision was made to determine this scale's validity and reliability for psychiatric assessments in Iranian geriatric patients. After determining the validity and reliability, it is expected that it can be used as a national health assessment scale to see psychiatry's therapeutic outcomes. It is also a scale to determine the effectiveness of prescribed medications and determine the appropriate time or criterion for patient's discharge. Previously, in Iran, there was no scale to assess all aspects of mental health for this age group.

2 | METHOD

The study consisted of two phases: the first involved translation of the HoNOS+65, and the second phase involved psychometric evaluation.

2.1 | Phase One — The Translation Process

2.1.1 | Translation of the HoNOS+65

After obtaining the scale developer's necessary permission by e-mail, based on the World Health Organization protocol of the forward-backward translation technique,[13] the scale was translated to the Persian version. Two independent English–Persian translators were asked to translate the HoNOS+65. Translators are selected in such a way that one is familiar with the medical sciences and its terms, as well as the concepts of psychiatric illnesses, while the other is unfamiliar with the medical sciences and related terms. As the expert panel incorporated with the Persian–English translator, our team's expert assessed the two versions and produced one final version. Then, a translator was requested to back-translate the Persian into HoNOS+65 English. This English version of the scale was sent to a Persian–English translator for translation correctness confirmation and confirming the similarity of the achieved English HoNOS+65 with its original. After the final translation, the scale was shared with Dr. Mike James, and the final confirmation was received by e-mail.

2.1.2 | Content validity testing

Content validity of the scale was assessed using Lawshe's content validity ratio (CVR) and content validity index (CVI). The relevant indices were calculated using the methods as mentioned earlier and formulas for calculating CVR and CVI. No questions were omitted or changed. The values obtained indicate the adequacy of the content validity of the Persian version of HoNOS+65. The 10 psychiatry expert's views were considered for further modifications in the qualitative content validity. For the CVR assessment, 10 psychiatry professors were asked to specify each item's necessity. The CVR specialists rated each item as 1 = necessary, 2 = somewhat necessary, or 3 = unnecessary. The content validity ratio was estimated based on the Lawshe formula (1975), which, when 10 experts are involved, the suitable score is 0.64 or above.[14] Also, for evaluating the simplicity, relevancy, and clarity of the scale, the content validity index (CVI) was utilized. The CVI ranged from one = not relevant, simple, and clear, to four = very consistent, simple, and bright, which in our scale achieved the rating of three or four. According to Poliet

and Beck's (2006), for assessing CVI's adequacy, the score of 0.9 is considered excellent, and 0.8 is considered acceptable.[15]

2.2 | Phase Two—Psychometric Evaluation

2.2.1 | Participants

The study sample consisted of two groups of persons aged over 65 and higher, who were admitted to the psychiatric ward of a hospital affiliated by Isfahan University of Medical Sciences (Modares Hospital, Isfahan, Iran), and those who were living in the community and had been referred to the hospital-affiliated clinic by their relatives or other physicians for a range of psychiatric diagnoses including depression, psychotic symptoms, dementia, and behavioral problems. The inclusion criteria were confirmatory diagnosis of any psychiatric illness based on DSM-5, patients over 65 years old, and literacy levels. Also, the exclusion criteria were based on patients without a prior psychiatric diagnosis, patients under 65 years old, patients who do not wish to attend, lack of response ability, dissatisfaction to complete the scale, and severe physical and neurological problems at the same time that interfere with psychiatric treatment and continued cooperation. The aim of the study and its procedure was explained to all patients. Also, they were assured that participation was voluntary and that it would not affect the course of their treatments. Data gathering was done from April to November 2020. Based on the convenience sampling technique, 300 patients participated in the study.

2.2.2 | Settings

Inpatient unit: A medium- to a long-term facility designed for people with psychiatric illness. Older individuals generally present with multifaceted physical and cognitive-behavioral problems, long-lasting, and often treatment-resistant, which need organized, intensive, and multilevel intervention to reduce symptom severity and improve adjustment and functioning. A multi-disciplinary team consisting of nurses, social workers, psychologists, and psychiatrists provides the interventions.

Hospital-affiliated clinic: Clinics typically deliver non-emergency outpatient care that's routine or preventive.

2.2.3 | Raters

The two raters (psychiatric resident and experienced nurse) were skilled and familiarized with HoNOS+65 and its corresponding severity scores.

2.2.4 | Measurements

The scale consisted of three sections, including the participant's demographic information, Health of the Nation Outcome Scales for Elderly People (HoNOS+65), and Clinical Global Impressions Scale (CGI). The HoNOS+65 was developed by Burns et al. in 1999 with confirmed validity and reliability.[16] The HoNOS+65 contained 12 items with four factors, including behavioral issues (items 1 to 3), impairment (items 4 and 5), symptomatic problems (items 6 to 8), and social issues (items 9 to 12). It covers clinical and social areas relevant to adult mental illness, provides a brief numerical record of the clinical assessment, and has various uses for clinicians, administrators, and researchers. The scoring tool was based on a five-point Likert-type scale (0 = no problem, 1 = minor problem requiring no formal action, 2 = mild problem, 3 = problem of moderate severity, 4 = severe to a very severe problem). The total score varied between 0 and 48, with higher scores representing very severe psychiatric disorder. The HoNOS+65 needs to be employed at the beginning and the end of care (admission and discharge).

To test the convergent validity of the Persian HoNOS+65, CGI was simultaneously assessed in the selected hospitalized inpatients, discharged inpatients, and patients who were referred to the clinic. Clinical Global Impression scale evaluates the overall clinical state of psychiatric patients and, at the end of treatment (post-test and follow-up), is completed by the authorities. The CGI scale has consisted of one question based on a 7-point Likert-type scale (1 = I have improved a lot, 2 = I have improved, 3 = I have improved a little, 4 = I have not changed, 5 = I have gotten a little worse, 6 = I have gotten worse, 7 = I have gotten a lot worse). The higher scores were showing less improvement.[17]

2.2.5 | Procedure

The two raters and invited expert psychiatrists in the geriatric field using information from all available sources independently completed the HoNOS+65 for the same number of participants from inpatient units and clinics. Also, at the same time, they filled the CGI for them. Two raters filled HoNOS+65 and CGI for 31 participants (9 clinics and 22 inpatients) to test the inter-rater reliability.

2.2.6 | Sensitivity and specificity assessment

The receiver operating characteristic (ROC) curve was used to obtain sensitivity and specificity. Using the area of under curve (AUC) value, it is possible to check whether the HoNOS+65 scale is appropriate for judging the treatment outcome and discharging geriatric patient's time. The AUC value was calculated using the software MedCalc19.[18,19]

2.2.7 | Construct validity

The scale's construct validity was assessed using the exploratory and confirmatory factor analyses by Analysis of Moment

Structure (AMOS) software version 24. The EFA is a statistical technique used to decrease data to a smaller set of summary variables and survey the phenomena underlying theoretical structure.[14,18,19] Also, by conducting the EFA, the researcher can identify the number of alpha extraction factors to maximize the generalizability factor.[20] Moreover, the CFA is utilized for minimizing the overall number of observed variables into latent factors based on commonalities within the data.[21] The CFA's benefits are the reduction of measurement error, and it allows the comparison of alternatively proposed a priori models at the latent factor level.[22] The Maximum Likelihood Exploratory Factor Analysis (MLEFA) with the Promax rotation was utilized for EFA. Sample adequacy was estimated based on the Kaiser-Meyer-Olkin (KMO) index and Bartlett's test. The KMO values of 0.7–0.8 and 0.8–0.9 were taken as good and excellent. Factors that didn't meet the factor eigenvalue of greater than one and scree plot criteria were extracted. Items with a factor loading of 0.3 or higher are considered appropriate. The employed fit indices in the study included Chi-square (χ^2) test, degree of freedom (*df*), χ^2/df ratio between 1 to 3, goodness-of-fit index (GFI) >0.90, comparative fit index (CFI) >0.90, and root mean square error of approximation (RMSEA) <0.09.[23]

2.2.8 | Reliability

Cronbach's alpha test assessed the internal consistency of the Persian version of HoNOS+65. The Cronbach's alpha of 0.70 or higher for scale represents internally consistent and reliability. Also, the weighted Kappa for the inter-rater reliability of Persian HoNOS+65 scores was assessed. Kappa can range from −1 to +1. An acceptable Kappa depends on the aim of the study and sample distribution. Kappa rating is as follow: 0.0–0.20 = slight agreement, 0.21–0.40 = fair agreement, 0.41–0.60 = moderate agreement, 0.61–0.80 = substantial agreement, and 0.81–1.00 = almost perfect agreement.[23]

3 | RESULT

3.1 | Descriptive analysis

The minimum and maximum ages of 300 participants were 65 and 87 years, respectively (mean 70.64 and SD = 5.38). Among the subjects, 134 (44.7%) were females and 166 (55.3%) were males. Mood disorders (MDD) (23.3%) were the most common disorder among the subjects (Table 1).

3.2 | Content validity

The CVR and CVI were calculated for each item, 0.75 and 0.90 respectively, and no question was removed or changed.[24]

TABLE 1 Demographic variables

Variable	Items	N (%)
Sex	Men	166 (55.3)
	Women	134 (44.7)
Type of disease	MDD	70 (23.3)
	BID	53 (17.7)
	BIID	53 (17.7)
	Schizophrenia	43 (14.3)
	Schizoaffective	15 (5)
	Adjustment disorder	9 (3)
Marriage status	Married	158 (52.7)
	Single	60 (20)
	Divorce	32 (10.7)
	Truce	8 (2.7)
	Widow	42 (14)
Job Status	Retired	105 (35)
	Unemployed	119 (39.7)
	Freelance	51 (17)
Education	Illiterate	28 (9.3)
	Elementary	78 (26)
	Intermediate	38 (12.7)
	High school	18 (6)
	Diploma	62 (20.7)
	Associate degree	34 (11.3)
	Bachelor	38 (12.7)
	Masters and PhDs and above	4 (1.3)

Abbreviations: BID, bipolar type 1 disorder; BIID, bipolar type 2 disorder; MDD, major depressive disorder.

3.3 | Consistency

Cronbach's alpha total score was 0.82, which indicates that this scale has a good fit for the Iranian population. The three subscales had good internal consistency (Table 2). The total Cronbach alpha coefficient for subscales was calculated to be 0.82 (sub-score A), 0.70 (sub-score B), and 0.67 (Sub-score C). Since Cronbach's alpha higher than 0.7 indicates high internal consistency,[25,26] this scale has good internal consistency.

3.4 | Exploratory factor analysis

First, the data were divided into two parts, and on 150 data, using exploratory factor analysis, three subscales were extracted from

TABLE 2 Keiser-Meyer-Olkin (KMO)

KMO		0/78
Bartlett's test	Chi-square	1165/129
	df	55
	Sig.	0.000

the scale. Before performing the exploratory factor analysis, Keiser-Meyer Olkin (KMO) test and Bartlett sphericity test were used to evaluate the sample size's adequacy (Table 2).

The two measurement indices of KMO equal to 0.78 and the Bartlett sphericity test's significance with $P = .000$ showed that the necessary factor analysis conditions were met in this study. The variance explained in this study was reported to be 62.8%.

Based on the varimax rotation, the first factor consists of items 1, 2, 7, 8, 9; the second factor consists of items 4, 5, 6, 10; and the third factor consists of items 11 and 12. Rotated factor loadings were as follows: first-factor range from 0.59 to 0.80; those in the second-factor range from 0.56 to 0.77; and third-factor range from 0.82 to 0.82. The question number there was removed for weak factor loading (Tables 3 and 4).

It is likely to observe the number of factors decided with parallel analysis in the same way as seen on the scree plot presented in Figure 1.

The results of the Weighted Kappa statistic between rater one and rater two were obtained (Table 5).

3.5 | Confirmatory factor analyses

Confirmatory factor analyses (CFA) were performed with AMOS version 24 (N = 150), and the primary model was unsuccessful in fit with data ($\chi^2 = 229/229$; $P < .001$; $df = 41$; $\chi^2/df = 5/59$; CFI = 0.83; RMSEA = 0.12; GFI = 0.88). Based on the modification indices provided by AMOS, many error co-variances were correlated and observed variables were related. After corrections according to largest modification indices, satisfactory fit indices were obtained ($\chi^2 = 134/143$; $P < .001$; $df = 38$; $\chi^2/df = 3/53$; CFI = 0.91; RMSEA = 0.09; GFI = 0.92) (Figure 2).

TABLE 3 Alpha, mean and standard deviation of item severity ratings by total sub-scores (N = 150)

	Sub-score	Mean (SD)	Alpha
Factor A	Aggression & over activity	1/4 (1/2)	0/82
	Self-harm	1/01 (1/2)	
	Depression	1/6 (1/43)	
	Other symptoms	1/45 (1/4)	
	Social relations	1/7 (1/41)	
Factor B	Cognition	0/92 (1/06)	0/70
	Physical health	0/83 (1/05)	
	Hallucinations & delusions	1/05 (1/3)	
	General function	1/07 (1/2)	
Factor C	Housing	0/87 (1/02)	0/67
	Activities	0/91 (1/19)	

TABLE 4 Rotated component matrix (total explained variance (%62/8))

	Rotated factor loading*		
Questions	1	2	3
(Q1) Behavioral disturbance	0/59		
(Q2) Non-accidental self-injury	0/73		
(Q4) Cognitive problems		0/77	
(Q5) Physical illness or disability problems		0/67	
(Q6) Problems associated with hallucinations and delusions		0/56	
(Q7) Problems with depressive symptoms	0/77		
(Q8) Other mental and behavioral problems	0/80		
(Q9) Problems with relationships	0/77		
(Q10) Problems with activities of daily living		0/75	
(Q11) Problems with living conditions			0/82
(Q12) Problems with occupation and activities			0/82

*Extraction Method: principal component analysis.

3.6 | Convergent validity

The convergent validity between HoNOS+65 and CGI was $r = 0/71$ and sig = 0.000, which shows good convergence.

3.7 | Criterion validity

The area's value under the curve for this scale was 0.927% (Table 6 and Figure 3). Based on the results, the cut-off point[13] with the best balance has the sensitivity and specificity values of 88.89% and 81.16% for the HoNOS+65, respectively, with the Youden index 0.7005 (Table 7). Therefore, those who scored higher than 13 on the scale are known as patients who need medical interventions. According to the results, this tool's sensitivity and specificity in the Iranian population has been recognized as excellent, and therefore this tool has an acceptable ability to diagnose the desired cases in discharged or hospitalized patients.

4 | DISCUSSION

People aging is becoming worrying in middle-income and low-income countries. Despite severe economic, social, and health effects, most developing countries are not prepared to face its devastating impacts.[27,28] As age grows, the prevalence of chronic illnesses, injuries, and mental disorders rises further. Also,

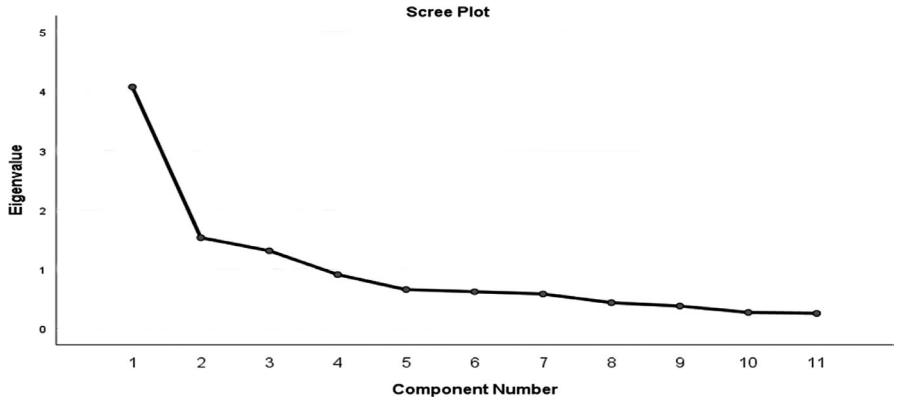

FIGURE 1 The scree plot of the factor analysis

TABLE 5 Comparison of classification accuracy using Weighted Kappa

Questions	Weighted Kappa	Standard error	95% CI
Q1	−0.19186	0.08115	−0.35091 to −0.032812
Q2	0.05263	0.05641	−0.057938 to 0.16320
Q3	0.07729	0.13634	−0.18993 to 0.34451
Q4	0.03351	0.12406	−0.20966 to 0.27667
Q5	0.02105	0.12323	−0.22048 to 0.26259
Q6	0.11439	0.17393	−0.22651 to 0.45529
Q7	0.19571	0.12656	−0.052354 to 0.44377
Q8	0.04916	0.11185	−0.17006 to 0.26838
Q9	−0.02968	0.07919	−0.18489 to 0.12552
Q10	0.16346	0.12309	−0.077795 to 0.40472
Q11	−0.01020	0.11754	−0.24057 to 0.22017
Q12	−0.18337	0.09321	−0.36606 to 0.0006761

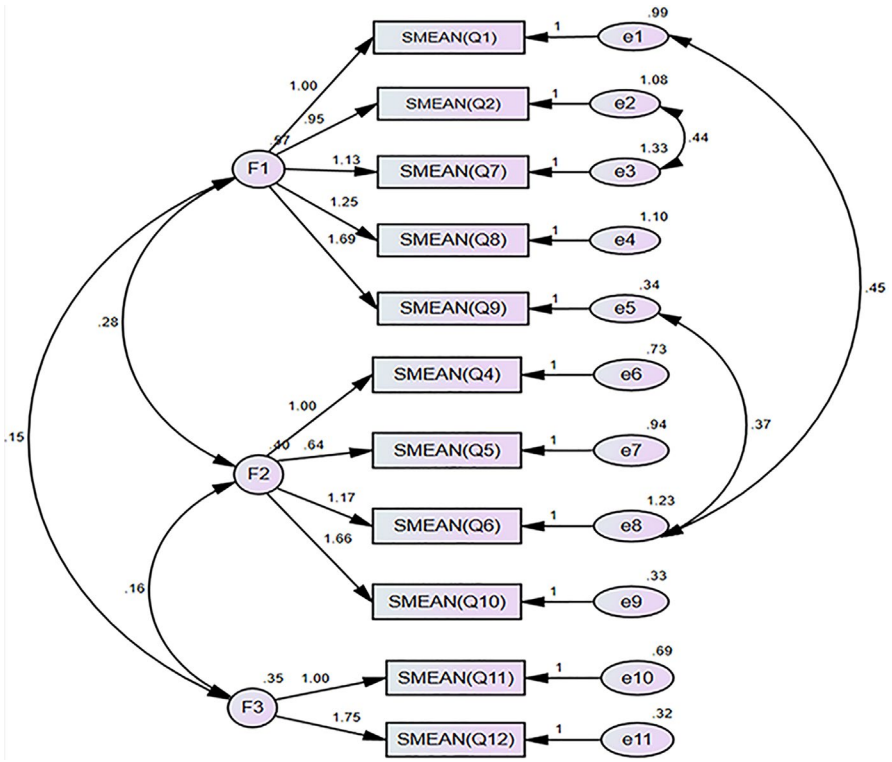

FIGURE 2 Confirmatory factor analysis for the Persian version of "HoNOS+65"

TABLE 6 The values of the area under the curve in the HoNOS+65

Prevalence of disease	Cut-off point	Youden Index	Specificity	Sensitivity	95% Confidence interval	Standard error	The area under the ROC curve	Tool
54%	13≤	0.7005	81.16	88.89	0.891 to 0.954	0.0142	0.927	HoNOS+65

considering Iran's increasingly aging population, the need for tools that provide a general perspective to geriatric mental health and its subsequent care is felt more than ever. The current study results showed that HoNOS+65 has good internal consistency in multidimensional measurement compared to most available questionnaires and tools, including Hamilton and Beck scales,[29] which are used to examine specific psychological dimensions such as depression and anxiety. Since many physical, economic, and psychological dimensions change in old age and all of the above can affect individuals' mental health, this tool helps identify patients through various areas and determine the treatment plan.[30] Compared to other versions of the HoNOS+65 scale, the higher Persian version reliability (alpha of 0.82) indicated it's fitting for the Persian population. In the French version of HoNOS+65, Cronbach's alpha was calculated to be 0.76, which is considered acceptable, and in the Dutch version of HoNOS+65, alpha of 0.60 is still acceptable because of the multidimensionality of the instrument.[31,32] Based on the results, HoNOS+65 demonstrated the optimal cut-off score at 13, which yielded a sensitivity of 88.89% and specificity of 81.16%. So those who scored higher than 13 are known patients who need psychiatric interventions. By these features, it turns to a promising option for judging the treatment outcome and geriatric patient's discharge time. Therefore, this tool has an acceptable ability to diagnose the desired cases for discharge or hospitalization.

Moreover, besides the HoNOS+65 Persian version's high specificity and sensitivity, it showed a surprising predictive value. As mentioned previously, the lower the prevalence of a disease, the higher the negative predictive value of that diagnostic test. On the other hand, the higher the prevalence of a disease, the greater the positive predictive value of that test.[33] This study's positive predictive value is 84.7%, which indicates that 84.7% of the patient who got more than 13 on this scale has a major psychiatric illness that requires hospitalization and serious medical interventions. The false positive was 15.3%. Also, its negative predictive value is 86.2%; this indicates that 86.2% of the participants in this project who have been referred on an outpatient basis if they get scores lower than or equal to 13 do not have severe disorders and do not need acute action and serious psychiatric interventions. The false negative was 13.8%. Therefore, this scale has an acceptable ability to diagnose the desired cases for discharge or hospitalization.

Besides high specificity and sensitivity, a similar performance trend might not be observed in the present study when the mental health tended to be overdiagnosed or misdiagnosed by raters. Based on the Kappa range (−0.19 to +0.19) in some of the items, we have a slight agreement.[34] Although this scale has high sensitivity and specificity, the rater clinical judgment and experience in the geriatric field also is an important factor that must be considered for using this scale. Test–retest reliability was not performed because it was predictable that this validity would be very low. This is because test–retest reliability requires a minimum interval,[35] and in many psychiatric patients, it is evident that patients

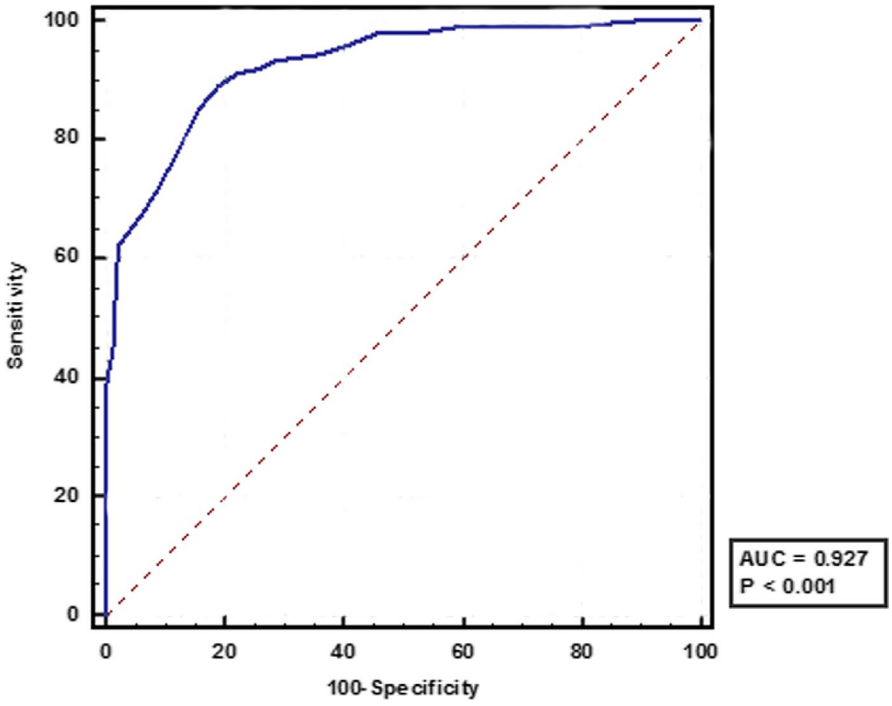

FIGURE 3 Area under the ROC curve for HoNOS65+

TABLE 7 Criterion values and coordinates of the ROC curve for HoNOS65+

Criterion	Sensitivity	95% CI	Specificity	95% CI	+LR	−LR	+PV	−PV	Cost
<1	0.00	0.0-2.3	100.00	97.4-100.0		1.00		46.0	0.540
≤5	38.89	31.3-46.9	100.00	97.4-100.0		0.61	100.0	58.2	0.330
≤6	46.91	39.0-54.9	98.55	94.9-99.8	32.37	0.54	97.4	61.3	0.293
≤7	51.85	43.9-59.8	98.55	94.9-99.8	35.78	0.49	97.7	63.6	0.267
≤8	62.35	54.4-69.8	97.83	93.8-99.5	28.68	0.38	97.1	68.9	0.213
≤9	67.90	60.1-75.0	93.48	88.0-97.0	10.41	0.34	92.4	71.3	0.203
≤10	71.60	64.0-78.4	91.30	85.3-95.4	8.23	0.31	90.6	73.3	0.193
≤11	78.40	71.3-84.5	87.68	81.0-92.7	6.36	0.25	88.2	77.6	0.173
≤12	85.19	78.8-90.3	84.06	76.9-89.7	5.34	0.18	86.2	82.9	0.153
≤13	88.89	83.0-93.3	81.16	73.6-87.3	4.72	0.14	84.7	86.2	0.147
≤14	91.36	85.9-95.2	77.54	69.7-84.2	4.07	0.11	82.7	88.4	0.150
≤15	91.98	86.7-95.7	74.64	66.5-81.7	3.63	0.11	81.0	88.8	0.160
≤16	93.21	88.2-96.6	71.74	63.5-79.1	3.30	0.095	79.5	90.0	0.167
≤17	94.44	89.7-97.4	63.77	55.2-71.8	2.61	0.087	75.4	90.7	0.197
≤18	96.30	92.1-98.6	57.97	49.3-66.3	2.29	0.064	72.9	93.0	0.213
≤19	98.15	94.7-99.6	53.62	44.9-62.1	2.12	0.035	71.3	96.1	0.223
≤20	98.15	94.7-99.6	46.38	37.9-55.1	1.83	0.040	68.2	95.5	0.257
≤21	99.38	96.6-100.0	39.13	30.9-47.8	1.63	0.016	65.7	98.2	0.283
≤26	99.38	96.6-100.0	18.84	12.7-26.4	1.22	0.033	59.0	96.3	0.377
≤27	100.00	97.7-100.0	10.14	5.7-16.4	1.11	0.00	56.6	100.0	0.413
≤42	100.00	97.7-100.0	0.00	0.0-2.6	1.00		54.0		0.460

Abbreviations: +LR, Positive likelihood ratio; -LR, Negative likelihood ratio; +PV, Positive predictive value; -PV, Negative predictive value.

who undergo hospitalization and relocation significantly change their mood; therefore, even on the first day of hospitalization, changes are visible.[36]

One of the factors related to judging the structure validity is the analysis of variance through the factors identified by the EFA. The EFA factor's variance of above 50% is acceptable.[37] In the Dutch

version of this scale, the variance measured 60.3%,[32] similar to our study, where the calculated variance is 62.8%, also an acceptable range. Based on the EFA results, three sub-scores have been found for this scale. Sub-score A has five items: "aggression & overactivity, self-harm, depression, other symptoms, social relations." In this sub-scale, for all items, the total Cronbach's alpha coefficient was calculated to be 0.82. Cronbach's alpha between 0.7 and 0.8 has an acceptable internal inconsistency.[38] These five items related to mood and personality disorder indicated that mood changes or expectations of personality disorders could affect these five items. These factor's items are also among the important and effective items in determining the patient's hospitalization.

Sub-score B has four items: "cognition, physical health, hallucinations & delusions, and general function." Internal inconsistency for this subscale was calculated to be 0.70. Cronbach's alpha between 0.7 and 0.8 indicated acceptable internal inconsistency.[38] These items indicate cognition and function. It shows that many cognitional and physical impairments affect general function, making each other worse.[39]

Sub-score C has two items: "housing and activities," related to psych and economy. Internal consistency for subscale C was calculated to be 0.67; Cronbach's alpha more than 0.6 and less than 0.7 shows questionable internal inconsistency.[38] In this sub-score, a health provider can relate between a patient's economic states and psychiatric disorders. Through this sub-score, it is possible to identify economically disadvantaged patients, and more help can be given to these patients through social workers and the mental health team's formation. Since economic problems can significantly affect patients' psyche, these two items that measure the patient's problems or economic power are included in one factor.

Question number three (problem drinking or drug-taking) was omitted in all factor loading because of its negative effect on other factors. This suggests that this item in this age group can have less impact on their disorder or hospitalization. This is justified because the elderly are less likely to use drugs and stimulants. Also, if they are used substances, it is controlled and less likely to cause a disorder or see a doctor.[36]

Our study, like other studies conducted for this scale (Greek, French, etc.),[35] found a good convergence validity, and as expected, with the increase in HoNOS +65 scores, the scores of the CGI scale also increased.[35] Also, we reveal a correlation between this scale and the CGI scale. Since the CGI scale is a promising tool to track patient changes over time in routine clinical care settings,[40] its higher correlation with HoNOS+65 provides a practical option for psychiatrists to measure therapeutic outcomes to designate their discharging time. So CGI scale, along with this scale, can help have a more multidimensional vision in geriatric mental health.

4.1 | Implication for practice

By its high sensitivity and specificity, this scale is a promising tool for psychiatrists to have a multidimensional view of their geriatric patients. By the optimal cut-off point, desire cases for hospitalization can be designated. In addition, as the scores become lower than the determined cut-off point during the treatment of patients, it is possible not only to understand the patient's recovery process but also to help discharge diagnosis. Also, subjective treatment outcomes could be evaluated for geriatric patients both in clinics or psychiatric wards.

4.2 | Limitations

One of this study's limitations was sampling from a limited number of provinces in Iran, which was done due to low monitoring of how the scale was filled and the possibility of low sampling quality. Also, as the sampling was done mostly in Iran's progressed city, the results may not be generalizable to those living in rural areas with a low education level. Some psychoeconomic variabilities that exist across the regions in Iran may further limit our finding's generalizability. Thus, we recommended further studies in different Iran regions with random sampling to suggest comparative evidence to our findings. Another limitation is that some of these patients were rater's patients, and a scale was filled out based on previous knowledge of that patient. It is recommended that psychiatrists do not become familiar with the patient before completing this scale to avoid bias.

5 | CONCLUSION

According to the results obtained in this study, due to this scale's high sensitivity and specificity, the Persian version of HoNOS+65 can be used as a clinical tool for assessing mental disorders or their severity in geriatrics at the time of hospitalization and for recovery monitoring at discharging time.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethics approval was granted by the Isfahan University of Medical Sciences Research Ethics Committee (IR.MUI.MED.REC.1398.361). Participants were informed about the aims and actions of the study before signing the consent form. All personal data and other information provided by participants were kept confidential.

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CONFLICT OF INTERESTS

Nothing to disclose.

AUTHOR CONTRIBUTIONS

All authors provided a substantial intellectual contribution to the conception, data collections, analysis, and drafting of the

manuscript. All authors read and approved the final manuscript for publication.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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