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Validity and reliability of the Persian version of general practitioner assessment of cognition (P-GPCOG)

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ABSTRACT

Objectives: The study aimed to examine the validity, reliability, and practicality of the Persian version of the General Practitioner Assessment of Cognition (P-GPCOG) as a brief, efficient cognitive assessment instrument in Iranian older adults.

Method: The sample comprised 151 community-dwelling older adults and 79 nursing home residents (aged ≥60 years). The English GPCOG was translated, back-translated, and revised to prepare the final P-GPCOG. The Abbreviated Mental Test score (AMTs) and the Depression in Old Age Scale (DIA-S) were administered to the two different samples to establish the convergent and discriminant validity of the P-GPCOG.

Results: The mean age of the sample was 70.67 (SD = 9.51); 57.4% were male. The mean P-GPCOG scores for the total, cognitive and informant subscales were 7.67 (SD = 4.59), 4.18 (SD = 2.73), and 3.49 (SD = 2.24), respectively. Cognitive ($P < 0.001$), informant ($P < 0.001$) and total scores ($P < 0.001$) differed significantly between community-dwelling participants and nursing home residents. Worse cognitive performance on the P-GPCOG correlated significantly with worse scores on the AMTs ($r = 0.61$, $P < 0.001$) and less so with depressive symptoms as measured with the DIA-S ($r = -0.20$, $P < 0.05$). Cronbach's alpha for the P-GPCOG cognitive and informant subscales were 0.90 and 0.83 respectively, indicating a high degree of internal consistency and homogeneity between items. The test-retest correlation for the total P-GPCOG score was 0.82 in 30 participants after 19 days. P-GPCOG cognitive scores correlated significantly with education.

Conclusion: The P-GPCOG displayed strong psychometric properties, offering healthcare professionals a quick and efficient cognitive instrument for older Persian speakers. As with other cognitive assessment tools, the P-GPCOG cognitive score is affected by a person's level of education.

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Aging; dementia; cognitive assessment; cognitive impairment; Psychogeriatrics

Introduction

The number of people with dementia worldwide exceeds 46 million and this is set to increase to 131.5 million by 2050 due to population ageing (Alzheimer's-Disease-International, 2015). Dementia impacts not only those affected, but also their families and the community in general, imposing significant societal and economic burden (Jönsson et al., 2006).

Over the last 20 years, the older Iranian population, defined as aged 60 or older, has been growing rapidly, increasing from 6.6% to 9.3% (Statistical-Center-of-Iran, 2018). In 2016, the overall crude prevalence of dementia among people aged ≥60 years in five provinces of Iran was estimated to be 7.9% (8.7% in women and 6.9% in men) (Sharifi et al., 2016). For all of Iran, the Iran Alzheimer's Association estimates as many as 300,000 people with dementia and one new case with dementia every 7 min (Iran-Alzheimer's-Association, 2015).

Intact cognitive function is seen as an indicator of healthy aging. However, cognitive impairment is common among older adults (Woodford & George, 2007) and decline is often insidious and easily missed (Okhravi & Palmer, 2012). Early recognition of cognitive decline, dementia or non-dementia, is important and has received considerable attention in the past few decades (Lindeboom, Schmand, Tulner, Walstra, & Jonker, 2002; Meulen et al., 2004). Herbert et al. found that in the US, dementia often remains undetected with rates of undiagnosed dementia reaching up to 80% for mild cases (Hebert, Scherr, Bienias, Bennett, & Evans, 2003).

The diagnosis of dementia and the management of associated symptoms are aided by high-quality assessment tools (Bentvelzen, Aerts, Seeher, Wesson, & Brodaty, 2017). One of the barriers to early recognition of symptoms and diagnosis in primary care is the lack of a brief, easily administered screening tool (Brodaty, Howarth, Mant, & Kurrle, 1994). The General Practitioner Assessment of Cognition (GPCOG), which was designed as a brief cognitive assessment instrument specifically for use in primary care, was found to be at least as accurate as the Mini-mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975) (Brodaty et al., 2002). It was developed using three principal sources: the Cambridge Cognitive Examination (CAMCOG) (Kay, 1990; Roth et al., 1986), the Psychogeriatric Assessment Scale (Jorm et al., 1995) and the Instrumental Activities of Daily Living Scale (Lawton & Brody, 1969). It consists of two parts administered by a health professional such as a general practitioner (GP), nurse, or psychologist: a cognitive screen (score 0–9) and an informant section asking six questions about decline in cognition and function (score 0–6). It is available free of charge as paper-

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and-pencil test or web-based instrument (Seeher & Brodaty, 2017), and has been translated into over 23 languages (GPCOG, 2018).

It is necessary to evaluate psychometric properties of an instrument developed in one population before using it in another to assess whether it is culture fair or not (Souza, Alexandre, & Guirardello, 2017). This study was designed to examine the validity, reliability, and practicality of the Persian version of the General Practitioner Assessment of Cognition (P-GPCOG) as a brief, efficient cognitive assessment instrument in Iranian older adults.

Methods

Design & participants

This is a cross-sectional study. A convenience sample of 151 community-dwelling older adults attending three day centre services in Tehran, the capital of Iran, and 79 nursing home residents from three centres were included in the study if they met the following criteria: able to communicate, willing to participate, providing verbal informed consent, and aged ≥60 years. Day care centres in Iran are designed to provide care and companionship for older adults who need some social and personal services during the day. Participation was offered to everyone provided they met inclusion/exclusion criteria. Trained psychologists conducted the interviews and assessments.

Measures

Demographic data such as age, gender, marital status and level of education were collected from all participants.

The P-GPCOG consists of 2 subscales: a cognitive subscale and an informant subscale. The cognitive subscale contains the following items: time orientation (1 point), clock drawing (2 points), reporting of a recent event (1 point), and a word recall task (5 points). Each correct answer scores one point, and higher scores reflect better cognitive performance (Range 0–9). The informant interview assesses the patient's function by asking six questions, such as 'Does the patient have more trouble remembering things that have happened recently than he/she used to?', 'Is the patient less able to manage his/her finances?' Each question that is answered in the negative, scores one point, according to the sequential two-stage scoring method (Range 0–6) (Brodaty et al., 2002).

The Abbreviated Mental Test score (AMTs) was used to measure convergent validity. The AMTs is a commonly used brief assessment of older patients' cognitive state (Hodkinson, 1972) and was chosen for its brevity, ease of administration by non-physicians, good reported psychometric properties, and the fact that it does not require patients to be able to read or write, which seemed advantageous given the high level of illiteracy in our sample participants. The AMTs has been validated in older Iranians and consists of the following 10 questions that can be answered in approximately 5 min: 1. provide the patient's age; 2. indicate the time (to the nearest hour); 3. recall the location where the test was administered; 4. indicate the year; 5. name the location; 6. identify two persons (e.g. doctor, nurse); 7. provide the patient's date of birth; 8. indicate the year when the war between Iran and Iraq began; 9. name the current country leader; and 10. count backwards from 20 to 1. Compared to the original version, items 8 and 9 have been adopted during the validation process of the Persian version of AMT. Correct answers are summed up to form a total score (range 0–10), with higher scores indicating better cognitive function. A score of 6 or less indicates cognitive impairment with a sensitivity of 99% and specificity of 94% (Foroughan et al., 2017).

The Depression in Old Age Scale (DIA-S) was used to assess discriminant validity. DIA-S is a short, simple and self-report instrument with potential applicability in clinical and research settings (Heidenblut & Zank, 2010). The DIA-S was constructed to be brief and easy to apply and interpret, with items that were meant to be context free, so the instrument could be used in different healthcare settings. The scale includes ten short statements about depression which are confirmed or denied in a simple yes/no answer format (Heidenblut & Zank, 2014). Rashedi et al. showed that the DIA-S is a valid and reliable self-report screening tool for depressive symptoms in the Iranian geriatric population (Rashedi, Rezaei, Foroughan, & Delbari, 2016). Recent studies have confirmed that depression and cognition are inversely correlated, with varied effect sizes (Condeelis, 2016; Rosenberg, Mielke, Xue, & Carlson, 2010; Sánchez-Martínez et al., 2016).

Procedure

Following the World Health Organization process for translating and adaptating instruments, the linguistic translation of the English version of the GPCOG into Persian involved several stages: 1. Translation; 2. Expert panel; 3. Back-translation; 4. Pre-testing and cognitive interviewing; and 5. Final version (World-Health-Organization, 2010).

The internal consistency was determined by Cronbach's alpha, while the test-retest reliability was calculated using the re-administration of the P-GPCOG after a 19 days interval in 30 community-dwelling participants.

Data analyses

Data obtained from the assessments/interviews were initially analysed using descriptive statistics. Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 20 (IBM Inc., Chicago, IL). Independent t-test, Analysis of variance (ANOVA), Pearson's r correlation test, and multiple regression were used for data analysis.

Ethical considerations

This study was approved by the Ethics Committee of Deputy of Research & Technology of the University of Social Welfare and Rehabilitation Sciences.

Results

The mean age of participants was 70.67 (SD = 9.51), community-dwelling participants were on average 8.37 years younger and less cognitively impaired than nursing home (Table 1). The sample consisted of 57.4% men, 56.5% were married and the others were single, widowed, or divorced. Almost half the participants had no formal education (43.5%), 20.4% were at primary level, 19.1% at secondary level and 17% had academic education (Undergraduate and Postgraduate degrees). Demographic and clinical characteristics of the two samples are summarized in Table 1.

Table 1. Demographic and clinical characteristics of the study sample.

	Community-dwelling (n = 151)		Nursing home (n = 79)			
Variable	N / M	% / SD	N / M	% / SD	Test value (df)	P-value
Gender					58.93^{X2} (1)	<0.001
Male	114	75.5	18	22.8		
Female	37	24.5	61	77.2		
Marital Status					a 1.285E2^{X2} (3)	<0.001
Married	125	82.7	6	7.6		
Single	0	0	12	15.2		
Widowed	26	17.3	56	70.9		
Divorced	0	0	5	6.3		
Education level					39.33^{X2} (3)	<0.001
No formal education	44	29.2	56	70.9		
Primary level	36	23.8	11	13.9		
Secondary level	36	23.8	8	10.1		
Academic education*	35	23.2	4	5.1		
Age	67.79	8.11	76.16	9.63	−6.96^{t} (228)	<0.001
AMTs	8.34	2.02	5.41	4.46	6.78^{t} (228)	<0.001
DIA-S	4.95	2.41	4.57	2.65	1.08^{t} (228)	>0.05
GPCOG total	9.44	3.92	4.28	3.82	9.55^{t} (228)	<0.001
GPCOG cognitive	5.12	2.51	2.38	2.20	8.17^{t} (228)	<0.001
GPCPG informant	4.32	1.89	1.90	2.01	9.01^{t} (228)	<0.001

[a] 3 cells (37.5%) have expected count less than 5. The minimum expected count is 1.70
[*] Undergraduate and Postgraduate

The mean P-GPCOG scores for the total, cognitive and informant subscales were 7.67 (SD = 4.59), 4.18 (SD = 2.73), and 3.49 (SD = 2.24), respectively. Community-dwelling participants performed significantly better on all three P-GPCOG scores: cognitive, informant and total scores and AMTs (see Table 1).

In the community-dwelling group, worse cognitive performance on the P-GPCOG correlated significantly with worse scores on the AMTs (r = 0.66, P < 0.001) and less so with depressive symptoms as measured with the DIA-S (r = −0.36, P < 0.001). In the nursing home group, the P-GPCOG cognitive scores also correlated positively with the AMTs (r = 0.46, P < 0.001); there was no significant association with depressive symptoms (r = −0.09, P > 0.05).

P-GPCOG cognitive scores also significantly and negatively correlated with age, significantly and positively with education, and were higher in men suggesting certain socio-demographic variables may influence the test scores (Table 2). Further analysis, using multiple regression analysis, confirmed the role of education in both samples, age only in community-dwelling individuals and no effect of gender on P-GPCOG scores in either sample (Table 3).

Cronbach's alpha for the P-GPCOG cognitive and informant subscales were 0.90 and 0.83 respectively, indicating a high degree of internal consistency and homogeneity between items. The test-retest correlation for the total P-GPCOG score was 0.82.

Table 3. Multiple regression analysis for P-GPCOG-cognitive scores.

	Model	B	Beta	t	P-value	R^2
Community-dwelling	(Constant)	10.73		6.56	<0.001	0.48
	Age	−0.08	−0.27	−4.44	<0.001	
	Gender	−0.63	−0.11	−1.68	>0.05	
	Education	0.70	0.44	6.55	<0.001	
	DIA-S	−0.22	−0.21	−3.43	0.001	
Nursing home	(Constant)	2.72		1.39	>0.05	0.53
	Age	−0.01	−0.05	−0.58	>0.05	
	Gender	−0.83	−0.16	−1.77	>0.05	
	Education	1.18	0.66	7.01	<0.001	
	Residency history	0.01	0.05	0.57	>0.05	
	DIA-S	0.01	0.01	0.04	>0.05	

Discussion

Before implementing any assessment tool in a new cultural environment, it is essential, to carry out a rigorous translation, adaptation and validation process. This study aimed to evaluate the adaptation and psychometric properties of the Persian version of the GPCOG (P-GPCOG) in order to introduce a short, practical, and useful tool for assessing cognition in primary healthcare settings and research fields among the growing older population of Iran. As the current older population in Iran has a low literacy level, a culture-free scale with least dependence on education is desirable.

Table 2. Correlation of demographic and clinical characteristics and P-GPCOG scores in the two groups of community-dwelling elders and nursing home residents.

		Cognitive		Informant		Total	
Group	Variable	Test value	P-value	Test value	P-value	Test value	P-value
Community-dwelling	Age	r = −0.37	<0.001	r = −0.28	<0.001	r = −0.37	<0.001
	Education	r = 0.61	<0.001	r = 0.35	<0.001	r = 0.56	<0.001
	Gender	r_{pb} = −0.27	0.001	r_{pb} = −0.20	<0.05	r_{pb} = −0.27	0.001
	AMTs	r = 0.66	<0.001	r = 0.37	<0.001	r = 0.60	<0.001
	DIA-S	r = −0.36	<0.001	r = −0.33	<0.001	r = −0.39	<0.001
Nursing home	Age	r = −0.38	<0.001	r = −0.22	<0.001	r = −0.33	<0.001
	Education	r = 0.70	<0.001	r = 0.43	<0.001	r = 0.64	<0.001
	Gender	r_{pb} = −0.25	<0.05	r_{pb} = −0.04	>0.05	r_{pb} = −0.17	>0.05
	AMTs	r = 0.46	<0.001	r = 0.24	<0.05	r = 0.40	<0.001
	DIA-S	r = −0.09	>0.05	r = −0.03	>0.05	r = −0.07	>0.05

Table 4. Comparison of current study findings with other studies.

Authors	Country	Year	Sample size	Age group	Reliability	
					Cognitive	Informant
Brodaty et al. (Brodaty et al., 2002)	Australia	2002	283	50–74 ≥75	0.75	0.84
Thomas et al. (2006)	France	2004	280	NA	NA	NA
Won & Soon (Park & Kim, 2010)	Korea	2009	412	NA	0.78	0.79
Pirani et al. (2010))	Italy	2010	200	≥55	NA	NA
Li et al. (2013))	China	2013	253	≥50	0.68	NA
Yokomizo et al. (2014)	Brazil	2013	91	≥60	NA	NA
This study	Iran	2016	230	≥60	0.90	0.83

The study results showed that the P-GPCOG is a reliable cognitive instrument with good internal consistency and test-retest reliability. This is in line with the findings of previous related research (Brodaty et al., 2002; Park & Kim, 2010). Table 4 presents comparison of current study findings with other studies on GPCOG instrument.

High and significant positive correlations of the P-GPCOG scores with AMT scores are suggestive of the convergent validity of the instrument. This is consistent with the original validation study of the GPCOG (Brodaty et al., 2002). On the other hand, the correlation between the scores of P-GPCOG and DIA-S were significant, but only in the community-dwelling participants and at a lower level than against AMT, suggestive of the ability of the P-GPCOG to discriminate between two different but related constructs, as many studies have suggested (Almeida, Flicker, & Rees, 2014; Arts et al., 2016; Lichtenberg, Ross, Millis, & Manning, 1995; Rashedi & Morasae, 2014; Thomas & T O'Brien, 2008). This can be considered as a support for discriminant validity of this scale. Known group comparisons confirmed previous studies (Kane et al., 2003; Nikmat, Al-Mashoor, & Hashim, 2015; Won & Kim, 2008) that the P-GPCOG can differentiate between community-dwelling older adults and nursing home residents which are known to be a more cognitively impaired group.

The study findings showed that the P-GPCOG cognitive scores were significantly related to major socio-demographic variables in community-dwelling older adults and nursing home residents. To investigate this further, multiple regression analysis was used which showed that the only significant socio-demographic variable affecting the results of P-GPCOG in both groups is education suggesting that the cognitive scores may relatively be in favor of people with higher education, as some other studies have found (Evans et al., 1993; Han et al., 2016; Rashedi, Rezaei, & Gharib, 2014). Age was significantly related with the scores in community-dwelling participants, but not in nursing home residents. This may be due to nursing home residents being more than eight years older than those in the community and having significantly less education which could be a cohort effect.

The correlations between P-GPCOG informant scores and education were weaker than for cognitive scores (Table 2) indicating that the informant section is less affected by socio-demographic variables. These findings represent an advantage of the P-GPCOG compared to other cognitive screening instruments.

Conclusion

The P-GPCOG is a valid and reliable instrument for cognitive assessment in older Persian speakers and its application in clinical and research settings is recommended. As cognitive performance on the GPCOG may be negatively affected by lower levels of education, adjusting scores and preparing a normative table based on education level may be required.

The present study was preliminary, so further research is needed to investigate comprehensively the diagnostic accuracy of the P-GPCOG (i.e. diagnostic accuracy, sensitivity, specificity) in Iran, also taking into consideration potentially different cut-off scores for illiterate older people or those with limited education.

There are some limitations in this study which provide ground for future research. First, differences between samples may have biased results. Second, the present study did not actually determine the diagnostic accuracy, that was outside the scope of this study. Third, as the performance of the P-GPCOG in a sample of consecutive older people attending primary care/general practice may differ, further testing in this setting is desirable. It will be necessary to validate the performance of the P-GPCOG against a clinical diagnosis of dementia. Fourth, dementia diagnoses of participants in this study were not recorded, as the primary aim of the study was to establish the psychometric properties of the P-GPCOG. Fifth, limited information was available about informants completing the GPCOG informant interviews. Finally the sample size was small affecting the generalization of the results.

This study used psychologists to administer the GPCOG to patients and informants. While the administration of the GPCOG is simple and minimal training is required, future studies using the P-GPCOG should determine, whether GPs or nurses could also administer the test.

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Disclosure statement

The authors declare no potential conflicts of interest respecting the conduct, authorship, and/or publication of this article.

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