Research Article

Psychometric Characteristics of Patient Health Questionnaire-2 (PHQ-2) in Iranian Psychiatric Outpatients

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Abstract

Depression is a serious public health problem in community settings and primary care in the worldwide. The Patent Health Questionnaire-2 (PHQ-2) is an ultra-brief depression screener. It has been used in both research and practice settings. The PHQ-2 has not had its validity examined in psychiatric and psychological settings in Iran. A cross-sectional study was conducted to investigate reliability, validity, and factorial structure of the Farsi version of Patent Health questionnaire-2 (PHQ-2) in a convenience sample of 130 Iranian volunteer psychiatric outpatients was selected from the psychiatric and psychological clinics at the School of Behavioral Sciences and Mental Health-Tehran Institute of Psychiatry at the Iran University of Medical Sciences. They were completed the Patent Health Questionnaire-2 (PHQ-2), the Patent Health Questionnaire-9 (PHQ-9), the Patent Health Questionnaire-15 (PHQ-15), the World Health Organization-five Well-Being Index (WHO-5), and the short form of the Beck Depression Inventory-13 (BDI-13). The mean score of the PHQ-2 was 3.53 (SD=1.73). The Cronbach alpha, Spearman-Brown, Guttman Split-Half coefficients, and one-week test-retest reliability for the PHQ-2 were 0.74, 0.74, 0.74, and 0.76, respectively. The PHQ-2 correlated 0.80 with the PHQ-9, 0.45 with the PHQ-15, -0.45 with the WHO-5, and 0.69 with the BDI-13, indicating good construct and criterion-related validity. The results of the factor analysis of the PHQ-2 items identified 1 factor labeled: General depression (79.44% of the variance). The PHQ-2, therefore, appears to have a uni dimensional structure, acceptable validity and reliability, and it can be used in the primary care, general population, clinical, and research settings in Iran society.

Keywords: Depression; Validity; Reliability; Factorial structure; Patent health questionnaire-2; Psychiatric outpatients; Iran

Introduction

Mental disorders are a major contributor to the Years Living with Disability (YLD) in worldwide [1]. Depression is a serious public health problem, the most prevalent and treatable mental disorder in primary care [2]; and in community settings [3]. The Patent Health Questionnaire-2 (PHQ-2) is a measure for diagnosing and monitoring depression [4-6]. It is a brief multipurpose, useful and time-saving measure for detecting, severity, and monitoring outcomes of depression over time [7-9].

The goal of the PHQ-2 is to screen for depression in a "first step" approach. Patients who screen positive should be further evaluated with the Patent Health Questionnaire-9 (PHQ-9) to determine whether they meet criteria for a depressive disorder. Clinical utility of the PHQ-2 is to reduce depression evaluation to two screening questions relating to core symptoms of depression (i.e. low mood, and loss of interest or pleasure) enhance routine inquiry about this mental disorder [8,10-12].

Lino, Portela, Camacho, Atie, Lima, et al. [13] reported that the PHQ-2 is not sufficient to screen for depression, and it is the first step of the screening. Mitchell, Yadegarfar, Gill, and Stubbs [14]

indicated that although the PHQ-2 has sensitivity and specificity, and is adequate for initial first step assessment of depression in primary care, but it cannot confirm a clinical diagnosis. Nevertheless, using of very shorter and brief screening tools for diagnosis and management of depression has been interested in many settings [15].

The PHQ-2 has not had its validity examined in psychiatric and psychological settings in Iran. We examined psychometric and screening properties for depression of this questionnaire in a sample of Iranian psychiatric outpatients.

Methods

Participants

A convenience sample of 130 Iranian volunteer psychiatric outpatients was selected from the psychiatric and psychological clinics at the School of Behavioral Sciences and Mental Health-Tehran Institute of Psychiatry at the Iran University of Medical Sciences in Iran. The mean age of the patients was 31.40 years (SD= 8.20); the mean duration of their mental disorder was 7.91 years (SD=6.94); 73.4% were female; 62.4% were single; 29.6% were married, 6.4% divorced, and .8% widow; the majority 66.6% had a degree of between lower diploma and higher diploma, 33.4% between

BA, to Ph.D. degree; 55.6% had an anxiety disorder, 37% a depressive disorder, 3.% other disorders, and 7.3% missing data). They were completed the Farsi versions of the Patent Health Questionnaire-2 (PHQ-2), the Patent Health Questionnaire-9 (PHQ-9), the Patent Health Questionnaire-15 (PHQ-15), the World Health Organization-five Well-Being Index (WHO-5), and the short form of the Beck Depression Inventory-13 (BDI-13).

Measures

The Patent Health Questionnaire-2 (PHQ-2): The PHQ-2 inquires about the frequency of depressed mood and anhedonia over the past two weeks. It includes the first two items of the PHQ-9. Each item is scored four-point Likert scale from 0 to 3. The PHQ-2 total score for the two items ranges from 0 to 6: Not at all (0), Several days (1), More than half the days (2), and Nearly every day (3). For major depressive disorder (7% prevalence) the sensitivity, specificity, and Positive Predictive Value (PPV) of the PHQ-2 were 97.6, 59.2, and 15.4 (for score of 1); 92.7, 73.7, and 21.1 (for score of 2); 82.9, 90.0, and 38.4 (for score of 3); 73.2, and 93.3, 45.5 (for score of 4); 53.7, 96.8, and 56.4 (for score of 5); 26.8, 99.4, and 78.6 (for score of 6), respectively. For any depressive disorder (18% prevalence) the sensitivity, specificity, and PPV of the PHQ-2 were 90.6, 65.4, and 36.9 (for score of 1); 82.1, 80.4, and 48.3 (for score of 2); 62.3, 95.4, and 75.0 (for score of 3); 50.9, and 97.9, 81.2 (for score of 4); 31.1, 98.7, and 84.6 (for score of 5); 12.3, 99.8, and 92.9 (for score of 6), respectively [4,8,10]. Kroenke, et al. [4] identified a PHQ-2 cutoff score of 3 as the optimal cut point for screening purposes and stated that a cut point of 2 would enhance sensitivity, whereas a cut point of 4 would improve specificity. In study of Löwe, et al. [7], with reference to the Structured Clinical Interview for DSM-IV (SCID), the PHQ-2 had a sensitivity of 87% and a specificity of 78% for major depressive disorder and a sensitivity of 79% and a specificity of 86% for any depressive disorder. McManus, Pipkin, and Whooley [16], with reference to the Diagnostic Interview Schedule, showed that the PHQ-2 had a sensitivity of 39% and a specificity of 92% for screening depression in patients with Coronary Heart Disease (CHD). Li, Friedman, Conwell, and Fiscella [17], with reference to the Structured Clinical Interview for DSM-IV (SCID), reported that the PHQ-2 had a sensitivity of 100%, a specificity of 77%, and Area Under the receiver operating characteristic Curve (AUC) 0.88 for identifying major depression in older patients. Cutler, Legano, Dreyer, Fierman, Berkule, et al. (2007), with reference to the Edinburgh postnatal depression scale, found that that the PHQ-2 had a sensitivity of 43% and a specificity of 97% for screening of maternal depression in a low-education population. Lima Osório, Vilela Mendes, Crippa, & Loureiro [18], with reference to the SCID, indicated the best cutoff score for the Brazilian version of the PHQ-2 was between 3 and 4. Richardson, et al [10] found the PHQ-2 score of > or =3 had a sensitivity of 74% and specificity of 75% for detecting major depression in adolescent in primary care, also it had an area under the curve of 0.84. Arroll et al [8] validated the PHQ-2 for diagnosing major depression, with reference to the computerized Composite International Diagnostic Interview (CIDI), and indicated that sensitivity and specificity of the PHQ-2 were 86% and 78% with a score of 2 or higher; and 61% and 92% with a score 3 or higher, respectively. On the PHQ-2, a score of 2 or higher detected more cases of depression than a score of 3 or higher in the primary care population of New Zealand. Similar to

these findings, Lino et al. [13], with reference to the SCID, found that the PHQ-2 had sensitivity 0.74, specificity 0.77, PPV 0.50, Negative Predictive Value (NPV) 0.90, with score equal to 1, and the AUC was 0.77. Hanwella, Ekanayake, and de Silva [19], with reference to the SCID-II, showed the sensitivity and the specificity of the PHQ-2 were 0.80, and 0.97, respectively. Manea et al. [15] using a systematic review found that sensitivity and specificity of the PHQ-2 were 91%, and 70% with a score 2 or higher; and 76% and 87% with a score of 3 or higher, respectively. On the PHQ-2, a score of 3 or higher had lower sensitivity than 83% in the original validation study (with a score of 2 or higher), donating a score of 2 or higher is preferable in identifying depression. In study of Liu, Yu, Hu, Lin, Zhou, et al. [20], the Cronbach's alphas of PHQ-2 was 0.76. With score of 3 of PHQ-2, the highest Youden's index of 0.79, with both sensitivity and specificity were 0.90 and the AUC was 0.94 to screening depression in the Chinese rural elderly. They suggested cut-off score of 3 for the PHQ-2.

The Patent Health Questionnaire-9 (PHQ-9): The PHQ-9 is a self-administered popular scale for assessing, diagnosing, and monitoring of depression severity, is sometimes used in certain screening or research settings [21-25]. The PHQ-9 has nine items and the answers refer to the past two weeks. Each item is scored four-point Likert scale from 0 to 3. The total score for the nine items ranges from 0 to 27: Not at all (0), Several days (1), More than half the days (2), and Nearly every day (3). Severity of depression is scored none-minimal (0-4); mild (5-9); moderate (10-14); moderately severe (15-19); and sever (20-27) [27-29]. Psychometric properties of the PHQ-9 have been investigated in many studies and good reliability and validity have been reported for the scale [17,19,26,27,30-45].

The Patent Health Questionnaire-15 (PHQ-15): The PHQ-15 is a brief, self-administered measure for screening of somato form disorders e.g. somatization, evaluating and monitoring the severity of somatic symptoms in clinical practice and research settings. It comprises 15 somatic symptoms (During the past four weeks, how much have you been bothered by any of the following problems: stomach pain, back pain, pain in your arms or legs or other joints, menstrual cramps or other problems with your periods (women only), headaches, chest pain, dizziness, fainting spells, feeling your heart pound or race, shortness of breath, pain or problems during sexual intercourse, constipation, loose bowels, or diarrhea, nausea, gas, or indigestion, feeling tired, or having low energy, and trouble sleeping) from the PHQ of the PRIME-MD, each symptom scored in Not bothered at all (0), Bothered a little (1), and Bothered a lot (2). The PHQ-15 scores of 5, 10, 15, represented cutoff points for low, medium, and high somatic symptom severity, respectively. Scores ranged to 0-4 (no somatisation disorder), 5-9 (mild somatisation disorder), 10-14 (moderate somatisation disorder), and 15+ (severe somatisation disorder) [46]. Evidence indicates high reliability and validity of the PHQ-15 in different samples of various settings [47-54].

The World Health Organization-five Well-Being Index (WHO-5): The 5-item World Health Organization well-being index was developed at the Psychiatric Research Unit, Mental Health Centre North Zealand, Hillerod, Denmark. The WHO-5 is a commonly used measure of subjective psychological well-being, and

Table 1: Mean and SD of the PHQ-2 items and total score.

PHQ-9	Minimum	Maximum	Mean	SD
1	0	3	1.66	0.96
2	0	3	1.87	0.97
Total score	0	6	3.53	1.73

emotional well-being, and is a screening tool for depression and as an outcome instrument in clinical trials [55]. Each of the five items of the WHQ-5 is rated on a 6-point Likert scale from not present (0) to constantly present (5). The lower the total score is, the more severe the depression, poor physical health, and psychological health, the higher the total score, the better the physical and psychological health. An answered score of 1 or 0 on any of these items means that it may be helpful to consult with a counseling professional. A score of 13 or lower suggests further investigation into possible symptoms of depression. It is suggested to administer the major depression (ICD-10) inventory if the raw score is below 13 or if the patient has answered 0 to 1 to any of the five items. Scores are summated, with a raw score ranging from 0 to 25, and the total score is multiplied by 4 in order to obtain a percentage score, with higher scores meaning better well-being. A percentage score of 0 represents the worst possible well-being, while a score of 100 represents the best possible well-being. A score of 50 or below is indicative of low mood, though not necessarily depression, and a score of 28 or below indicates likely depression and warrants further assessment (diagnostic interview) to confirm depression [32]. Acceptable psychometric characteristics of the WHO-5 have been shown in previous studies in different samples, e.g. for depression in Dutch diabetes outpatients [56,57] in primary care patients [58]; for screening of psychological well-being in patients with Metabolic Syndrome (MS) [28]; for screening of well-being in Iranian adolescents [59]; and for maternal well-being in Iranian pregnant women [60]. The test-retest reliability of the WHO-5 in Germany and Japan was 0.90. Wu [28] indicated the WHO-5 negatively correlated -0.60 with the PHQ-9, -0.42 with the Hospital Anxiety and Depression scale (HADS-Anxiety), -0.57 with the HADS-Depression, and positively correlated 0.49 with the World Health Organization Quality of Life-Short-form Version for Taiwan (WHOQOL) in patients with metabolic syndrome [28].

The short form of the Beck Depression Inventory-13 (BDI-13): The BDI-13 is a screening tool for depressive disorders. Dadfar and Kalibatseva [61] found good psychometric properties for the BDI-13 with Iranian psychiatric outpatients including Cronbach's alpha of .85, having moderate to strong positive associations of the BDI-13 with the instruments related to mental health constructs, and three identified factors were affective, somatic/vegetative, and cognitive/loss of functioning.

Table 3: The Pearson correlations (r) between the PHQ-2 items and total.

Items	1	2	Total
1	1		
2	.589**	1	
Total	.891**	.892**	1

**Significant at the 0.01 level.

Table 4: The Pearson correlations (r) between the questionnaires.

Questionnaires	r with PHQ-2
Patient Health Questionnaire-9 (PHQ-9)	.800**
Patient Health Questionnaire-15 (PHQ-15)	.458**
World Health Organization-five Well-Being Index (WHO-5)	-.457**
Beck Depression Inventory-13 (BDI-13)	.698**

**Significant at the 0.01 level.

Results

The mean score of the PHQ-2 was 3.53 (SD=1.73). The lowest mean score was 1.66 (SD=.96) for item of 1, and the highest mean score was 1.87 (SD=.97) for item of 2 (Table 1).

Reliability coefficients of the PHQ-2

The Cronbach alpha coefficient for the PHQ-2 was 0.74 the Spearman-Brown coefficient 0.74, the Guttman Split-Half coefficient 0.74, indicating high internal consistency (Table 2). One-week test-retest reliability was 0.76.

Correlations of inter-items, and total scores of the PHQ-2

The correlations between items and total score were ranged from .892 for item of 2 and total score to .891 for item of 1 and total score (significant at the 0.01 level), indicating high association between the each items and total scores of the scale.

The correlations between items were ranged .589 for items of 1 and 2 (significant at the 0.01 level), indicating moderate association between the each items of the scale (Table 3).

Correlations of the PHQ-2 with other questionnaires

The PHQ-2 correlated 0.80 with the PHQ-9, 0.45 with the PHQ-15, -0.45 with the WHO-5, and 0.69 with the BDI-13, indicating moderate to high construct and criterion-related validity and association between the measures. Concurrent validity for the PHQ-2 with the other scales, were positively significant at the 0.01 level, expect for PHQ-2 with WHO-5 was negatively significant at the 0.01 level (Table 4).
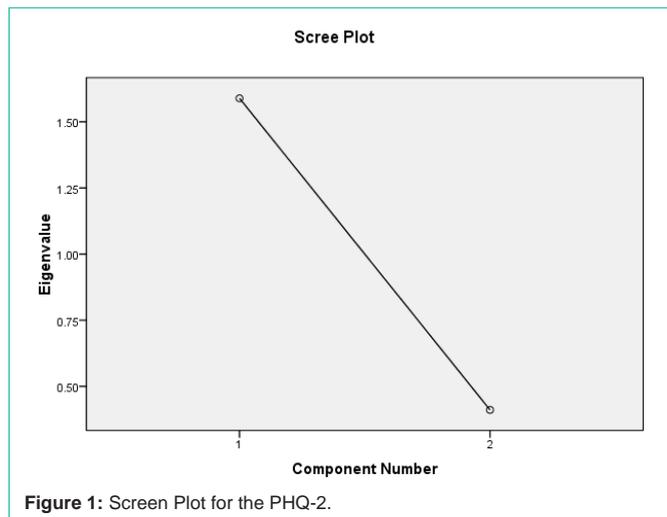
Factor analysis of the PHQ-2

The criteria for the factor analysis were evaluated using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and

Table 2: Descriptive statistics of all questionnaires.

Questionnaires	Mean	SD	Number of items	Format	Cronbach's Alpha
Patient Health Questionnaire-2 (PHQ-2)	3.53	1.73	2	Likert (0-3)	0.74
Patient Health Questionnaire-9 (PHQ-9)	12.83	6.25	9	Likert (0-3)	0.88
Patient Health Questionnaire-15 (PHQ-15)	11.02	6.22	15	Likert (0-2)	0.85
World Health Organization-five Well-Being Index (WHO-5)	9.05	6.46	5	Likert (0-6)	0.92
Beck Depression Inventory-13 (BDI-13)	9.65	5.92	13	Likert (0-3)	0.80

Table 5: Factor loadings of the Patient Health Questionnaire-2 in 130 Iranian psychiatric outpatients.

Patient Health Questionnaire-2 Items Over the last 2 weeks, how often have you been bothered by any of the following problems?	Component 1
1. Little interest or pleasure in doing things.	.89
2. Feeling down, depressed, or hopeless.	.89
Eigen value % of Variance	1.58 79.44

Factor 1 (item: 1 and 2): General depression.

Figure 1: Screen Plot for the PHQ-2.

the Bartlett Test of Sphericity. The KMO was 0.500, indicating the adequacy of the sample of psychiatric outpatients, and the Bartlett's Test of Sphericity was 54.286 (df = 1, p< .001) indicating that the factor analysis was justified in the psychiatric outpatients sample. The results of exploratory factor analysis on PHQ-2 extracted only one component (factor), and the solution cannot be rotated.

Factor 1 (2 items) explained 79.44% of the observed variance and was labeled "General depression". It included the item: "There have been times when I wished that I were dead", and "I sometimes think that death would solve my problems" (Table 5 and Figure 1).

Conclusion

The aim of the study was to examine of psychometric and screening properties for depression of the PHQ-2 in a sample of Iranian psychiatric outpatients.

The mean score of the PHQ-2 was 3.53 (SD=1.73). The lowest mean score was 1.66 (SD=.96) for item of 1 "Little interest or pleasure in doing things", and the highest mean score was 1.87 (SD=.97) for item of 2 "Feeling down, depressed, or hopeless".

We found the Cronbach alpha, Spearman-Brown, Guttman Split-Half coefficients, and one-week test-retest reliability for the PHQ-2 was 0.74, 0.74, 0.74, and 0.76, respectively, indicating good reliability. Similar to our finding, the study of Liu et al [20] showed that the PHQ-2 has good Cronbach's alpha 0.76.

Our study showed that the correlations between two items; and between two items and total score were significant at the 0.01 level. Liu et al [20] found correlations between the total scores of the PHQ-2 and each item were 0.81 and 0.90, respectively.

The PHQ-2 correlated 0.80 with the PHQ-9, 0.45 with the PHQ-15, -0.45 with the WHO-5, and 0.69 with the BDI-13, positively significant at the .01 level (expect for PHQ-2 with WHO-5 was negatively significant at the 0.01 level) and indicating good construct and criterion-related validity. Findings of Li et al [17] showed the PHQ-2 had adequate criterion validity and correlated with the six scales of the Medical Outcomes Study 12-item Short Form Questionnaire (SF-12), donating good construct validity. Lima Osório, et al [18] identified discriminative validity of the PHQ-2 and the PHQ-9.

We identified 1 factor labeled: General depression (79.44% 0f the variance). The validation process of the Farsi PHQ-2 version showed psychometric properties similar to those in international studies, indicating the PHQ-2 assesses the same constructs, in the same way, as the original version. We provided evidence for the validity and reliability of the PHQ-2 as a quick screening instrument, or a brief tool of depression severity in Iranian patients with psychiatric disorders. The PHQ-2, therefore, appears to have a uni dimensional structure, adequate and good validity and reliability, and it can be can be administered easily and used in the primary care, general population, clinical, and research settings in Iran society.

For evaluation the diagnostic accuracy of minor and major depression by the PHQ-2, combination the use of an interview-based ICD (International Classification of Diseases) or DSM (Diagnostic and statistical Manual of Mental Disorders) diagnosis of depression, the Mini International Neuropsychiatric Interview (MINI), a semi structured interview, the Computerized Diagnostic Interview Schedule (C-DIS), the Composite International Diagnostic Interview (CIDI), the Center for Epidemiological Studies Depression (CES-D) Scale, the PHQ-9, the 90-item Revised Symptoms Checklist (SCL-90-R), the 28-item General Health Questionnaire (GHQ-28), the 10-item/6-item Kessler Psychological Distress Scales (K10/K6), the Patient Health Questionnaire–Somatic, Anxiety, Depressive Symptoms (PHQ-SADS), and using Rasch Item Response Theory (IRT) approaches are recommended.

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