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# Validation of Goldberg's Depression Scale in academic and non-academic peoples

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# ABSTRACT

Depression is a psychiatric disorder and the most common illness of present century which is known as psychiatric cold. In order to diagnose this disease, various tests have been developed. The purpose of this research is to study reliability, validity and composing norms of Goldberg's depression scale. This research is applied. Goldberg's depression scale was administered to 427 residents of West Azerbaijan who were chosen using stratified random sampling method. In order to calculate the reliability and validity of the scale, Cronbach's Alpha and factorial analysis (Varimax Rotation) were respectively used. Those items which had a correlation coefficient lower than 0. 4 were removed from the final version of the scale and analysis. To carry out the study further, other statistical indices such as independent sample t-test and F were used. Total reliability obtained by Cronbach's Alpha method for those with high school degrees was0.901, for those with higher education degrees was 0.861 and for others was 0.817. The results of factorial analysis indicates that this scale consist of three main factors which explain 44.63% of the total depression variance. With regard to high reliability of the scale, validity, norms and few items and necessary time for its administration (about 5minutes), it could said that Goldberg's depression scale is a suitable instrument to identify and pilot depressed individuals.

Key words: depression scale, standardization, academic, non academic

# INTRODUCTION

Research is a factor and root for development in all educational, cultural, economic and industrial domains. Every endeavor to clarify the significance of research, tackle problems and shortcomings is essential [1]. In research various methods can be employed, one of which used in this study is factorial analysis. This method for the first time developed in early 20<sup>th</sup> century in 1904 by Spearman. The purpose for factorial analysis is to examine or to summarize the relationships among variables or other receptive factor phenomena. Factorial analysis, in fact, plays a major role in economizing academic and scientific studies. This method reduces variability in tests, scales, measures, and simplifies them. In fact, it tells us that what relationship tests and measures share. So it reduces the number of variable so that scholars can overcome them. Given this, the purpose of factorial analysis is to discover the simplest pattern out of the ones related to the relationship among variables. This method seeks to understand whether the observed variables could be explained based on fewer variables (factors) extensively and fundamentally. Therefore, the aims of factorial analysis are as follows:

1. Reducing a great number of variables to fewer factors for modeling

- 2. Selecting a subtest from a large number of items that have the highest coefficient with the main components
- 3. Producing a collection of factors as uncorrelated variables so that the so-called could be close
- 4. Validating a scale or index by means of determining the load of the components of the scale on extracted factors5. Preparing multiple tests which measures only one factor and requires administration of fewer tests.
- 6. Determining clusters of the subjects
- 7. Determining groups by selecting those people who are classified in a cluster [2]

The movement of mental measurement was introduced in late 19<sup>th</sup> century by Galton and then developed further by other researchers. Without doubt, one of psychology's contributions to the society is the assessment of ideas and psychological variables [3]. Today measuring mental characteristics is one of the most important activities of psychologists. In fact, there are very few people who have not undergone mental measurement during their life time. Therefore, developing suitable measurement instruments, and having standards and norms appropriate to educational and cultural status of the society cannot be avoided [4].Since depression is the most common mental disease of the present century [5], it is regarded as the most serious illness of the century and according to Harvard University report, it will hold the first or second rank among common diseases until 2020 [6]. As a result, diagnosing this disease is essential because the sooner and cheaper depressed people are identified, the more valuable the standardization of the scale is.

## MATERIALS AND METHODS

### Subjects

Out of West Azerbaijan residents a sample consisting of 427 were selected using stratifies random sampling method. Descriptive indices related to sample under study are presented in Table 1.

This research is applied. In order to calculate the reliability and validity of the scale, Cronbach's Alpha and factorial analysis (Varimax Rotation) were respectively used. For each single item mean and SD were calculated and those items which had a correlation coefficient lower than 0. 4 were removed from the final version of the scale and analysis. Also, categorical and percentile norms were calculated.

Table 1: I	Descriptive	indices of	f the sampl	e under study
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Variable	Resi	dent	Education			Ge	ender
Statistic	Urban	Rural	High school	Academic	other	Male	Female
Frequency	387	39	142	141	144	195	232
Percentile Frequency	90.6	9.1	33.3	33.0	33.7	45.7	54.3

#### Measures

In order to study the variables, the researchers used *Goldberg's depression scale*. This scale consists of 18 items with 6 choices. For choice (to a great extent) score 5, choice (a lot) score 4, choice (quite a lot) score 3, choice (partly) score 2, choice (only slightly) score 1 and choice (not at all) score 0 are allocated. The more total scores are, the higher depression level will be. It should be mentioned that every individual can take this test frequently to assess his/her mental status. Every subject's mental status could be calculated based on Table 2.

Table 2: §	Subjects	status with	regard to r	aw score	hefore s	standardizati	on of the scale
able 2.	Jubjects	status with	regard to r	aw score	Derore s	stanuar uizau	on or the scale

No	Score	Status
1	0-9	Depression unlikely
2	10-17	Possibly minor depression
3	18-21	On the verge of depression
4	22-35	Minor to moderate depression
5	36-53	Moderate to severe depression
6	54+	Severe depression

When the total score is over 21, the individual should refer to health experts for examination and necessary treatment.

## **RESULTS AND DISCUSSION**

**Reliability of Goldberg's depression scale:** Reliability is dependability, consistency, and repeatability of results for measuring information and characteristics [7]. Reliability of a test refers to the agreement of its assessors or achieving similar results under similar circumstances [8]. On the other hand, the size of the sample in standardization is one of researchers' concerns which should be big enough and represent the sample population.

Item	Mean	SD	Number of Subjects
1	3.27	1.6	427
2	2.65	1.49	427
3	3.35	1.46	427
4	2.87	1.54	427
5	3.08	1.53	427
6	2.93	1.58	427
7	2.96	1.64	427
8	2.84	1.6	427
9	3.16	1.61	427
10	3.43	1.67	427
11	2.91	1.64	427
12	2.7	1.58	427
13	2.54	1.55	427
14	2.82	1.58	427
15	2.28	1.68	427
16	2.72	1.64	427
17	2.59	1.54	427
18	2.8	1.71	427

Table 3: Mean and Standard Deviation of each item of the depression scale

What is important is the precision, stability, and reliability, more broadly the degree of the reliability of the test .i.e. if an individual is reassessed by an instrument, to what extent it is possible to replicate, retrieve and repeat the same results. Reliable measurement means every individual's position should be kept consistent in relation to other people in his/her group. An indicator of this issue is a small standard error of measurement or a big reliability coefficient. One of the methods to calculate the reliability of the test is Cronbach's alpha. This method is only used in tests which have homogenous and similar items and all of them are used to assess one single characteristic. Here the analysis in this assessment is based on the assumption that all the items are indices of one basic characteristics, i.e. test is homogenous in terms of content.

#### Table 4: Descriptive indices of each item in relation to the whole test if items are removed

Item	Total mean if	Total variance	Relationship between	Test reliability if
	items removed	if items removed	items and the whole test	items removed
1	31.62	227.94	.375	.861
2	32.23	221.50	.561	.854
3	31.54	229.98	.374	.861
4	32.02	222.19	.524	.855
5	31.81	230.98	.331	.863
6	31.96	220.26	.552	.854
7	31.93	217.30	.594	.852
8	32.05	217.91	.595	.852
9	31.73	224.21	.454	.858
10	31.46	236.19	.190	.869
11	31.98	226.39	.398	.861
12	32.19	217.76	.610	.852
13	32.35	219.51	.583	.853
14	32.07	225.63	.432	.859
15	32.61	220.92	.500	.856
16	32.17	216.85	.602	.852
17	32.30	219.10	.595	.852
18	32.09	230.08	.302	.865

If the test consists of two or more different subtests, it is essential that the analysis of each subtest be done separately, and to calculate total reliability of the test, one should use summation correlations. When homogenous assumption is true, this method is, perhaps, the most concrete means to determine harmony of the items [9]. Descriptive indices of the items of the test under study are presented in 3. Likewise, descriptive indices of the mean of the whole test, total variance of the test, and reliability of the test in the event of removing items regarding total test are presented in Table 4. Also, correlation coefficient of each item with total score of the test is shown in Table 5.

Item	Pearson correlation	Significance level	Number
1	.461**	0.01	427
2	.624**	0.01	427
3	.452**	0.01	427
4	.593**	0.01	427
5	.416**	0.01	427
6	.620**	0.01	427
7	.659**	0.01	427
8	.659**	0.01	427
9	.533**	0.01	427
10	.291**	0.01	427
11	.484**	0.01	427
12	.671**	0.01	427
13	.646**	0.01	427
14	.512**	0.01	427
15	.577**	0.01	427
16	.666**	0.01	427
17	.656**	0.01	427
18	.399**	0.01	427
Depression	.461**	0/001	427

#### Table 5: Pearson correlation coefficient of each item with total score of the test

Significance level =0.01 (two-tailed) \*\*

According to the Table 5, Pearson correlation coefficient of each item with total score of the test indicates that all of the items have positive correlation coefficient with total score of the test. Items 12 and 16 have the correlation coefficient 0.666 and 0.671 respectively with total score. Table 6 displays reliability correlation of the test and its factors by means of Cronbach's alpha method.

#### Table 6: Reliability correlation of the test and its composing factors

Education level			Number of subjects		
	Factor 1	Factor 2	Factor 3	Total score	
				of depression	
	Sadness &	Disappointment	Inability in decision making	or depression	
	lack of				
	interest in life				
High school	0.903	.440	.688	.901	142
Academic	.838	.351	.628	.861	141
Other	.804	.354	.366	.817	144
Total subjects	.855	.383	.569	.864	427
Number of items	12	3	3	18	

Results obtained for the whole test indicates that *Goldberg's depression scale* has a high level of reliability to carry out research and counseling.

## Validity of depression scale

Test validity means what the test measures and to what extent it is effective. It should be noted that the name or label of a test does not show what it measures. In fact, the names of tests are only short labels to identify them. Although at present researchers try increasingly to choose exclusive names based on practical applications, the names of most tests are so broad and obscure that they require clear guidelines in the behavioral domain of the test construction. By only examining the objective sources of information and empirical operations done to diagnose test validity it is possible to define a particular trait that the test assesses [10]. Construct validity is one method of validating the instrument used in present study. To put it simply, construct validity means comparing the results of the administration of the instrument with those predictions achieved based on a theory or other known facts. A trait or traits assessed by a test or a questionnaire is an abstract characteristic that cannot be assessed directly. But without doubt there is a theory for that trait at a higher level. A theory related to a particular trait shows what kind of validity is appropriate to reveal that trait. Construct validity put more emphasis than other validity on broader behavioral descriptions, more stable and more abstract. It requires gradual gathering of information from different sources and it takes into account whatever data that displays the nature of characteristic and effective circumstances in its development [11]. In order to collect evidence related to the test, the researchers used methods concerning the construct, that is, factorial analysis.

## Factorial Analysis of the scale

It should be, first, noted that before running factorial analysis it is essential to observe the following assumption. 1. Measure of sampling adequacy should be at least .7 2. The results of Bartlett test of sphericity should be significant.

3. The factor load of each item in factorial matrix and rotated matrix should be at least 0.3 and preferably over that value.

4. Each of the factors should belong to, at least, 3 items.

5. Factors should posses enough validity.

#### Table 7 shows KMO sizes and the results of Bartlett test of sphericity.

Quality index of sampling	0.915
Bartlett test	1990.571
df	153
Significance level	0.001

KMO index obtained for analysis of data indicate that from statistical point of view, data analysis is significant at the level 0.001. The AIC of non- diametric elements shows that the sample size of the study was sufficient. As it can be seen in Table 7 KMO value (Quality index of sampling) for Goldberg's depression scale was significant at the level 0.001. Therefore, it could be concluded that running factorial analysis based on correlation matrix is justifiable in control groups under study. One can trust the extraction of factors based on the data obtained. Initial results (without rotation) of the principal component analysis are presented in Table 8 which displays the commonality, factor, special value, variance percentage, and the cumulative percentage of each item.

Based on Table 8 it could be said that four factors of Goldberg's depression scale have a special value more than 1 and 50.302 % of variance of the total scale is explained in terms of these four factors. Based on the principal component analysis three factors were extracted from the scale which explain 44.628 % variance of the depression scale. As a result of factorial analysis, first, second and third factors justify respectively 31.903 %, 6.648 % and 6.076 % of variance of total variables.

#### Table 8: Commonality, factor, special value, variance percentage for each item

Factor			Total variance of compo	sing factors of th	ie scale	
		Initial variance of the	e factors	Obtained variance of the factors		
	Special value	Variance percentage	Cumulative percentage	Special value	Variance percentage	Cumulative percentage
1	5/743	31/903	31/903	5/743	31/903	31/903
2	1/197	6/648	38/551	1/197	6/648	38/551
3	1/094	6/076	44/628	1/094	6/076	44/628
4	1/021	5/675	50/302	1/021	5/675	50/302
5	0/957	05/319	55/621			
6	0/870	4/832	60/453			
7	0/810	4/499	64/952			
8	0/786	4/369	69/321			
9	0/709	3/393	73/260			
10	0/696	3/865	77/125			
11	0/684	3/801	80/926			
12	0/600	3/331	84/257			
13	0/550	3/053	87/310			
14	0/544	3/024	90/335			
15	0/499	2/771	93/106			
16	0/447	2/481	95/587			
17	0/399	2/219	97/806			
18	0/395	2/194	100/00			

Figure 1 shows composing factors of Goldberg's depression scale. Initial factors (first, second, third and then other factors in order) have more commonality with other composing factors.

Figure 1: Composing factors of depression scale



Four main factors of Goldberg's depression scale were extracted which had a factor load more than 1 by means of main component analysis. The results are displayed in Table 9.

	Factor			
Item	1	2	3	4
1	.442	126	.494	200
2	.642	193	.283	260
3	.442	075	.407	.382
4	.613	181	.132	.143
5	.382	.347	.301	.281
6	.631	.071	076	013
7	.674	005	239	.206
8	.684	155	123	.190
9	.527	.117	049	.486
10	.216	.681	.309	297
11	.459	.371	109	285
12	.686	047	106	226
13	.664	052	061	107
14	.493	.251	095	023
15	.597	301	247	307
16	.677	.011	.024	.060
17	.684	205	027	122
18	.351	.375	471	.094

#### Table 9: Factors extracted from Goldberg's depression scale

Factorial analysis of depression scale by mean of Viarmax rotation indicate that none of the items of the scale had a load factor lower than 0.40.

As it was mentioned earlier, in order to obtain a meaningful construct out of the factorial loads, factors extracted based on regular methods and crooked rotation use, were shifted to new axes so that not only the discovery of overall characteristic of the material but also a simpler diagnosis of the construct which represent major and rather obvious routes to interpretable solutions are achieved. The results of construct matrix obtained after 9 times repetitions are shown in Table 10. From matrix figures of this table the followings are deduced:

- 1. Complex item whose weight is concentrated on three factors do not exist
- 2. Items 2 and 4 are complex and have load only on two factors
- 3. Other items are unique or lack complexity, or their load on main factors has a great distance with other factors.

#### Table 10: Matrix

	Factor			
Item	1	2	3	
15	.691			
7	.690			
8	.675			
12	.646			
17	.639			
13	.607			
16	.546			
6	.560			
4	.498			
9	.498			
18	.446			
14	.414			
1		.643		
2	.453	.563		
3		.553		
10			.758	
5			.501	
11			.475	

# Factors extracted from Goldberg's depression scale

Based on the construct factors of matrix those items correlated with one factor jointly comprise one subtest. Therefore, after analysis of the scale by means of factorial analysis methods three factors as follows were extracted and named considering the highest factorial load.

*First Factor*: items 15,7,8,12,17,13,16,6,4,9,18,14 (sadness and lack of interest in life)

Second Factor: items 1, 2, 3 (disappointment)

*Third Factor:* items 10, 5, 11 (inability in decision making)

All the items had load factor more than 0.40 and none of them were removed from the scale.

Figure 2 displays composing factors of Goldberg's depression scale in a 3-dimension space.

Figure 2: Goldberg's depression scale in a 3-dimension space.



## Component Plot in Rotated Space

# Goldberg's depression scale norm

In order to interpret and explain an individual's scores, it is necessary to define his/her raw scores in a scale that provide an overall framework for comparing the scores. The purpose of this scale which is called *standard* or *norm* is to shows an individual relative status and rank in a suitable reference group. A suitable reference group is a group with which an individual can be logically compared [12]. Percentile norms are very important on one hand for

determining an individual overall status and rank, and on the other hand for comparing the results of different tests [13]. The main purpose of the process of the standardization of the test was to determine the distribution of raw scores of the norm group or standardization group. A comparison of the raw score of the subject helps the psychologist or counselor to determine the subject's position in relation to other age groups' raw scores, levels or gender [13]. In Goldberg's depression scale scores are changed into percentile norms. This norm shows what percentage of the subjects in norm group is lower or higher than a particular score. Percentile norms of the test used in this study are presented considering gender segregation of the subjects of the study in Table 11.

	Raw score							
Percentile Rank	Factor 1	Factor 2	Factor 3	Total				
	Sadness & lack of interest in life	Disappointment	Inability in decision making	Depression				
5	3	1	2	8				
10	5	2	2	12				
20	10	3	4	20				
30	14	4	5	25				
40	18	5	5	29				
50	21	6	6	35				
60	25	7	7	39				
70	27	8	8	42				
80	31	9	9	45				
90	36	11	11	51				
95	42	12	12	64				

Table 11: The results of the standardization of Goldberg's depression scale and its factors in terms of percentile score.

Based on Table 11, it could be said that a subject receiving a raw score of 9 in Disappointment factor acquires a score in that factor higher than 80% of the other subjects. In other words, he/she suffers from disappointment more than 80% of the individuals.

As there was no significant statistical difference among the subjects in terms of education, for all subjects a categorical norm was prepared. The categorical norm is shown for female and male university students in Table 12.

Category			Factor 1	Factor 2	Factor 3	Total
	Raw score	Percentage	Sadness & lack of interest in life	Disappointment	Inability in decision making	Depression
Very high	up 69	2/28	46 - 60	14 – 15	14 - 15	67 – 75
high	57 - 68	13/59	34 - 45	10 - 13	11 – 13	51 - 66
Moderate to high	44 - 56	34/13	21 - 33	6 - 9	6 – 10	33 - 50
Moderate to low	32 - 43	34/13	9-20	3 – 5	3 – 5	18 - 32
Low	20 - 31	13/59	0 - 8	0-2	0-2	3 - 17
Very low	کمتر از 20	2/28				0-2

Table 12: Goldberg's depression scale categorical norm

Note: High scores in Goldberg's scale indicate greater depression. Those individuals who receives scores higher than 51, are recommended to see counselors for better diagnosis.

## DISCUSSION

Without doubt one of psychology's contributions to the society is the assessment of concepts and psychological variables [11]. Depression is one of psychiatric disorders and the most common illness of the present century which is known as psychiatric cold. It is mental disorder that affects a person's thoughts, feelings, behavior and physical performance. The purpose of this research was to study reliability, validity and composing factors of Goldberg's depression scale. In so doing, the scale was administered to 427 West Azerbaijan residents who had academic and non-academic study background. The results of the study indicate that all the test items had positive and significant relationship with the total test score. Total validity of the test yielded for people with high school degree, university degree and other were respectively 0.901, 0861 and 0.817. This amount of validity indicates reliability and stability

of the test in diagnosing depression. Furthermore, the results of factorial analysis show that this test consists of three factors which totally cover 44.63 % of all depression variance. None of the items Goldberg's depression scale had a factorial load lower than 0.40. Given the high validity of the test, reliability and norm, and small number of items and time needed to score it (about 5 minutes), it could be said that Goldberg's depression scale is a suitable instrument for screening depressed people.

Other results of the study however indicate that there is no significant difference between the factors considering gender. These results are in accord with those done by [14- 18]. These findings are, however, contrary to those found by [19- 33]. Given the results of the study, it could be inferred that gender is an influential factor on depression and female individuals twice as much as male ones are susceptible to the disease. These findings could be interpreted on the ground that social, cultural and other factors may prevent females from expressing their views openly, therefore, they regard themselves weaker than males and this issue affects their self-concept which in turn increases the likelihood of mental disorders such as depression. Females ' little social support, social isolation, economic dependency and hormonal changes could give rise to this phenomenon.

There was no significant difference between urban and rural residents in Goldberg's depression scale composing factors. These results are contrary to those of Talaei et al [19]. Given the obtained results in 2004, it could be said that the prevalence of depression is wider in rural community than urban one though the difference is not significant at present. The reason for this little difference is that extensive social changes and communications development caused rural population to be more active and also urban population to enjoy more freedom. These development and changes has provided both urban and rural community with more freedom, sense of importance, and self-efficiency, resulting in bridging the gap between urban and rural community in terms of the depression difference.

There was no significant difference between married and single individuals in Goldberg's depression scale composing factors. These findings are in accord with those obtained by Molavi et al [24, 17 and 18] but in contrast with [27, 33].

There was no significant difference across individuals with academic, nonacademic and high school degrees in Goldberg's depression scale composing factors. These findings are in line with those found by Molabaqeri et al [30] but contrary to those discovered by Vazeirei et al [20]. With regard to these results it could be concluded that depression has nothing to do with being single or married, being old or young, being female or male or being educated or not educated and even being from rural or urban areas because all individuals are susceptible to this disease. Depression is a dangerous disease. In fact, if a new solution is not found to this issue, it could have serious consequences. Generally speaking, this test could recognize depressed individuals from others in a short term but it should be noted that it cannot do the job of a psychiatrist.

should be noted that it cannot do the job of a psychiatrist.

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