

General Health Questionnaire-12 for the Detection of Depression

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Abstract

Objective: The aim of this study was to assess the validity and the possible cut-off points of the General Health Questionnaire-12 (GHQ-12) in detecting depression in university students.

Methods: The study included 170 students (115 females and 55 males) that consecutively applied to a university student health center psychiatric clinic and who were asked to complete a sociodemographic data form and the GHQ-12 before their visit with the psychiatrist. DSM-IV psychiatric diagnoses were established using the Structured Clinical Interview for DSM-IV Axis-I Disorders (SCID-I).

Results: Depression was the most prevalent DSM-IV diagnosis (49%) and 35% of the students did not have any psychiatric diagnosis. Mean GHQ-12 score was 7.5 ± 3.7 (8.0 ± 3.6 for females and 6.4 ± 3.7 for males, $p < 0.05$). Sensitivity and specificity for depressive disorder were 83% and 65% (for the cut-off point 7/8), 75% and 77% (for the cut-off point 8/9), and 62% and 88% (for the cut-off point 9/10), respectively. The internal consistency (Cronbach's alpha 0.88) was good. Kappa coefficient for agreement between DSM diagnosis for depression and GHQ (cut-off 8/9) was 0.52. Item 9, which inquired about pleasure, produced the highest odds ratio for the diagnosis of depression ($OR(CI) = 11.84 (4.66-30.08)$).

Conclusion: The results of this study revealed that GHQ-12 is a useful screening instrument for the detection of depression with a high cut-off point (8/9). The students' tendency to report more psychological symptoms and the administration of the instrument in a student psychiatric clinic could be the reasons for the high GHQ-12 cut-off points. We propose the use of high cut-off points for students who applied to a psychiatric clinic for more accurate detection of depression.

Key Words: GHQ, depression, diagnosis, students, validity

INTRODUCTION

Depression is an important health problem due to its prevalence and associated consequences. The life-time prevalence of depression ranges between 10% and 21% (Noble, 2005). According to the findings of the Turkish Mental Health Profile Study, the rate of depression for a period of one year was 4% (Kılıç, 1998). Depression is among the most frequent disorders in patients who apply for primary care health services (Katon, 1982; Rezaki, 1995b; Whooley et al., 1997). According to the findings of the World Health Organization (WHO) in 1997, depression is estimated to become the second leading cause of dysfunction by the year 2020. In addition, it was reported that by 2020 depression would be the leading cause of burden

of disease in developing countries (Murray and Lopez, 1997).

In a Turkish study made in collaboration with WHO, depression was detected in 11.6% of the patients who applied to health centers and it was reported that depression was the second most common complaint after upper respiratory track infections (Rezaki, 1995a). However, some studies showed that only 30%-50% of the patients who applied to the primary health care centers were diagnosed with depression (Docherty, 1997; Williams et al., 1999). This rate drops to 15% in Turkey (Sağduyu et al., 2000). Recognition and treatment of depression, especially at primary health centers, could lead to a decrease in the related negative consequences.

The most prevalent method used in primary health care centers for recognizing depression is the daily administration of screening tests. It was reported that in this manner, depression diagnoses increased 2-3 times (Henkel et al., 2003). Valenstein et al., (2001) showed that depression screening could be effective if screening expenses are lowered and appropriate treatments are initiated.

Numerous studies have been conducted with screening tests developed or modified specifically for depression (Williams et al., 2002; Klinkman et al., 1997; Whooley, 1997; Henkel et al., 2003). Characteristics of a good screening instrument are short and clear questions, short administration time, the existence of reliability studies for the particular group the test would be used with, a clear cut-off point, and a high specificity rate. Instruments used for depression screening should include questions about depression symptoms. Although the General Health Questionnaire (GHQ) was developed for differentiating psychiatric disorders, it includes items that question basic depression symptoms, such as enjoying daily activities, feeling under strain, and having difficulties in concentration and sleeping.

The GHQ (Goldberg and Blackwell, 1970) is one of the two most frequently used instruments for case differentiation after the CES-D: Epidemiological Research Center Depression Scale (Williams et al., 2002). The GHQ was originally developed as a 60-item instrument, but at present, shortened versions, including the GHQ-30, the GHQ-28, and the GHQ-12 are available. The short forms were found to be as valid and reliable for screening psychiatric disorders as the original form (Goldberg et al., 1997). The GHQ has been adapted to 38 languages in more than 50 countries with reliability studies that found sensitivity and specificity rates between 70% and 80% (Goldberg and Williams, 1988). In the user's manual of the scale, it is suggested that the cut-off score should be determined according to each particular patient group. For example, in order to prevent false positive findings, higher cut-off points than those used in England are needed in Latin America (Lewis and Araya, 1995). The proposed cut-off points for GHQ-12 for various countries in a 15-center study, including Turkey, conducted by WHO ranged between 1/2 and 6/7 (Goldberg et al., 1998). These cut-off points were calculated for any psychiatric disorder. In addition to cultural differences, different psychiatric disorder prevalence rates and comorbid diagnoses can lead to differences in the cut-off points. In our literature survey conducted with PubMed, we failed to find a suggested cut-off point for depression.

In a review study, the mean specificity and sensitiv-

ity values of 16 depression scales were compared and the GHQ's performance was found to be equal to the other scales (Williams et al., 2002). In the same study, ROC curves of 4 scales, including the GHQ, were compared and no statistical differences were found. As the GHQ was not directly developed for screening depression, there are only a few studies on its psychometric properties for depression.

Students are among the groups for which depression screening is frequently conducted and necessary. Studies on stress factors of education and possible psychiatric disorders (Dahlin et al., 2005; Saipanish, 2003), showed that depression has a negative effect on learning. Studies on this subject show high rates of anxiety and depression symptoms among students (Dahlin et al., 2005; Guthrie et al., 1995). Epidemiological and clinical studies show that the prevalence of depression in adolescents and young adults is similar to adults; however, adolescents report higher depressive symptoms (Takamura and Sakihara, 2001; Wight et al., 2004). Schönbach et al. (1983) reported that adolescents more frequently report transient psychological symptoms than adults. In a study conducted with the CES-D, it was shown that when the cut-off point for adults is used with adolescents, the depression rate increases and, therefore, adolescents require a higher cut-off point (Radloff, 1991). Therefore, it is important to determine different cut-off points for different groups.

The aims of this study are to examine the depression rate in students who applied to the Student Health Center for psychological counseling and/or psychiatric help, the validity of the GHQ-12 for the diagnosis of depression, the relevant cut-off point, the relationship between depression and some sociodemographic variables, and possible risks of positive GHQ-12 items for depression.

METHODS

The study included 170 students (115 females, 55 males) who applied to the Student Health Center Psychiatry Outpatient Clinic of the university for the first time between September 2002 and May 2003. All of the students who applied directly to the Student Health Center Psychiatry Outpatient Clinic agreed to participate in the study. All students were informed about the research study and, before being interviewed, students who agreed to participate filled out a sociodemographic form and the GHQ-12. Afterwards, in order to determine DSM-IV diagnoses, a psychiatrist (HÖ) administered the SCID-I to the GHQ-12 results in a blind

Table I. The Sociodemographic Variables.

	Number	%
Sex		
Female	115	67.5
Male	55	32.4
Faculty		
Medice	48	28.2
Dentistry/Pharmacy	22	12.9
Other Health Sciences*	52	30.6
Technical Graduate Schools	18	10.6
Other Faculties**	30	17.6
Duration of the education (years)		
First year	35	20.6
2-4 years	92	54.1
Longer than 4 years	43	25.3
Year Loss		
Yes	52	30.6
No	118	69.4
Type of the high school		
Normal High school	60	35.3
Technical High school	36	21.2
Science / Anatolia / Private H.	73	42.9
Housing		
Dormitory	63	37.1
With the family	55	32.4
In a house with friends	52	30.6
Profession of the father		
Unemployed	4	2.4
civil servant /worker	62	36.5
Retired	46	27.7
Business owner	54	31.8
Monthly income of the student		
0-150 YTL	59	34.7
151-250 YTL	49	28.8
251- YTL	62	36.5
Previous health center admission		
Yes	135	79.4
No	34	20.0
Previous psychiatric admission		
Yes	79	46.2
No	90	52.9

* Nursing Graduate School Health Administration Health Technology, Physiotherapy and Rehabilitation, Child Development, Nutrition Technology

** Faculty of Engineering and Architecture, Faculty of Science and Arts, Faculty of Social Sciences and Administrative Sciences

fashion. It took each student approximately 20 min to fill out the sociodemographic form and the GHQ-12, and SCID-I administration lasted approximately 45 min. Only the students who applied for the first time

were included in the study; students who were being followed-up were excluded.

Instruments

The Structured Clinical Interview for DSM-IV Axis-I Disorders (SCID-I) is a structured clinical interview scale for DSM Axis-I disorders, which was developed by First et al. (1997) (American Psychiatric Association, 1994). In the interview in which questions are answered as yes or no, relevant DSM-IV diagnosis is made after the administration of sections questioning mood symptoms and psychotic symptoms. The same coding is repeated after the administration of the sections related to alcohol and other substance use disorders, anxiety, and other disorders. The reliability and validity study of the Turkish version of the SCID-I was conducted by Çorapçıoğlu et al. (1999).

The GHQ-12 is a self-report psychiatric screening instrument developed by Goldberg (1972, 1978) for the differentiation of psychiatric disorders. To date, the GHQ-12 has been adapted to many languages and cultures. Short forms of the original 60-item form were found to be reliable and valid. The GHQ used in this study includes 12 items. Each item has the following 4 answer choices: not at all, no more than usual, more than usual, and much more than usual.

Answers can be scored on a Likert-type scale (0-1-2-3) or as (0-0-1-1) as suggested in the GHQ manual. Its Turkish reliability and validity study was conducted by Kılıç (1996). The suggested cut-off score of the GHQ-12, with its specificity measured as 0.84 and sensitivity as 0.74 for patients admitted with any somatic problems, is 1/2 (Kılıç, 1996).

In addition, a sociodemographic form, which included questions on age, sex, profession of the parents, monthly income of the student, current academic field of study, current residence, social security situation, and past psychiatric and other health admissions was administered.

Data Analysis

In analyses of group comparisons, Chi-square test was used for categorical variables and t-test was used for continuous variables. Odds ratio (OR) of the GHQ items for depression were calculated in order to discriminate the items, which increase the depression risk. In order to evaluate the consistency between the GHQ scale and DSM diagnosis, kappa values of different cut-off points were calculated. An ROC curve, which evaluates the per-

Table II. DSM-IV Diagnoses and Mean GHQ Scores.

DSM-IV Diagnoses	Female n (%)	Male n (%)	Total n (%)	Mean GHQ $\pm$ SD
Depression	63 (%54.8)	21(%38.2)	84 (%49.4)	9.5 $\pm$ 2.4
Anxiety Disorder	4 (%3.5)	5 (%9.1)	9 (%5.3)	4.1 $\pm$ 3.1
Somatoform Disorder	2 (%1.7)	2 (%3.6)	4 (%2.4)	7.0 $\pm$ 3.9
Psychosis	1 (%0.9)	6 (%10.9)	7 (%4.1)	4.7 $\pm$ 5.3
Dysthymia	2 (%1.7)	2 (%3.6)	4 (%2.4)	7.5 $\pm$ 3.8
Other	3 (%2.8)	0	3 (%1.8)	7.3 $\pm$ 5.6
No Diagnosis	40 (%34.8)	19 (%34.5)	59 (%34.7)	5.3 $\pm$ 3.3
Total	115	55	170	7.5 $\pm$ 3.7

formance of the scale, was calculated both for 0-1 type scoring and for likert-type scoring.

RESULTS

Sociodemographic variables

The study group included 115 females (68%) and 55 males (32%). The mean age of the students was 21.9 ± 2.2 years and 97.6% of the students were single. Other sociodemographic data are summarized in Table I.

DSM-IV diagnoses and GHQ-12 results

Of all the students, 34% did not receive any diagnosis and the diagnoses of the remaining 66% are presented in Table II. The category labeled "other" in this table includes eating disorders, adjustment disorders, and alcohol abuse disorders; the category labeled "psychosis" includes schizophrenia, schizoaffective disorder, and manic episodes with psychotic features.

Of the 84 students diagnosed with depression, 13 (15%) had a comorbid diagnosis; obsessive-compulsive disorder ($n=3$), conversion disorder ($n=3$), alcohol or substance abuse disorder ($n=5$), and eating disorders ($n=2$). The mean GHQ score of the group, without comorbid diagnoses, was calculated as 9.6 ± 2.3 and the mean GHQ score of the all students in the depression group was 9.5 ± 2.4 . There was no significant difference between these mean scores.

The mean GHQ scores of the students with different diagnoses are summarized in Table II. The overall mean

GHQ score was 7.5 ± 3.7 (females: 8.0 ± 3.6 ; males: 6.4 ± 3.7 ; $p < 0.05$). The GHQ response percentages of students with and without depression are presented in Table III.

The relationships between the sociodemographic variables and the total GHQ score were examined. Depression was more frequent in students who missed a year (61.5%) in comparison to students who did not miss a year (43.2%) ($\chi^2: 4.847$, $p < 0.05$). In addition, the depression rate was higher in females (54.8%) in comparison to males (36.4%) ($\chi^2: 5.052$, $p < 0.05$).

The internal consistency coefficient (Cronbach's alpha) of the GHQ for likert-type scoring was 0.91 and 0.88 for 0-1-type scoring. The ROC curves both for 0-1-type scoring and for likert-type scoring are presented in Figure 1. Regions that fall below the ROC curves are very close to each other; 0.82 for 0-1-type scoring and 0.81 for likert-type scoring.

The sensitivity, specificity, positive and negative predictive values, odds ratios, confidence interval, and kappa values for depression according to 0-1-type scoring are given in Table II. When the change in the sensitivity and specificity rates according to sex was evaluated, it was noted that for the 8/9 cut-off point the sensitivity and specificity were 81.0% and 75.0%, respectively in females, and in males, for the 6/7 cut-off point, sensitivity was 85.7%, and specificity was 61.8%.

The odds ratios, which showed the percentage of increase in the risk of depression when GHQ items were

Table III. The Percentage of the Positive Answers Given to the GHQ Items of Subjects with Depression and Without Depression.

GHQ (0/1)	Depression (+)	Depression (-)	Total
1. Lost sleep over worry	% 59.5	% 31.4	% 45.3
2. Constantly under strain	% 83.1	% 52.9	% 67.9
3. Able to concentrate	% 90.5	% 54.7	% 72.4
4. Play useful part in things	% 70.2	% 32.9	% 51.5
5 Face up to problems	% 79.8	% 38.8	% 59.2
6 Capable of making decisions	% 83.1	% 43.5	% 63.1
7. Could not overcome difficulties	% 84.5	% 54.7	% 69.4
8. Reasonable happy	% 84.5	% 46.5	% 65.3
9. Enjoy day-to-day activities	% 92.9	% 52.3	% 72.4
10. Unhappy or depressed	% 90.5	% 62.8	% 76.5
11. Losing confidence in self	% 79.8	% 53.5	% 66.5
12. Thinking of self as worthless	% 60.7	% 20.9	% 40.6

positive, are given in Table V. The risk of depression was 11.44 times higher in students who scored 1 on the item for level of pleasure they experienced (CI: 4.51-29.03) than in students who scored 0. The depression risk for students that had attention difficulties was 7.62 times (CI: 3.28-17.69) higher than for students who did not. These items and their OR's changed according to sex: in females, feeling worthless [10.27 (4.21-25.10)], able to experience pleasure [9.94 (3.43-28.81)], attention difficulty [8.51 (2.93-24.71)] and joylessness [7.16 (2.23-23.01)] items; in males, able to experience pleasure [20.00 (2.41-17.27)], and feeling happy [10.69 (2.15-53.21)] items (the OR values and 95% CI rates of the items are given in parenthesis).

DISCUSSION

The prevalence of depression among the students in this study was 49.4%. Some other studies on depression rates among students reported higher prevalence rates in comparison to the general population (32%-35%) (Dahlin et al., 2005; Allgoewer et al., 2001; Doğan et al., 1994). In contrast, Hoepfer et al., (1984) reported less psychiatric prevalence in students in a general GHQ screening. The high depression rate found in our study might have been due to the nature of the sample. The sample of this study was composed of students who presented to the health center for psychiatric help.

There were differences among genders in both psy-

chiatric admission rates, and in GHQ scores and depression rates. Depression was more prevalent among the females (54.8%) than among the males. A higher rate of depression in women is a frequently reported finding in the literature. Epidemiological studies showed that the lifetime risk of depression in women ranges between 20% and 25%; this value is 8-12% for males (Noble, 2005). Many studies showed that female students scored higher in screening scales and reported more depression symptoms (Schraedley et al., 1999; Tait et al. 2003; Akman, 1995; Doğan et al., 1994). In this regard, the gender differences found in the present study are in agreement with the literature findings.

Another result of this study was the positive correlation between year loss and depression. This result can be evaluated in different ways as the chronological relationship between depression and year loss is unknown. As year loss may trigger depression as a stress factor, depression may also lead to a decline in academic performance. There are other studies, which reported that students who have lower academic success rates have higher rates of psychiatric diagnoses (Özkürkçügil Çorapçıoğlu, 1999).

The main question of this study was the validity of the GHQ in depression screening. ROC curves calculated both for 0-1-type scoring and for Likert-type scoring (Figure I) showed that the performance of the scale for depression screening is good.

Table IV. Sensitivity, Specificity, Positive and Negative Predictive Values of Different Cut-Off Points for Depression, Odds Ratios, Confidence Intervals, and Kappa Values.

GHQ	Sensitivity	Specificity	PPV	NPV	Odds ratios	Confidence interval	Kappa
1 / 2	%98.8	%18.6	%54.2	%94.1	18.97	2.45-146.66	0.17
2 / 3	%98.8	%27.9	%57.2	%96.0	32.13	4.23-243.94	0.27
3 / 4	%96.4	%33.7	%58.7	%90.6	13.74	3.99-47.28	0.30
4 / 5	%95.2	%44.2	%62.5	%90.5	15.83	5.32-47.12	0.39
5 / 6	%91.7	%51.2	%64.7	%86.3	11.54	4.77-27.83	0.43
6 / 7	%88.1	%55.8	%66.1	%82.8	9.35	4.26-20.51	0.44
7 / 8	%83.3	%65.1	%70.0	%80.0	9.33	4.52-19.27	0.48
8 / 9	%75.0	%76.7	%75.9	%75.9	9.90	4.90-20.00	0.52
9 / 10	%61.9	%88.4	%83.9	%70.4	1.35	5.59-27.29	0.50
10/11	%42.9	%89.5	%80.0	%61.6	6.42	2.84-14.49	0.33

The mean sensitivity and specificity values reported in the reliability studies of the GHQ are between 70% and 80%. In a reliability study conducted in Turkey, the sensitivity of the GHQ for any psychiatric disorder was found to be 74% and its specificity to be 84% (Kılıç, 1996). Sensitivity and specificity values in our study were similar to Kılıç's study (74.7% and 75.9%, respectively, for the 8/9 cut-off point). When the cut-off point was increased to 7/8, sensitivity increased to 83.1% and

specificity decreased to 64.4%. Median values determined for depression for 16 depression screening instruments, including the GHQ were as follows: sensitivity 85%, specificity 74% (Williams et al., 2002). Differing from other depression screening instruments, the GHQ was not developed specifically for depression, but it was developed for differentiating psychiatric disorders.

The performance of GHQ was found to be similar to other depression screening instruments (Mulrow et

Table V. Odds Ratios (OR) of the GHQ Items for Depression.

GSA (0-1)	OR (%95 CI)	Females (n:115)	Males (n:55)
1. Lost sleep over worry	3.214(.,71-6.04)	3.02 (1.41-6.48)	2.96 (0.92-9.49)
2. Constantly under strain	4.38 (2.14-8.96)	4.02 (1.68-9.64)	4.50 (1.24-16.28)
3. Able to concentrate	7.88 (3.39-18.32)	8.51 (2.93-24.71)	6.00 (1.49-24.21)
4. Play useful part in things	4.80 (2.51-9.21)	5.00 (2.25-11.11)	4.18 (1.31-13.30)
5 Face up to problems	6.21 (3.12-12.36)	5.76 (2.45-13.50)	6.00 (1.81-19.93)
6 Capable of making decisions	6.39 (3.12-13.10)	6.12 (2.50-14.99)	5.87 (1.72-19.99)
7. Could not overcome difficulties	4,53 (2.19-9.38)	4.54 (1.91-10.83)	4.74 (1.17-19.16)
8. Reasonable happy	6.28 (3.04-13.00)	5.52 (2.36-12.89)	10.69 (2.15-53.21)
9. Enjoy day-to-day activities	11.84 (4.66-30.08)	9.94 (3.43-28.81)	20.00 (2.41-166.27)
10. Unhappy or depressed	5.63 (2.41-13.17)	7.16 (2.23-23.01)	3.36 (0.93-12.10)
11. Losing confidence in self	3.43 (1.74-6.77)	3.20 (1.36-7.53)	3.17 (0.99-10.14)
12. Thinking of self as worthless	5.84 (2.96-11.52)	10.27 (4.21-25.10)	1.71 (0.53-5.48)

CI: Confidence interval

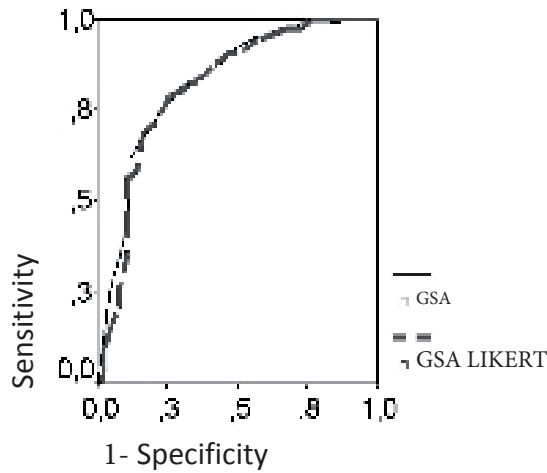


Figure 1. Roc Curves of Depression Diagnosis According to GHQ-Type and Likert-Type Scoring.

al., 1995). In addition, the internal consistency of the GHQ calculated both for 0-1-type scoring and for Likert-type scoring was high. In a study conducted with anxiety and depression patients, Koeter (1992) suggested that because the GHQ is shorter than other depression screening instruments, it is preferable. When the kappa values for different cut-off points are evaluated (Table IV), the highest kappa value is found to be the one calculated for the 8/9 cut-off score (0.52). This value shows an intermediate level of congruity between the diagnosis and the GHQ value, and is within the acceptable limit.

Another striking result of this study was the high level of GHQ mean scores, and therefore, the high cut-off point (8/9). To date, many studies on this subject have been conducted with individuals who applied to primary health service centers with any kind of somatic problem. The suggested cut-off points in these studies ranged between 1/2 and 6/7 (Kılıç, 1996; Goldberg and Lecrubier, 1995; Goldberg et al., 1998). Our study was conducted with students who sought psychological

help. This difference might be responsible for the high level of depression mean and cut-off point.

Many studies reported higher levels of depression in adolescents and young adults in comparison to adults (Takamura and Sakihara, 2001; Wight et al., 2005), which might be another explanation for the high level of depression. Similarly, Radloff (1991) showed that the cut-off point increases in adolescents and young adults. In their studies conducted with the GHQ, Finlay-Jones et al. (1979) reported that false positive cases are related to loneliness, life events, and physical illness.

Goldberg et al. (1998) proposed that differences in the cut-off points are due to both comorbid diagnoses and cultural features. In the present study, 15% of the depressive students had a comorbid DSM-IV diagnosis; however, the mean GHQ score for students with comorbid diagnoses was not higher than for students without comorbid diagnoses.

When the effect of positive answers given to each item concerning depression risk was considered, it was observed that scores for the following items increased the odds ratios: ability to experience pleasure, attention disorder, difficulty in making decisions, and feeling happy. These questions are similar to the criteria of depression in DSM-IV (American Psychiatric Association, 1994).

CONCLUSION

This study showed that the GHQ can be used for screening university students for depression. Although the GHQ was not originally developed for depression, it questions some of the basic depression symptoms. The most important reasons for using the GHQ for depression screening are its brevity, intelligibility, and psychometric properties. We think that the GHQ is an effective tool for screening depression in students, especially in health centers without a psychiatrist. The issue to be considered is keeping the cut-off point high with this kind of population; the suggested cut-off point being 8/9.

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