# The patient health questionnaire-15 and its abbreviated version as screening tools for depression in Korean college and graduate students

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## Abstract

**Objective:** Over half of all suicides worldwide occur in Asia. Given the close association between suicide and depression, it is quite unexpected that depression is least frequently diagnosed in Asia. This is, in part, due to the fact that Asians somatize depression. Young adults including college and graduate students are no exceptions. Therefore, a somatic symptom-focused screening tool would be useful in detecting depression in Asian college and graduate students. The purpose of this study was to evaluate the psychometric properties of the Patient Health Questionnaire-15 (PHQ-15) in screening for depression among Korean college and graduate students. In addition, we developed an abbreviated version of the PHQ-15 (aPHQ-15) and studied validity measures.
**Methods:** Three-hundred and fifty Korean college and graduate students were screened with the PHQ-15. Of all participants, 176 were interviewed using the Structured Clinical Interview for DSM-IV to diagnose major depressive episode, while the other 174 were evaluated with the Beck Depression Inventory-II (BDI-II) and the Inventory of Depressive Symptomatology-Self-Report (IDS-SR). Reliability and validity measures including the internal consistency, test–retest reliability, and criterion, convergent, and divergent validity were tested. Principal component analysis was used in developing the abbreviated version of the PHQ-15.
**Results:** The PHQ-15 showed good internal consistency and test–retest reliability (Cronbach's alpha 0.82, intra-class correlation coefficient 0.87). The optimal cut-off point for detecting depression was estimated to be 8. There were strong correlations between the PHQ-15 total scores and self-report measures of depressive symptom severity (BDI-II: $r = 0.69$ and $p < 0.001$, IDS-SR: $r = 0.77$ and $p < 0.001$). The 5-item aPHQ-15 had comparable validity with the PHQ-15.
**Conclusions:** The somatic symptom-focused PHQ-15 and aPHQ-15 can work as effective screening tools for depression.
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## 1. Introduction

Epidemiological studies have consistently shown that the depression is less prevalent in Asian countries than in Western countries [1,2]. Considering the close relationship between depression and suicide [3], this is, however, in sharp contrast with the fact that suicide rates in Asian countries are among the world's highest [4]. This inconsistency is likely to stem from under-diagnosis of depression in Asia [5]. Several potential barriers to the recognition of depression have been reported including minimization and denial of depressive symptoms, and the cultural stigma associated with mental illness [6]. Due to, in part, these psychological and social barriers, emotional distress is rather expressed as somatic symptoms [7–10], which may have contributed to under-detection of depression [7,11].

Asian adolescents and young adults including college and graduate students are no exceptions regarding the tendency for somatizing depression [6,11–13]. Considering that

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adolescence and early adulthood are particularly vulnerable periods for suicide attempts [3,14] and the functional impairment during this critical period may cause enduring detrimental consequences throughout life [15], early detection of depression and proper intervention would be of paramount importance.

The under-diagnosis issue may efficiently be overcome by using the non-specific somatic symptoms as a gateway for screening depression [16]. This approach may also have an advantage in assessing young adults and adolescents, since they feel more comfortable in expressing their physical symptoms [17], more commonly have negative attitudes toward seeking psychiatric help and are more sensitive to stigmatization than older generations [6,18,19].

The Patient Health Questionnaire-15 (PHQ-15), a screening tool developed for assessing physical symptoms, has widely been used in various primary care settings [20,21]. It consists of 15 items that inquire about the presence and severity of non-specific somatic symptoms experienced in the past 4 weeks. The items are as follows: back pain, chest pain, pain in limbs or joints, stomach pain, shortness of breath, nausea, gas or indigestion, loose bowels, constipation or diarrhea, headaches, heart pounding or racing, fainting spell, dizziness, low energy or fatigue, trouble sleeping, pain or problems during sexual intercourse, and menstrual cramps or other period-related problems (women only) [21]. Interestingly, a line of literature has repeatedly reported the relationship between the PHQ-15 total and sub-scores and depression severity [22,23]. Yet it has not been systemically studied for its potential as a tool for screening depression.

In the current study, we explored the effectiveness of the PHQ-15 as a screening instrument for depression in Korean college and graduate students. In addition, considering the importance of the brevity of the screening procedure, we developed an abbreviated version of the PHQ-15 (aPHQ-15) as a potential shorter screening tool for somatized depression and compared sensitivity and specificity measures to the full version of the PHQ-15 in screening depression.

## 2. Methods

### 2.1. Participants

Participants were recruited through advertisement between February and June 2012. Only those who are undergraduate and graduate students attending at least 15 h of classes weekly on university campuses were enrolled. Each participant received a small stationery gift at the end of the survey. A randomly selected subgroup took the questionnaire twice to measure the test–retest reliability. The second PHQ-15 survey was conducted within 10 days of the first PHQ-15.

All participants provided written informed consent and were free to withdraw from the study at any point. Anonymity of personal information was guaranteed. The study protocol was reviewed and approved by the Ewha W. University Bioethics Committee.

In addition to taking the PHQ-15, subgroup A (n = 176) received a structured psychiatric interview (Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders-IV [SCID-IV]) [24], while subgroup B (n = 174) completed additional self-report depression symptom severity scales, the Beck Depression Inventory-II (BDI-II) and the Inventory of Depressive Symptomatology-Self Report (IDS-SR), for diagnosing and screening depression. Participants also completed other self-reports as listed below.

### 2.2. Instruments

For measuring depressive symptoms, the BDI-II, IDS-SR, and Hopkins Symptom Checklist-25 (HSCL-25) were used. The BDI-II consists of 21 self-rating items related to the severity of depressive symptoms [25,26]. The IDS-SR is a 30-item questionnaire that evaluates all depressive symptoms listed in the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) criteria including those for melancholic, endogenous, and atypical subtype diagnosis [27,28]. The HSCL-25 is a screening instrument frequently used in primary care settings, composed of 10 items that measure anxiety symptoms and 15 items for depression symptoms [29].

Scores from these tools were used to test convergent validity. In order to test divergent validity, the social network diversity score from the Social Network Index (SNI) was used [30]. The social network diversity score is calculated using the number of high-contact roles, which is not likely to be affected by depression.

All participants were evaluated with the HSCL-25 and the SNI while subgroup B participants additionally completed the BDI-II and IDS-SR questionnaires.

### 2.3. Statistical Analysis

Reliability in terms of internal consistency was measured with the Cronbach's alpha coefficient [31]. Test–retest reliability was examined in a random subsample of 19 participants who were assessed twice, using the intra-class correlation coefficient.

Principal component analysis with varimax rotation was performed to evaluate the factor structure of the PHQ-15. Factors with eigenvalue over 1.0 from the exploratory factor analysis were retained for rotation [32]. The Kaiser–Meyer–Olkin measure was used to test sampling accuracy [33].

For subgroup A, the receiver operating characteristic (ROC) analysis [34] was carried out with the major depressive episode diagnosis, which was made using the SCID-IV, to determine the sensitivity and specificity of the PHQ-15. The ROC analysis was also used to examine the sensitivity and specificity of the aPHQ-15. The areas under the ROC curves of the PHQ-15 and aPHQ-15 were compared using an algorithm suggested by Delong et al. [35]. The Youden's index [36] was calculated to find the optimal cut-off point for screening for depression.

For subgroup B, convergent and divergent validity was established using the Pearson-product moment correlation