# Development of self-report assessment tool for anxiety among adolescents: Indonesian version of the Zung self-rating anxiety scale

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## Abstract

Anxiety is common among adolescents. Self-report anxiety scales are needed to screen and prevent adolescents sinking into worse mental health. The purpose of this study was to assess the psychometric properties of Indonesia Zung Self-rating Anxiety Scale (SAS), including translation, validity, reliability and receiver operating characteristics (ROC). We used cross-sectional study and correlational design in this study. Total sample was 1,000 adolescents in junior and senior high school. The SAS was translated into Bahasa Indonesia based on World Health Organization guidelines. SAS and the Indonesia version of Beck Depression Inventori-(BDI) II questionnaires were used to develop construct validity. Correlation between item score and total score was used to establish convergent validity. Cronbach's alpha was used to calculate reliability and ROC curves were used to examine cut-off point of SAS. Construct validity showed positive correlation between the SAS and Indonesia version of BDI II scores. Convergent validity showed positive correlation between each item and total score. Cronbach's alpha 0.691 and the ROC 36.5. Thus, the Indonesia version of SAS provides a reliable and valid tool to screen anxiety among adolescents.

## Introduction

Anxiety is common psychological problem among adolescents and is related to clinical concern.[1] The prevalence of anxiety among adolescents is around 31%[2] and only 18% of adolescents with anxiety are in treatment.[3] In Indonesia, 6% of adolescents, or 14 million people, had emotional disorder, with anxiety and depression symptoms.[4]

Anxiety has negative effects on physical and somatic symptoms, such as headache, fatigue, difficulty concentrating and also social phobia.[5] Patients with anxiety are more likely to have physical symptoms rather than mental health problems5 and commonly also have depression.[6] More than 25% of patients have anxiety and depression.[6] Anxiety onset usually happens in adolescents.[5] Primary care providers, adolescent's parents, should be aware of anxiety's symptoms.[5] Unfortunately, they do not understand about anxiety.

A tool is needed to improve understanding and measure anxiety in adolescents, to be used in clinical and research for the purpose of rapid screening on a large scale to provide reliable data.[7] Also required are public mental health efforts and strategies.[8] The Zung Self-rating Anxiety Scale (SAS) is widely used to screen anxiety over the course of the past week, and the original SAS had good validity and reliability.[7,9] The SAS has 20 items and is based on 20 items of diagnostic criteria, 15 being somatic symptoms and five affective symptoms.[9] SAS has not been translated into Bahasa and, as far as we know, there is no study about the psychometrics of the SAS-Indonesia version. The aim of this study was to develop an Indonesian adaptation of the SAS and to validate reliability and cut-off points in a general population and a depression risk population.

## Materials and Methods

This study used cross-sectional study and correlational design, using self-reported questionnaires. Data were collected from adolescents who studied at high school. The inclusion criteria were students in high school who both lived in a dormitory provided for students by the school and outside a dormitory. The exclusion criteria were students whose parents disagreed about their children participating in this survey or students who did not return the informed consent sheet. Total final sample was 1,000 adolescents.

Anxiety was measured by the Zung Self-Anxiety Scale (SAS) designed by William W. K. Zung.[9] Each adolescent was assessed using the Indonesian version of scale. It is a 20-item self-report assessment to measure anxiety levels and each question is scored on a Likert-type scale of 1-4. The total score on the SAS is from 20 to 80, with higher scores indicating more anxiety.[9] In this study, yje SAS-Indonesia version had a sufficient alpha coefficient (0.658). The BDI was created by Aaron T. Beck[10] and each adolescent was assessed using the Indonesian version of the Beck Depression Inventory (BDI). The BDI is self-reporting tool to measure the presence and severity of depressive symptoms; patients with depression have anxiety disorders.[6] The BDI has 21 items, each with a score 0-3. The total score on the BDI is from 0 to 63 and the cut-off point of for the Indo BDI-II is 17. For validity, the BDI is closer to the diagnostic criteria for depression.10 In this study, BDI-II had a high alpha coefficient (0.815).

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Permission was granted by the ethics committee from Universitas Airlangga. Data were collected from August to September 2014. Permission to use SAS was granted from the original authors. We translated the original SAS into Bahasa based on World Health Organization guidelines.[11] As a first step, we conducted forward translation into Bahasa, the second step was expert panel, the aim of which was to review the result of translation, and the third step was back translation into English and comparison of the result with the original questionnaire. If the result was similar with the original questionnaire, the Bahasa questionnaire could be used. Furthermore, we conducted a pilot study to examine whether the questionnaire could be easily understood by adolescents and we then distributed the final version to adolescents.

All analyses were conducted using SPSS for Windows, $p<0.05$ was considered statistically significant. Descriptive statistics were used to evaluate all variables. Internal consistency was used to measure the Cronbach's alpha for each item of the SAS. Convergent validity was calculated by examining the relationship between each item and total score using the Pearson product moment. Depression and anxiety may occur together;[6] therefore, construct validity was developed to examine correlation between the score of the SAS and BDI-II. Using Pearson correlation, we hypothesized that adolescents with higher depression have higher score of anxiety. In addition, we used receiver operating characteristic (ROC) analysis to develop the cut-off point of the SAS among adolescents with or without anxiety.

## Results

Table 1 shows the characteristics of respondents. The proportion of age was predominantly by participants aged 16-18 (65.9%) and most participants were students in senior high school (79.7%). In terms of residence, this was predominantly participants from West Indonesia (Java, Sumatra, and Kalimantan). The proportion of gender was almost equal, with female 58.9% and male 41.1%.

### Reliability: Cronbach's alpha

We examined internal consistency for the SAS-Indonesia version. Cronbach's alpha was 0.658 for 20 items and 0.691 for 19 items. Previous studies mentioned that Cronbach's alpha of > 0.5 is considered acceptable.[12,13]

### Validity: convergent validity

Convergent validity was measured by the relationship between each item and total score, one item is not significant (item 19). Table 2 shows the range of correlation between each domain was r = 0.043 – 0.530, $p<0.05$.

### Construct validity

Correlation between total score SAS and BDI-II was significant ($r=0.394$, $p< 0.05$). This result supports our hypothesis that there is positive correlation between anxiety and depression. The mean of total score anxiety (mean = 39.14) in adolescents normal group is greater than adolescents in depression risk group (mean = 35.01) (Table 3).

### Cut-off point determination

Receiver-operating characteristic (ROC) curves were used to measure cut-off point for the SAS-Indonesia version (Figure 1). The area below the ROC curve was

**Table 1. Demographic characteristics of respondents (Total sample = 1000).**

| Characteristics | n | % |
|---|---|---|
| Age | | |
| 13-15 | 341 | 34.1 |
| 16-18 | 659 | 65.9 |
| Mean = 15.9 SD =1.2 | | |
| Gender | | |
| Female | 589 | 58.9 |
| Male | 411 | 41.1 |
| Class | | |
| Junior High School | 203 | 20.3 |
| Senior High School | 797 | 79.7 |
| Residence | | |
| West of Indonesia | 938 | 93.8 |
| Centre of Indonesia | 59 | 5.9 |
| East of Indonesia | 3 | 0.3 |

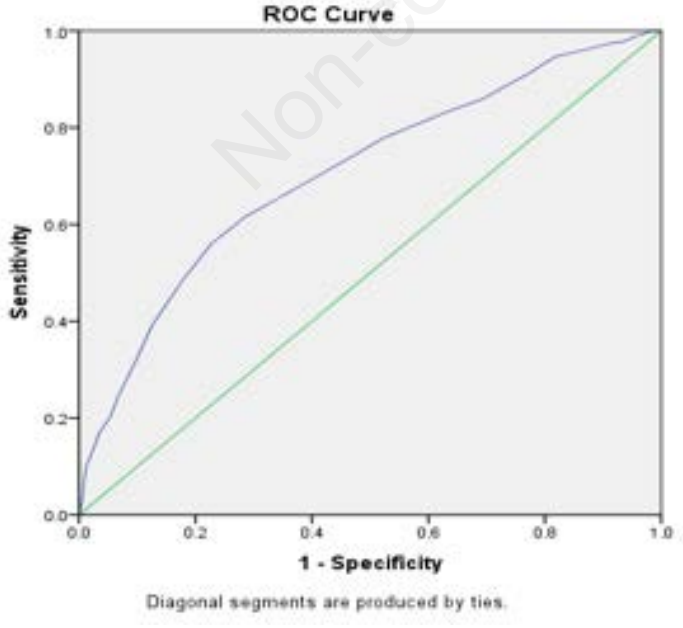


**Figure 1. Note: Area below the ROC curve: 0.706; standard error: 0.017; asymptotic sig. <0.001; lower bound: 0.674; and upper bound: 0.739.**

**Table 2. Item total correlation of SAS (n=1000).**

| Item | Item-total correlation | p-value |
|---|---|---|
| SAS 1 | 0.444 | < 0.05 |
| SAS 2 | 0.451 | < 0.05 |
| SAS 3 | 0.501 | < 0.05 |
| SAS 4 | 0.424 | < 0.05 |
| SAS 5 | 0.311 | < 0.05 |
| SAS 6 | 0.455 | < 0.05 |
| SAS 7 | 0.524 | < 0.05 |
| SAS 8 | 0.516 | < 0.05 |
| SAS 9 | 0.303 | < 0.05 |
| SAS 10 | 0.486 | < 0.05 |
| SAS 11 | 0.530 | < 0.05 |
| SAS 12 | 0.324 | < 0.05 |
| SAS 13 | 0.311 | < 0.05 |
| SAS 14 | 0.411 | < 0.05 |
| SAS 15 | 0.453 | < 0.05 |
| SAS 16 | 0.276 | < 0.05 |
| SAS 17 | 0.180 | < 0.05 |
| SAS 18 | 0.252 | < 0.05 |
| SAS 19 | 0.043 | > 0.05 |
| SAS 20 | 0.341 | < 0.05 |

0.706, which means that the SAS-Indonesia version would be considered to be "acceptable" at differentiating adolescents with or without anxiety. The result showed that 36.5 was the global score of the SAS-Indonesia version and represented the best sensitivity and specificity for measuring anxiety among adolescents with or without depression (Table 4).

## Discussion

The aim of this study was to develop an Indonesian adaptation of the SAS and to validate reliability and cut-off point among Indonesian adolescents. This study was consistent with previous study.[7] Our finding showed that the SAS-Indonesia version had good validity and reliability and can be used to screen anxiety. The construct validity of the SAS-Indonesia version was acceptable with the Indo BDI-II. This finding was consistent with suggestions that anxiety is associated with depression.[14] Most people with depression, also have an anxiety problem.[6]

Convergent validity of the SAS Indonesia version was satisfactory, the positive correlation between each item and total score was more than 0.2,[15] except item number 19 about sleep. We assumed that adolescents are unaware of sleep problems, since adolescents commonly have sleep problems and change in their sleep-wake patterns.[16] We still consider to use this item, and calculate internal consistency and cut-off point with 20 items. Previous study mentioned that psychological factors, such as depression and anxiety, were associated with poor sleep quality.[17,18]

We tested internal consistency for the SAS Indonesia version. Cronbach's alpha for SAS-I was 0.658 for 20 items. It showed that the SAS Indonesia version has good internal consistency and is acceptable. The mean total score of the SAS Indonesia version indicates that adolescents in depression risk group were higher than the adolescents normal group. It supported that the SAS Indonesia version can be used to screen anxiety among healthy adolescents and those with depression.

Receiver operating characteristic curve analyses showed that the cut-off mean value was 36. This study was not similar with previous study in Chinese populations, in which the cut-off point showed anxiety symptoms to be more than 40.[19] Our study had lower mean than previous study to assess anxiety among Indonesian adolescents. Our finding suggests that, if adolescents had total score of more than 36, they may have an anxiety problem. The results must be interpreted cautiously based on cultural differences in each country.[20]

There are several limitations in this study such as we did not perform factor analysis. Further study is needed to calculate exploratory factor analysis to determine subscale categories in items of SAS. Also, it is important to develop the psychometric of the SAS-Indonesia version using anxiety

**Table 3. Mean difference between adolescents normal group and adolescent depression risk group.**

| | Adolescents normal group | | Adolescents depression risk group | | Correlation |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Total Score SAS | 35.01 | 5.13 | 39.14 | 5.82 | 0.394** |

*p value <0.05, SD: Standard Deviation

**Table 4. Sensitivity and specificity of the SAS-Indonesia version score using ROC curve analysis.**

| Global | Sensitivity | 1 – specificity | Specificity | Sensitivity + specificity |
|---|---|---|---|---|
| 18.0000 | 1.000 | 1.000 | 0.000 | 1.000 |
| 20.0000 | 1.000 | 0.998 | 0.002 | 1.002 |
| 21.5000 | 1.000 | 0.996 | 0.004 | 1.004 |
| 22.5000 | 1.000 | 0.995 | 0.005 | 1.005 |
| 23.5000 | 1.000 | 0.987 | 0.013 | 1.013 |
| 24.5000 | 0.998 | 0.978 | 0.022 | 1.02 |
| 25.5000 | 0.993 | 0.969 | 0.031 | 1.024 |
| 26.5000 | 0.989 | 0.956 | 0.044 | 1.033 |
| 27.5000 | 0.978 | 0.936 | 0.064 | 1.042 |
| 28.5000 | 0.973 | 0.911 | 0.089 | 1.062 |
| 29.5000 | 0.958 | 0.858 | 0.142 | 1.100 |
| 30.5000 | 0.947 | 0.818 | 0.182 | 1.129 |
| 31.5000 | 0.911 | 0.771 | 0.229 | 1.140 |
| 32.5000 | 0.858 | 0.691 | 0.309 | 1.167 |
| 33.5000 | 0.831 | 0.629 | 0.371 | 1.202 |
| 34.5000 | 0.778 | 0.522 | 0.478 | 1.256 |
| 35.5000 | 0.738 | 0.465 | 0.535 | 1.273 |
| 36.5000 | 0.682 | 0.384 | 0.616 | 1.298 |
| 37.5000 | 0.616 | 0.285 | 0.715 | 1.367 |
| 38.5000 | 0.560 | 0.227 | 0.773 | 1.333 |
| 39.5000 | 0.482 | 0.176 | 0.824 | 1.306 |
| 40.5000 | 0.391 | 0.125 | 0.875 | 1.266 |
| 41.5000 | 0.311 | 0.095 | 0.905 | 1.216 |
| 42.5000 | 0.240 | 0.065 | 0.935 | 1.175 |
| 43.5000 | 0.204 | 0.055 | 0.945 | 1.149 |
| 44.5000 | 0.169 | 0.035 | 0.965 | 1.134 |
| 45.5000 | 0.138 | 0.025 | 0.975 | 1.113 |
| 46.5000 | 0.102 | 0.013 | 0.987 | 1.089 |
| 47.5000 | 0.073 | 0.009 | 0.991 | 1.064 |
| 48.5000 | 0.060 | 0.007 | 0.993 | 1.053 |
| 49.5000 | 0.047 | 0.007 | 0.993 | 1.040 |
| 50.5000 | 0.031 | 0.005 | 0.995 | 1.026 |
| 51.5000 | 0.024 | 0.005 | 0.995 | 1.019 |
| 52.5000 | 0.020 | 0.004 | 0.996 | 1.016 |
| 53.5000 | 0.011 | 0.002 | 0.998 | 1.009 |
| 55.5000 | 0.007 | 0.002 | 0.998 | 1.005 |
| 58.0000 | 0.004 | 0.002 | 0.998 | 1.002 |
| 59.5000 | 0.000 | 0.002 | 0.998 | 0.998 |
| 61.0000 | 0.000 | 0.000 | 1.000 | 1.000 |

diagnosis in clinical population. Despite the limitations, the results of this study support the reliability, convergent validity, and construct validity of the SAS-Indonesia version to screen anxiety among adolescents.

## Conclusions

The results of this study support the reliability and validity of the Indonesia version of SAS to screen anxiety among adolescents. It can be used to quickly assess anxiety problems for primary healthcare providers, adolescents' parents, as well as adolescents themselves.

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