07. Validity and reliability test of Sheehan

by Damba Bestari

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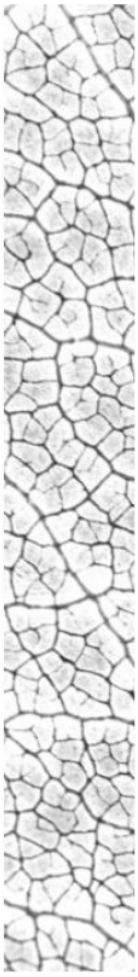

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Validity and reliability test of Sheehan-suicidality tracking scale in Indonesian adult general population

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Abstract

Background: One of the strategies to prevent suicide is to use screening method for suicide risk in the community. The purpose of this study was to test the validity and reliability of Sheehan-Suicidality Tracking Scale (S-STS) with Beck Scale for Suicidal Ideation (BSSI) as the gold standard; thus the scale is expected to be a screening tool for suicide risk in Indonesia.

Methods: This was a descriptive-observational study with cross-sectional design on 300 respondents in Surabaya general population in April 2018. Measurement instruments were S-STS and BSSI self-reports.

Results: The average age group of the respondents was 26-35 years. There were 38 respondents (12.67%) positive of suicide risk with BSSI and S-STS with a cut-off >16. All of the items were valid. The sensitivity and specificity of S-STS compared to BSSI for screening tool of suicide risk were 100% and 96.32%, respectively (Area Under Curve = 0.991). Reliability test with Cronbach's alpha was 0.9802 (95% CI 0.9796-0.9846).

Conclusions: S-STS is a valid and reliable instrument for detecting suicidal risk in general population in Surabaya, Indonesia, and there were 9.33% of adult population at risk of suicide.

Keywords: suicide risk, validity, reliability, S-STS, BSSI

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INTRODUCTION

Suicide is a major problem in the field of public health throughout the world. This phenomenon globally causes one million people to die each year (Biddle et al. 2004; De Leo et al. 2005). WHO data in 2016 stated that 800,000 people worldwide die every year, and there are more than two thousand suicides every day. Based on statistical data from the National Institute of Mental Health, suicide is the number two cause of death for the age of 15-35 years. The number of victims killed by suicide even exceeds the total number of deaths due to homicide and war (Beck et al. 1979).

In the United Kingdom, suicide is the leading cause of death in men aged 20-49 years, higher than deaths caused by traffic accidents, cardiovascular disease, or cancer (Simms et al. 2017). Adolescents from lower-income families or neighborhoods also report higher rate of suicidal ideation (CheeK.-Y. et al. 2015). According to WHO data, suicide rates in Indonesia continue to show a significant increase. In 2010, there were 5000 cases, while in 2012, the figure increased to 10,000 cases per year or one person every hour (Simms et al. 2017).

The onset of episodes of depression is etiologically related to stressful life events (Effendy et al. 2019). Depression can generate an idea or desire to commit suicide (Alkaff et al. 2018; Wantini 2019). The utilization of psychotropic medication for the treatment of psychiatric disorders increases due to this issue (CheeK. Y. et al. 2016). They with depressive mood experience loss of energy and interest, feelings of guilt, reduced concentration and attention, loss of appetite, and the presence of thoughts about death or suicide (Agus et al. 2019; Starki et al. 2019). Unfortunately, suicide is often difficult to predict because it is not always visible. We often find that individuals who later commit suicide seem to remain normal in their daily activities. Symptoms of depression or talking about the idea of hurting or ending life, even to the closest others, are not

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always visible (Shah et al., 2016). As many as 30% of attempts or actions of suicide are not preceded by cry for help (Luo, 2020). It is important to remember, the dynamics of suicide are complex and multifactorial. Nevertheless, this phenomenon can be prevented (Jacobson et al. 2011; Wirasto, 2012).

In the 2016, International Association of Suicide Prevention world congress stated that several strategies to prevent suicide are the provision of educational programs on suicide in the community, supervision of suicide reporting by the mass media, therapy and intervention in high-risk individuals, and methods of screening suicide risk in the community. Some of these strategies have been implemented in Indonesia (Haseeb et al., 2020). However, for the screening method to date, there are no instruments commonly used in detecting suicide risks (Agerbo et al. 2002; Bagalkot et al. 2014).

Universally, an instrument often used and whose validity has been tested in many countries is the Beck Scale for Suicidal Ideation (BSSI). Although initially intended for a population of psychiatric patients in the United States, the United Kingdom, Australia, Iran, China, and Malaysia, this instrument has been tested for the general population. In Indonesia, BSSI has been tested for validity (r count > r table = 0.361) and reliability (Cronbach's alpha = 0.837) on adolescent populations (Antony et al. 1998, Bridge et al. 2006). The Sheehan-Suicidality Tracking Scale (S-STS) has been developed as an instrument for assessing suicidal tendencies. S-STS has not been widely used or tested for validity and reliability, including in Indonesia. The instrument was developed by Sheehan et al. in 2009, and claimed to be more specific, sensitive, concise, easy to understand and can be used for all ages, from pediatrics to geriatrics (Sheehan et al. 2014; Das, & Biswas, 2017)). However, this scale has not yet been tested in Indonesia's population. The purpose of this study was to test the validity and reliability of S-STS with BSSI as the gold standard, and the scale is expected to be a screening tool for suicide risk in Indonesia.

METHODS

This was a descriptive-observational study employed a quantitative approach with cross-sectional design. This study was conducted in several professions in Surabaya, Indonesia, such as the military, police, doctors, artists (including models, musicians, and photographers), lecturers or teachers, journalists, make-up artists, gym trainers, sales promotion girl (SPG), engineers, bank employees, pharmacists, entrepreneurs, students, and housewives. The study was conducted from February 2017 to April 2018. Respondents were recruited through a non-probability purposive sampling method. The inclusion criteria were males and females aged 21 to 60 years, minimum education of high school or equivalent, willing to take part in this study by signing informed consent, and being cooperative and coherent. The drop-out criterion was incomplete filling of the questionnaire. We used the A-priori sampling estimator technique to determine the number of samples that must be recruited (calculated using MedCalc software version 14) with Area Under Curve (AUC) estimation: 0.8, α: 0.01, β 0.01, the proportion of negative cases: positive cases was ten: one. We must obtain a minimum of 230 negative cases of suicide risk and 23 positive cases of suicide (253 respondents, rounded to 300).

Measurement instruments in this study were S-STS and BSSI self-reports. S-STS is an instrument with a prospective rating scale detecting all forms of suicidality (risks or suicidal tendencies), ranging from suicidal ideation to suicidal-related behaviour (plans and attempted suicide). This questionnaire consists of 16 items adapted from the suicide risk module in the Mini International Neuropsychiatric Interview (MINI) developed by Sheehan et al. with the answer format in the form of a 5-point Likert scale (0 = not at all, 1 = a little, 2 = moderately, 3 = very, and 4 = extremely). S-STS can be done either by clinicians (doctor, psychologist, trained person) or the patient himself or self-reported. The scoring of this instrument as a screening tool is: positively has the risk of suicide if the respondent answers ≥2 to questions number 1a, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 14 (cut-off >23, the higher the score, the higher the risk of suicide).

BSSI consists of 19 items with values 0, 1 and 2 for each different response to each statement. If the respondent answers 0 (no desire) to questions number 4 and 5, then he can proceed directly to questions number 20 and 21. The client does not need to answer questions from numbers 6 to 17. However, if the respondent answers 1 or 2 (1 = weak, 2 = moderate to strong) to questions number 4 and 5, then they must complete all questions. Scores are calculated by adding up each score with a minimum score of 0 and a maximum of 38. A total score above 24 is considered a clinical cut-off indicating that the respondent has a significant risk of suicide (Sittisom, 2020). The higher the score obtained indicates the higher risk of suicide.

Validity and reliability test were performed through by three steps. First, Translating step, in this step S-STS was translated to Indonesian language and the results were translated back to English. Translator is a person who never perceive this instrument before. Second, we performed diagnostic/clinical validity test by Receiver Operating Characteristic (ROC) method which summarize the correlation between sensitivity and specificity. The instrument validity was defined by AUC which is merging the specificity and sensitivity. We also counted the Negative Predictive Value (NPV) and Positive Predictive Value (PPV). Third, we performed internal consistency reliability test to this instrument that we measure Cronbach's Alpha reliability coefficient. All

Table 1. Profile of demographic characteristics of the respondents

Variables	Total (n=300)	Percentage (%)
Sex		
Male	139	46.4
Female	161	53.6
Age		
21-25 years	99	33.0
26-35 years	132	44.0
36-45 years	55	18.3
46-60 years	14	04.7
Marriage status		
Married	162	54.0
Unmarried	138	46.0
Education level		
High School	20	06.7
Diploma degree	37	12.3
Bachelor degree	243	81.0
Occupation status		
Working	210	70.0
Not working	90	30.0
Non-patient population	270	90.0
Patient population	30	10.0

of this step and subject demographic characteristic profile was proceeded by Medcalc Software version 14.

RESULTS

In general, this study was welcomed by the respondents. We found a total of 308 respondents who met the inclusion criteria, consisting of 30 patients (9.74%) and 278 non-patients (90.26%). Eight persons were found incompletely filled out the questionnaire, meeting the drop out criteria, so the final number was 300 respondents. Sampling was carried out in various different places in Surabaya in order to cover the general population. Sampling in non-patient general population was carried out to the army in the Navy Koarmatim total 20 respondents (6.67%), the police in Bhayangkara Hospital 20 respondents (6.67%), musicians in Harmoni studio 10 respondents (3.33%), models and photographers in Cholil Photography studio 20 respondents (6.67%), employees at Bank Panin Kombes Pol M Duryat branch 30 respondents (10%), students 60 respondents (20%) and lecturers 20 respondents (6.67%) in Campus A, B and C of Universitas Airlangga, pharmacy employees at PT Eisai 20 respondents (6.67%), trainers in the Atlas Sports Club 5 respondents (1.67%) and SPG 5 respondents (1.67%) who we the researchers met them at the mall. Other respondents, i.e. the doctors 30 respondents (10%), entrepreneurs 15 respondents (5%), engineers 5 respondents (1.67%), reporters 5 respondents (1.67%) and makeup artists 5 respondents (1.67%), met directly by the researchers based on appointment. Sampling in the patient population was carried out at the Psychiatric Outpatient Clinic, Dr. Soetomo Hospital, Surabaya, Indonesia, as many as 30 respondents (10%). Respondents worked out BSSI and S-STS each for a total of 15 minutes. The average age group of the respondents was 26-35 years (**Table 1**).

Table 2. Diagnostic values of S-STS compared to BSSI as gold standard with new cut-off values (>16)

S-STS diagnosis (Index)	BSSI Diagnosis (*Gold standard*) Positive	Negative	Total
Positive	28 (a)	10 (b)	38 (12.7%)
Negative	0 (c)	262 (d)	262 (87.3%)
	28 (9.3%)	272 (90.7%)	300 (100%)

Sensitivity: 100%
Specificity: 96.32%
Positive Predictive Value (PPV): 79.81%
Negative Predictive Value (NPV): 100%

Table 3. AUC values of the S-STS compared to BSSI as the gold standard

Area under the ROC curve (AUC)	0.991
Standard Error	0.00414
95% Confidence interval	0.972 to 0.998
z statistic	118.617
Significance level P (Area=0.5)	<0.0001

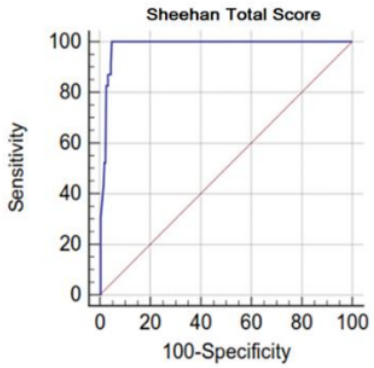

Fig. 1. ROC curve of the diagnostic value of S-STS compared to BSSI as the gold standard

Furthermore, we compared the value of S-STS to BSSI as gold standard with new cut-off values (>16) as shown in **Table 2.** The sensitivity and specificity of S-STS compared to BSSI for screening tool of suicide risk were 100% and 96.32%, respectively. These results indicate that S-STS has succeeded in identifying the positive cases of suicide risk of 100% and excluding negative cases of suicide risk of 96.32%. While the PPV and NPV of S-STS were 79.81% and 100%, respectively. Thus, the probability that the subject really had a risk of suicide, if the diagnostic test was positive, was 79.81% and the probability of subjects having no risk of suicide if the test result was negative was 100%.

The AUC value was 0.991 (95% CI: 0.972-0.998) indicate that this instrument was high validity (**Table 3, Fig. 1**). The internal consistency reliability test revealed Cronbach's Alpha value from the S-STS instrument was 0.9802 (95% CI 0.9796-0.9846), showing that this instrument was reliable.

DISCUSSION

There have been no references discussing that S-STS with BSSI as a gold standard have been tested for

validity by the ROC method, especially in Indonesia. This might be because the study was not in a clinical setting. Both in narrow and broad understanding, measurement in clinical realm is closely related to diagnostic importance. If the purpose of the study is diagnostic or prognostic, the validity test can only be done with ROC method (Hidayat et al. 2011).

For the S-STS questionnaire, a validity test was once conducted in the United States, with general population and sample of 250 people using the construct validity test, and obtained r count > r table = 0.4, indicating a reliable validity. A study in 2010 also stated that the validity of this instrument was satisfactory with a sensitivity of 100% (Sheehan et al. 2014). In this study, the sensitivity of the S-STS questionnaire was obtained at 100%, indicating that this questionnaire was 100% successful in identifying positive cases of true suicide risk. On the other hand, the specificity value was 96.32%, meaning that 96.32% succeeded in excluding negative cases of suicide risk. According to the literature which classifies AUC values into five levels of validity, AUC values of 0.9-1 are the best (very high validity) (Hidayat et al. 2011). In this study, the AUC value was 0.991 (95% CI 0.972-0.998). Furthermore, this instrument was considered to have a very high validity category.

The level of sensitivity and specificity of an instrument also often varies from one another, which can be influenced by the setting. In a screening setting where the population is 'healthy' and without symptoms (asymptomatic), sensitivity is needed more than specificity in order to capture as many groups as at risk. This study used a sample of patients of 10% and a general population of 90%. In accordance with this theory, in this study the sensitivity value obtained was very high (100%). High sensitivity and specificity results in this study might have been because S-STS is the result of adaptation of MINI, a screening tool that had been tested for validity and reliability using CIDI and SCID as gold standards (sensitivity 94%, specificity 97%) (Sari et al. 2014).

ROC calculation in this study produced a new cut-off point, which was the boundary value of the positive and negative test results or the boundary value between normal and abnormal. In this study, the cut-off value was >16, indicating that if a respondent has a score above 16, he is regarded as positively having suicide risk. Whereas, based on the 2014 Status Update on the S-STS journal a subject is regarded as positive for a high risk of suicide when he answers 2 (moderately) or 3 (very) or 4 (extremely) in questions number 1a, 3, 4 , 5, 6, 7, 8, 9, 10, 11, 12, so the score is >23 (Sheehan et al. 2014).

Because the purpose of this suicide scale study was for screening, there were more normal people than patients so that the cut-off value was lower. This study obtained a lower cut-off value (>16) compared to the standard value of S-STS with clinical populations, comprising mild to severe depressed patients in the United States (>23). The difference in the S-STS cut-off value certainly affects the positive suicide risk diagnosis results in the respondents, because with a cut-off >23, we found a total of 19 respondents (9.33%) who were positive, whereas with a cut-off >16, the positive results doubled up to 38 respondents (12.67%).

The difference in cut-offs values in various studies is a natural phenomenon. This difference can be caused by the type of measurement used as the gold standard, the type of population and subject, local cultural conditions, and other sociodemographic backgrounds. In this case, the character of Indonesian people who are different from the people in America in expressing ideas to the history of attempted suicide, could have affected the openness in filling out the questionnaire, so the cut-off values went down (Wirasto 2012).

We suggest that religion certainly can also influence the openness of Indonesian people who are mostly religious. All five recognized religions in Indonesia strictly prohibit all matters relating to suicide. In Indonesian society, which is predominantly Muslim, suicide is an act that is strictly prohibited by both the Qur'an and Al Hadith. For those who are religious, there is a concept that God is the Creator of life, so that besides God there is no one entitled to end life. If humans kill other people or even themselves, then it is a sinful act with hell as a punishment.

Indonesian people have a belief that everything related to suicide is taboo to talk about and is an attitude of disrespect for religion or sin. In addition, the culture of Indonesian people still does not have enough awareness about mental health, including in this case suicide. An open and honest attitude about what someone is feeling is still stigmatized, so being repressive or closed on the presence or absence of suicidal thoughts is commonly found (Wirasto 2012). This is in contrasts with the culture of people in the United States who are more open and expressive in conveying how they feel (Altangerel et al. 2014, Wirasto 2012). This phenomenon is called social desirability (SD) bias, which is the answer or response of an individual to the question that is imposed on him, where the subject is trying to increase his characteristics similarity to those of the community (enhance some social characteristics) and reduce the characteristics not expected by the community. In short, it can be said that SD is affirming the good and hiding the bad (Sjöström et al. 2002). We assume that these various factors can have influence on the cut- off value, where the S-STS cut-off value in general population in Surabaya is lower than that of the clinical population in the United States.

Internal consistency reliability shows the correlation between one item and the others in an instrument. Internal consistency reliability test on the S-STS instrument showed a Cronbach's alpha value of 0.9802.

This value was higher than the previous S-STS reliability test conducted in the United States in general population with Cronbach's alpha values of 0.83 to 0.88. The results of this study were also higher than those in a study in North Caroline, United States, in general population aged 21-65 years with Cronbach's alpha values between 0.78 to 0.92 (Sheehan et al. 2014).

A variable is regarded as reliable (consistently giving the same results from time to time) if it gives a Cronbach's alpha value >0.7. Thus, a value of 0.9802 indicates that the questionnaire has good reliability. In the reliability test of the questionnaire, if the value of Cronbach's alpha on the instrument will be improved, several questions can be removed and analyzed again. In this study, using the guidelines of the effect of dropping variables, it was found that if questions number 1, 1a, 1b, 2 on S-STS were removed then the Cronbach's alpha (0.9802) value would increase. The four questions could be modified so as not to create a double meaning that made the reliability decrease. However, because the change in Cronbach's alpha value obtained if the question items were omitted was very small (0.002-0.0031), these items could still be included. Thus, we can conclude that all questions in S-STS are reliable.

Although the results of calculating the validity and reliability of the S-STS instrument are very high, there are limitations in this study. For data collection we used non-random methods for respondents from different backgrounds with different cultural values, ethnicities and customs, so they were likely filled the instrument with different perceptions. Further studies needs to be done on the population by taking into account the background of different cultural values, ethnicity, customs, and habits.

CONCLUSION

S-STS has a higher validity and reliability compared to BSSI as gold standard on general adult population in Surabaya. Thus, the S-STS instrument can be used to detect the risk of suicide in Indonesia in adult population aged between 21-60 years.

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07. Validity and reliability test of Sheehan

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