

Psychometric Tests of the Indonesian Version of Self-Efficacy of Sleep Hygiene Inventory-Revised

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ABSTRACT

This study examined the content and construct validity, internal consistency reliability, and test-retest of the Indonesian version of the Self-Efficacy of Sleep Hygiene Inventory-Revised (SESHI-R) instrument. This quantitative study was conducted with psychometric tests using a cross-sectional design. The cultural translation and adaptation were conducted through the stages of forward translation, synthesis, backward translation, expert review, pilot testing, and validity and reliability tests. The content validity was measured using Aiken's V. The construct validity was measured using Pearson Product Moment and factor analysis. The internal consistency reliability was measured using Cronbach's alpha, and the test-retest used paired t-test. The content validity test showed an Aiken's value of 0.75 to 1. The construct validity test proved that all items were valid. The factor analysis gave 18 valid items (factor loading >0.5) with 6 factors formed (Eigen value >1). The internal consistency reliability test showed a Cronbach's alpha value of 0.894 (>0.7). The test-retest had a value of 0.747. This study showed the Indonesian version of SESH-R has good content validity, construct validity, internal consistency reliability, and acceptable test-retest. Therefore, it can be used to assess the self-efficacy of sleep hygiene behavior among adolescents from 15 to 19 years old in Indonesia.



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1. Introduction

According to Bandura [1], self-efficacy is a measurement of one's ability to complete tasks. High self-efficacy increases the likelihood of adopting health-promoting behaviors. Conversely, low self-efficacy increases the likelihood of failure to adopt new behaviors [1].

One of the health problems among adolescents is their lack of sleep quality [2]. Based on a research conducted in Yogyakarta, as many as 62.24% of adolescents experience sleep disorders [3]. Adolescents need 8 to 10 hours of sleep every night to prevent unnecessary fatigue and susceptibility to infection [4].

Inadequate knowledge about sleep contributes to poor sleep habits and reduces the total duration of sleep [5]. Sleep hygiene behaviors which include sleeping environment, physical activities, diets, and habits before bed also contribute to children's sleep behavior [6]. Research in Indonesia demonstrated that sleep hygiene interventions in school-age children with sleep disorders can reduce complaints of drowsiness at school, improve daily mood, and reduce difficulty of getting up in the morning [7].

Self-efficacy for sleep hygiene is related to sleep habits and can still be modified based on the factors that can improve sleep quality. Currently, research on self-efficacy for sleep hygiene has not been widely conducted [8].

The Self-Efficacy for Sleep Hygiene Inventory (SESHI) is a self-efficacy instrument related to the practice of sleep hygiene as a therapy for sleep disorders. It was developed by [8] which was then revised in 2020 to be the Self-Efficacy for Sleep Hygiene Inventory-Revised (SESHI-R) [9]. The SESHI-R contains 25 items that have been tested on young adults (18-26 years) with Cronbach's alpha score of 85 for Behaviors to Adopt (9 items), 79 for Managing Mindset and Environment (8 items), 70 for Behaviors to Avoid (8 items), and 88 for Inventory.

Until now, the instrument for measuring self-efficacy for sleep hygiene practices, namely the SESHI-R has not been widely used in Indonesia. Therefore, it is important to conduct research to determine the content validity, construct validity, the reliability of test-retest, and the internal consistency of the Indonesian version of the SESHI-R.

2. Materials and methods

This quantitative research was conducted with psychometric tests using a cross-sectional design. The research on the psychometric tests of the Indonesian version of the SESHI-R was conducted in four high schools in Sleman Regency [10].

The validity test in this study was done after a process of cultural adaptation, namely forward translation, synthesis, backward translation, expert review, and pilot testing in January 2021. The validity and reliability tests of this study were conducted in February-March 2021. This study was approved by the Medical and Health Research Ethics Committee of the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia with number: KE/FK/1224/EC/2020.

2.1 Sampling methods

The population in this study was adolescents aged 10-19 who lived in the Special Region of Yogyakarta, particularly in Sleman Regency. This research employed simple random sampling and purposive sampling techniques. The simple random sampling technique was used to choose the high schools in Sleman Regency. The respondents were selected using the purposive sampling technique.

The inclusion criteria in this study were: 1) children aged 14-19, 2) those who were willing to be the respondents and had obtained an approval from their parents/guardians, and 3) those who are able to access the Internet and use Google forms. The exclusion criteria in this study were children who had been previously exposed to information about sleep hygiene.

2.2 Sample size

The cultural adaptation stage involved six experts and 36 children who were willing to become pilot testing respondents. The total respondents in the construct validity and internal consistency reliability tests were

328. Responses to the similarity of concepts (clarity) of items on the instrument were done by six to ten expert panels who are knowledgeable about the content of the instrument, understood the target population to be used in the instrument testing, and had used the instrument's translated language as their native language [11]. Expert review in the validity test involved six people consisting of a doctor who had been involved in research with child respondents, a pediatric nurse, two pediatric nursing lecturers, and two nursing lecturers who had been involved in research on adolescents. In the test-retest stage, 30 respondents filled out the questionnaire again. Based on the literature review conducted by [12], the number of samples in the test-retest test should use a ratio of 1:1 to 1:4 of the number of items on the instrument.

2.3 Research instruments

This study used the SESH-R instrument that had been culturally adapted into Indonesian to assess the Self-Efficacy for Sleep Hygiene practices. There were 25 items in the SESH-R that came from three factors, namely Behaviors to Adopt (9 items), Managing Mindset and Environment (8 items), and Behaviors to Avoid (8 items). The assessment used in the SESH-R was a scale of 0 to 100 where 0 indicated no confidence and 100 represented complete confidence. The higher the SESH-R score, the better the self-efficacy towards sleep hygiene practices [1].

2.4 Research procedures

The data for the construct validity and reliability tests were collected after the children and parents had completed the informed consent via Google Forms with a photo signature. Data collection was also done through Google Meet and Google Forms. The content validity test was conducted via WhatsApp and email. Because of the current COVID-19 pandemic, school learning was conducted online. After two weeks, the researchers asked the willingness of the respondents to complete the Indonesian version of the SESH-R instrument again.

3. Findings and discussion

3.1 Cultural adaptation

The cultural adaptation process of the SESH-R instrument used the cross-cultural adaptation theory of [13]. It consists of six stages, namely forward translation, synthesis, backward translation, expert review, pilot testing, and validity and reliability tests.

The initial stage was the forward translation to translate from English to Indonesian using two translators. The final results of the forward translation stage were translation 1 (T1) and translation 2 (T2). The second stage was synthesizing by linguists and experts in the field of health and pediatric nursing regarding the ambiguity or discrepancy between T1 and T2. The final product in this synthesis stage was T12. The third stage was back translation to translate T12 back into its original language (English) and it was done by two linguists with English native speakers different from the previous translators. The final results of this stage were the production of back translation 1 (BT1) and back translation 2 (BT2).

The fourth stage was the expert committee review to produce a pre-final version of the SESH-R. The review was conducted by six experts of a doctor who had been involved in researches with child respondents, a pediatric nurse, two pediatric nursing lecturers, and two nursing lecturers who had been involved in researches on adolescents. The results of the review showed that some words in item numbers 20 and 25 were deleted. In item number 20, the word intimacy which was translated into *keintiman* in Indonesian was recommended to be deleted because it was found improper due to the age of the respondents. In item number 25, the word party which in Indonesian means *berpesta* was also

recommended to be removed because it is not typically found in the Indonesian culture. As for item number 15, the experts thought that it was also not deemed to be suitable with the age of the respondents.

The fifth stage was the pilot testing on 36 children aged 15-18 with an average age of 16. This testing was to gain an understanding of the pre-final of the SESH-R instrument. At this stage, 9 respondents stated “interesting” about the SESH-R instrument, and 5 reported that the scale used was too many which made it difficult to choose. There were inputs from the respondents to add the normal time needed to sleep in item numbers 8, 9, and 10 of the instruments. The results of the testing showed that all respondents could understand the SESH-R items clearly.

The Pearson Product Moment analysis in the pilot testing was conducted to determine the correlation value of each valid item where the value of r count $>$ r table. The results of the r count are presented in Table 3 with a range of value of -0.135 to 0.448. The results of pilot testing with 36 respondents showed that the Indonesian version of the SESH-R instrument item had an internal consistency level of Cronbach’s alpha at 0.846-0.870 with the overall Cronbach’s alpha value of the instrument of 0.859.

The pilot testing in this study involved 35 children with an average age of 16.68 years old, and 68.5% of the respondents were female. All respondents stated that all SESH-R items could be understood clearly.

3.2 Demographic data

The construct validity and reliability tests involved 328 children who were asked to respond to the questionnaires. The characteristics of the respondents and the distribution of the child respondents based on age and gender are presented in Table 1.

Table 1. Participants’ descriptive statistics (n=328)

Category	<i>f</i>	%	<i>Mean ± SD*</i>
Age			
a. 15 years	55	16.8	16.13 ±
b. 16 years	180	54.9	0.700
c. 17 years	87	26.5	
d. 18 years	6	1.8	
Gender			
	61	18.6	
a. Male	267	81.4	
b. Female			

*SD, standard deviation.

3.3 Validity test

The content validity test involved 25 items with a range of coefficient value of 0.75-1. The Aiken’s V coefficient of each item was greater than the required valid value, i.e. 0.79 for the questionnaires with 6 experts and 5 assessment categories with a 5% chance of error (p -value $<$ 0.05) [14]. Item number 15, however, was stated to be invalid.

Based on the results of the item correlation analysis, the total items in the SESH-R instrument were in the range of 0.323-0.747 (Table 2). Items on the instrument can be said to be valid if the value of r count $>$ r table. The value of the r table for 328 respondents was 0.113 with a significance value of 0.05. Thus, the items on the SESH-R instrument are considered valid because $r >$ 0.113.

Table 2. Results of Pearson's Product moment and Cronbach's alpha of the 25 item Indonesian version SESH-R

Item no	r	Cronbach's Alpha
Item 1	0.584*	0.888
Item 2	0.503*	0.890
Item 3	0.632*	0.887
Item 4	0.623*	0.887
Item 5	0.519*	0.890
Item 6	0.545*	0.889
Item 7	0.555*	0.890
Item 8	0.702*	0.885
Item 9	0.698*	0.885
Item 10	0.631*	0.887
Item 11	0.669*	0.886
Item 12	0.741*	0.884
Item 13	0.458*	0.891
Item 14	0.451*	0.892
Item 15	0.340*	0.895
Item 16	0.559*	0.889
Item 17	0.325*	0.895
Item 18	0.747*	0.885
Item 19	0.506*	0.890
Item 20	0.504*	0.891
Item 21	0.365*	0.894
Item 22	0.471*	0.891
Item 23	0.386*	0.892
Item 24	0.323*	0.894
Item 25	0.484*	0.891

*r value; $p < 0.05$.

In the construct validity test, the researchers also conducted a factor analysis test on the SESH-R instrument to determine the number of factors derived from the instrument. The factor analysis test began with finding the value of Kaiser Meyer Oklin (KMO) and Bartlett's test of sphericity. The KMO value determined if the research data were adequate, while the Bartlett's test identified the correlation between the items of the SESH-R instrument. Both assessed the feasibility of the instrument, to determine if factor analysis could be applied. The expected KMO value was >0.5 with a significance value of Bartlett's test of <0.05 . The KMO value obtained in this study was 0.881 with a significance value of the Bartlett's test = 0.000.

The results showed that the assessment of construct validity could be further analyzed using the Anti-Image Matrices table with the value of Measure of Sampling Adequacy (MSA). The MSA correlation matrix marked with the letter a on the SPSS output with the MSA value of >0.5 could be further analyzed, while the item with the MSA value of <0.5 was excluded from the factor analysis test. The results revealed that there were no items with MSA value of <0.5 , so that all items could be further analyzed using factor analysis. Furthermore, initial Eigen values and extraction sums of squared loadings were used to explain the variance and the number of factors derived.

The results of the analysis showed that the 25 items of the SESH-R instrument have a valid factor loading value of >0.5 . Thus, there were six derived factors based on the Eigen value since the requirement to

become a factor was an Eigen value of >1 . The six factors were the best to summarize all items of the SESH-R instrument used for adolescents.

The six factors explained 60.32% of the construct. Factor 1 contributed to the construct with 30.50% variation, factor 2 with 9.72%, factor 3 with 5.91%, factor 4 with 5.18%, factor 5 with 4.91%, and factor 6 with 4.09% variation.

Based on the results of the analysis, the items can be grouped into those appropriate factors following the level of correlation. Item numbers 3, 4, 8, 9, 10, 11, 12, 13, 16, and 18 were grouped into factor 1. Item numbers 14, 15, 17, and 24 were grouped into factor 2. Item numbers 6, 7, 19, and 20 were grouped into factor 3. Item numbers 1, 2, and 21 were grouped into factor 4. Item numbers 22 and 23 were grouped into factor 5. Item numbers 5 and 25 were grouped into factor 6.

3.4 Reliability test

The internal consistency reliability test using Cronbach's alpha gave a value of 0.7. It was found consistent with the instrument used. The closer the Cronbach's alpha value is to 1, the more consistent it will be. The results of the analysis showed that all items of the Indonesian version of the SESH-R instrument had an internal consistency level of 0.70 with an average Cronbach's alpha value of 0.894 (Table 2). Therefore, it could be said that the SESH-R instrument was considered feasible and consistent to be used. The test-retest reliability test was also conducted among 30 respondents who had previously filled out the questionnaires. The test-retest was based on the paired T-test analysis with the value of $N=30$. The results showed the stability of the first and second measurements (sig. 0.747).

3.5 Discussion

The results of the committee review in this study suggested that some words should be deleted in item numbers 20 and 25. In item number 20, the word intimacy which is translated into *keintiman* in Indonesian was deleted concerning the age of the respondents. It is improper to use the word for adolescent respondents. Intimacy is a developmental task for young adults [15]. In item number 25, the word party which in Indonesian means *berpesta* was also recommended to be removed because it is not found appropriate in the Indonesian culture. The phenomenon of partying in adolescents (clubbing) is considered to deviate from the social and moral order because there are many negative aspects that can harm adolescents [16]. Meanwhile, item number 15 is considered inappropriate for the age of the respondents because alcohol can damage the brain development of the adolescents [17].

The results of the pilot testing among 35 adolescents with an average age of 16.68 years old show that all adolescents clearly understood each item of the SESH-R instrument. In the previous studies, pilot testing was not yet done. However, focus group discussions were conducted among 29 respondents to explore additional information about sleep and sleep habits [9].

In the pilot testing, five respondents felt that the scale used was too many which made it difficult to choose. In the standard methodology for measuring self-efficacy, respondents who were provided with different levels of tasks have an accuracy of assessment with a scale of 100 points because the simplification of the rating scale is considered less sensitive and unreliable. Hence, in this case, the researchers did not change the scale of assessment in the Indonesian version of the SESH-R instrument. In addition, there were inputs from the respondents to add the normal time needed to sleep in item numbers 8, 9, and 10 of the instruments. Adolescents need 8 to 10 hours of sleep every night to prevent unnecessary fatigue and susceptibility to infection [4]. Therefore, the researcher added the normal time needed to sleep, that is 8 to

10 hours every night, in item numbers 8, 9, and 10 of the instruments.

The value of the r count in the pilot testing was in the range of -0.135 to 0.448. Meanwhile, the value of r table for 36 respondents was 0.329 with p value <0.05 . Therefore, 19 instruments were not found valid in the pilot testing. This is because the number of respondents was too small. According to [11], the number of respondents has to be 10 times the number of items to determine the psychometric test using Pearson correlation. In the internal consistency test of the pilot testing using Cronbach's alpha, the value was 0.7, which is considered consistent with the instrument used.

This study involved 328 respondents aged 15-18, while the previous study was conducted among 296 respondents aged 18-26. This was because 62.24% of adolescents in Yogyakarta have experienced sleep disorders. The number of respondents in this study was dominated by females, and this was the same as other studies related to the development of sleep hygiene instruments [9].

The search for research journals used the keywords of Self-Efficacy for Sleep Hygiene Revised in the PubMed database. Two journals related to SESH-R were found, namely journals on the development of the original SESH-R instrument by [8], [9]. No journals related to the SESH-R psychometric test were found in other languages. Thus, in discussing the validity and reliability of the results of this study, the researcher used comparisons and reference results based on the original SESH-R instrument.

This instrument showed an Aiken's V value of 0.75 - 1. This value indicated that the overall coefficient of each item was greater than the valid criteria, which was 0.79 for the questionnaires with 6 experts and 5 assessment categories with a 5% chance of error (p value <0.05) [15]. However, item 15 was found to be invalid (Not using depressants such as alcohol before bedtime). The experts assumed that the item was not inappropriate considering the age of the respondents. Alcohol abuse usually begins among adolescents with greater consumption than adults where the average number of drinks per incident is reported to be about twice as much [18]. Alcohol is one of the factors that adversely affects the lives of adolescents because it can affect the development of the central nervous system and becomes the main cause of damage to the formation of the brain. Various efforts are needed to prevent and minimize alcohol consumption among adolescents [17]. Hence, item 15 still needs to be considered whether it should be removed or improved.

The results of the correlation analysis between the items and the total items of the Indonesian SESH-R instrument gave a range of 0.32-0.75. This value was greater than the r table, where the value of r table for 328 respondents was 0.113 with a significance value of 0.05. Meanwhile, in other studies on SESH-R instruments conducted by [8], [9] the r table test was unknown.

In this study, the KMO value obtained was 0.881 with a significance value of 0.000 for the Bartlett's Test. The value of the MSA showed a value of >0.5 . These results indicated that the instrument could be further analyzed. The factor analysis test stated that there were 6 factors with the formed an initial Eigen value of >1 representing 25 items. The six factors had an influence on the instrument construct of 60.316% in this study.

The researchers combined factors and moved items according to the context [9] so that in this study, factors 2 and 3 were combined, while factors 1 and 4 were independent. Factors 5 and 6 which only consisted of two items were reduced and the items moved to other factors. Items 22 and 23 were moved to factor 4, item 5 was moved to factor 1, and item 25 was moved to factor 2.

According to [9], the three factors are Behaviors to Adopt, Managing Mindset and Environment, and Behaviors to Avoid. To adjust the items with the factors, the items were moved based on the conceptual framework. Items 9, 10, and 11 were moved to Managing Mindset and Environment factor; item 16 was moved to Behaviors to Avoid factor; items 20 and 24 were moved to Behaviors to Adopt.

These results were consonant with the previous study which stated that the KMO value was 0.86 with an Anti-Image Correlation Matrix value of >0.5 (a range of 0.61-0.94) and this makes the factor analysis can be conducted. In the previous study, 8 factors were reduced into 3 factors using a scree plot because one factor was declared to be loaded, and the other 3 were considered weak [12]. In addition, [9] also mentioned that the results of the rotation of factor loadings showed that 3 factors reflected the instrument.

It can be concluded that in this study, the Indonesian SESHI-R instrument consists of 3 factors. They are Behaviors to Adopt as found in items 3, 4, 5, 8, 12, 13, 18, 20, and 24; Managing Mindset and Environment in items 1, 2, 9, 10, 11, 21, 22, and 23; and Behaviors to Avoid in items 6, 7, 14, 15, 16, 17, 19, and 35.

The Indonesian version of the SESHI-R instrument item tested had an average Cronbach's alpha value of 0.894. This was consistent with the research by [9] with a Cronbach's alpha value of 0.88 for all SESHI-R instrument items. Based on other studies, the acceptable range of Cronbach's alpha value is 0.70 to 0.95 with a maximum alpha recommended value of 0.90 [19].

The results of the test-retest in this study showed stability in the results. Also, no differences were found in the first and second measurements with a significance value of 0.747, which is close to 1. A correlation value greater than 0.50 gives the consistency of the two tests [20].

4. Conclusions

Based on the results of this study, it can be concluded that the Indonesian version of the SESHI-R Instrument has good content validity, construct validity, internal consistency reliability, and acceptable test-retest. Therefore, this instrument can be used to assess the self-efficacy of sleep hygiene behavior among adolescents of 15-19 years old in Indonesia by considering deleting item number 15 if it is used for adolescents or children.

5. References

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