PalArch's Journal of Archaeology of Egypt / Egyptology

# VALIDITY AND RELIABILITY OF INSTRUMENTS BODY SHAPE QUESTIONNAIRE-34 (BSQ-34) BASED ON INDONESIA VERSION

*Franky Hadinata Sitepu[1], Elmeida Effendy[2], Mustafa M. Amin[3]*
[1,2,3]Psychiatric Study Program at the Faculty of Medicine, University of North Sumatra, Indonesia.
E-mail: frankysitepu@yahoo.com, micipsych@yahoo.com, mustafamamin78@gmail.com

**Franky Hadinata Sitepu, Elmeida Effendy, Mustafa M. Amin: Validity and Reliability of Instruments *Body Shape Questionnaire*-34 (BSQ-34) Based on Indonesia Version--Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(6), 1-14. ISSN 1567-214x**
**Keywords: Validity, reliability, Body Shape Questionnaire-34 (BSQ-34).**

**ABSTRACT**
Imaging the body is treated as an important illustration to increase self-confidence and as a guarantee to elevate a person's dignity and self-esteem. Individuals who are satisfied with the body's imaging help in adjusting or if not satisfied will cause inability to adjust. An assessment of the level of individual attention to body shape is very important to avoid health problems, and this perception can be assessed using the Body Shape Questionnaire-34 (BSQ-34) psychometric scale. Obtain a valid and reliable Indonesian version of the BSQ-34 instrument. A cross sectional diagnostic study with 300 female students at the Faculty of Medicine, University of North Sumatra in December 2019 aged 18-25 years with probability sampling method for research sampling. Indonesian version of BSQ-34 instrument showed a strong positive correlation with Eat Attitudes Test-26 (EAT-26) of 0.69, p <0.001. The Indonesian version of the BSQ-34 instrument shows very high internal consistency reliability, which is 0.966 (α> 0.9). The BSQ-34 instrument showed a sensitivity value of 99% and a specificity of 98%, with a value*cut-off* amounting to ≥ 81.50. The Indonesian version of the BSQ-34 instrument produced in this study is an instrument with 34 valid questions and can be used to determine the level of individual attention to body shape.

## I. Introduction

In increasing self-confidence and as a guarantee to elevate dignity and self-esteem, body imaging is still an important part of one's life. To improve body image, most people will describe beauty by trying to maintain their ideal body shape or being thin, and the tendency to have a body like a model correlates with eating disorders.(1)

Our perspective on seeing the shape of our body will fill our minds which is clearly reflected in the psychological state, satisfaction self, as well as social adjustment. Individuals who are satisfied with the body's imaging will help in adjustment, on the contrary, if dissatisfied will cause the inability to adjust. Imaging the body represents a picture of the soul, where individuals attempt to regulate their body and outward appearance.(2)

Attention to body shape refers to the individual's perception of body shape which involves the appearance, size, and shadow of the body. This perception is greatly influenced by psychological, cognitive, and behavioral factors, and can be experienced by individuals who are vulnerable to mental and physiological changes related to physical appearance. Attention to body shape is an important factor that directly influences the daily lives of individuals.(3)

The concept of body imaging was originally coined by an Austrian psychiatrist, Paul Ferdinand Schilder (1886 - 1940)in 1935, as the existence of images of our own body in our minds. Furthermore, it illustrates that our appearance is for ourselves. Schilder broadens it by defining it as an individual's perceptions, attitudes, and experiences of his body, especially appearance.(4)

Imaging the body is considered as a representation of awareness of the body that is very bound to visual information and an understanding of the size and shape of the body parts as a whole.(5)Imaging the body has two concepts, namely the ideal body (ideal body), which means an attractive body style and in accordance with a certain age group, which is accepted in individual culture, and second is the concept of the body (body concept), including ideas, beliefs, and limitations, related to the body, besides perception of the body.(2)

Body imaging can be interpreted positively or negatively according to individual feelings towards their own body. Negative self-assessments of the body can be associated with eating disorders, such as anorexia and bulimia, as well as obesity. Research on body imaging dissatisfaction focuses on various aspects, including concerns about body shape, weight gain, current weight, physical appearance, and muscle mass. Since individual perceptions of the body have an impact on psychological function and quality of life, and young women are more prone to experiencing body image dissatisfaction than other groups, assessment of body problems is important and must be done, especially among young women.(5)

Satisfaction with body imaging is more often formed in the minds of women than men, for this reason, satisfaction is more clearly seen among women, while men are more interested in the achievements and future of their profession. Appropriate weight is the foundation in the body imaging component among women in different cultures. Men focus on imaging the upper body along with muscle formation, while women maintain their overall body shape.(2) Lots of evidence shows that women suffer more than men in terms of body image dissatisfaction, regardless of age and the negative impact of dissatisfaction in their lives. Women are more likely than men to describe themselves as fat, weigh more often, and adjust their diet more often than men.(6)

## II. Method

A. Research design

This research is a diagnostic research through a cross-sectional approach (*cross-sectional*) to get a valid and reliable instrument.

B. Research subject

The research took place from October to December 2019, where the research subjects were students of the Faculty of Medicine, University of North Sumatra, aged 18 to 25 years, were female, and were able to speak Indonesian well, and were willing to take part in the research. Taking research subjects with probability sampling method, namely simple random sampling.

In determining the large number of research subjects, this study uses the method from Comfrey, et al., who suggested a large sample of research with a scale of 50 subjects (very bad), 100 subjects (bad), 200 subjects (enough), 300 subjects (good), 500 subjects (very good), and 1000 subjects (outside usual). (7,8)This study uses a large limitation of research subjects which are categorized as good, as many as 300 subjects.

C. Instrument

The Body Shape Questionnaire (BSQ) instrument is a self-report questionnaire developed to measure concern about body shape and appearance in the normal population and clinical population. This instrument consists of 34 questions that ask participants how they feel about their performance over the past four weeks. (14) The BSQ instrument has six Likert scale points, namely 1 (never), 2 (rarely), 3 (sometimes / sometimes), 4 (often), 5 (very often), and 6 (always). This instrument can be completed in 10 minutes.(9)

Based on the total score, the assessment of the instrument is divided into four levels, namely no attention (total score ≤ 80), mild attention (total score 81-110), moderate attention (total score 111-140), and severe attention (score total> 140).(1)

Instrument *Eating Attitudes Test*-26 (EAT-26) is a measurement scale made by Garner, et al. in 1982, it could be used in nonclinical conditions as well as non-specific clinical conditions focused on eating disorders.(10)This instrument is a self-report questionnaire containing 26 statements. Participants respond to statements on the six-point Likert scale, namely 1 (never), 2 (rarely), 3 (sometimes), 4 (often), 5 (usually), and 6 (always / always). Answers to scale points 1,2 or 3 are coded as 0, and response responses to scale points 4,5 or 6 are coded as 1,2 and 3, respectively (with the exception of one reverse code), and responses from each statement items are added together to get a total score or factor score.(11)Scores of 20 or more of all statement items indicate the need for further interviews to assess diagnostic criteria for eating disorders.(10)This instrument has three subscales called "factors". Factor I, namely dieting, assesses negative preoccupation in body shape and actively avoids fattening foods. A high score on factor I indicates dietary behavior and worries about eating. Factor II, namely bulimia and food preoccupation, assesses binge eating behavior and laxative behavior, as well as food preoccupation. A high score is associated with bulimia and excess body weight. Factor III, labeled oral control (control), and contains statements regarding self-control and social

pressure on body weight. A high score on this factor is associated with low body weight and the absence of bulimia nervosa.(11)

D. Procedure

*Body Shape Questionnaire*adapted through forward translation and backtranslation, in an effort to ensure the validity and reliability of this instrument in Indonesian. Requests for permission to translate this instrument to the author are represented by Chris Evans by e-mail. Research subjects answered questions on the instruments in the classroom, where they were told the purpose of this study. Research subjects were asked to sign an informed consent explaining that the data obtained would be treated according to research ethical standards set by the Research Ethics Commission of the Faculty of Medicine, University of North Sumatra.

E. Data analysis

Data is collected and tabulated and processed statistically. Validity test in the form of concurrent validity, measured by the Pearson correlation coefficient of BSQ-34 and EAT-26 to assess the level of attention and satisfaction to the body. The reliability test is measured by the reliability of the internal consistency of each statement by measuring Cronbach's alpha. This research in data processing uses the tools of the Statistical Package for Social Science (SPSS) program.

## III. Results

A. Characteristics of Research Subjects

Characteristics of the research subjects of 300 female students of the Faculty of Medicine, University of North Sumatra, are in the following table.

Table 1. Demographic characteristics of study subjects

| Variable | n | % | |
|---|---|---|---|
| Age (years) | | | |
| Median (min - max.) | | | 19 (18-24) |
| Semester lectures | | | |
| Semester 1 | 32 | 10.7 | |
| 3rd semester | 135 | 45 | |
| 5th semester | 91 | 30.3 | |
| 7th semester | 42 | 14 | |
| Ethnicity | | | |
| Batak | 146 | 48.6 | |
| Malay | 29 | 9.7 | |
| Nias | 3 | 1 | |
| Java | 41 | 13.7 | |
| Minang | 18 | 6 | |
| Aceh | 16 | 5,3 | |
| Chinese | 35 | 11.7 | |
| India | 3 | 1 | |
| and others | 9 | 3 | |
| Body mass index / BMI (kg / m2) | | | |
| Median (min - max.) | | | 21.9 (15.6 - 39.5) |
| BSQ-34 score | | | |
| Average ± sb | | | 1.87 ± 1.68 |

| | |
|---|---|
| EAT-26 score | |
| Median (min - max.) | 7 (1 - 45) |

Based on the demographic characteristics of the study subjects, it was found that the median age of the subjects was 19 years, with a minimum value of 18 years and a maximum value of 24 years. On the characteristics of the semester of study, the most research subjects of semester 3 students were 135 people (45%). Demographic characteristics related to ethnicity / ethnicity showed that the most Batak tribe students became the research sample of 146 people (48.6%). Body mass index of the study subjects showed a median value of 21.9 kg / m2 with a minimum value of 15.6 kg / m2 and a maximum value of 39.5 kg / m2. The score from the BSQ-34 questionnaire shows a mean value of 1.87 with a standard deviation of 1.68. Likewise, the score from the EAT-26 questionnaire shows a median value of 7, with a minimum value of 1 and a maximum value of 45.

B. Validity *Conccurent*

Validity *conccurent* is one part of criterion validity, where the results obtained and criteria are applied at the same time.(12)

Based on the normality test shows the BSQ-34 score is normally distributed with a p value = 0.067 (p> 0.05), but the EAT-26 score is still not normally distributed with a p value <0.001 (p <0.05). Next, the Pearson correlation test was performed. From the Pearson correlation test results there is a positive correlation with the strength of a strong correlation between BSQ-34 and EAT-26 (r = 0.69, p <0.001, n = 300).

C. Internal Consistency Reliability

Coefficient *Cronbach's alpha*most often used in research to assess the internal consistency of an instrument.(12)

Table 2. Indonesian version of internal consistency reliability BSQ-34

| Test variable | *Corrected item-total correlation* | *Cronbach's alpha if item deleted* | *Cronbach's alpha* |
|---|---|---|---|
| Q1 | 0.685 | 0.964 | **0.966** |
| P2 | .807 | 0.964 | |
| Q3 | 0.718 | 0.964 | |
| Q4 | 0.755 | 0.964 | |
| Q5 | 0.555 | 0.965 | |
| Q6 | 0.711 | 0.964 | |
| Q7 | .641 | 0.965 | |
| Q8 | 0.470 | 0.966 | |
| Q9 | 0.743 | 0.964 | |
| Q10 | 0.721 | 0.964 | |
| Q11 | 0.519 | 0.965 | |
| Q12 | .693 | 0.964 | |
| Q13 | .684 | 0.965 | |
| Q14 | 0.760 | 0.964 | |
| Q15 | 0.604 | 0.965 | |
| Q16 | 0.733 | 0.964 | |
| Q17 | 0.769 | 0.964 | |
| Q18 | .473 | 0.966 | |
| Q19 | .802 | 0.964 | |

| | | |
|---|---|---|
| Q20 | 0.721 | 0.964 |
| Q21 | 0.730 | 0.964 |
| Q22 | 0.521 | 0.966 |
| Q23 | 0.741 | 0.964 |
| Q24 | 0.742 | 0.964 |
| Q25 | 0.630 | 0.965 |
| Q26 | 0.395 | 0.966 |
| Q27 | 0.650 | 0.965 |
| Q28 | 0.748 | 0.964 |
| Q29 | .708 | 0.964 |
| Q30 | .703 | 0.964 |
| Q31 | 0.589 | 0.965 |
| Q32 | 0.435 | 0.966 |
| Q33 | 0.633 | 0.965 |
| Q34 | 0.735 | 0.964 |

In the table above shows that the results of the hypothesis testing of the internal consistency reliability of the Indonesian version of the BSQ-34 instrument have a value of reliability with value *Cronbach's alpha* 0.966. This value can be accepted if all statements are valid. When looking at the table above, all corrected item-total correlation values are more than 0.3.

D. Area Under the Curve (AUC) Value with Receiver Operating Characteristic (ROC) Procedure

Receiver characteristic (ROC) and area under the curve (AUC) methods are pairs that cannot be separated from one another. The ROC method is a statistical method which is the result of a tug of war between sensitivity and specificity at various alternative intersection points, which are presented in graphical form. While AUC is the area produced by the ROC curve.(13)

The geometric mean score on the BSQ-34 score was 74.13 and the IK95% value on the BSQ-34 score was 70.79 - 77.62.

Information obtained from *case processing summary* shows research subjects who give attention to body shape as many as 130 people (positive) and subjects who do not pay attention to body shape as many as 170 people (negative).

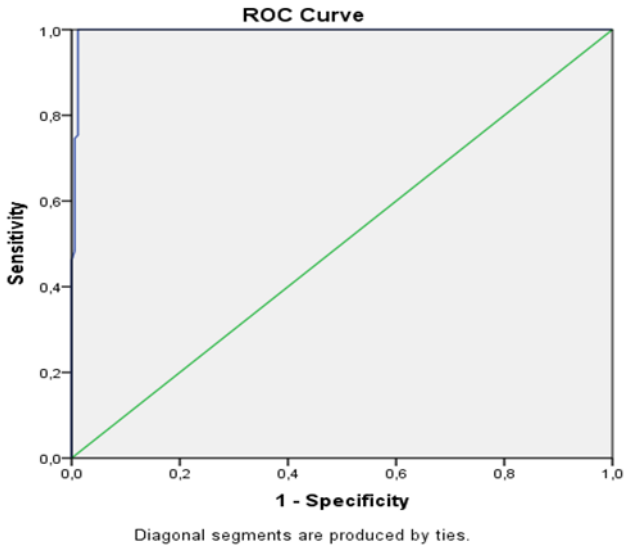

Figure 1. ROC curve

At the output, the ROC curve shows the BSQ-34 score has a good diagnostic value because the curve is far from the 50% line and is at the 100% line. The AUC value obtained from the ROC method is 99.5% (IK95% 98.9% - 100%), p <0.001.

Hypothesis testing conducted by the SPSS program is to compare the AUC obtained by the index compared to the AUC value of 50%. P value <0.05 obtained at output (*the output*) shows that the AUC BSQ-34 score is significantly different from the AUC score of 50%. Clinically, the AUC value is very satisfying because it is greater than the minimum AUC value expected by researchers.

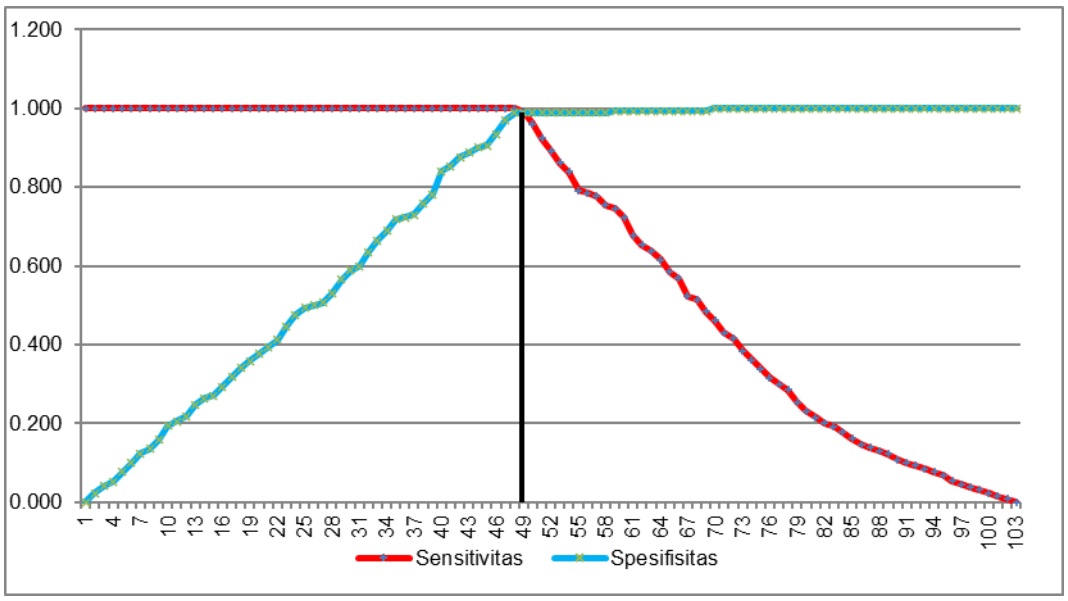


**Figure 2. Curve of sensitivity and specificity**

The curve above is the sensitivity and specificity curve. The optimal cut-off point is the value at which the sensitivity and specificity curves intersect. To find the optimal point of intersection, a vertical line is drawn from the point of intersection.

Table 3. Value of sensitivity and specificity of alternative cut points

| No. | *Positive if greater than or equal toa* | *Sensitivity* | *Specificity* | No. | *Positive if greater than or equal toa* | *Sensitivity* | *Specificity* |
|---|---|---|---|---|---|---|---|
| 1 | 33.00 | 1,000 | 0,000 | 34 | 66.50 | 1,000 | .688 |
| 2 | 34.50 | 1,000 | 0.024 | 35 | 67.50 | 1,000 | 0.718 |
| 3 | 35.50 | 1,000 | 0.041 | 36 | 68.50 | 1,000 | 0.724 |
| 4 | 36.50 | 1,000 | 0.053 | 37 | 69.50 | 1,000 | 0.729 |
| 5 | 37.50 | 1,000 | 0.076 | 38 | 70.50 | 1,000 | 0.759 |
| 6 | 38.50 | 1,000 | .100 | 39 | 71.50 | 1,000 | 0.782 |
| 7 | 39.50 | 1,000 | 0.124 | 40 | 72.50 | 1,000 | 0.841 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | 40.50 | 1,000 | .135 | 41 | 73.50 | 1,000 | .853 |
| 9 | 41.50 | 1,000 | .159 | 42 | 74.50 | 1,000 | .876 |
| 10 | 42.50 | 1,000 | .194 | 43 | 75.50 | 1,000 | .888 |
| 11 | 43.50 | 1,000 | .206 | 44 | 76.50 | 1,000 | 0,900 |
| 12 | 44.50 | 1,000 | 0.218 | 45 | 77.50 | 1,000 | .906 |
| 13 | 45.50 | 1,000 | .247 | 46 | 78.50 | 1,000 | 0.935 |
| 14 | 46.50 | 1,000 | 0.265 | 47 | 79.50 | 1,000 | 0.971 |
| 15 | 47.50 | 1,000 | .271 | 48 | 80.50 | 1,000 | 0.988 |
| 16 | 48.50 | 1,000 | 0.294 | **49** | **81.50** | **.992** | **0.988** |
| 17 | 49.50 | 1,000 | 0.318 | 50 | 82.50 | 0.962 | 0.988 |
| 18 | 50.50 | 1,000 | .341 | 51 | 83.50 | 0.923 | 0.988 |
| 19 | 51.50 | 1,000 | .359 | 52 | 84.50 | .892 | 0.988 |
| 20 | 52.50 | 1,000 | .376 | 53 | 86.00 | 0.862 | 0.988 |
| 21 | 53.50 | 1,000 | .394 | 54 | 87.50 | 0.838 | 0.988 |
| 22 | 54.50 | 1,000 | 0.412 | 55 | 88.50 | 0.792 | 0.988 |
| 23 | 55.50 | 1,000 | .447 | 56 | 89.50 | 0.785 | 0.988 |
| 24 | 56.50 | 1,000 | .476 | 57 | 90.50 | .777 | 0.988 |
| 25 | 57.50 | 1,000 | .494 | 58 | 91.50 | 0.754 | 0.988 |
| 26 | 58.50 | 1,000 | 0.500 | 59 | 92.50 | 0.746 | .994 |
| 27 | 59.50 | 1,000 | 0.506 | 60 | 93.50 | 0.723 | .994 |
| 28 | 60.50 | 1,000 | 0.529 | 61 | 94.50 | .677 | .994 |
| 29 | 61.50 | 1,000 | 0.565 | 62 | 95.50 | 0.654 | .994 |
| 30 | 62.50 | 1,000 | 0.588 | 63 | 96.50 | 0.638 | .994 |
| 31 | 63.50 | 1,000 | 0,600 | 64 | 97.50 | 0.615 | .994 |
| 32 | 64.50 | 1,000 | 0.635 | 65 | 98.50 | 0.585 | .994 |
| 33 | 65.50 | 1,000 | 0.665 | 66 | 100.00 | 0.569 | .994 |
| 67 | 101.50 | 0.523 | .994 | 86 | 126.50 | .146 | 1,000 |
| 68 | 102.50 | 0.515 | .994 | 87 | 128.00 | .138 | 1,000 |
| 69 | 104.00 | 0.485 | .994 | 88 | 129.50 | .131 | 1,000 |
| 70 | 106.50 | 0.462 | 1,000 | 89 | 132.00 | 0.123 | 1,000 |
| 71 | 108.50 | 0.431 | 1,000 | 90 | 135.00 | .108 | 1,000 |
| 72 | 109.50 | 0.415 | 1,000 | 91 | 138.00 | .100 | 1,000 |
| 73 | 110.50 | .385 | 1,000 | 92 | 140.50 | 0.092 | 1,000 |
| 74 | 111.50 | .362 | 1,000 | 93 | 142.00 | 0.085 | 1,000 |
| 75 | 112.50 | .338 | 1,000 | 94 | 144.00 | 0.077 | 1,000 |
| 76 | 113.50 | 0.315 | 1,000 | 95 | 145.50 | 0.069 | 1,000 |
| 77 | 114.50 | .300 | 1,000 | 96 | 148.50 | 0.054 | 1,000 |
| 78 | 115.50 | 0.285 | 1,000 | 97 | 153.00 | 0.046 | 1,000 |
| 79 | 117.00 | 0.254 | 1,000 | 98 | 155.50 | 0.038 | 1,000 |
| 80 | 118.50 | 0.231 | 1,000 | 99 | 160.00 | 0.031 | 1,000 |
| 81 | 119.50 | 0.215 | 1,000 | 100 | 167.50 | 0.023 | 1,000 |
| 82 | 121.00 | .200 | 1,000 | 101 | 173.00 | 0.015 | 1,000 |
| 83 | 122.50 | .192 | 1,000 | 102 | 177.00 | 0.008 | 1,000 |
| 84 | 124.00 | .177 | 1,000 | 103 | 180.00 | 0,000 | 1,000 |
| 85 | 125.50 | .162 | 1,000 | | | | |

The optimal cut point is at points 49 and 50, where number 49 is ≥ 81.50 with a sensitivity value of 99% and specificity of 98%. At number 50, it is ≥ 82.50 with a sensitivity of 96% and a specificity of 98%. It can be concluded that the cutoff point that indicates attention and absence of attention to body shape is 81.50. This means that individuals who show concern for their body shape will get skor total BSQ-34 of ≥ 81.50.

AUC value of 100% is classified as very good. AUC value of 99.5% has the meaning that if the attention score on body shape is used to assess whether there is attention to body shape in 100 people then the right conclusion will be obtained on these 99 people.

## IV. Discussion

The subjects chosen in this study were female because women showed more attention to body shape and appearance compared to men. The BSQ-34 instrument was developed to assess feelings of feeling fat after eating, excessive attention to body shape, and shame and avoidance from the public on women.(5)

To confirm validity *concurrent*from the Indonesian version of BSQ-34, the Indonesian version of BSQ-34 score compared with the EAT-26 score. In this concurrent validity test, it was found that the value of r = 0.69, which indicates that there is a positive correlation between the two questionnaires with a strong correlation strength. This shows that if the Indonesian version of BSQ-34 scores with high results, the scores on EAT-26 will give high results too. This result is in line with several studies, such as research by Evans et al. in 1993 which showed a positive correlation with a strong correlation strength (r = 0.63),(14)and also research by Akdemir, et al. in 2012 which showed a positive correlation with moderate correlation strength (r = 0.35), between the BSQ-34 score and EAT-26.(15)

Score *Cronbach's alpha*for the Indonesian version of BSQ-34 0.966. Although Cronbach's alpha coefficient is very often used to assess internal consistency, there is no mutual agreement related to interpretation. Several studies have determined Cronbach's alpha value> 0.7 is ideal, but a value close to 0.6 is satisfactory. (18) Classification of Cronbach's alpha, which is very low (≤ 0.3), low (<0.3 - ≤ 0 , 6), moderate (<0.6 - ≤ 0.75), high (<0.75 - ≤ 0.9), and very high (> 0.9).(16) Research by Evans, et al. get value*Cronbach's alpha* BSQ-34 of 0.97.(14)In the research of Akdemir, et al. earned value*Cronbach's alpha* amounted to 0.96.(15)Likewise with research by Dzayee, et al. in 2016 who received a Cronbach's alpha score of 0.98.(4)When compared with the three studies it shows that the Indonesian version of BSQ-34 has the same Cronbach's alpha value and is in a very high classification (α> 0.9).

Score *corrected item-total correlation*from BSQ-34 above the minimum correlation coefficient which is considered valid, which is 0.3. Thus, 34 questions were deemed valid.

The AUC value obtained from the ROC method is 99.5% (IK95% 98.9% - 100%), p <0.001. Statistically, the AUC value of 99.5% is classified as very good. AUC value of 99.5% has the meaning that if the attention score on body shape is used to assess whether there is attention to body shape in 100 people then the right conclusion will be obtained on these 99 people.

Hypothesis testing conducted using the SPSS program is to compare the AUC obtained by the index compared to the AUC value of 50%. P value <0.05 obtained at*the output*shows that the AUC BSQ-34 score is significantly different from the AUC score of 50%. Clinically, the AUC

value is very satisfying because it is greater than the minimum AUC value expected by researchers, which is 70%.

The optimal cut point on the sensitivity and specificity curves is at points 49 and 50, where number 49 is ≥ 81.50 with a sensitivity value of 99% and specificity of 98%. At number 50, it is ≥ 82.50 with a sensitivity of 96% and a specificity of 98%. If the instrument is to be used for screening purposes, the highest sensitivity value is chosen between the two optimal intersection points (13) Intersection number 49 shows the highest sensitivity value compared to intersection number 50, so the BSQ-34 sensitivity value for this study by 99% and specificity is still taken from the cut point number 49 by 98%. The cut off point score that indicates attention and lack of attention to body shape is at the cut point 49, which is 81.50. This means,

The advantages of this study, detected individuals who showed dissatisfaction with body shape quickly and precisely. The limitation of this study is that it is only conducted on a limited number of subjects, where to obtain validity and strong reliability results requires a greater number of subjects than this study. In this study, subjects who showed more concern or dissatisfaction with body shape were not followed up with follow-up.

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