

Measurements

For the following, circle the best response.

1. When you renew your nursing license you are asked to indicate your area of specialization. This datum is measured on the
 - a. nominal scale
 - b. ordinal scale.
 - c. interval scale.
 - d. ratio scale.

2. The weakest level of measurement is:
 - a. nominal.
 - b. ordinal.
 - c. interval.
 - d. ratio.

3. The level of measurement that classifies and ranks objects in terms of the degree to which they possess the attribute of interest is:
 - a. nominal
 - b. ordinal
 - c. interval
 - d. ratio

4. Religion is measured on a:
 - a. nominal scale
 - b. ordinal scale
 - c. interval scale
 - d. ratio scale

5. Which of the two variables temperature in Fahrenheit degrees or weight in kilograms uses a higher level of measurement?
 - a. Temperature in Fahrenheit
 - b. Weight in kilograms
 - c. Both are the same degrees
 - d. Insufficient information to make a determination

6. A record of the fluid intake, in ounces, of a post surgical patient is an example of which level of measurement?
 - a. nominal
 - b. ordinal
 - c. interval
 - d. ratio

7. Which level of measurement permits the researcher to add, subtract, multiply, and divide?
- nominal
 - ordinal
 - interval
 - ratio
8. It is not meaningful to calculate an average with data from which of the following?
- nominal measures
 - ordinal measures
 - nominal and ordinal measures
 - none of the above
9. Degrees such as associate's, bachelor's, master's, and doctorate correspond to measures on which of the following scales?
- nominal
 - ordinal
 - interval
 - ratio
10. Interviews are generally preferable to questionnaires because:
- They are less expensive
 - They are easier to analyze
 - The quality of the data tends to be higher
 - There is less opportunity for bias
11. On a seven-point Likert scale, a person who neither agreed nor disagreed with the statement would be scored as:
- 0
 - 1
 - 4
 - 7
12. On a 20-item Likert scale with five response categories, the range of possible scores is:
- 0 to 100
 - 20 to 80
 - 20 to 100
 - 0 to 50

13. The semantic differential scale consists of:
- A series of declarative statements along an agree-disagree continuum
 - A small number of test items on semantics
 - Items that measure facts rather than attitudes
 - Sets of bipolar adjectives arranged along a continuum of degree of feeling about a concept
14. The difference between a true score and an obtained score is referred to as:
- Internal inconsistency
 - Triangulation
 - Response sampling
 - Error of measurement
15. Cronbach's alpha is used to determine which of the following instrument attributes?
- Internal consistency
 - Stability
 - Criterion validity
 - Construct validity
16. The aspect of reliability for which test-retest reliability is appropriate is:
- Stability
 - Internal consistency
 - Equivalence
 - Criterion related
17. The type of validity that employs logical rather than empirical procedures in its assessment is:
- Content
 - Concurrent
 - Predictive
 - Construct
18. Suppose a researcher was interested in assessing the adequacy of an instrument to measure the concept of hopelessness. The type of validation procedure would most probably be:
- Content
 - Concurrent
 - Predictive
 - Construct

19. Biophysiologic measures have several advantages to nurse researchers. These include:
- objectivity--two people reading the same machine output are likely to record the same or highly similar reading.
 - patients are unlikely to be able to distort measures deliberately.
 - precision, sensitivity, and validity for measuring desired variables.
 - all of the above
20. Pictorial scales such as the Faces used to assess pain intensity
- can only be used realistically with children.
 - may be useful for clients who do not speak or understand English.
 - are examples of self-report data which should not be used in research.
 - have been shown to have a great deal of social desirability bias in them.
21. Which of the following is an advantage of interviews over questionnaires as a method of data collection?
- They are less expensive.
 - Data are easier to analyze.
 - In-depth information can be gathered.
 - There is less opportunity for bias.
22. Which of the following is true about Likert scales?
- Data from each item are at the ratio level of measurement.
 - There are always 7 response options to this type of item.
 - Scores from individual items can be summed into scales.
 - Response set biases are not a problem with this type of scale.
23. In a semantic differential scale the respondent rates the concepts on a:
- seven-point scale for each adjective pair.
 - five-point scale for each adjective pair.
 - eleven-point scale for each adjective pair.
 - nine-point scale for each adjective pair.
24. In which situations would unstructured interviews be preferred over other types of self-report data?
- large numbers of subjects are expected to participate.
 - in-depth information is of greatest importance.
 - there are a lot of specific questions to be asked.
 - researcher time and resources are limited.

25. Which of the following is the most sensitive scale for measuring acute pain?
- The 7-option Likert scale ranging from none to worst I can imagine.
 - Set of 9 faces representing varying levels of pain.
 - A vertical version of a Visual Analog Scale.
 - All are equally sensitive.
26. Subjects respond to a visual analog scale by:
- circling the response they believe fits them best.
 - making a check mark in the appropriate box.
 - making a mark across a 100 mm line which has bipolar anchors.
 - looking at a set of items and selecting the one they like best.
27. Likert scales have which of the following characteristics?
- They must have 7 response categories.
 - They may be used to determine how frequently someone does a behavior.
 - Each individual item is scored separately rather than calculating a total score.
 - These scales are meant to be used mainly in an interview format.
28. Which of the following can be measured using direct measures?
- Concrete factors such as age, gender, height and weight
 - Abstract factors such as anxiety and coping
 - Traits such as personality and hardiness
 - None of the above
29. Sensitivity of physiologic instruments means:
- ability to distinguish signal being measured from extraneous noise.
 - consistency or reproducibility of readings.
 - degree of change that can be measured.
 - equivalence between two persons' readings of values on the instrument.
30. Which of the following is an advantage of observational methods of data collection?
- Directly captures a record of events and behaviors
 - Reactivity of subjects when observer is conspicuous
 - Data are free from distortions or biases
 - Faulty inferences can be based on attitudes and values of the observer
31. Which of the following scales is most sensitive to differences between ratings?
- 5 item Likert scale
 - 0-10 numerical rating scale
 - A Visual Analog Scale
 - All are equally sensitive

32. A major advantage of fixed response questions is that they
- are easy to construct.
 - can be analyzed in a straightforward manner.
 - allow for follow-up on subject's responses.
 - eliminate all sources of bias in subject's responses.
33. The difference between the observed score and what exists in reality (true score) is called
- discrimination index.
 - split-half reliability.
 - homogeneity.
 - measurement error.
34. In critiquing nominal level instruments, the reviewer checks the items in the instrument to be sure they are:
- mutually exclusive and equivalent.
 - mutually exclusive and exhaustive.
 - stable and structured.
 - valid and reliable.
35. Data which can be assigned to categories of an attribute that can be ranked are measured on which scale?
- nominal scale
 - ordinal scale
 - interval scale
 - ratio scale
36. You recently had your blood drawn and had a hemoglobin of 13.5 g/100 ml. This would be which level of measurement?
- nominal scale
 - ordinal scale
 - interval scale
 - ratio scale
37. If you were comparing the difference between a temperature of 70 and 80 degrees and 30 and 40 degrees, this would be an example of which type of measurement?
- nominal scale
 - ordinal scale
 - interval scale
 - ratio scale

38. Which of the following measurements systems has an absolute zero point?
- nominal scale
 - ordinal scale
 - interval scale
 - ratio scale
39. The aspect of reliability for which internal consistency of an instrument appropriate, is:
- stability.
 - equivalence.
 - homogeneity.
 - internal consistency.
40. You are doing a time and motion study and are measuring how long it takes the nurse to do a particular task. You record the time in minutes for later comparison with other subjects. This is an example of which type of measurement?
- nominal scale
 - ordinal scale
 - interval scale
 - ratio scale
41. Reliability could be established for a physiologic instrument such as a blood pressure cuff by
- measuring pulse rate as well as blood pressure.
 - using another blood pressure cuff to compare results.
 - taking the blood pressure in a different arm.
 - having the manufacturer recalibrate the equipment.
42. Which of the following alpha coefficients would be the lowest value you would accept in evaluating the reliability of a measurement tool?
- 0.25
 - 0.50
 - 0.65
 - 0.80
43. To test for internal consistency (the extent to which all items in the instrument measure the same construct), which procedure is used?
- Cronbach's alpha
 - standard test
 - pretest-posttest
 - Delphi procedure

44. You are developing an instrument to measure nurses' attitudes toward AIDS. You prepare the instrument and send it out to 25 experts in the field to examine and give you feedback on the instrument. This would be considered a form of:
- concurrent validity.
 - construct validity.
 - content validity.
 - predictive validity.
45. What is the problem with the following example? The age categories are:
- Under 18
18-30
30-60
Over 60
- not exemplary.
 - not exhaustive.
 - not exclusive.
 - all of the above
46. The concept of objectivity for physiologic measures refers to the
- lack of interactions that generally accompany their use.
 - unobtrusive nature of their presence.
 - inability of subjects to distort readings or values.
 - agreement of two independent observers of the observed measurement.
47. Which of the following uses the lower level of measurement: Temperature in Celsius degrees or height in centimeter?
- Temperature
 - Height
 - Both are measured at the same level
 - Not enough information given to make a decision
48. You have recorded the "number of years since diagnosis" for subjects in your study. Which of the following levels of measurement could you convert these data to if you so desired?
- Categorical/nominal
 - Ordinal
 - Each of the above
 - Neither of the above

49. In intervention studies, subjects are often divided into groups with a treatment being given to one group and not to the other. This independent (or treatment) variable is most often measured at which level of measurement?
- categorical/nominal
 - ordinal
 - interval
 - ratio
50. What level of measurement does this scale represent?
- _____ (1) <\$10,000
_____ (2) \$10,001-\$25,000
_____ (3) \$25,001-\$40,000
_____ (4) >\$40,000
- nominal
 - ordinal
 - interval
 - ratio
51. Which of the following represents the same idea for physiologic instruments as reliability does for psychosocial instruments?
- Accuracy
 - Precision
 - Selectivity
 - Sensitivity
52. Suppose a researcher was interested in assessing the degree of relationship between the two instruments. The type of validation procedure most probably would be:
- concurrent validity.
 - construct validity.
 - internal validity.
 - predictive validity.
53. Cronbach's alpha is used to determine:
- equivalence of two forms of a scale or test,
 - internal consistency of items on a scale or test.
 - stability of measurement between 2 administrations of a scale or test.
 - triangulation agreement between qualitative and quantitative data.

54. Which of the following is true about the relationship between reliability and validity?
- As reliability increases, validity decreases.
 - If a measure is reliable, it will be valid.
 - There is no relationship between the two ideas.
 - Unless a measure is reliable, it cannot be valid.
55. Every obtained/observed score is made up of a true score and an error component. Which of the following can lead to measurement error in a research project?
- Variations in data collection methods from one subject to the next
 - Situational contaminants such as reactivity or awareness that one is being observed.
 - Transitory personal factors (fatigue, hunger, mood)
 - all of the above
56. You are collecting data on the race of your subjects. You assign the numerical label 1 to Caucasian, 2 to African-American, 3 to Hispanic, 4 to Asian, and 5 to Other. This is an example of which type of data?
- nominal
 - ordinal
 - interval
 - ratio
57. Nursing education (AD, BS, MS, PhD) is:
- nominal
 - ordinal
 - interval
 - ratio
58. HDL cholesterol in mg/dl is:
- nominal
 - ordinal
 - interval
 - ratio
59. Which of the following is used to determine the correlations of items within a multi-item test?
- Test-retest reliability
 - Interrater reliability
 - Internal consistency reliability
 - Sensitivity

60. Which of the following can only be used effectively when concept being measured is stable?
- Test-retest reliability
 - Interrater reliability
 - Internal consistency reliability
 - Sensitivity
61. Which of the following refers to the consistency of measurement between two or more raters?
- Test-retest reliability
 - Interrater reliability
 - Internal consistency reliability
 - Sensitivity
62. Which of the following can best indicate the amount of change that can be measured?
- Test-retest reliability
 - Interrater reliability
 - Selectivity
 - Sensitivity
63. Which of the following can best indicate the ability to identify correctly the signal under study and to distinguish it from other signals?
- Test-retest reliability
 - Interrater reliability
 - Selectivity
 - Sensitivity
64. Which of the following is true about the validity of a measure?
- Once validity is established, it need not be examined before using the tool in future applications.
 - Characteristics of the sample may affect the validity of a tool for use in a particular study.
 - Physiologic measures are objective and accurate so do not need to be examined for any type of validity.
 - If a measure has been used in many studies, it is valid.

65. Which of the following is true about content validity?
- Statistical correctional procedures are needed to determine this type of validity.
 - This represents the ability of scores on an instrument to predict specified future events.
 - Experts may be used to determine if items on the tool adequately represent conceptual definitions of variables in the study.
 - Scores on a new tool are compared with those from a well-accepted measure of the same variable to see if the new tool can replace the old one.
66. Which of the following is true about Cronbach's alpha?
- It is used to determine stability of measurements over time.
 - It is used to determine consistency among a set of items.
 - It is used to determine if two or more raters score an event the same way.
 - Only values of Cronbach's alpha of 0.90 or above are acceptable.
67. Which of the following is true about test-retest reliability?
- It is a measure of accuracy of instruments.
 - It is best to have at least three weeks between test and retest.
 - It is not useful in situations where the variable is dynamic and changing.
 - Correlation between the two administrations of 0.50 or greater is acceptable.
68. Which of the following is true of interrater reliability?
- It is the relationship between two or more data collectors' ratings of the same event.
 - It is the relationship between ratings by the same person done at two separate times.
 - There is little the researcher can do to increase this type of reliability because too many people are involved.
 - This type of reliability is only of interest when using psychosocial instruments.
69. The strongest level of measurement is:
- nominal
 - ordinal
 - interval
 - ratio
70. Sorting patients according to their blood type is an example of creating a:
- nominal scale
 - ordinal scale
 - interval scale
 - ratio scale

71. The reliability level of a scale should be at least:
- 0.25
 - 0.50
 - 0.60
 - 0.80
72. The aspect of reliability for which interrator reliability is appropriate is:
- stability
 - equivalence
 - interval scale
 - internal consistency
73. You recently had your systolic and diastolic blood pressures measured. This would be which level of measurement?
- nominal scale
 - ordinal scale
 - interval scale
 - ratio scale
74. Temperature is an example of what level of measurement?
- nominal scale
 - ordinal scale
 - interval scale
 - ratio scale
75. Which of the following levels of measurement may not have an absolute zero point?
- nominal scale
 - ordinal scale
 - interval scale
 - ratio scale
76. You are collecting data on subject's pain. You assign the numerical label 1 to "no pain", 2 to "slight pain", 3 to "moderate pain", and 4 to "severe pain." This is an example of which type of data?
- nominal
 - ordinal
 - interval
 - ratio

77. In the research question: "What is the relationship between weight gain and number of vitamin supplements taken?," what is the level of measurement of the variable(s)?
- ratio
 - interval
 - nominal
 - ordinal
78. An alpha coefficient of 0.93 for internal consistency of an instrument would indicate:
- strong validity
 - strong reliability
 - weak validity
 - weak reliability
79. The level of measurement that ranks data is called:
- nominal.
 - ordinal.
 - interval.
 - ratio.
80. Which of the following statements about level of measurement is true?
- Nominal data may be converted to ordinal data.
 - Ratio data may be converted to ordinal data.
 - Ordinal data may be converted to interval data.
 - No data may be converted to another level of measurement.
81. Pulse rate is an example of which level of measurement?
- nominal
 - ordinal
 - interval
 - ratio
82. It is possible to measure a person's age at which of the following levels of measurement?
- ordinal
 - ratio
 - all of the above
 - none of the above

83. The researcher is comparing subjects' scores on coping instrument with their scores on the same instrument taken two months later. This is an example of:
- alternate forms reliability.
 - internal consistency reliability.
 - interrater reliability.
 - test-retest reliability.
84. The researcher is trying to determine if the items on a self-report anxiety test obtain similar results as those obtained when using another means of measuring anxiety. This would be an example of:
- concurrent validity.
 - construct validity.
 - content validity.
 - predictive.
85. The internal consistency reliability of the Smith Anxiety Test has been estimated to be 0.20. Based on this information, which of the following statements is true about the validity of the test?
- The validity of the test cannot be estimated based on this information.
 - The validity of the test is low.
 - The reliability of the test does not influence the validity of the test.
 - The reliability of the test is high.
86. Which of the following statements is true concerning the validity and reliability of instruments?
- Validity is a necessary condition for reliability.
 - Reliability and validity are not related.
 - An instrument may be valid without being reliable.
 - An instrument may be reliable without being valid.
87. When a panel of experts is used to establish the validity of an instrument, this is an example of which type of validity?
- Content
 - Construct
 - Predictive
 - Concurrent
88. When a panel of experts is used to judge subjectively the degree to which the instrument appears to measure the relevant construct, this assessment is called?
- Content Validity
 - Construct Validity
 - Face Validity
 - Concurrent Validity

Study Questions:

1. In general, what is meant by a factor? What is meant by a factor in the context of factor analysis?
2. What is the distinction between factor analysis and principal component analysis?
3. Explain the difference between principal component factor analysis and principal factor analysis.

4. What is the distinction among common, specific, and error variances?

5. What type of variances are explained by principal component factor analysis and principal factor analysis?

6. Explain the difference between an exploratory factor analysis and a confirmatory factor analysis.

7. What is the meaning of an eigenvalue?

8. Discuss the meaning of a factor loading. What is the maximum and minimum value of a factor loading? As a rule of thumb, what constitutes a high factor loading?

9. Define communality and specificity in a factor analysis.

10. What is accomplished by rotating a factor loading matrix?

11. Explain the difference between an orthogonal and an oblique factor rotation? When would the application of each approach be most appropriate?

12. What is a simple structure in factor analysis?

13. What is the distinction between R factor analysis and Q factor analysis?

14. What is the distinction between common factors and specific factors?

15. What guidelines can we use to determine the number of common factors to extract?
Explain each briefly.

16. What is the distinction between VARIMAX and QUARTIMAX rotations?

17. What is the factor score? How and when should we use factor scores in conjunction with other multivariate statistical techniques?

18. What is the surrogate variable?