

Validity and Reliability

Final Project
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Lecture 8





جامعة الجميع الذكية
EVERYONE'S SMART UNIVERSITY

Data collection methods

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Lecture 7

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Chapter 05

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By the end of this chapter you will understand the following knowledge:

- Understand the concept of **Reliability**.
- Learn about methods of measuring **Reliability**
- Identify the factors that affect the **Reliability** of the questionnaire.
- Understand the concept of **Validity**.
- Knowing the types of **Validity**.
- Identify the relationship between **Validity** and **Reliability**.
- Identify factors that increase the **Validity** and **Reliability** of the data collection tool.

By the end of this chapter you will possess the following Skills:

- The ability to distinguish between different methods of measuring the reliability of a data collection tool.
- The ability to distinguish between the different types of validity of the data collection tool.
- The skills of measuring the reliability of the data collection tool.
- The Skills of measuring the validity of the data collection tool.
- Skills that maximize the reliability and validity of the data-gathering tool.

Reliability and validity are concepts used to evaluate the quality of research. They indicate how well a method, technique or test measures something. Reliability is about the consistency of a measure, and validity is about the accuracy of a measure.

It's important to consider reliability and validity when you are creating your research design, planning your methods, and writing up your results, especially in quantitative research.

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What is validity?

Validity refers to how accurately a method measures what it is intended to measure. If research has high validity, that means it produces results that correspond to real properties, characteristics, and variations in the physical or social world.

High reliability is one indicator that the measurement is valid.

What is Validity?

Examples: - If the thermometer shows different temperatures each time, even though you have carefully controlled conditions to ensure the sample's temperature stays the same, the thermometer is probably malfunctioning, and therefore its measurements are not valid.

- If a symptom questionnaire results in a reliable diagnosis when answered at different times and with different doctors, this indicates that it has high validity as a measurement of the medical condition.

However, reliability on its own is not enough to ensure validity. Even if a test is reliable, it may not accurately reflect the real situation.

The thermometer that you used to test the sample gives reliable results. However, the thermometer has not been calibrated properly, so the result is 2 degrees lower than the true value. Therefore, the measurement is not valid.

Example:

A group of participants take a test designed to measure working memory. The results are reliable, but participants' scores correlate strongly with their level of reading comprehension. This indicates that the method might have low validity: the test may be measuring participants' reading comprehension instead of their working memory.

There are five main types of validity:

Content validity: Is the test fully representative of what it aims to measure?

Face validity: Does the content of the test appear to be suitable to its aims?

Criterion validity: Do the results accurately measure the concrete outcome they are designed to measure

Predictive validity: Does the measurement predict The future outcome?

Factor Validity: the degree to which the covariance of measured items matches the real covariance or behaviors in real life.

❑ Content Validity

- Assesses whether a test is representative of all aspects of the construct.
- To produce valid results, the content of a test, survey, or measurement method must cover all relevant parts of the subject it aims to measure. If some aspects are missing from the measurement the validity is threatened.

Example

A mathematics teacher develops an end-of-semester algebra test for her class. The test should cover every form of algebra that was taught in the class. If some types of algebra are left out, then the results may not be an accurate indication of students' understanding of the subject. Similarly, if she includes questions that are not related to algebra, the results are no longer a valid measure of algebra knowledge.

To use content validity, the following questions should be answered:

1. Does the test contains enough information to cover what it is supposed to measure?
2. Are the test questions appropriate and do the test measure the area to be measured?
3. What is the level of proficiency with which the test is measured?

If these questions are answered with satisfactory answers, this indicates that the content of the test is good and characterized by Validity.

❑ Face validity

considers how suitable the content of a test seems to be on the surface. It's similar to content validity, but face validity is a more informal and subjective assessment.

Example

You create a survey to measure the regularity of people's dietary habits. You review the survey items, which ask questions about every meal of the day and snacks eaten in between for every day of the week. On its surface, the survey seems like a good representation of what you want to test, so you consider it to have high face validity.

❑ Criterion validity

Criterion validity evaluates how well a test can predict a concrete outcome, or how well the results of your test approximate the results of another test.

What is a criterion variable?

A criterion variable is an established and effective measurement that is widely considered valid, sometimes referred to as a “gold standard” measurement. Criterion variables can be very difficult to find.

To evaluate criterion validity, you calculate the correlation between the results of your measurement and the results of the criterion measurement. If there is a high correlation, this gives a good indication that your test is measuring what it intends to measure.

Example

A university professor creates a new test to measure applicants' English writing ability. To assess how well the test really does measure students' writing ability, she finds an existing test that is considered a valid measurement of English writing ability and compares the results when the same group of students takes both tests. If the outcomes are very similar, the new test has high criterion validity.

□ Predictive validity

Refers to the ability of a test or other measurement to predict a future outcome. Here, an outcome can be a behavior, performance, or even disease that occurs at some point in the future.

Example:

A pre-employment test has predictive validity when it can accurately identify the applicants who will perform well after a given amount of time, such as one year on the job.

❑ Factor validity

It is the degree to which the covariance of measured items matches the real covariance or behaviors in **real life**. It is a type of validity that is the degree to which a test is measuring what it is intended to.

For example, a test that asks a student questions about the French language is not a valid measure of the student's mathematical abilities. This would be an invalid measurement. Factor validity is related to context validity which is how well the questionnaire items represent the construct being researched.

What is reliability?

Reliability refers to how consistently a method measures something. If the same result can be consistently achieved by using the same methods under the same circumstances, the measurement is considered reliable.

Example:

You measure the temperature of a liquid sample several times under identical conditions. The thermometer displays the same temperature every time, so the results are reliable.

What is reliability?

Example: A doctor uses a symptom questionnaire to diagnose a patient with a long-term medical condition. Several different doctors use the same questionnaire with the same patient but give different diagnoses. This indicates that the questionnaire has low reliability as a measure of the condition.

Different types of reliability can be estimated through various statistical methods.

1. Test-retest:

- The consistency of a measure **across time**: do you get the same results when you repeat the measurement?

Example:

A group of participants complete a questionnaire designed to measure personality traits. If they repeat the questionnaire days, weeks, or months apart and give the same answers, this indicates high test-retest reliability.

2. Split-half reliability:

- A statistical method used to measure the consistency of the scores of a test. It is a form of internal consistency reliability and had been commonly used before the coefficient α was invented.
- the method involves splitting a test into halves and correlating examinees' scores on the two halves of the test. The resulting correlation is then adjusted for test length using the Spearman-Brown prophecy formula.

This entry introduces the basic principles and estimation procedures for this method and discusses its limitations.

3. Cronbach's Coefficient alpha

- Cronbach's alpha coefficient measures the internal consistency, or reliability, of a set of survey items. Use this statistic to help determine whether a collection of items consistently measures the same characteristic. Cronbach's alpha quantifies the level of agreement on a standardized 0 to 1 scale. Higher values indicate higher agreement between items.
- High Cronbach's alpha values indicate that response values for each participant across a set of questions are consistent.

Validity and Reliability

Validity is harder to assess than reliability, but it is even more important. To obtain useful results, the methods you use to collect your data must be valid: the research must be measuring what it claims to measure. This ensures that your discussion of the data and the conclusions you draw are also valid.

How are reliability and validity assessed?

Reliability can be estimated by comparing different versions of the same measurement.

Validity is harder to assess, but it can be estimated by comparing the results to other relevant data or theories. Methods of estimating reliability and validity are usually split up into different types.

❖ Factors affecting the Reliability of the questionnaire:

1. Questionnaire length
2. Time to fill out the questionnaire
3. The predictability of the questions
4. Questions formulation.

❖ The relationship between test Validity and Reliability

- Test must be valid and consistent (high correlation)
- **The reliability and validity of the questionnaire can be maximized by:**
 1. Clarify the purpose of the questionnaire.
 2. The clarity of the questions.
 3. Clear division of the questionnaire axes and paragraphs.
 4. Questionnaire pre-test.
 5. Well managing the data collection process.
 6. Respondents' circumstances.
 7. Confirmation of data confidentiality.



Thank You