

Introduction to Statistics in Human Performance

Chapter 2

Some Issues to Consider

- ▶ Who do the subjects used in a study represent?
- ▶ How were they selected?
- ▶ What other variables might cause something to change?
- ▶ Have these variables been controlled or accounted for in any way?
- ▶ How many subjects should be used?
- ▶ How should something be measured?
- ▶ How accurate is the measurement used?
- ▶ To whom do the results of this study apply?

Levels of Measurement

- ▶ Nominal
 - ▶ Ordinal
 - ▶ Interval
 - ▶ Ratio
- } Continuous or scalar measurements

Levels of measurement are hierarchical, and a researcher should always choose the highest level of measurement available.

Video 2.1

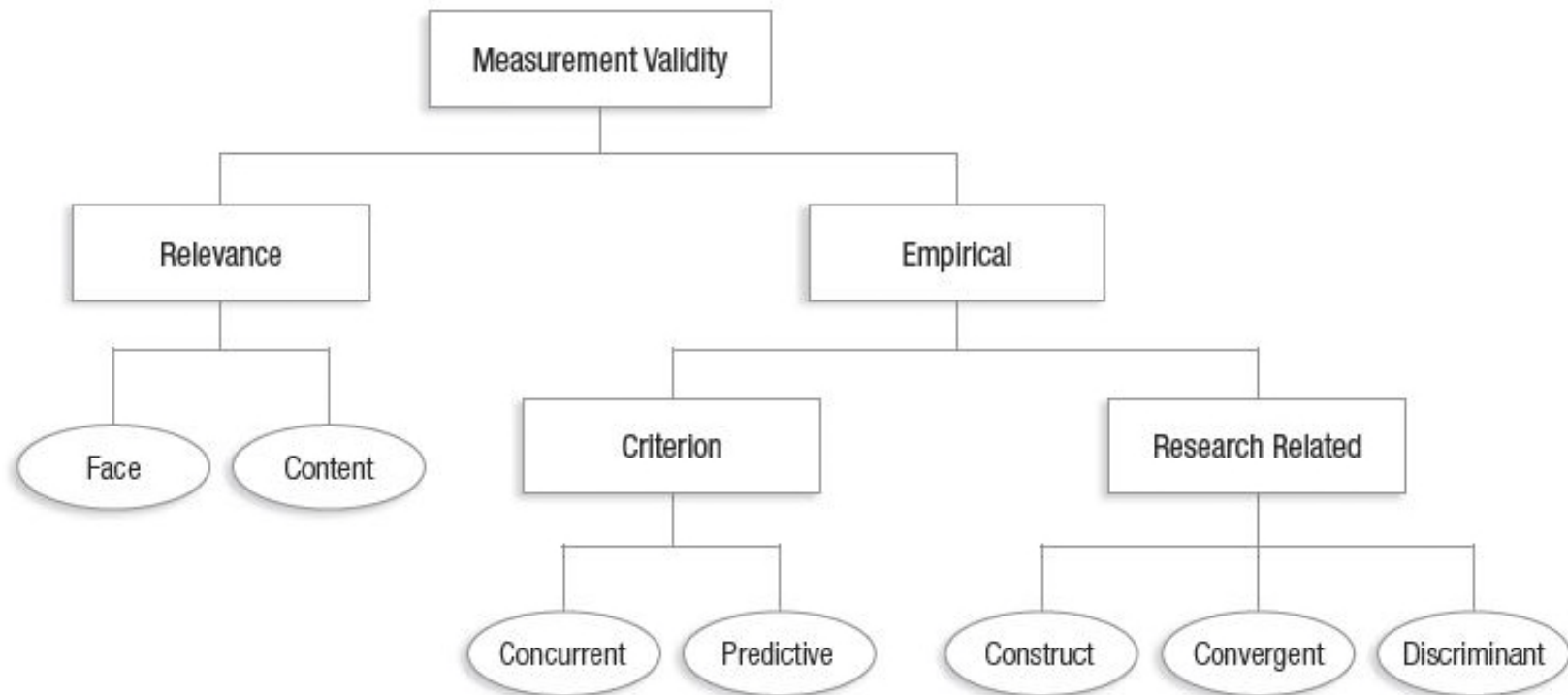
- ▶  Introduction to Measurement



Accuracy of Measurement

- ▶ Validity and reliability.
- ▶ No method is completely valid or reliable.
- ▶ Examining sources of errors is vital to statistical reasoning.

Measurement Validity



Video 2.2

- ▶  Measurement Validity



Measurement Reliability

- ▶ Consistency of measurement
- ▶ Variety of interpretations/statistics:
 - Stability reliability
 - Equivalence reliability
 - Internal consistency

Video 2.3

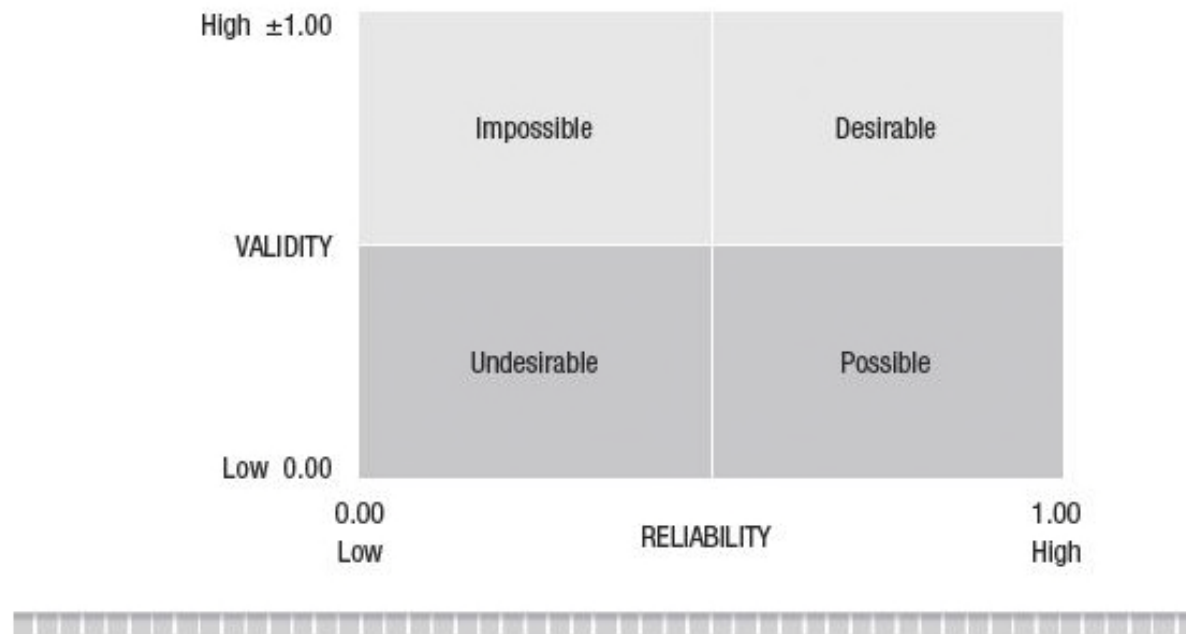
- ▶  Measurement Reliability



Measurement Objectivity

- ▶ A type of reliability (inter-rater reliability)
 - When two observers/raters perceive the same thing and record the same value for the observation
- ▶ $r_{xx'}$
 - The reliability (r) for a measurement taken on two occasions (x and x').

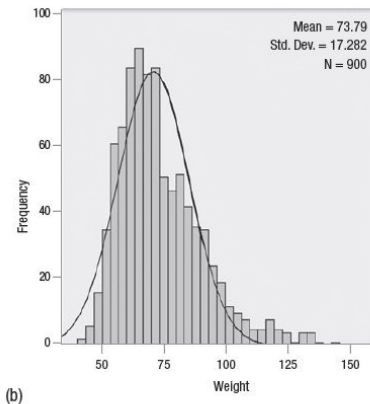
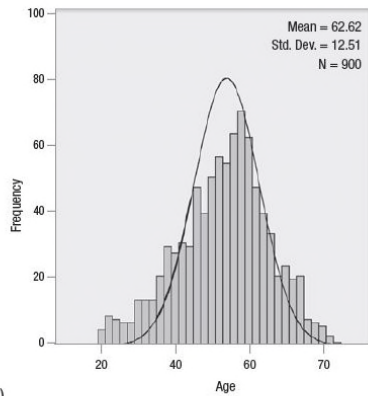
Relationship Between Validity and Reliability



Types of Statistics

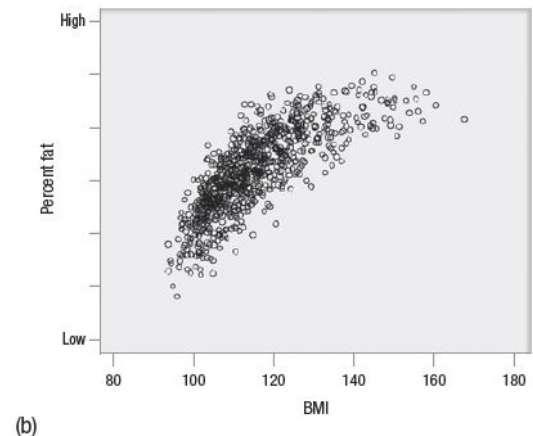
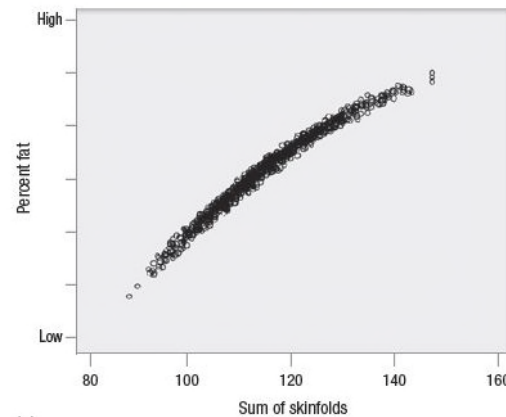
- ▶ Descriptive
- ▶ Correlational
- ▶ Inferential

Types of Statistics—Examples



Descriptive statistics for age (a) and weight (b)

Correlational statistics showing relationship between DXA determined percentage of body fat and skinfold thickness (a) or BMI (b).



Errors

- ▶ No measurement process is perfectly reliable.
- ▶ Standard error of measurement (SEM)
- ▶ Standard error of estimate (SEE) or standard error of prediction (SEP)
- ▶ “Margin of error” in inferential statistics = standard error of estimate

Video 2.4

- ▶  Categories of Statistics



Video 2.5

- ▶  Starting SPSS

