HSCC 470
Research Methods and Data Analysis in Health Sciences

Hypothesis Testing IV
Testing for Normality with SPSS

Unit Objectives

Upon completion of this unit, the student will be able to:

- Discuss the relationship of data distribution and hypothesis testing
- List which statistical tests require normally distributed data
- List the properties of the normal distribution.
- Describe how probabilities are calculated from the normal distribution curve
- Describe how to test a data set for normality.

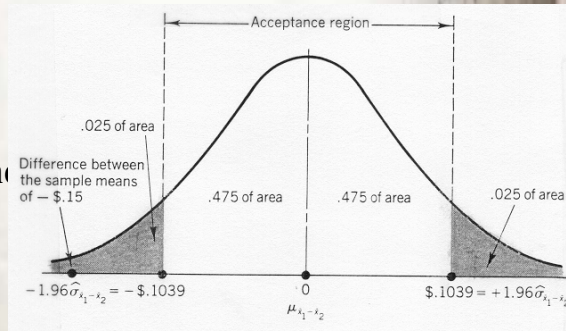# Elements of a Statistical Test

- **Assumptions**
  - Scale of measurement
  - **Population distribution**
  - Method of sampling
  - Sample size
- **Hypotheses**
  - Null
  - Alternative
- **Select Alpha Level**
- **Test statistic**
- **P-value**
- **Conclusion**

Statistical Tests Requiring Normal Distributions

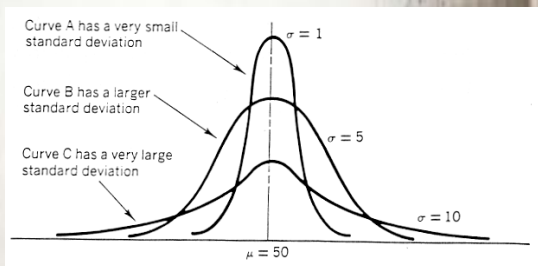| Scale of Measurement	Two Treatment Groups Consisting of Different Individuals	Three or More Treatment Groups Consisting of Different Individuals	Before and After a Single Treatment in the Same Individuals	Association Between Two Variables
Interval	Unpaired *t* test	ANOVA	Paired *t* test	Linear Regression and Pearson Correlation
Nominal	Chi-square	Chi-square	McNemar's test	Contingency Coefficients
Ordinal	Mann-Whitney rank-sum test	Kruskal-Wallis statistic	Wilcoxon signed-rank test	Spearman Rank Correlation

Properties of the Normal Distribution

- **Continuous data**
- **Symmetrical**
- **Unimodal**
- **Mean, median, and mode at the peak**
- **Tails extend indefinitely**
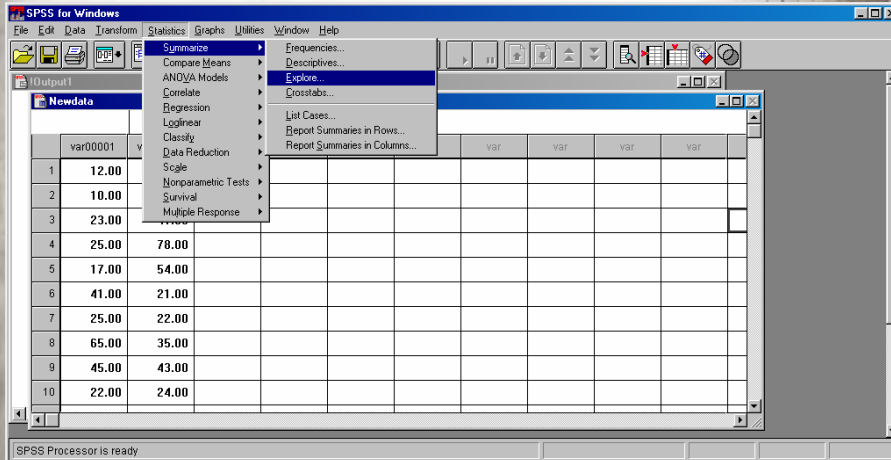
Properties of the Normal Distribution continued
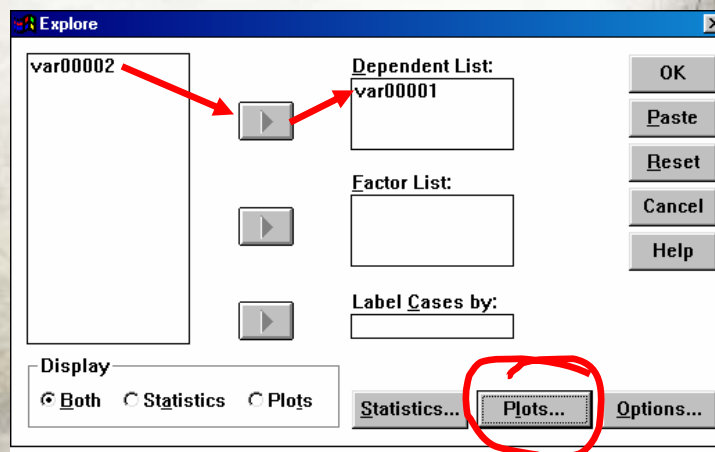
- **Many different curves, each defined only by the mean (μ) and standard deviation (σ)**
- **Whereas the probability of a value (x) is the height of the histogram divided by *n* for discrete data, the probability of value (x) is the area under the curve for continuous data.**
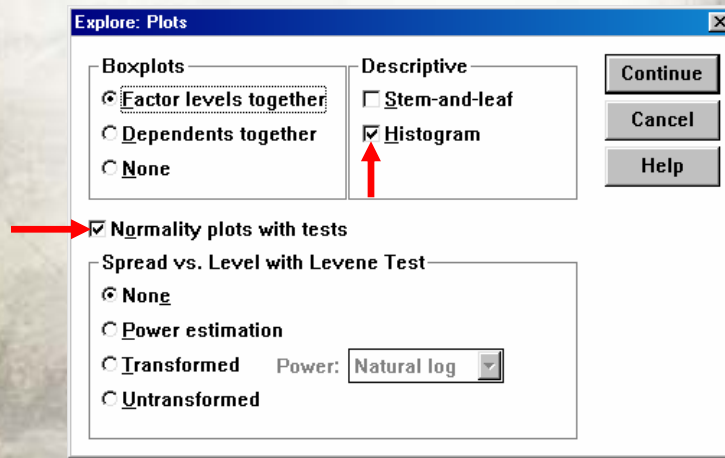
Testing Data for Normality
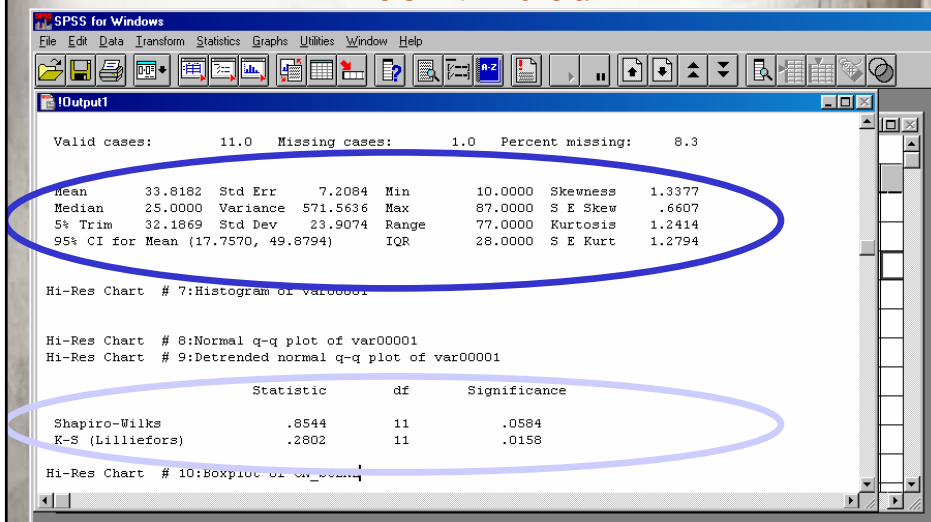
Testing Data for Normality continued

Testing Data for Normality continued

Testing Data for Normality continued

Testing Data for Normality continued

- **When Kolmogorov-Smirnov test has a *p* value less than alpha, reject the null hypothesis and conclude that the data are not normally distributed.**

- **When the *p* value is greater than alpha, accept the null hypothesis and conclude that the data are normally distributed.**

- **When data are normally distributed, we can use more powerful statistical procedures for hypothesis testing.**