

HSCC 470

Research Methods and Data Analysis in Health Sciences

Using SPSS: ANOVA

HSCC 470 Using SPSS: ANOVA



Unit Objectives

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

- List the assumptions of the analysis of variance (ANOVA) test.
- Describe when the ANOVA test is appropriate for testing a hypothesis.
- Use SPSS to conduct an ANOVA test and correctly interpret the output.

HSCC 470 Using SPSS: ANOVA

2



Statistical Methods to Test Hypotheses

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 <i>t</i> test	ANOVA	Paired <i>t</i> 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



Assumptions of the ANOVA Test

- Continuous data
- Data measured on an interval or ratio level
- 3 or more groups are being compared
- The groups are independent
- Data drawn from a normally distributed population
- Comparing means



Conducting an ANOVA Test Using SPSS

- **Assumptions**
 - Scale of measurement
 - Continuous data measured on an interval scale
 - Population distribution
 - Kolmogorov-Smirnov Test – $p > 0.05$
 - Method of sampling
 - Randomized, 3 or more independent samples
 - Sample size
 - Control N = 50
 - Experimental₁ N = 50
 - Experimental₂ N = 50



Conducting an ANOVA Test Using SPSS continued

- **Hypotheses**
 - Null
 - There is no difference in the ejection fraction of MI patients 3 weeks post-MI who receive TPA, Streptokinase, or a placebo.
 - Alternative
 - There is a difference in the ejection fraction of MI patients 3 weeks post-MI who receive TPA, Streptokinase, or a placebo.
- **Select Alpha Level**
 - Alpha = 0.05
- **Test statistic**
 - ANOVA



Conducting an ANOVA Test Using SPSS continued

- *P*-value
- Conclusion



Conducting an ANOVA Test Using SPSS continued

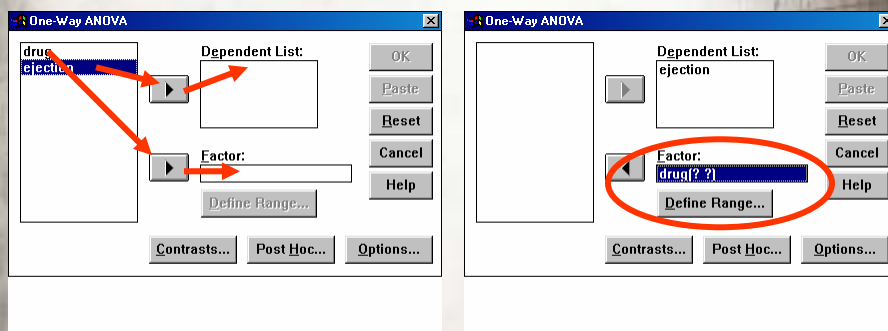
The screenshot shows the SPSS for Windows interface. The 'Statistics' menu is open, and 'One-Way ANOVA...' is selected. The 'Data' window shows a table with columns 'ejection' and 'd'. The 'Output' window shows a table with columns 'var' and 'var'.

	ejection	d
1	59	
2	44	
3	48	
4	53	0
5	51	0
6	43	0
7	41	0
8	52	0
9	60	0
10	51	0

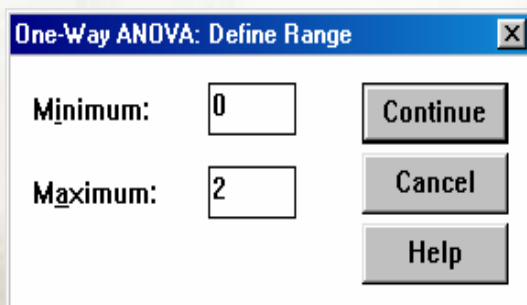
	var	var	var	var	var	var	var



Conducting an ANOVA Test Using SPSS continued



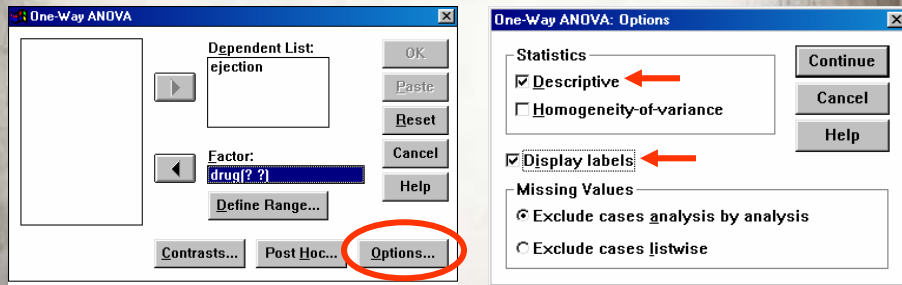
Conducting an ANOVA Test Using SPSS continued



- Placebo Group = 0
- TPA Group = 1
- Streptokinase Group = 2



Conducting an ANOVA Test Using SPSS continued



HSCC 470 Using SPSS: ANOVA

11

Conducting an ANOVA Test Using SPSS continued

SPSS for Windows

File Edit Data Transform Statistics Graphs Utilities Window Help

Output1

Variable EJECTION
By Variable DRUG

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	23243.6267	11621.8133	226.1650	.0000
Within Groups	297	15261.7700	51.3864		
Total	299	38505.3967			

Variable EJECTION
By Variable DRUG

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	23243.6267	11621.8133	226.1650	.0000
Within Groups	297	15261.7700	51.3864		
Total	299	38505.3967			

Group Count Mean Standard Deviation Standard Error 95 Pct Conf Int for Mean

Grp 0	100	50.0500	5.7619	.5762	48.9067 TO	51.1933
Grp 1	100	70.3300	6.0068	.6007	69.1381 TO	71.5219
Grp 2	100	66.5300	9.2129	.9213	64.7020 TO	68.3580
Total	300	62.3033	11.3482	.6552	61.0140 TO	63.5927

SPSS Processor is ready

Conducting an ANOVA Test Using SPSS continued

- ***P*-value**
 - $P = 0.000$
- **Conclusion**
 - P value is less than alpha. Therefore, we reject the null hypothesis and conclude that there is a difference in ejection fraction between the 3 treatment groups.

