

Differences Among Group Means: One-Way Analysis of Variance

One-Way Analysis of Variance

- ANOVA
- Comparison of group means

ONEWAY ANOVA

- One independent variable
- Two or more levels

ANOVA

- Type of Data Required
- Nominal-level independent variable/s
- Continuous dependent variable

ANOVA

- Assumptions

- Mutually exclusive groups
- Normally distributed dependent variable
- Homogeneity of variance

ANOVA

- Source of Variance

- Between group variation
- Within group variation
- Total variation

ANOVA

Degrees of Freedom

- Total = $n-1$
- Between = $k-1$
- Within = $n-k$

- ($k = \# \text{ of groups}$)

POST-HOC TESTS

- Scheffe
- Bonferroni
- Least Significant Difference Test (LSD)
- Tukey's Honestly Significant Difference (HSD)
- Student Newman-Keuls
- Tukey's Wholly Significant Difference (WSD)

Research Question

- Do the three smoking groups differ significantly in reported life satisfaction?

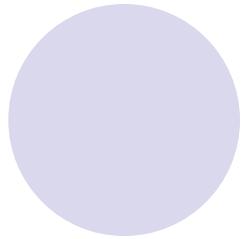
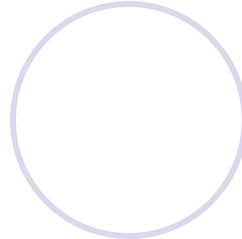
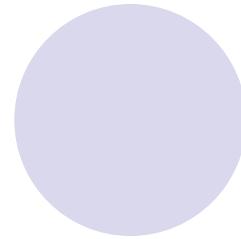
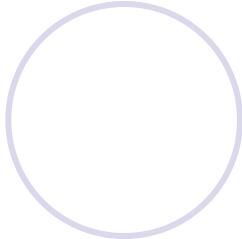
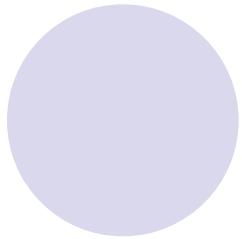
SPSS - Oneway

- **ANALYZE**

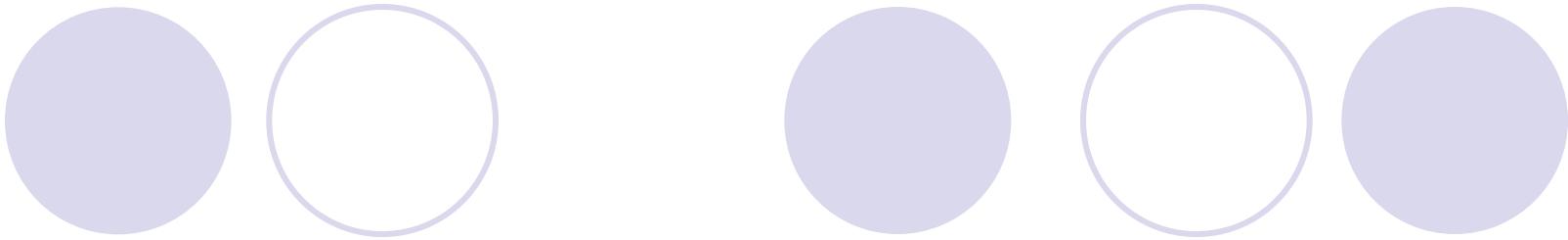
- **Compare Means**

- **One-Way ANOVA**

- Post hoc -select test
 - Options
 - Descriptives
 - Homogeneity of variance test
 - Brown Forsythe
 - Welch



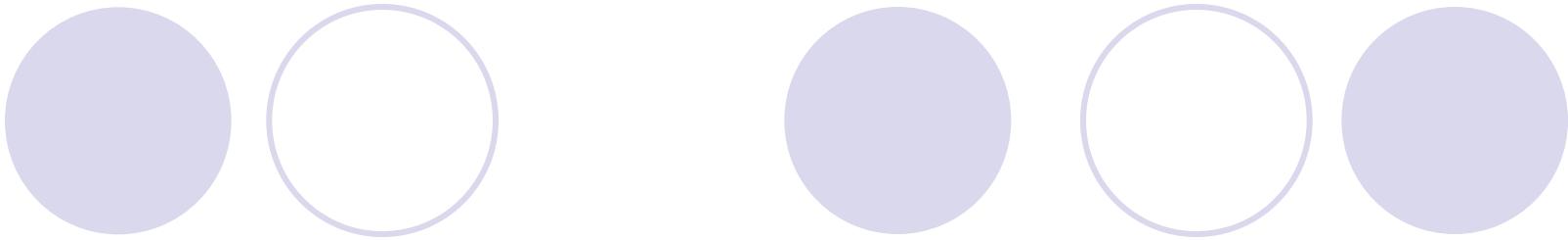
- Studying the effects of study load in terms of credit hours on students' interaction with academic staff



Test of Homogeneity of Variances

totalinteraction2

Levene Statistic	df1	df2	Sig.
.815	4	268	.517



ANOVA

totalinteraction2

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1276.335	4	319.084	1.916	.108
Within Groups	44625.035	268	166.511		
Total	45901.370	272			

Multiple Comparisons

totalinteraction2
Scheffe

(I) credit hours in this term	(J) credit hours in this term	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
9-12	13-15	-3.57037-	3.09176	.855	-13.1605-	6.0197
	16-18	-2.70515-	3.16894	.948	-12.5346-	7.1243
	19 and mor	-8.66154-	4.59719	.472	-22.9212-	5.5981
	19 and more	-12.32500-	5.39810	.269	-29.0690-	4.4190
13-15	9-12	3.57037	3.09176	.855	-6.0197-	13.1605
	16-18	.86522	1.71756	.993	-4.4624-	6.1928
	19 and mor	-5.09117-	3.74726	.764	-16.7145-	6.5322
	19 and more	-8.75463-	4.69546	.483	-23.3191-	5.8099
16-18	9-12	2.70515	3.16894	.948	-7.1243-	12.5346
	13-15	-.86522-	1.71756	.993	-6.1928-	4.4624
	19 and mor	-5.95638-	3.81119	.655	-17.7780-	5.8653
	19 and more	-9.61985-	4.74663	.394	-24.3431-	5.1034
19 and mor	9-12	8.66154	4.59719	.472	-5.5981-	22.9212
	13-15	5.09117	3.74726	.764	-6.5322-	16.7145
	16-18	5.95638	3.81119	.655	-5.8653-	17.7780
	19 and more	-3.66346-	5.79849	.982	-21.6493-	14.3224
19 and more	9-12	12.32500	5.39810	.269	-4.4190-	29.0690
	13-15	8.75463	4.69546	.483	-5.8099-	23.3191
	16-18	9.61985	4.74663	.394	-5.1034-	24.3431
	19 and mor	3.66346	5.79849	.982	-14.3224-	21.6493