SPSS: k Between Groups ANOVA & Trend Analyses

Application: To examine the "shape" of the IV-DV relationship (only used when IV conditions are equally spaced)

Research Hypothesis: Theory suggests an inverted U-shaped relationship between level of anxiety and performance.

H0: for this analysis: There is no mean differences among mean performance in the different anxiety conditions.

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Analyze → General Linear Model → Univariate

- highlight the "Dependent" variable (be sure it is • quantitative) and click the arrow
- highlight the "Factor" (IV, grouping) variable (be sure it is • qualitative) and click the arrow
- "Options" check that you want "Descriptive Statistics •
- "Contrasts" Highlight "Polynomial" & click "Change"

-

"Plots" - Move IV into "Horizontal Axis" then click "Add"

SPSS Syntax

- UNIANOVA perf BY anx_lvl ← DV "by" IV /CONTRAST(anx_lvl)=Polynomial get trend analysis /METHOD=SSTYPE(3) /PLOT=PROFILE(anx lvl) ← get means plot /PRINT=DESCRIPTIVE.
 - ← get descriptive stats

Univariate		
Ø Z Ø Zscore(z) [Zz] OK	Dependent Variable: Image: perf Fixed Factor(s): Image: perf Random Factor(s): Image: perf Image: perf Random Factor(s): Image: perf Image: perf<	Model Contrasts Plots Post Hoc Save Options
Univariate: Contrasts Eactors: anx_M(Polynomial) Change Contrast Contrast Polynomial Reference Category: D	Change ast ③ First	

Divariate: Options	×
Estimated Marginal Means Factor(s) and Factor Interactions: (OVERALL) anx_M	Display Means for:
	Compare main effects Confidence interval adjustment LSD(none)
Display Descriptive statistics Estimates of effect size Observed power Parameter estimates Contrast coefficient matrix Significance leyel: 05 Confident Continue	Homogeneitylests Spread vs. level plot Residual plot Lack of fit General estimable function nce intervals are 95.0% Cancel Help
ta Univariate: Profile Plots	×
Factors: anx_M	Horizontal Axis: Separate Lines:
Plots: Add	Separate Plots:
Continue	Cancel Help

Please Note: You can also perform this analysis using the "ONEWAY" procedure we used for the 2 BG ANOVA and analytic comparisons. It has the same polynomial choices and produces equivalent output.

Descriptive Statistics

Dependent Variable:perf

Anxiety Level	Mean	Std. Deviation	N
1.00	2.3145	1.43834	10
2.00	3.5037	1.42093	10
3.00	5.7605	1.32364	10
4.00	6.1776	1.51531	10
5.00	5.2733	.41903	10
6.00	4.6027	1.93537	10
Total	4.6054	1.91186	60

Tests of Between-Subjects Effects

Dependent Variable:perf

Anxiety Level Polynomial Contrast^a

Sig

Sig.

Std. Error

Sig

Linear

Quadratic

Cubic

Contrast Estimate

Hypotheszed) Std. Error

Contrast Estimate

Hypotheszed) Std. Error

Contrast Estimate

Hypotheszed Value

Difference (Estimate -Hypotheszed)

a. Metric = 1.000, 2.000, 3.000, 4.000, 5.000, 6.000

Hypothesized Value

Difference (Estimate -

Hypotheszed Value

Difference (Estimate -

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	107.142 ^a	5	21.428	10.663	.000
Intercept	1272.579	1	1272.579	633.268	.000
anx_lvl	107.142	5	21.428	10.663	.000
Error	108.515	54	2.010		
Total	1488.236	60			
Corrected Total	215.657	59			

Depende... perf

2.052

2.052

.448

.000

0

-2.394

.448

.000

-.195

-.195

448

666

0

0

a. R Squared = .497 (Adjusted R Squared = .450)



Remember, even if the printout shows it, never report p = .000, because that would suggest there is no possibility of a Type 1 error. Instead, report "p < .001"

← →

The p-value of .000 means that there less than a .1% chance that this result is a Type I error

The trend analysis results show...

A significant linear trend

- Inspection of the means and plot shows that this is a positive linear trend
- This results does not support the RH:

A significant quadratic trend

- Inspection of the means and plot shows that this is an inverted U-shaped quadratic trend
- This results supports the RH:

A nonsignificant cubic trend

• This results supports the RH:

Note:

You can compute the t-value for each comparison using t = Difference (Estimate – Contrast) / Std. Error

For the Linear trend this would be t = 2.052 / .448 = 4.580With df = 54

Or if you prefer, $F = t^2$ F = 4.5802 = 20.975 df = 1, 54

Reporting the Results

The average performance for each anxiety level is summarized in Table/Figure 1. There were significant mean differences in the performances among the anxiety levels, F(5, 54) = 10.663, Mse = 2.010, p <.001. Trend analyses revealed that, as hypothesized, there was a quadratic component to the relationship, F(1,54) = 28.552, p<.001, with the highest average performance for anxiety level 4. Also, there was no cubic trend, F(1,54) = .198, p = .666. However, contrary to the research hypothesis, there was also a positive linear component to the relationship, F(1, 54) = .20.975, p<.001, with higher average performance for the higher anxiety levels than for the lower anxiety levels.