PSY2206 Methods and Statistics Tests Cheat Sheet

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Glossary terms

Correl-ational designs	examine the relationship between existing variables as they occur naturally- often analysed using regressions
Indepe-ndent groups design	Most appropriate when comparing the differences between two independent groups. Parametric test. Often indicates that seperate indepe-ndent groups are tested with no participants taking part in more than one condition or level

Glossary terms (cont)

Indepe-ndent T-test	looks at the difference between two groups of participants on a particular variable. The parametric statistics used is the independent t-test- used to asses the difference between two independent groups on an interval/ratio level variable. Tests the null hypothesis that there is no significant difference betweeen the groups + altern-ative hypothesis that there is a significant difference. Equation for the t-test takes into account variability/differences and sample size of data. value denoted by t. The bigger the value of t, the more likely you are to find a statistically significant differences.
Indepe-ndent T-test Assump tions	assumes a normal distribution (and if it is not normal then consider performing a Mann Whitney test instead if the sample is small), homogeneity of variance/levenes test

Glossary terms (cont)

t statistic	The bigger the value of t, the more likely you are to find a statistically significant differ-ences. There is no standardised t-value/distribution that signifies statistical significance, therefore you must consider both t and degrees of freedom. Can be positive or negative (is depend-endent on how you ordered your groups). you usually report it as a positive number.

Glossary terms (cont)

Mann-W-hitney test	Non-parametric equivalent of Independent t-test. Can be used to test the null hyp. that there is no significant difference between two independent groups. Can use when DV is ordinal. Data is ranked and these ranks are added up allowing for a mean rank of each group. This can be used to assess whether there is a significant difference. Important to know that by ranking the data you lose some information, making the test less powerful- thus you should always go for parametric test unless the data violates the assumptions

Glossary terms (cont)

Levenes Test for Equality of variance table	Test for homogeneity of variance. t-test provides two equal variance assumed results- to choose which one to interpret is dependent on the results of Levenes test of equality. if Levenes text is statistically significant (less than 0.05) read the t-test result from the bottom line. If it is greater read t-test result from the top line.

Glossary terms

ANOVA	Analysis of variance test. Always have only one DV. One way ANOVA = only one IV, two way ANOVA = two IVs ect. Only indicates whether there is a statistically deviation values for each group. Need to conduct a post hoc test or planned comparisons
Between groups ANOVA	focus on independent groups used to explain differences between groups.

Glossary terms (cont)

One-way betwee-n-G-roups ANOVA	examine differences between two or more ivs. Tests the null hypothesis that the mean scores for all groups are equal- which we then test by analysing the variance. IV should be catego-rical, DV should be measured at the interval/ratio level, groups have approx. equal variances, residual scores should follow approx, normal distribution.
Two-way Betwee n-G-roups ANOVA	examine the differences between two or more indepe-ndent variables. often describes a number of levels of the two IV variables.
Planned Compar isons	only make specific comparisons between groups which have been decided in advance. - usually driven by theory.
Post Hoc	compares every possible pair of groups- usually driven by trawling the data looking for significant findings.

Interpreting the Output:

N	Number of participants in each group
Mean	mean of each group
Std. Deviation	is the average deviation scores in your data set. Indicates the extent to which the scores on a variable deviate from the mean score.

Interpreting the Output: (cont)

Std. Error of the Mean	is obtained by dividing the standard deviation by the square root of the sample size for each group. Used to help calculate the significance.
t	The bigger the value of t, the more likely you are to find a statistically significant differences. There is no standardised t-value/distribution that signifies statistical significance, therefore you must consider both t and degrees of freedom.
Degrees of Freedom (df)	reflection of the sample size. In the case of an independent t-test the df is always equal to 2 less than the total sample size. (e.g. 45 males and 17 females in your sample = 62-2=60)
Sig. (2 tailed test)	Any value less than 0.05 is statistically significant. If the Independent t-test results are significant then the result is unlikely to be due to chance.
Sig. (one tailed test)	divide two tailed significance value by 2
Std. Error Difference	divide the mean difference by the t-value

Interpreting the Output: (cont)

F ratio	F ratio = Between-groups mean square/ within groups mean square. If F ratio is greater than 1 it indicates a difference between groups. P value accompanies the F ratio to tell you whether the difference is statistically significant.
Error row	term used for the within-groups information. Error mean square value is the value used as the denominator in the F-ratio calculation
Decision (mann whitney)	telling you whether to retain or reject the null hypothesis. If the significance value is greater than .05 you are advised to retain.

Independent t-test Guide:

1) Analyze	Analyse > Compare Means > Independent Samples t-test
2) Identify and move DV	Move DV to the test variables box
3) Identify and move IVs	Move IVs into the grouping variable box
4) Click Define groups button	Enter the two numbers that were used to code the independent variables (e.g. you may have coded/assigned numbers to genders: Female 1, Male 2) > Continue > OK

Independent t-test Guide: (cont)

5) Interpret the output	Choose which t variable using the Levenes test of equality of variance. If Levenes text is statistically significant (less than 0.05) read the t-test result from the bottom line. If it is greater read t-test result from the top line. Then work out your degrees of freedom and also identify the probability.
6) Report your results	t value should be rounded to 2 decimal places, followed by df in brackets and the significance level.
Example answer	E.g. In this study there was a 'statistically significant' difference between 'males' and 'females' on 'the statistics anxiety scores', t(60)=3.92, p< .001. May also comment on the data found in the Group Statistics table: 'Females' has a 'higher' mean 'statistics anxiety score' of 8.71 (SD=1.78) comapred to the mean 'male scores' of 6.65 (SD=2.03)
Test for homogeneity of variance	
Testing normality of residuals	

Mann-Whitney test

1) Analyze	Analyse > Nonparametric test >Independent samples
2) Non-param-etric test window	Fields > Automatically compare distributions across groups > run
3) specify variables	Move DV to test variables (this is the variables you hyp. a difference would be present) > Move IV to grouping variable box > Run
4) Interpret Output	tables slightly vary (look at interpreting output column)
5) Results	report U value to 2dp. followed by significance level e.g. U=66, p=.53
Example	There was no statistically signif-icant difference between psychologists and psychiatrists on the rating scores of vegeto-therapy, U=66, p=.48. The psychologist group reported a median rating of 1.00 (interqua-rtile range=2.5) and the psychi-atrist group had a higher median rating of vegetotherapy of 2 (interquartile range= 2).

One way Between-groups ANOVA Guide:

1) Analyze	Analyse > General Linear Model > Univariate
2) Identify and move variables to appropriate boxes	Move DV to Dependent variable box > Move IV into Fixed Factors box

One way Between-groups ANOVA Guide: (cont)

3) Descri-ptive stats and homegenity information	options > display > tick descriptive stats > tick homogeneity tests > singif-icance level .05 > continue
4) Save	Select save (to save residual scores that are useful for checking the assumptions) > tick unstandardized box (under Residuals list) > continue > OK
5) Interpret output	most important rows in the ANOVA table: IV named row and Error row (the error mean square is the denomi-nator value used in the F-ratio calculations). Probability associated with F ratio- less than .05= reject null hyp. Require F ratio rounded to 2 decimal places, two dfs (one for between groups mean square and one for within-groups mean square, separted by comma), appropriate effect size statistic. report the standard deviation and mean values.

One way Between-groups ANOVA Guide: (cont)

6) Write up results	There 'was/was no' statistically significant difference between the 'three' groups in terms of their 'intelligence scores', F(2,27)=0.07, p=.94.

Important steps in Between Groups ANOVA

Normal calcul-ations of variance	divide the sum of squares by n-1 (n= no. of values used to calculate the sum of squares)-DIFFERENT FOR ANOVA

Important steps in Between Groups ANOVA (cont)

Calculating Sums of Squares- provides a sense of the amount of variation between groups and within groups	Calculate variance for the individual score within the same group: 1) subtract group mean from each score within that group, then square that result (this calculate sum of the squared deviations for each individual score from its group mean). Then add up the values obtained (this is known as the sum of squared deviations). Calculate variance between groups 2) Can follow same principle to calculate the sum of squared deviations of each group mean from the grand mean (which is mean of all scores): replace ind. score with the group mean - grand mean , then square this deviation. Do this for everyone in data set then add them all up to get the sum of squares between groups.

Important steps in Between Groups ANOVA (cont)

Calculating Mean Square	between groups: divide the sum of squares by its df (df= no. of groups - 1)(e.g. we have 3 groups, df is therefore 3-1=2). Within groups: df = no. of individuals in analysis - no. of groups (e.g. we havwe 30 pps and 3 groups, 30-3=27, so it would be sum of squares/27).
Calculating the F ratio	F ratio = Between-groups mean square/ within groups mean square. If F ratio is greater than 1 it indicates a difference between groups. P value accompanies the F ratio to tell you whether the difference is statistically significant.

Two-way between groups ANOVA

1) Plot	Plots > move one to Horizontal axis box > move the other variable to separate lines box > Add > Continue > OK. it doesnt matter which variable is put on the horizontal axis

Two-way between groups ANOVA (cont)

2) Interpret Output	most important rows are the ones that correspond with the names of the variables and the error. The mean square found in the error is used as the denominator for f ratio. make sure to read the p value for each of the varaibles, this will determine if they are significant or not.
Example (train of thought when interpreting the results)	the p value for the interaction term (e.g. variable + variable row) is 0.001 which means that there is a statistically significant interaction (e.g. the effect on cowboys preference for intelligence is influenced by gender)
6) Write up results	Report in the same way that you do a one way Anova. The only difference is that you need to clarify the results from the main effect or an interaction.

Two-way between groups ANOVA (cont)

Example results write up	A 3x2 ANOVA with cowboy preference (JH, CE, none) and gender (M, F) as between subjects factors revealed no main effect for cowboy preference, F(2,24)=0.11, P=.89. or for gender, F( ), p= . However there was an interaction effect, f( )..... The interaction plot suggests..... Also report the mean and standard deviation.

To exaime the difference between two or more independent groups on two independent group variables. It uses the same method as one way however requires you to place all IVs into Fixed factors box. Also key to use the interactions box. Additional plots instructions...