Example

Research Methodology in Musculoskeletal Physiotherapy Part 1

Practical examination

Instructions

- Write down your answers in a Word document.
- Put your name and student number on top of the Word document.
- Besides Word, you are allowed to use SPSS and Excel, and in the end an email program. During the exam you are not allowed to use Internet and Blackboard. You may only use Internet when you have finished the exam and have to email the document.
- You are not allowed to use your own notes.
- Save your document as: lastname_studnr.doc (also several times during the exam!!!)
- In the end, email the document to: m.j.m.hoozemans@vu.nl

REMEMBER TO SAVE YOUR WORK AS YOU GO.

Good Luck!

1.

Twenty children were tested on their physical capacity to perform squats. The children had to perform squats at a fixed pace until they indicated that they were exhausted and the maximum number of squats was registered. The data were:

18, 16, 18, 24, 23, 22, 23, 26, 29, 32, 34, 36, 43, 49, 46, 57, 22, 26, 25, 31.

Do you consider these data to be normally distributed? Provide the necessary evidence to substantiate your answer. (5 points)

2.

A physiotherapist is interested in whether her treatment of low back pain patients is more effective when patients visit the physiotherapy practice 4 times per week compared to only 1 time per week. Below you find her data.

Therapy	LBP at end of therapy	Gender	Number of weeks therapy
PT 1x per week	low back pain	male	13
PT 1x per week	low back pain	female	9
PT 1x per week	low back pain	female	15
PT 1x per week	low back pain	male	30
PT 1x per week	low back pain	female	11
PT 1x per week	low back pain	female	11
PT 1x per week	low back pain	female	10
PT 1x per week	low back pain	female	9
PT 1x per week	low back pain	female	12
PT 1x per week	low back pain	female	25
PT 1x per week	no low back pain	male	33
PT 1x per week	no low back pain	male	42
PT 1x per week	no low back pain	male	25
PT 1x per week	no low back pain	male	37
PT 1x per week	no low back pain	male	45
PT 1x per week	low back pain	female	18
PT 1x per week	low back pain	female	16
PT 1x per week	no low back pain	male	20
PT 1x per week	no low back pain	female	29
PT 1x per week	no low back pain	female	38
PT 4x per week	low back pain	male	10
PT 4x per week	low back pain	male	20
PT 4x per week	low back pain	male	32
PT 4x per week	low back pain	female	9
PT 4x per week	low back pain	female	25
PT 4x per week	no low back pain	male	14
PT 4x per week	no low back pain	female	35
PT 4x per week	no low back pain	male	9
PT 4x per week	no low back pain	male	16
PT 4x per week	no low back pain	male	19
PT 4x per week	no low back pain	male	21
PT 4x per week	no low back pain	male	35
PT 4x per week	no low back pain	male	10
PT 4x per week	no low back pain	male	24
PT 4x per week	no low back pain	female	28
PT 4x per week	no low back pain	female	23
PT 4x per week	no low back pain	male	11
PT 4x per week	no low back pain	male	18
PT 4x per week	no low back pain	female	45
PT 4x per week	no low back pain	male	30

The physiotherapist registers whether the patients belongs to the group that has either 1 or 4 times per week treatment (therapy), whether the patient reports low back pain at the end of the treatment period (LBP at end of therapy), the treatment period (number of weeks therapy) and whether the patient is male or female (gender). She asks you to analyze her data.

a) After putting in these data in SPSS, first determine and report the incidences of recovery among the two groups. (2 points)

b) Determine, using SPSS, and report both the relative risk (RR) and odds ratio (OR), their 95% confidence intervals and whether they are significant, for not recovering and describe in words what they mean. (4 points)

c) You suspect that gender may be a potential confounder. First determine whether gender is associated with treatment and with LBP, present the data that substantiates your answer. What would be your first conclusion as to whether gender is a confounder? (5 points)

d) Secondly, you eliminate confounding by gender using a logistic regression analysis. Report the unadjusted/crude OR of treatment for not recovering and its 95% confidence interval after logistic regression and report the OR of treatment for not recovering adjusted for gender. What would be your conclusion as to whether gender is a confounder now after the logistic regression? (6 points)

e) Thirdly, does gender modify the association between treatment and LBP? Explain your answer using the SPSS output. What is your final conclusion regarding the value of the OR for treatment and its uncertainty? (3 points)

f) The physiotherapist also registered the time to recovery (no low back pain) in weeks of treatment. Create and show a graph with Kaplan-Meier curves for both treatment modalities. Also include the log-rank test. What is the result of the log-rank test and how do you have to interpret the result? (5 points)

g) Analyze the data using Cox regression analysis. Account for gender in the appropriate way if necessary as you did for the logistic regression. Show the relevant output from SPSS and describe the results and conclusion in words. (5 points)

3.

A physiotherapist wants to know whether measuring knee range of motion using a hand-held goniometer is a reliable method. She and her colleague both assess the range of knee motion of 10 patients. She collects the following data:

Observer 1: 135, 145, 147, 131, 138, 136, 140, 141, 141, 139
Observer 2: 135, 141, 135, 130, 142, 133, 141, 132, 139, 140

Determine the reliability of the procedure by calculating the parameters for reliability and measurement error. You do not have to include a Bland and Altman plot. Explain the reason(s) why you did chose the parameters for reliability and measurement error that you are going to report. What would be your conclusion as to the reliability of the procedure, is it sufficient and explain why? (6 points)