HSC-5003X

Occupational Therapy Degree Apprenticeship

Research Practice

Quantitative Methods Summative assignment 2021

The purpose of this assignment is to help you demonstrate your understanding of the principles of good research practice. This assignment covers the essential aspects of quantitative research, which reflect the content of appraisal tools such as CASP, providing the structure necessary for those new to research. It tests your knowledge about research design, reliability and validity, and the ways in which results are analysed and interpreted. The essential principle being learned is that it is important to be knowledgeable about (and have competence in) research skills in order to appraise published studies.

You are provided with a series of questions about research skills. These are to be answered on the form provided.

It is good practice to include references to support their arguments. Wider reading is necessary to understand key concepts and to answer the assessment questions, but we will not be assessing use of sources or referencing in this assignment. If citations and references are used, they will be **excluded** from the word count.

**Formatting:**

* Please use Arial or Calibri font size 12, 1.5 line spacing.
* This assignment has a word limit of 1000 words. 10% under or over rule does apply.
* In the header, please include your student number and word count. Please do NOT include your name.
* Feel free to keep or delete this title page from your assignment.
* If there are any issues with formatting, please save as a pdf before uploading to Blackboard.
* Percentages are attributed per question and are indicated at the end of the question in brackets.

**Specific guidelines:**

1. Illustration of a well-developed understanding of quantitative research design and sampling
2. Illustration of a well-developed understanding of reliability and validity
3. Illustration of a well-developed understanding of SPSS data input, reading the output, and data distribution
4. Illustration of a well-developed understanding of SPSS data input, interpretation of data using p values
5. Illustration of a well-developed understanding of interpretation of data using confidence intervals and p values

**1) Read the scenario given below and answer the following questions on research design.**

**Scenario**

A carer support package designed to improve the mental well-being and resilience in people who are carers for people with dementia has been developed. This new intervention can be delivered online but it has not been evaluated for its effectiveness. Four mental health community trusts together with the General Practices in Norfolk have agreed to collaborate in a study to investigate the effect of a carer support package.

**1a)** From the options given below, select which study design would be most appropriate for the scenario and provide a justification for your answer. (10%)

Cohort study (or)

Randomised controlled trial (or)

Case control study

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| **1a) Answer** |
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**1b)** In relation to the above scenario, could you use ‘blinding’ as a strategy to reduce specific biases, and why would this be desirable? (10%)

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| **1b) Answer** |
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**2) Read the scenario given below and answer the following questions regarding reliability and validity.**

**Scenario**

The Frenchay Activities Index (FAI) and Functional Independence Measure (FIM) are two widely used assessments of functioning used in stroke rehabilitation Reliability and validity information for FAI and FIM is as below:

|  |  |  |
| --- | --- | --- |
|  | **FAI** | **FIM** |
| **Internal consistency** | Cronbach’s alpha= 0.70 | Cronbach’s alpha= 0.93 |
| **Inter-rater reliability** | ICC= 0.88 | ICC= 0.74 |
| **Test–retest reliability** | ICC= 0.79 | ICC= 0.69 |

**2a)** Which screening tool has a better internal consistency and why? In your answer define internal consistency and interpret the values by comparing and contrasting the values of the two measures. (5%)

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| **2a) Answer** |
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**2b)** Which screening tool has a better reliability and why? In your answer define inter-rater and test-retest reliability. Interpret the values by comparing and contrasting the values of the two measures. (5%)

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| **2b) Answer** |
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**3) Read the scenario given below and answer the following questions.**

As part of a National Institute for Health Research project, the height and weight of 50 students was measured. The following values were obtained for height (unit is centimetres):

162, 164, 165, 166, 168, 170, 171, 171, 172, 172,

173, 174, 174, 175, 175, 176, 177, 177, 177, 178,

178, 178, 179, 179, 179, 180, 180, 180, 180, 181,

181, 181, 181, 182, 182, 182, 183, 183, 185, 185,

186, 187, 187, 188, 189, 190, 190, 192, 194, 196

**3a)** Height is measured on which scale of measurement? Provide reasons for your answer in relation to the scenario. (5%)

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| **3a) Answer** |
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**3b)** Enter the given data (heights) in SPSS, and create and display a histogram to answer the following question. If you need to review how to enter data into SPSS, please review the last SPSS seminar session available on Blackboard.

Looking at the histogram you created from the data, how would you best describe the distribution and why? (10%)

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| **3b) Answer** |
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**4) Read the scenario given below to answer the following questions on data analysis.**

**Scenario**

A total of 60 participants diagnosed with stroke were tested as part of an intervention study trialling a physical intervention called Functional Strength Training (FST). Study participants were randomisation to receive either normal care (control) or FST (intervention).

The main outcome measure was the Action Research Arm Test (ARAT). The ARAT consists of 19-items. Performance on each item is rated on a 4-point (0-3) ordinal scale and gives a maximum total score of 57. Higher scores indicate better performance. Both the control and intervention group participants were tested at baseline (pre-intervention) and at 3-month follow-up (post-intervention).

You wish to carry out inferential statistical analysis of the data, to identify whether or not the differences in scores are statistically significant. The data is not normally distributed.

**4a)** What statistical test would you use for this task? Give reasons for your answer, using the decision tree (below) to explain the stages of your decision-making. (5%)

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| **4a) Answer** |
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**Inferential statistical testing: a decision tree or ‘taxonomy’**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| In your analysis, are you looking for evidence of ***differences*** or ***relationships***? | | | | | | | | | | | | | | | |  |
| **↓** | | | | | | | | | | |  |  |  | **↓** |  |  |
| **Differences** | | | | | | | | | | |  |  | **Relationships** | | |  |
|  | **↓** | | |  |  |  | **↓** | | |  |  |  |  | **↓** |  |  |
| **Within same group of Ss\*** | | | | |  | **Between different groups of Ss** | | | | |  |  | **Between 2 or ≥3 sets of data** | | |  |
| **↓** | |  | **↓** | |  | **↓** | |  | **↓** | |  |  | **↓** |  | **↓** |  |
| Two conditions | |  | Three or more conditions | |  | Two different groups | |  | Three or more groups | |  |  | Two sets of data |  | Three or more sets |  |
| **↓** | |  | **↓** | |  | **↓** | |  | **↓** | |  |  | **↓** |  | **↓** |  |
| McNemar test  (nominal)  Wilcoxon test  (ordinal, or interval/  ratio) | |  | Friedman  Test  (ordinal, or interval/  ratio)  Page’s L  trend  test | |  | Chi-squared test  (nominal)  Mann-Whitney test  (ordinal, or interval/  ratio | |  | Chi-squared  test  (nominal)  Kruskal-Wallis test or Jonkheere test  (ordinal, or interval/  ratio) | | **Non-**  **parametric**  **statistical**  **tests** | | Spear-man  Rank test |  | Kendall’s co-efficient of concord-ance |  |
| **↓** | |  | **↓** | |  | **↓** | |  | **↓** | |  |  | **↓** |  | **↓** |  |
| Related  t-test  (interval/  ratio) | |  | ANOVA test  (interval/  ratio) | |  | Unrelated  t-test  (interval/  ratio) | |  | ANOVA test  (interval/  ratio) | | **Parametric**  **statistical**  **tests** | | Pearson Test |  | No equiv-alent |  |

\* or different groups of subjects that have been matched

This diagram based on Hicks ‘Research Methods for Clinical Therapists’ Churchill Livingstone (various editions)

**4b)** Based on your decision in 4a, conduct the appropriate inferential statistical analysis of the data, to identify whether or not this change was statistically significant. The data are provided below (*Table 1: Scores on ARAT*). You should use the SPSS computer statistical package, but you must provide evidence of how your answer was arrived at.

In your answer include the steps taken in SPSS; interpret the descriptive and inferential statistic results and comment on what the results mean for the scenario. Your evidence for how you did the statistical test can be presented as a list/process. (20%).

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| **4b) Answer** |
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*Table 1: Scores on ARAT*

*Group 1 = normal care; Group 2 = FST*

|  |  |  |  |
| --- | --- | --- | --- |
| Participant ID | Group | Baseline | 3-month follow-up |
| 101 | 1 | 13 | 13 |
| 102 | 1 | 52 | 55 |
| 103 | 1 | 3 | 3 |
| 104 | 1 | 31 | 23 |
| 105 | 1 | 3 | 3 |
| 106 | 1 | 9 | 9 |
| 107 | 1 | 17 | 7 |
| 108 | 1 | 14 | 12 |
| 109 | 1 | 5 | 5 |
| 110 | 1 | 4 | 4 |
| 111 | 1 | 3 | 4 |
| 112 | 1 | 3 | 3 |
| 113 | 1 | 31 | 37 |
| 114 | 1 | 23 | 18 |
| 115 | 1 | 23 | 23 |
| 116 | 1 | 25 | 25 |
| 117 | 1 | 4 | 6 |
| 118 | 1 | 10 | 12 |
| 119 | 1 | 3 | 3 |
| 120 | 1 | 3 | 3 |
| 121 | 1 | 27 | 28 |
| 122 | 1 | 32 | 26 |
| 123 | 1 | 8 | 11 |
| 124 | 1 | 3 | 3 |
| 125 | 1 | 3 | 15 |
| 126 | 1 | 4 | 6 |
| 127 | 1 | 9 | 12 |
| 128 | 1 | 8 | 9 |
| 129 | 1 | 11 | 8 |
| 130 | 1 | 4 | 14 |
| 131 | 2 | 3 | 3 |
| 132 | 2 | 16 | 37 |
| 133 | 2 | 41 | 51 |
| 134 | 2 | 3 | 7 |
| 135 | 2 | 5 | 11 |
| 136 | 2 | 21 | 22 |
| 137 | 2 | 3 | 6 |
| 138 | 2 | 4 | 9 |
| 139 | 2 | 32 | 36 |
| 140 | 2 | 29 | 32 |
| 141 | 2 | 23 | 30 |
| 142 | 2 | 5 | 17 |
| 143 | 2 | 20 | 28 |
| 144 | 2 | 25 | 24 |
| 145 | 2 | 3 | 3 |
| 146 | 2 | 9 | 9 |
| 147 | 2 | 12 | 3 |
| 148 | 2 | 22 | 27 |
| 149 | 2 | 7 | 14 |
| 150 | 2 | 22 | 24 |
| 151 | 2 | 27 | 13 |
| 152 | 2 | 14 | 18 |
| 153 | 2 | 18 | 19 |
| 154 | 2 | 21 | 22 |
| 155 | 2 | 55 | 56 |
| 156 | 2 | 7 | 32 |
| 157 | 2 | 15 | 14 |
| 158 | 2 | 11 | 27 |
| 159 | 2 | 16 | 21 |
| 160 | 2 | 23 | 14 |

**5) Read the scenario given below to answer the following questions on interpretation of data.**

**Scenario**

A randomized controlled trial tested whether a Cognitive-Linguistic Treatment (CLT) is more effective than communicative-treatment. CLT restores the affected linguistic levels such as everyday language skills and semantics (i.e. meaning of words). Communicative-treatment makes use of residual language skills by providing compensatory strategies. It was hypothesised that CLT would be more effective than communicative-treatment in the early stages after stroke in restoring the affected linguistic levels.

80 patients with aphasia after stroke were included within 3 weeks post-stroke and randomised into the CLT or the communicative-treatment groups. Patients received 6 months of CLT or communicative-treatment for at least 2 hours per week over 6 months.

Patients were assessed at pre-intervention, and at 3 and 6 months in the intervention period with the Amsterdam Nijmegen Everyday Language Test (ANELT-A) as the primary outcome measure.

The ANELT-A measures everyday language abilities. The semantic tests measure verbal skills and executive control in coming up with specific words. The ANELT-A is scored from 0-50 and scores lower than 36 are indicative of moderate to severe communication impairment. A change in score of 8 points is deemed clinically significant.

The intervention effect was evaluated by means of analysis of covariance, with adjustment for baseline scores. Results are presented in Table 5.1

**Results:**

**Table 5.1 Primary outcome measure: mean ANELT-A scores for the CLT and the communicative treatment groups at 3 months and 6 months (M= mean, CI = confidence interval, p= probability).**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | CLT (n=38) | Communicative treatment (n=42) | Adjusted mean difference between the two treatment groups (95% CI) | p value |
| 3 months post-stroke | M= 33.4 | M= 31.6 | 1.5 (-2.6 to 5.6) | 0.48 |
| 6 months post-stroke+ | M= 35.2 | M= 33.2 | 1.6 (-2.3 to 5.6) | 0.42 |

**5a)** What do you conclude from these results regarding the effectiveness of the intervention? Interpret the mean between group differences, the statistical significance and width of the 95% confidence interval for the primary outcome (30%).

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| **5a) Answer** |
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**(There is no 5B. This is the end of assignment.)**