Research Methods

A controlled observation was designed to compare the social behaviours of pre-school children of working parents and pre-school children of stay-at-home parents. The sample consisted of 100 children aged three, who were observed separately. Half of the children had working parents and the other half had stay-at-home parents.

The observation took place in a room which looked like a nursery, with a variety of toys available. In the room, there were four children and one supervising adult. Their behaviour was not recorded.

Each child participant was brought into the room and settled by their parent. The parent then left to sit outside. Each child participant's behaviour was observed covertly for five minutes while they played in the room.

The observation was conducted in a controlled environment and a standardised script was used when the children and their parents arrived.

The researcher used two trained observers to record the social behaviours of each child during the observation.

The data from the observation was summarised by converting the number of agreed observations into a total social behaviour score for each child.

The researcher then conducted a statistical test to identify whether there was a significant difference between the social behaviour scores for the children of stay-at-home parents and those of working parents.

Identify an appropriate statistical test that the researcher could use to analyse the social behaviour scores in this study. Explain **three** reasons for your choice in the context of this study.

[7 marks]

Mark Scheme:

Marks for this question: AO2 = 7

1 mark for Mann-Whitney (or an alternative statistical test if appropriately justified in bullet point three).

Plus

For **each** of the following bullet points award:

2 marks for a clear and coherent reason explicitly linked to the study.

1 mark for a limited reason implicitly linked to the study.

- the psychologist is testing a difference (not a correlation) between the social behaviours of children of working parents compared to stay-at-home parents
- an independent group design is used as the children are either of working parents or of stay-at-home parents
- the data collected can be treated as ordinal as it is a social behaviour score (the difference between each score is not fixed/can be ranked).

Note: appropriate reason can be credited even if an incorrect test is named or no test is given.

Note: where more than three reasons are given, only the first three should be marked.

A researcher placed an advert in a university psychology department asking for third year students to participate in a sleep experiment.

Each student had a sleep tracker watch to wear at home for the two-week study. Each morning they were asked to open the sleep tracker app to view their sleep quality data on their mobile phones. The students were unaware that the sleep data they could see on their phones had been manipulated by the researcher. Over the two weeks of the study, each student saw that he or she had had poor sleep quality for seven random nights of the experiment and good sleep quality for the remaining nights.

Every morning, after viewing the sleep data, each student completed a questionnaire about the previous night's sleep. One of the questions asked the students to rate how well rested they felt, on a scale from 1–10, after the previous night's sleep. Apart from this, students were asked to continue their normal everyday activities.

The researcher collected quantitative data about how well rested the students felt.

One ethical issue in this study is deception, as the students were unaware that the sleep data they could see on their phones had been manipulated by the researcher.

Apart from the question about how well rested the students felt, the researcher's questionnaire contained nine other questions. The responses to these questions were not analysed.

The researcher believed that the actual number of hours slept by the students could have affected the results of the study.

In a follow-up study, the researcher investigated whether there was a correlation between the number of hours slept and how well rested the students felt.

The researcher randomly selected 18 participants from first-year students at the university.

On the day of the study, each student participant was asked, 'How many hours did you sleep last night?' They then had to rate on a scale of 1 to 5 how well rested they felt.

The researcher hypothesised that there would be a positive correlation between the two co-variables.

Outline **one** reason why it was appropriate to conduct a correlation rather than an experiment in this case.

[2 marks]

Mark Scheme:

Marks for this question: AO2 = 2

2 marks for a clear and coherent reason with some relevant elaboration in the context of this study.

1 mark for a limited/muddled reason.

Possible content:

- it would be difficult to dictate the number of hours the students should sleep
- it may be more ethical to conduct a correlation rather than restrict how many hours each student slept.

Credit other appropriate reasons.

Examiner Comment:

Question 18
This question was not well answered with the majority of students failing to gain marks. This was mainly due to students not answering the question set, instead either explaining why an experiment would have been better or justifying what makes it a correlation. There also appeared a lot of confusion regarding causation and correlation.

The researcher used Spearman's rho statistical test to analyse the data from this study.

Explain why Spearman's rho was a suitable test for this study. Refer to the description of the study in your answer.

[4 marks]

Mark Scheme:

Marks for this question: AO2 = 4

Award 2 marks for each bullet point:
- correlational hypothesis (1 mark) as the researcher is investigating the relationship between the number of hours slept and how well rested the students feel (1 mark)
- ordinal data (1 mark) as they are using an arbitrary scale of 1–5 to assess how well rested the students feel/not a universal or standardised measure (subjective) of how well rested the students feel but can be ranked (1 mark).

Examiner Comment:

Question 20
This question differentiated well but there were many students who did not attempt the question. Those attempting the question generally did well, especially on the first bullet point of the mark scheme. Some students did not refer to the description of the study in their answers, which limited them to a maximum of two marks.

The researcher chose to use the 5% level of significance and the calculated correlation coefficient for the Spearman's rho test was 0.395

Table 1 Critical values of rho

Level of significance for a one-tailed test	0.05	0.025
Level of significance for a two-tailed test	0.10	0.05
N = 16	0.429	0.503
17	0.414	0.485
18	0.401	0.472
19	0.391	0.460
20	0.380	0.447

The calculated value of rho must be greater than or equal to the critical value to be significant.

Identify the appropriate critical value from **Table 1**. Explain your choice.

[4 marks]

Mark Scheme:

Marks for this question: AO2 = 4

Award 1 mark for each bullet point:
- the critical value is 0.401 (accept value identified in table)
- the hypothesis is directional/it is a one-tailed test
- there are 18 participants so N=18
- the level of significance is 0.05.

Examiner Comment:

Question 21
This question differentiated well, although there was a high proportion of the cohort who did not attempt the question. Most students who produced responses, achieved all 4 marks but there were still a lot of two-mark responses. The most common error was to use a two-tailed test and thus a critical value of 0.472.

Explain whether the researcher's hypothesis should be accepted. Refer to the critical value in your answer.

[2 marks]

Mark Scheme:

Marks for this question: AO2 = 2

Award 1 mark for each bullet point:
- the researcher's hypothesis should not be accepted (as the result is not significant)
- because the calculated value of rho (0.395) is less than the critical value (0.401).

Examiner Comment:

Question 22
A lot of students did not attempt this question. The majority of those who answered the question obtained full marks, although some muddled the critical value and calculated value of rho. Some students who made errors in Q21, which meant that they identified the critical value as less than the calculated value, were able to gain follow through marks.

Explain why the researcher decided to use the 5% level of significance rather than the 1% level in this study.

[2 marks]

Mark Scheme:

Marks for this question: AO2 = 2

2 marks for a clear and coherent explanation with some relevant elaboration in the context of this study.

1 mark for a limited/muddled explanation.

Possible content:
- the 5% level of significance is the conventional level of probability employed by psychologists/balances the risks of making a Type I and Type II error
- the researcher is investigating the relationship between numbers of hours slept and how well rested participants feel, this is not a sensitive topic nor one which may affect individual's health (as in clinical trials).

Examiner Comment:

Question 23
This question was generally not well answered, with the majority of students failing to achieve any marks. Too many students did not attempt the question, either due to gaps in knowledge or timing issues. Those who attempted the question often did not seem to have learned why the 5% level should be used and/or did not understand what this meant. Students who identified the 5% level of significance being the conventional level tended to gain credit but references to Type I and Type II errors were often muddled. Less than 3% of the cohort were able to explain why the researcher used the 5% level of significance, as opposed to the 1% level, in the context of the study.

When the researcher compared the calculated and critical values of rho, he began to wonder if he might have made a Type II error.

Explain what is meant by a Type II error in the context of this study.

[2 marks]

Mark Scheme:

Marks for this question: AO2 = 2

2 marks for a clear and coherent explanation with some relevant elaboration in the context of this study.

1 mark for a limited/muddled explanation.

Content:

- when the researcher accepts there is no correlation between the number of hours slept and how well rested they felt (null hypothesis) even though the alternative hypothesis is correct
- when the researcher believes the relationship between the number of hours slept and how well rested they felt is not significant when it is (false negative).

Examiner Comment:

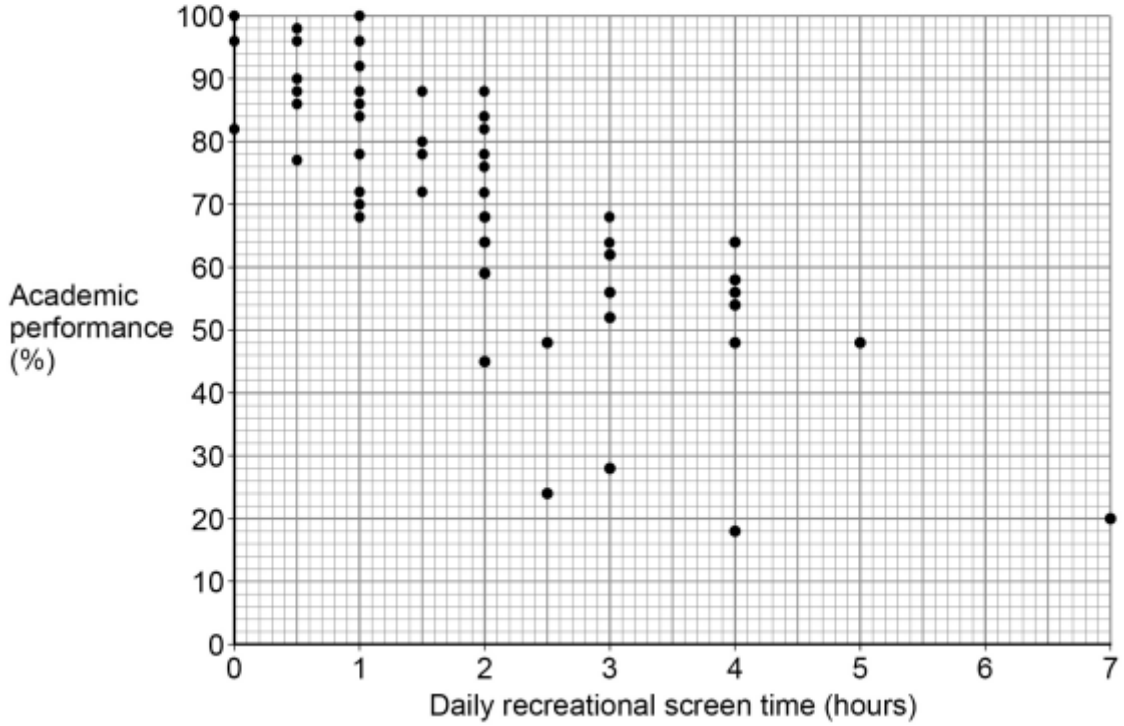
Question 24

This question was not well answered with the majority of students unable to access the marks either due to not attempting the question or due to a lack of understanding of what a Type II error is. A lot of students incorrectly explained a Type II error to be an error made in the calculation. Approximately a third of the cohort were able to correctly explain what a Type II error was but failed to contextualise their answers. The small proportion of students who did understand what was meant by a Type II error and were able to explain it in the context of the study attained full marks.

A study into the relationship between recreational screen time and academic achievement was conducted. Students were asked to self-report the number of hours spent watching TV, playing on their mobile phones or video games (daily recreational screen time) and their end-of-year test performances (academic performance).

The results of the study are shown in **Figure 2**.

Figure 2 The relationship between daily recreational screen time and academic performance



Which of the following correlation co-efficients best describes the data represented in **Figure 2**?

Shade **one** circle only.

[1 mark]

A –0.80 ⬭

B –0.25 ⬭

C +0.25 ⬭

D +0.80 ⬭

Mark Scheme:

Marks for this question: AO2 = 1

A –0.80

Identify the type of graph shown in **Figure 2** and explain why this is an appropriate graph to use for the data collected.

[3 marks]

Mark Scheme:

Marks for this question: AO2 = 3

1 mark for scattergram/scattergraph.

Plus

2 marks for a clear and coherent explanation linked to this study.

1 mark for a limited or muddled explanation.

Possible content:

- the study is correlational/looking at the relationship between recreational screen time and academic performance
- scattergrams display relationships between co-variables, academic performance and recreational screen time are co-variables.

Credit other relevant material.

Examiner Comment:

Question 14

Most students were able to identify the graph as being a scattergram and were able to give a limited explanation of why this would be appropriate but fewer managed to provide an explanation that referred to the actual data collected.

The psychologist decided to design an experiment to test the effects of recreational screen time on children's academic performance.

The psychologist randomly selected four schools from all the primary schools in her county to take part in the experiment involving Year 5 pupils. Three of the four schools agreed to take part. In total, there were 58 pupils whose parents consented for them to participate. The 58 pupils were then randomly allocated to **Group A** or **Group B**.

For the two-week period of the experiment, pupils in **Group A** had no recreational screen time. Pupils in **Group B** were allowed unrestricted recreational screen time. At the end of the experiment all pupils completed a 45-minute class test, to achieve a test score.

The feedback from one of the schools was that recreational screen time affected pupils' social interactions. The psychologist decided to investigate this further by using an observation of social interaction during playtime at the school.

Design the observation to investigate pupils' social interaction in the playground.

In your answer you will be awarded credit for providing appropriate details of:

- type of observation, with justification
- choice of time sampling **or** event sampling, with justification
- dealing with **one** relevant ethical issue
- assessing reliability of the data through inter-observer reliability.

[12 marks]

Mark Scheme:

Marks for this question: AO2 = 6 and AO3 = 6

Level	Marks	Description
4	10–12	Suggestions are generally well detailed and practical, showing sound understanding of observational design. All four elements are present. Justifications are appropriate. The answer is clear and coherent. Specialist terminology is used effectively. Minor detail and/or explanation sometimes lacking.
3	7–9	Suggestions are mostly sensible and practical, showing some understanding of observational design. At least three elements are present. There is some appropriate justification. The answer is mostly clear and well organised. Specialist terminology is mostly used effectively.
2	4–6	Some suggestions are appropriate but others are impractical or inadequately explained. At least two elements are addressed. Justifications are partial, muddled or absent. The answer lacks clarity, accuracy and organisation on occasions.
1	1–3	Knowledge of observational design is limited. At least one element is addressed. The whole answer lacks clarity, has many inaccuracies and is poorly organised.
	0	No relevant content.

Four elements of design to be credited:

- type of observation with justification for choice of observation type, eg covert or overt, naturalistic, participant or non-participant and why
- use of time **OR** event sampling with justification – recordings can take place at specified time intervals (time sampling), eg every minute **OR** as the behaviour occurs (event sampling), eg number of times child talks to another child
- dealing with **one** relevant ethical issue – request informed consent from parents, minimise risk of harm to pupils, confidentiality of personal data, debriefing, enabling a withdrawal of data
- how reliability of the data collection could be assessed, eg using two observers/raters and comparing separate recordings; statistical comparison (correlation) of data from both observers/raters.

Examiner Comment:

Question 25

Responses to this question generally showed a sound understanding of different types of observations and the rationale for choosing these as well as knowledge of key ethical issues. However, the responses also demonstrated that students are still struggling to understand what time and event sampling are. It was rare to see time sampling explained accurately and students often referred to sampling methods (e.g. opportunity sampling) rather than time/event sampling.

Students often described a range of potential ethical issues whereas the question required them to detail how they would deal with one relevant ethical issue. Those who correctly addressed this bullet point tended to focus on requiring parental/guardian consent, but this was often merely stated with generic justification rather than providing practical detail of how to deal with the ethical issue.

Reliability was tackled with mixed success. Some students had an excellent understanding of inter-observer reliability, detailing a practical explanation of how reliability of the data could be assessed through inter-observer reliability. However, there were also too many students who did not seem to understand the procedure and some suggested repeating the study at different times. Some answers also focussed on how to improve inter-observer reliability rather than how it would be assessed.

Overall, there is little evidence that students are engaged in or completing their own practical work. Responses generally consisted of a plethora of relevant key terms that were not applied appropriately and generic justifications rather than practical details. With more practical experience and less rote learning of theoretical concepts, students would be far less likely to confuse the alternative sampling terms. Teachers should be encouraged to deliver as much of the research studies content as practically as possible in order to develop the skills their students require to tackle design questions and even for students' potential further study in this field.