Surname	StemUp Model Solution	Centre Number	Candidate Number
First name(s)			2

GCE A LEVEL

A290U20-1

S24-A290U20-1

WEDNESDAY, 22 MAY 2024 – MORNING

PSYCHOLOGY – A level component 2
Psychology: Investigating Behaviour

2 hours 15 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**8**	
2.	**2**	
3.	**6**	
4.	**4**	
5.	**2**	
6.	**6**	
7.	**12**	
8.	**15**	
9.	**15**	
10.	**19**	
11.	**11**	
Total	**100**	

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ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. Additional space is provided for some questions within the booklet (if required). If further space is required for any question, you should use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

Assessment will take into account the quality of written communication used in your answers.

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SECTION A – Principles of Research

Answer **all** questions.

1. Define the following terms:

(a) Researcher bias. [2]

Researcher bias is when the researcher's expectations, either directly or indirectly, influence the results of a study, for example through how they design the study, how they behave towards participants (giving cues) or how they record and interpret the data, so the findings are distorted.

(b) Demand characteristics. [2]

Demand characteristics are a type of confounding variable where participants pick up cues and unconsciously work out the aim of the study, then change their behaviour, e.g. acting how they think the researcher wants (social desirability / please-you effect) or deliberately not (the screw-you effect).

(c) Predictive validity. [2]

Predictive validity is the degree to which a test or measure accurately forecasts a future outcome or behaviour that it should be related to, e.g. if high scores on an aptitude test given at 16 accurately predict later exam results or job performance.

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(d) Secondary sources. [2]

Secondary sources are data or sources that have not been directly collected or created by the researcher for the current study, but by someone else, e.g. official statistics, previous research used in a literature review or meta-analysis, or existing media analysed in a content analysis.

2. (a) Identify the type of skewed distribution in this diagram. [1]



Negative skew (left skewed).

(b) Identify the type of skewed distribution in this diagram. [1]



Positive skew (right skewed).

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3. Explain how psychologists use ethics committees and ethical guidelines to manage the risk posed by ethical issues. [3 + 3]

Ethics committees: before research can begin, the researcher submits a detailed proposal (aims, procedures, participants, risks) to an ethics committee, a board of experienced researchers and often lay members at a university or institution. The committee carries out a cost-benefit analysis, weighing the possible harm to participants against the value of the findings, and checks that the proposal meets the standards of current codes of conduct (e.g. the BPS Code of Ethics and Conduct). It can approve, reject or demand changes, e.g. adding a full debrief or removing a stressful task, and it monitors research while it is carried out, so risk is managed before anyone takes part.

Ethical guidelines: published codes such as the BPS Code of Human Research Ethics give a set of moral principles (respect, competence, responsibility, integrity) that guide research from planning to publication. They set out what researchers must do: obtain valid informed consent (parental consent for under-16s), avoid deception or justify it and debrief, protect participants from stress, anxiety, humiliation or pain (no more risk than in everyday life), give the right to withdraw, including their data, and keep data confidential and anonymous. Following them reduces risk, and breaking them can lead to sanctions by the BPS.

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4. (a) Explain why a psychological researcher might use standard deviation for measuring dispersion in a set of data. [2]

Standard deviation measures the average spread of every score around the mean, so it uses all the data and is more sensitive than the range, giving a more accurate representation of dispersion; it is the most appropriate measure for interval or ratio data that is normally distributed.

(b) Explain why a psychological researcher might use range for measuring dispersion in a set of data. [2]

The range (highest score minus lowest score) shows the difference between the lowest and highest scores, so it is quick and easy to calculate compared with the standard deviation, and it can be used with ordinal data, giving a simple first impression of spread.

5. Explain **one** advantage of using quantitative data in psychological research. [2]

Quantitative (numerical) data can be analysed using descriptive and inferential statistics, e.g. a Mann-Whitney U test, so the researcher can check objectively whether a difference is significant and not due to chance, and results can be easily compared and replicated, increasing reliability.

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6. Evaluate the use of brain scans in psychological research. [6]

Brain scans such as MRI, fMRI and PET give an objective, scientific assessment of brain structure and function. Unlike self-reports, they are not affected by social desirability or researcher interpretation, which increases validity and allows replication. They also allow psychologists to investigate the living brain, rather than waiting for a post-mortem, so changes over time, for example during recovery from brain injury, can be tracked.

Different scans have different strengths. MRI and fMRI do not expose participants to radiation, so they are best suited when a person must be scanned several times in the short term, and fMRI has good spatial resolution, showing which areas are active during a task. PET scans reveal chemical information, such as glucose use or neurotransmitter activity, that is not available with other techniques.

However, scans are extremely costly, so they are not easily available for research and samples are often small, which reduces generalisability. With PET, a radioactive tracer must be injected, so it can only be used a few times on each person, raising ethical issues of harm. Scans take a long time and can be noisy and uncomfortable, unsuitable for people with claustrophobia, children or those with metal implants. Because participants must lie still inside a machine, only a limited range of activities can be studied, so behaviour is artificial and ecological validity is low. Finally, scans show correlation, not causation: an active area may not be the cause of the behaviour, and fMRI has poor temporal resolution (a delay of a few seconds), so findings must be interpreted cautiously.

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7. (a) Discuss the limitations of the methodology used by Kohlberg (1968) in his research '*The child as a moral philosopher*'. [6]

Kohlberg used structured interviews based on hypothetical moral dilemmas (e.g. Heinz stealing a drug for his dying wife) in a longitudinal study of 75 American boys aged 10 to 16, followed up every three years for 12 years, plus cross-cultural comparisons (e.g. Taiwan, Mexico, Turkey).

Interviews: younger boys may struggle to answer long, abstract questions or stay focused, and they are more susceptible to researcher bias and social desirability, giving the answer they think the interviewer wants, which reduces validity. Kohlberg also had to interpret and score their reasoning into stages, which is subjective. However, interviews let him ask supplementary questions to probe the reasoning behind each answer.

Hypothetical dilemmas: the boys said what they would do, not what they actually would do, so moral reasoning may not match moral behaviour, lowering ecological validity. Different dilemmas and questions were used with boys of different ages, which reduced reliability, although keeping the scenarios standardised allowed an objective comparison across the sample.

Longitudinal method: over 12 years the study is likely to suffer sample attrition, so the remaining boys may be unrepresentative, though it did let Kohlberg track the actual development of the same boys, controlling participant variables.

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Sample and culture: an all-male, American sample means the stages may not generalise to females; Gilligan argued they are gender biased towards a justice orientation. The cross-cultural comparison was hindered by dilemmas and techniques developed in one (Western) culture, e.g. questions had to be changed for Taiwan, introducing cultural bias, although it did allow him to test whether moral development is universal or culturally specific.

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(b) Discuss ethical issues with Kohlberg's (1968) research *'The child as a moral philosopher'*. [6]

Risk of stress, anxiety, humiliation or pain: the dilemmas involved life and death situations, such as a dying wife or stealing, so some of the youngest boys (aged 10) were exposed to emotionally challenging scenarios that could cause anxiety or negative feelings, especially if they felt their answer was 'wrong'. However, the dilemmas were hypothetical and often not relevant to the children's own lives, so many may not have related to them personally, and the risk was probably no greater than in everyday life.

Valid consent: as the boys were under 16, consent would need to come from parents or next of kin. The children may have been asked for their own consent too, but younger boys may not have fully understood the aim or procedures, especially that they would be interviewed repeatedly for 12 years. Even with parental consent, the child may not have been protected from harm.

Right to withdraw and debriefing: the boys may have been told they could withdraw in line with ethical guidelines, but younger children often find it harder to refuse an adult researcher, and may have had difficulty understanding the nature of the research and any debrief offered.

Confidentiality: the longitudinal design meant detailed records of each boy's moral reasoning were kept for many years, so identities must be protected; there is no

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evidence names were published.

On balance, the ethical costs were fairly low and the research gave a valuable understanding of moral development, but by today's BPS standards more care would be needed with consent and debriefing for children.

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SECTION B – Personal Investigations

You should answer **all** the questions in this section with reference to the investigations carried out in your study of psychology.

INVESTIGATION ONE: An experiment on a context dependent memory task.

8. (a) (i) Explain how you operationalised the independent variable in your experiment. [2]

The IV was the room in which participants recalled the list of words: in condition 1 they learnt and recalled the list in the same room (the psychology classroom); in condition 2 they learnt it in the classroom and recalled it in a different room (the library).

(ii) Explain how you operationalised the dependent variable in your experiment. [2]

The DV was the number of words correctly recalled (written down in any order) from a list of 20 concrete nouns, during a 2-minute free recall test, so each participant scored from 0 to 20.

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(b) Identify **one** extraneous variable that you considered and explain how you managed this variable in your experiment. [3]

One extraneous variable was noise from the dining hall next to the library, which could distract participants in the different-room condition and lower recall. I managed this by carrying out the experiment during lesson time, when the dining hall was closed, so both rooms were equally quiet, and I kept the time of day (10 am) the same for both conditions.

(c) Explain **one** ethical issue that you considered and explain how you managed this ethical issue in your experiment. [4]

The ethical issue was deception. I did not tell the students that the aim of my study was to see whether recalling words in a different room affected memory; they were only told they would learn a list of words. This meant their consent was not fully informed.

I managed this by giving every student a full debrief straight after the recall test, explaining the true aim and why I had to hide it: if they had known, those moved to the library might have tried harder to remember, creating demand characteristics. I reminded them of their right to withdraw their data, which would then be destroyed, and they could ask me any questions.

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(d) Identify and fully justify the inferential statistic you used to analyse the data in your experiment. [4]

I used a Mann-Whitney U test.

It is a test of difference: I was testing for a difference in the number of words recalled between the two conditions (same room vs different room), not a correlation.

It is used for independent data: I used an independent groups design, with students randomly allocated to either stay in the classroom or move to the library, so different participants were in each condition.

The level of measurement was at least ordinal: I counted the number of words correctly recalled out of 20, which is interval data, but with only 10 students per group I could not assume normal distribution, so a non-parametric test was appropriate.

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INVESTIGATION TWO: A non-participant observation of mobile phone use.

9. (a) (i) State an operationalised hypothesis for your non-participant observation. [2]

Students will be recorded using their mobile phones in more of the 2-minute time-sampling intervals than teachers, during a 30-minute observation of the college canteen at lunchtime.

(ii) Identify whether your hypothesis in 9(a)(i) is directional or non-directional. [1]

Directional (one-tailed).

(b) Identify and briefly explain the observational sampling technique used in your non-participant observation. [3]

I used time sampling. I sat at a table in the college canteen from 12:30 to 1:00 pm and every 2 minutes (15 intervals) I looked at each of my target people and recorded on a tally chart whether or not they were using their mobile phone (phone in hand with the screen on), noting whether each was a student or a teacher. This meant I did not have to record everything continuously.

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(c) Evaluate the sampling technique you used to select participants for your non-participant observation. [4]

I used an opportunity sample: I observed the students and teachers who happened to be in the college canteen during the lunchtime observation. This was quick and easy, as I did not need a list of the whole college population or have to recruit anyone, so I could observe a large number of people (20 students and 10 teachers) in one session.

However, the sample was biased, as it only included people who use the canteen at lunchtime. Students without a lesson after lunch, or who eat outside, were missed, and teachers who use the canteen may be different from those who stay in the staff room, e.g. more relaxed and more likely to use their phones.

Also, I chose who to watch, so researcher bias may have affected the selection, e.g. choosing students I expected to be on their phones. This means my sample does not represent the wider college and I cannot generalise my findings.

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(d) A psychologist wants to replicate your non-participant observation. Apart from sampling, discuss **two** improvements that they could make. [5]

One improvement would be to use two observers and test inter-rater reliability. I was the only person observing, so my recordings could be affected by observer bias or by missing behaviour. The psychologist could use two trained observers, recording at the same time with the same clearly operationalised behavioural categories (e.g. 'phone in hand, screen on' and 'talking on phone'), and then correlate their tallies of phone use. A strong positive correlation (e.g. +0.8 or above) would show the observations are consistent, increasing reliability and making the findings more objective.

A second improvement would be to use standardised procedures over several sessions, e.g. observing students and teachers on their phones at the same time of day (12:30 pm) in the same area of the college on five different days. My study was a one-off occurrence, so the day, time or room could have been confounding variables, e.g. students may use their phones more on a Friday. Repeating it under the same conditions would show the findings are not a one-off, increasing validity and making the study easier to replicate.

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SECTION C – Application of research methods to a novel scenario

Answer **all** questions.

10. A self-selecting sample of 30 college students were randomly allocated into one of two groups – Group A watched an action movie and Group B watched a romantic movie. Students could take as many free bags of popcorn as they wanted during the movie.

The researcher predicted that more popcorn would be eaten during the action movie than during the romantic movie. At the end of the film, the amount of popcorn that each participant had eaten was recorded (**Figure 1**).

Figure 1: The number of bags of popcorn eaten during the action movie and the romantic movie

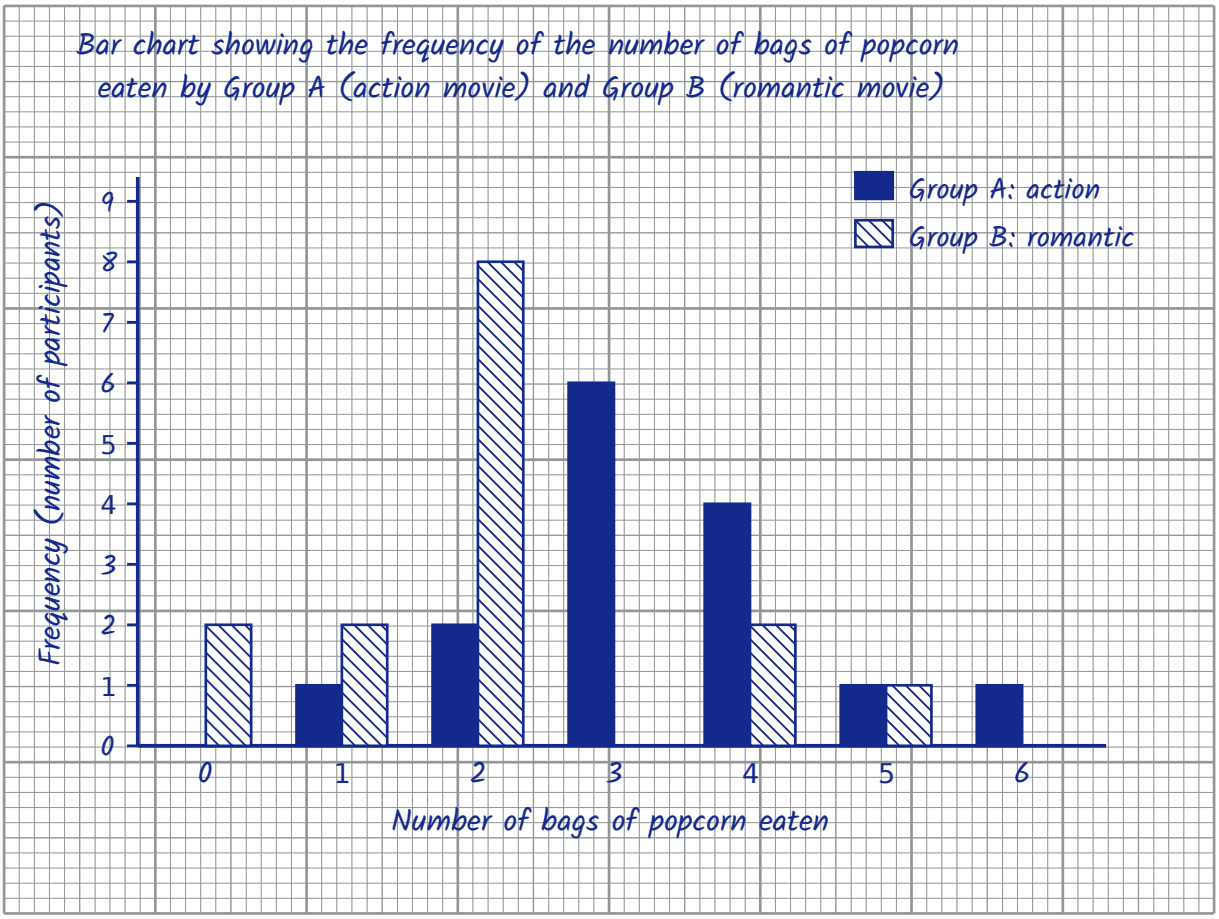
Participant number	Number of bags of popcorn eaten by Group A – watching an action movie	Participant number	Number of bags of popcorn eaten by Group B – watching a romantic movie
1	3	16	4
2	2	17	2
3	3	18	4
4	1	19	0
5	4	20	2
6	3	21	1
7	6	22	2
8	4	23	5
9	3	24	1
10	2	25	2
11	4	26	2
12	3	27	2
13	3	28	2
14	5	29	0
15	4	30	2

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(a) Using an appropriate graphical representation, display the data from **Figure 1**. [4]



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(b) (i) Suggest an appropriate measure of central tendency to describe the number of bags of popcorn eaten and fully justify why this is appropriate in this research. [3]

The mean is appropriate because the number of bags of popcorn eaten is ratio data and the mean uses every score, so it is the most sensitive measure. Its usual weakness, being distorted by extreme scores, does not apply here: none of the college students in Group A or B ate an extreme number of bags, as all scores fell between 0 and 6, so the mean is representative of each group.

(ii) Calculate the measure of central tendency identified in 10(b)(i) for Group A. Show your workings. [2]

Mean = total ÷ number of participants

Total for Group A = 3 + 2 + 3 + 1 + 4 + 3 + 6 + 4 + 3 + 2 + 4 + 3 + 3 + 5 + 4 = 50

Mean = 50 ÷ 15 = 3.33 bags of popcorn (2 d.p.)

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The psychologist analysed if the findings were significant by performing a Mann Whitney U test. The calculated value was 57.5

Figure 2: Critical values for the Mann Whitney U test, where $p \leq 0.05$

		N_1										
		10	***11***	***12***	***13***	***14***	***15***	***16***	***17***	***18***	***19***	***20***
N_2	***10***	27	31	34	37	41	44	48	51	55	58	62
	11	31	34	38	42	46	50	54	57	61	65	69
	12	34	38	42	47	51	55	60	64	68	72	77
	13	37	42	47	51	56	61	65	70	75	82	84
	14	41	46	51	56	61	66	71	77	82	87	92
	15	44	50	55	61	66	72	77	83	88	94	100
	16	48	54	60	65	71	77	83	89	95	101	107
	17	51	57	64	70	77	83	89	96	102	109	115
	18	55	61	68	75	82	88	95	102	109	116	123
	19	58	65	72	80	87	94	101	109	116	123	130
	20	62	69	77	84	92	100	107	115	123	130	138

(c) (i) Identify the appropriate critical value for this research from **Figure 2** above. [1]

72 (where $N_1 = 15$ and $N_2 = 15$ intersect)

(ii) Explain what is meant by '$p \leq 0.05$' in this research. [2]

It means the probability that the difference in the number of bags of popcorn eaten between the action movie group and the romantic movie group is due to chance is less than or equal to 5% (5 in 100). So we can be at least 95% confident the difference is caused by the type of movie.

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(iii) Explain why the researcher should accept or reject the null hypothesis. [2]

The researcher should reject the null hypothesis (and accept the alternative hypothesis), because for a Mann-Whitney U test the calculated value must be equal to or less than the critical value to be significant, and the calculated value of 57.5 is lower than the critical value of 72 ($p \leq 0.05$). So significantly more popcorn was eaten during the action movie.

(d) Explain why a psychologist would use an independent groups design rather than a repeated measures design. [5]

An independent groups design has no order effects. In a repeated measures design each student would watch both movies, so in the second movie they could already be full of popcorn from the first (a fatigue / satiation effect) or bored, which would lower the amount eaten in the second condition and confound the results. Counterbalancing only balances these effects rather than removing them. There is also less chance of demand characteristics. A student who watched both an action and a romantic movie and was offered free popcorn each time might guess the aim and deliberately eat more or less. In independent groups each student only experiences one condition, so the aim is less obvious and validity is higher.

Independent groups also avoid participant attrition between conditions, as each student only needs to attend one session (a full movie takes about 2 hours). Although individual differences, e.g. appetite, could vary between groups, randomly allocating students, as this researcher did, reduces this problem.

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11. A librarian is worried that the library where they work may be closed down due to a lack of use. A questionnaire was carried out on the high street of the town using an opportunity sample. People were asked for their reasons why they do or do not use library services.

(a) Explain **one** strength of collecting qualitative data rather than quantitative data in this questionnaire. [2]

Qualitative data from open questions lets people on the high street give their own reasons in depth (e.g. 'the opening hours clash with my work'), rather than being restricted to fixed responses chosen by the librarian, so the answers are more detailed and honest, increasing validity and showing what might bring people back.

(b) Explain **one** issue of reliability with this research and how the researcher could have dealt with the issue. [4]

One issue is external reliability: the questionnaire was only completed once, on one day, by an opportunity sample on the high street, so answers may not be consistent over time. For example, if it was a sunny Saturday people may give different reasons from a rainy weekday, or rush their answers while shopping. The researcher could deal with this using the test-retest method: give the same questionnaire to the same people again at a later date (e.g. two weeks later) under the same conditions (same time, day and weather) and correlate the two sets of answers. A strong positive correlation (+0.8 or above) would show high reliability.

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(c) Evaluate the use of a semi-structured interview compared to a structured interview in psychological research. [5]

A semi-structured interview uses some pre-set questions but lets the interviewer ask follow-up questions and change the order depending on the answers. This gives rich, detailed qualitative data and allows the interviewer to clarify misunderstandings and explore unexpected issues, so it has higher validity and gives insight into the reasons behind behaviour. Building rapport may also make participants more comfortable and honest, and the interviewer can respond to distress, which is ethically better on sensitive topics.

However, a structured interview asks every participant exactly the same questions in the same order, so it is standardised and easy to replicate, giving higher reliability. Its closed questions produce quantitative data that is quicker and easier to analyse and compare statistically. Semi-structured interviews are harder to analyse, because responses must be coded or analysed with thematic analysis, which is time-consuming and open to researcher bias in interpretation. They also need skilled, trained interviewers, and because each interview is different, answers are harder to compare and interviewer effects are more likely.

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Overall, a semi-structured interview is better for in-depth, valid exploration of a new topic, whereas a structured interview is better when reliability and easy comparison are the priority.

END OF PAPER

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