Please check the examination details below before entering your candidate information

Candidate surname: StemUp Model Solution

Other names:

Pearson Edexcel
International Advanced Level

Centre Number

Candidate Number

Thursday 14 January 2021

Afternoon (Time: 2 hours)

Paper Reference **WPS02/01**

Psychology

International Advanced Subsidiary

Paper 2: Biological Psychology, Learning Theories and Development

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 96.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- The list of formulae and statistical tables are printed at the start of this paper.
- Candidates may use a calculator.

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ▶

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FORMULAE AND STATISTICAL TABLES

Standard deviation (sample estimate)

$$\sqrt{\left(\frac{\sum(x-\bar{x})^2}{n-1}\right)}$$

Spearman's rank correlation coefficient

$$1-\frac{6\sum d^2}{n(n^2-1)}$$

Critical values for Spearman's rank

	Level of significance for a one-tailed test				
	0.05	**0.025**	**0.01**	**0.005**	**0.0025**
	Level of significance for a two-tailed test				
N	**0.10**	**0.05**	**0.025**	**0.01**	**0.005**
5	0.900	1.000	1.000	1.000	1.000
6	0.829	0.886	0.943	1.000	1.000
7	0.714	0.786	0.893	0.929	0.964
8	0.643	0.738	0.833	0.881	0.905
9	0.600	0.700	0.783	0.833	0.867
10	0.564	0.648	0.745	0.794	0.830
11	0.536	0.618	0.709	0.755	0.800
12	0.503	0.587	0.678	0.727	0.769
13	0.484	0.560	0.648	0.703	0.747
14	0.464	0.538	0.626	0.679	0.723
15	0.446	0.521	0.604	0.654	0.700
16	0.429	0.503	0.582	0.635	0.679
17	0.414	0.485	0.566	0.615	0.662
18	0.401	0.472	0.550	0.600	0.643
19	0.391	0.460	0.535	0.584	0.628
20	0.380	0.447	0.520	0.570	0.612
21	0.370	0.435	0.508	0.556	0.599
22	0.361	0.425	0.496	0.544	0.586
23	0.353	0.415	0.486	0.532	0.573
24	0.344	0.406	0.476	0.521	0.562
25	0.337	0.398	0.466	0.511	0.551
26	0.331	0.390	0.457	0.501	0.541
27	0.324	0.382	0.448	0.491	0.531
28	0.317	0.375	0.440	0.483	0.522
29	0.312	0.368	0.433	0.475	0.513
30	0.306	0.362	0.425	0.467	0.504

The calculated value must be equal to or exceed the critical value in this table for significance to be shown.

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Chi-squared distribution formula

$$X^2 = \sum \frac{(O-E)^2}{E} \qquad df = (r-1)(c-1)$$

Critical values for chi-squared distribution

	Level of significance for a one-tailed test					
	0.10	**0.05**	**0.025**	**0.01**	**0.005**	**0.0005**
	Level of significance for a two-tailed test					
df	**0.20**	**0.10**	**0.05**	**0.025**	**0.01**	**0.001**
1	1.64	2.71	3.84	5.02	6.64	10.83
2	3.22	4.61	5.99	7.38	9.21	13.82
3	4.64	6.25	7.82	9.35	11.35	16.27
4	5.99	7.78	9.49	11.14	13.28	18.47
5	7.29	9.24	11.07	12.83	15.09	20.52
6	8.56	10.65	12.59	14.45	16.81	22.46
7	9.80	12.02	14.07	16.01	18.48	24.32
8	11.03	13.36	15.51	17.54	20.09	26.12
9	12.24	14.68	16.92	19.02	21.67	27.88
10	13.44	15.99	18.31	20.48	23.21	29.59
11	14.63	17.28	19.68	21.92	24.73	31.26
12	15.81	18.55	21.03	23.34	26.22	32.91
13	16.99	19.81	22.36	24.74	27.69	34.53
14	18.15	21.06	23.69	26.12	29.14	36.12
15	19.31	22.31	25.00	27.49	30.58	37.70
16	20.47	23.54	26.30	28.85	32.00	39.25
17	21.62	24.77	27.59	30.19	33.41	40.79
18	22.76	25.99	28.87	31.53	34.81	42.31
19	23.90	27.20	30.14	32.85	36.19	43.82
20	25.04	28.41	31.41	34.17	37.57	45.32
21	26.17	29.62	32.67	35.48	38.93	46.80
22	27.30	30.81	33.92	36.78	40.29	48.27
23	28.43	32.01	35.17	38.08	41.64	49.73
24	29.55	33.20	36.42	39.36	42.98	51.18
25	30.68	34.38	37.65	40.65	44.31	52.62
26	31.80	35.56	38.89	41.92	45.64	54.05
27	32.91	36.74	40.11	43.20	46.96	55.48
28	34.03	37.92	41.34	44.46	48.28	56.89
29	35.14	39.09	42.56	45.72	49.59	58.30
30	36.25	40.26	43.77	46.98	50.89	59.70
40	47.27	51.81	55.76	59.34	63.69	73.40
50	58.16	63.17	67.51	71.42	76.15	86.66
60	68.97	74.40	79.08	83.30	88.38	99.61
70	79.72	85.53	90.53	95.02	100.43	112.32

The calculated value must be equal to or exceed the critical value in this table for significance to be shown.

Wilcoxon Signed Ranks test process

- Calculate the difference between two scores by taking one from the other
- Rank the differences giving the smallest difference Rank 1

  Note: do not rank any differences of 0 and when adding the number of scores, do not count those with a difference of 0, and ignore the signs when calculating the difference
- Add up the ranks for positive differences
- Add up the ranks for negative differences
- T is the figure that is the smallest when the ranks are totalled (may be positive or negative)
- N is the number of scores left, ignore those with 0 difference

Critical values for the Wilcoxon Signed Ranks test

	Level of significance for a one-tailed test		
	0.05	0.025	0.01
	Level of significance for a two-tailed test		
n	0.1	0.05	0.02
N=5	0	-	-
6	2	0	-
7	3	2	0
8	5	3	1
9	8	5	3
10	11	8	5
11	13	10	7
12	17	13	9

The calculated value must be equal to or less than the critical value in this table for significance to be shown.

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SECTION A

Biological Psychology

Answer ALL questions in this section. Write your answers in the spaces provided.

1 (a) Define the term 'infradian rhythm' as used in biological psychology.

(1)

An infradian rhythm is a biological rhythm with a cycle that lasts longer than 24 hours, such as the menstrual cycle, which lasts about 28 days.

(b) Explain **one** weakness of using infradian rhythms when explaining human behaviour.

(2)

Infradian rhythms are biologically reductionist, as they explain behaviour only through bodily cycles and hormones and ignore social and environmental factors. For example, a woman may be irritable or aggressive before menstruation because she has observed and imitated others behaving this way during their cycle, rather than because of the rhythm itself, so infradian rhythms are an incomplete explanation of human behaviour.

(Total for Question 1 = 3 marks)

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2 (a) Describe research into the role of hormones in aggression.

(4)

Research into hormones and aggression often uses the correlational method to see whether there is a relationship between levels of hormones, such as testosterone and cortisol, and levels of aggression. Chang et al. (2012) studied fish and found a positive correlation between testosterone and aggression, so the more testosterone the fish had, the more aggressive they were.

Some research measures hormone levels in saliva samples and compares them with measures of aggression. Okhlopkova et al. (2018) found increased levels of cortisol and testosterone in males who showed pronounced levels of aggression, suggesting that these hormones play a role in aggressive behaviour in humans.

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(b) Explain **one** strength and **one** weakness of research into the role of hormones in aggression.

(4)

Strength

Hormone research is scientific, as it is empirical and uses objective, observable data. For example, the amount of testosterone in saliva or blood can be measured precisely and compared with the number of specific aggressive acts counted, so the data are objective and free from researcher bias, making the findings more reliable.

Weakness

Research such as Chang et al. (2012) was conducted on fish, so the results may not be representative of aggression in humans. Humans have more complex thought processes and social norms that can mediate whether high testosterone leads to an aggressive response, so findings from animal research may not generalise to human aggression.

(Total for Question 2 = 8 marks)

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3 Juana had conducted an investigation into brain activity and aggression using an fMRI scan. Her sample consisted of 11 males, and she used a repeated measures design.

Juana measured the amount of brain activity in the participants when they were resting and then again when they were shown aggressive pictures.

Juana carried out a Wilcoxon signed ranks test on her data. She had a calculated value of 12.

(a) Explain, using data, whether Juana's results were significant at p=0.05 for a two-tailed (non-directional) test.

The formulae and statistical tables can be found at the front of this paper.

(2)

Juana's results were not significant, so there was no significant difference in brain activity between resting and being shown aggressive pictures. With N = 11 for a two-tailed test at p = 0.05, the critical value is 10. Her calculated value of 12 is greater than 10, and for a Wilcoxon test the calculated value must be equal to or less than the critical value to be significant.

(b) Explain **one** strength of Juana using an fMRI scan for her investigation.

(2)

The fMRI produces exact computer images of each participant's brain activity when resting and when shown the aggressive pictures. These images can be stored and looked at again by other researchers, who can check that Juana has interpreted the brain activity correctly, so her findings are objective and more reliable.

(Total for Question 3 = 4 marks)

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4 Ferdinand conducted a correlation to see if there was a relationship between the average number of hours slept per night and the average number of hours spent exercising per week.

Ferdinand asked his participants to fill in a daily diary stating how long they slept each night. The participants also had to record how long they exercised for in a week.

Ferdinand's results are shown in **Table 1**.

Participant	Average number of hours slept per night	Average number of hours spent exercising per week
A	7	4
B	4	2
C	5	4
D	6	5
E	8	6
F	8	5

Table 1

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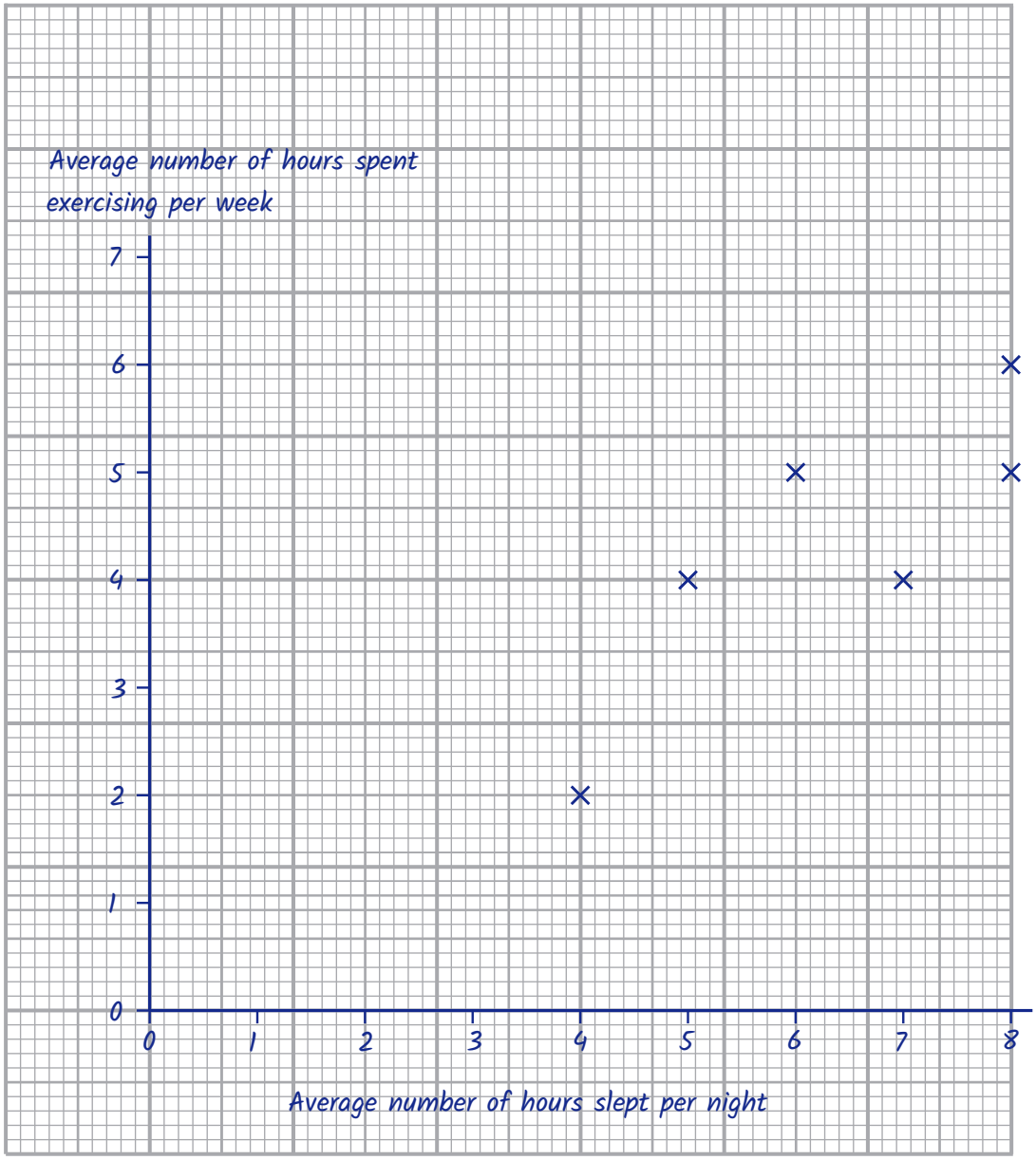
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(a) (i) Draw a scatter diagram to represent the data shown in **Table 1**.

(3)

Title

A scatter diagram to show the relationship between the average number of hours slept per night and the average number of hours spent exercising per week



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(ii) State the type of correlation from the scatter diagram you have drawn in (a)(i).

(1)

Positive correlation: as the average hours slept per night increase, the average hours spent exercising per week also increase.

(b) Explain **one** improvement Ferdinand could make to his investigation.

(2)

Ferdinand could ask his participants to wear a sleep-tracking device, such as a wrist monitor, that records how long they actually sleep each night rather than relying on their diary entries. This removes errors from participants guessing or misremembering their sleep, so his data on hours slept would be more accurate and his results more valid.

(Total for Question 4 = 6 marks)

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5 Rosa is a psychologist who works with families who need help. She has assessed a family who have been referred to her due to their aggression.

The father of the family frequently shouts at the children and throws objects at walls. The eldest two children often fight with each other, which led to one of the children having to go to hospital for treatment.

Rosa believes that genes play a role in the aggression displayed by the family.

(a) Describe the role genes may play in the family's aggression.

(3)

The family members may have inherited the low-activity MAOA-L gene variant, sometimes called the warrior gene, which runs in families and would explain why the father and both eldest children are aggressive. MAOA-L produces less of the enzyme monoamine oxidase A, so neurotransmitters such as serotonin and dopamine are not broken down properly, which affects the regulation of aggression. This may be why the father shouts and throws objects at walls and why the two children fight so violently that one needed hospital treatment.

(b) Explain **one** weakness of the role of genes in explaining the family's aggression.

(2)

Genes alone may not explain the family's aggression, as the MAOA-L gene seems to lead to aggression mainly when combined with an adverse environment. The children may have learned to fight by observing and imitating their father shouting and throwing objects, so a purely genetic explanation ignores nurture and is an incomplete explanation of their aggression.

(Total for Question 5 = 5 marks)

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6 Evaluate light therapy as a treatment for seasonal affective disorder.

(8)

Light therapy treats seasonal affective disorder (SAD), a type of depression that occurs in winter when there are fewer daylight hours. The person sits in front of a light box that emits bright light of about 10,000 lux, around 41 to 61 centimetres from their face, for about 30 to 60 minutes each morning, every day. The box may give full spectrum light or a specific bandwidth of blue light. Alternatively, a dawn simulator can be used, which gradually brightens the light in the bedroom before the person wakes. The bright light is thought to suppress the release of melatonin and reset the circadian rhythm, improving mood.

A strength is that light therapy works quickly. Avery et al. (2001) reported that it usually works after 1 to 2 weeks, so it may be better than psychotherapies, which can take longer to be effective. Light therapy is also non-invasive and can be used at home, so it is cheap and convenient.

Different types of light therapy are effective. Danilenko et al. (2015) found that dawn simulators were almost as effective as bright light boxes, with depression scores reducing by 42.2%, so people who cannot sit in front of a light box each morning can still benefit.

However, light therapy may not be the best long-term treatment. Rohan et al. (2015) found that patients who had cognitive behavioural therapy had fewer depressive episodes two winters later than those who had light therapy, which suggests that light therapy treats the symptoms only while it is being used, whereas CBT changes the negative thinking behind the disorder.

Light therapy is also not suitable for everyone. People with some eye problems, or who take certain antibiotics that make them sensitive to light, cannot use it because the bright light may

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damage their eyes, and some people experience side effects such as headaches.

In conclusion, light therapy is an effective, fast-acting treatment for many people with SAD and can be delivered in different ways, but it is not suitable for everyone and its effects may not last as long as CBT, so it may work best alongside a psychological therapy.

(Total for Question 6 = 8 marks)

TOTAL FOR SECTION A = 34 MARKS

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SECTION B

Learning Theories And Development

Answer ALL questions in this section. Write your answers in the spaces provided.

7 In your studies of learning theories and development, you will have learned about operant conditioning.

Describe, using an example, what is meant by the term 'primary reinforcement' as used in operant conditioning.

Primary reinforcement is a reward that satisfies a basic biological need, such as food, water or warmth, so it is reinforcing without having to be learned. For example, a hungry child who is given a biscuit they like after putting their toys away is more likely to put their toys away again.

(Total for Question 7 = 2 marks)

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8 Xuanye has carried out some research into the number of times children repeated a behaviour. He took the names of all the children aged four years old in his village. He put the names into a computer programme, which then selected his sample. There was an equal chance for each child to become part of the sample.

Xuanye observed the children for 10 minutes. He tallied how many times they displayed a behaviour after they had received a reward for the first time they demonstrated that behaviour.

(a) (i) Identify the sampling technique Xuanye used to collect his participants.

(1)

Random sampling, as every four-year-old in the village had an equal chance of being selected by the computer programme.

(ii) Explain **one** strength of using the sampling technique you identified in (a)(i) for Xuanye's study.

(2)

Because the computer selected the four-year-olds and each had an equal chance of being picked, the sample is free from researcher bias. Xuanye could not choose children he knew would repeat a behaviour more after being rewarded, so his tallies of repeated behaviour are more likely to be valid and representative of four-year-olds in the village.

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(b) Calculate the standard deviation for the data gathered by Xuanye, where the sum of the differences^2 is 48 and n = 6.

You **must** substitute the data into the correct formulae and give your answer to **one** decimal place.

The formulae and statistical tables can be found at the front of this paper.

(3)

Space for calculations

$$s = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}}$$

$$= \sqrt{\frac{48}{6 - 1}}$$

$$= \sqrt{\frac{48}{5}} = \sqrt{9.6} = 3.098...$$

Standard deviation = 3.1

(Total for Question 8 = 6 marks)

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9 In your studies of learning theories and development, you will have conducted a practical investigation.

(a) Describe the procedure of your learning theories and development practical investigation.

(4)

Our practical was an observation of children's play with gender-stereotyped and aggressive toys. Before the observation we categorised toys into non-aggressive toys, such as dolls and tea sets, and aggressive toys, such as toy swords and guns. We then watched a video found on YouTube of boys and girls playing with toys at a nursery. Four of us watched the same video and, for each child, recorded on a tally chart whether the first toy they played with was aggressive or non-aggressive, giving quantitative data. We then watched the video a second time and wrote down what the children said while playing with the aggressive and non-aggressive toys, giving qualitative data.

(b) Explain **one** strength of your learning theories and development practical investigation in terms of validity.

(2)

The video showed the children playing at their own nursery, which is their natural setting, so the observation had high ecological validity. The children were playing with the toys they usually play with and were not aware of us observing them, so their choice of aggressive or non-aggressive toys and what they said would have been natural and realistic.

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(c) Explain **one** improvement you could have made to you learning theories and development practical investigation in terms of reliability.

(2)

We should have kept pausing the video whenever the children were talking so that we could write down exactly what they were saying. This would mean we had a full record of the qualitative data, so if other researchers repeated our observation of the same video they would get the same qualitative data, increasing reliability.

(Total for Question 9 = 8 marks)

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10 (a) Describe the object relations school of thought as a therapy/treatment.

(4)

Object relations therapy is based on the idea that our past relationships with significant others, or 'objects', especially our early caregivers, affect our present relationships. Relationships from childhood are internalised and unconsciously form the standards and patterns we expect in relationships as adults. The therapy aims to bring these unconscious ideas about relationships into the conscious mind so the client can gain insight into their current behaviour. To do this the therapist must gain the client's trust and show they are listening, so the client feels safe talking about past relationships, and the client's relationship with the therapist can be used to explore these patterns.

(b) Explain **one** weakness of the object relations school of thought as a therapy/treatment.

(2)

Object relations therapy may not be effective for disorders such as depression, where clients may lack the motivation to engage with the therapist and talk openly about their past relationships. Drug treatments may be better for these clients, as the client does not need to talk about their past for the treatment to be effective.

(Total for Question 10 = 6 marks)

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11 Explain **two** weaknesses of classical conditioning as an explanation of human behaviour.

1 *Classical conditioning only explains how we learn to associate reflex responses with new stimuli, so it cannot explain how we learn new voluntary behaviours. Operant conditioning is needed to explain how reinforcement teaches new voluntary behaviours, which reduces the validity of classical conditioning as an explanation of human behaviour.*

2 *Classical conditioning focuses on nurture and ignores other explanations of behaviour, such as biological factors like genes and hormones. This means it is not a complete explanation of human behaviours such as aggression, which reduces its credibility.*

(Total for Question 11 = 4 marks)

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12 Assess the contemporary study by Capafóns et al. (1998) in terms of reliability and validity.

(8)

Capafóns et al. (1998) aimed to investigate whether systematic desensitisation is an effective treatment for fear of flying. A sample of 41 volunteers with a fear of flying was randomly allocated, 20 to the treatment group and 21 to a control group. The treatment group were taught relaxation and worked through a hierarchy of feared situations, including a flight simulator with videos and sounds of a flight. Fear of flying was measured in a variety of ways, including the EMV fear of flying scale to measure anxiety. The results showed a significant difference in fear of flying, with the treatment group showing less fear of flying than the control group.

The study has good reliability because the measurements used, such as the EMV, are standardised and have been used before, so other researchers could use the same measures to replicate the study and check the findings. However, participants had between 12 and 15 sessions of treatment, so the procedure was not fully standardised. The number of sessions could affect how much fear was reduced, so a replication may not get the same results, which lowers reliability.

Validity is improved because participants were randomly allocated to the treatment and control groups. This meant there was no bias in deciding who received the treatment and participant variables, such as how severe each person's fear was, were spread across both groups. The use of a control group also means the reduction in fear can be attributed to systematic desensitisation rather than time passing, increasing internal validity.

However, the treatment used videos in a flight simulator, so it may not have been a valid measure of fear when actually on an aeroplane, lowering ecological validity. Much of the data

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also came from self-report questionnaires, so participants may have given socially desirable answers, claiming less fear after treatment than they really felt.

Overall, the study is fairly reliable because of its standardised measures, and its random allocation and control group give it good internal validity, but the varying number of sessions and the artificial flight simulator reduce its reliability and ecological validity, so the findings should be applied to real flying with some caution.

(Total for Question 12 = 8 marks)

TOTAL FOR SECTION B = 34 MARKS

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SECTION C

Answer ALL questions in this section. Write your answers in the spaces provided.

13 Philippe is 27 years old. He finds it hard to maintain a romantic relationship. He has just separated from his partner. Philippe's partner said that Philippe was looking for a mother not a romantic partner. The partner also claimed that Philippe had deliberately caused arguments, though Philippe denies this.

Philippe has started smoking cigarettes again. His home is messier than usual now there is no one else there to help with the cleaning.

Evaluate Freud's psychosexual stages of development as an explanation of Philippe's behaviour.

You must make reference to the context in your answer.

(12)

Freud stated that children develop through five psychosexual stages: oral, anal, phallic, latent and genital. At each stage the libido is focused on a different part of the body, and if a child does not successfully resolve a stage, through too much or too little gratification, they become fixated, which affects their adult personality. Freud also proposed that the mind is made up of the conscious, preconscious and unconscious, and that the unconscious is the largest part of the mind and motivates our behaviour.

Philippe is 27, so he should be in the genital stage, where desires are gratified through mature relationships with the opposite sex. However, he finds it hard to maintain a romantic relationship, which suggests earlier stages were not successfully resolved. Philippe may be fixated in the oral stage, as he has started smoking cigarettes again since his relationship ended; under stress he may regress to the oral stage to gain oral gratification. His home being messier than usual may suggest an anal expulsive personality, linked to fixation in the anal stage, which is associated with being messy and disorganised.

During the phallic stage, boys go through the Oedipus complex, where they unconsciously desire their mother and fear their father. Philippe may not have resolved this complex by identifying with his father, which would explain why his partner said he was looking for a mother rather

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than a romantic partner. Philippe also denies deliberately causing arguments, which Freud would explain as his unconscious mind motivating the arguments, and his denial may be a defence mechanism protecting him from this anxiety.

There is some support for the theory. Fisher and Greenberg (1996) carried out a meta-analysis and found evidence of an oral personality, with over-eating being one way people sought oral gratification, which supports the idea that Philippe's smoking is linked to oral fixation. Freud (1909) also explained Little Hans' fear of horses as an unconscious fear of his father during the Oedipus complex, supporting the idea that unresolved conflicts with parents can shape later behaviour, as with Philippe looking for a mother figure.

However, Freud's theory is based on very limited evidence. He only studied one child, Little Hans, and much of the case was reported through the boy's father, while the rest of his data came from adult patients recalling their childhoods retrospectively, which may be inaccurate. This means the theory may not generalise to Philippe.

The theory is also unscientific, as unconscious processes such as fixation and the Oedipus complex cannot be directly observed or measured, so it is hard to test whether Philippe's arguments are unconsciously motivated. Other explanations may fit better: Philippe's smoking may be due to nicotine addiction or stress, and his home may be messier simply because his partner used to help with the cleaning.

In conclusion, Freud's psychosexual stages can explain all of Philippe's behaviours, including his smoking, messiness and wish for a mother figure, and there is some support from Fisher and Greenberg (1996). However, because the theory is unfalsifiable and based on limited evidence, and simpler situational explanations exist, it is unlikely to be a complete explanation of Philippe's

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behaviour.

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14 Henrietta has been in trouble for her aggression. She has poured a drink over a customer after they complained about the service at the restaurant she works at. Her boss says that if Henrietta is aggressive again to someone at work she will be fired.

Henrietta's parents have said that she has to look for somewhere else to live after she threw a book at her younger brother. Her father thinks Henrietta's aggression is due to her watching the behaviour of the female lead in a martial arts film. Her mother thinks that the aggression is due to damage to Henrietta's prefrontal cortex after she fell down some stairs.

To what extent do social learning theory and the prefrontal cortex explain Henrietta's behaviour?

You must make reference to the context in your answer.

(16)

Social learning theory (Bandura) states that aggression is learned by observing and imitating role models. Role models are people with certain characteristics, such as being powerful, attractive or the same sex as the observer. Because the model is important to the observer, their behaviour is paid attention to and retained in memory, and it is reproduced if the observer is able to and is motivated to. If the model is reinforced for the behaviour, the observer experiences vicarious reinforcement and is more likely to imitate it.

Henrietta's father believes she is copying the female lead in a martial arts film. The female lead is the same sex as Henrietta and will have power, as she uses her martial arts to gain victory over her opponents. Henrietta may see this victory and the fame the female lead gains as a reinforcer, so she pays attention to and copies the aggressive actions she saw in the film.

Bandura (1965) supports this, as he found that children were more likely to copy a model's aggressive behaviour towards a Bobo doll when the model was rewarded rather than punished. This may explain why Henrietta imitates the aggression of the female lead, who is rewarded with victory. However, much of Bandura's research used young children and a Bobo doll, which is designed to be hit, so it may not generalise to Henrietta, who is an adult with a job and is aggressive towards real people. Henrietta also pours a drink and throws a book, which are not

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martial arts moves, so she is not directly imitating the film, and she continues to be aggressive even though she is being punished by her boss and parents.

The prefrontal cortex is involved in decision making, impulse control and the delay of gratification. If the prefrontal cortex is damaged or has decreased functioning, people become more impulsive because their decision making is impaired, so reactive aggression may take place in situations where it is unwarranted.

Henrietta's mother believes the damage to her prefrontal cortex from falling down the stairs is the cause. Henrietta threw a drink over a customer as an immediate reaction to their complaint about the service, which is reactive aggression in a situation where it was not warranted. She may also not have thought about the consequences of throwing a book at her brother, throwing it on impulse, as her damaged prefrontal cortex cannot inhibit the response, even though she risks losing her job and her home.

Raine et al. (1997) found that murderers had less activity in areas of the prefrontal cortex, including the left and right medial superior frontal cortex, than controls, suggesting that reduced prefrontal activity may cause Henrietta's aggression. Choy et al. (2018) found that stimulating the prefrontal cortex led to participants having less intention to carry out a physical assault in a hypothetical situation, so if Henrietta's prefrontal cortex is under-stimulated after her fall it may explain her aggression. However, Raine et al. (1997) studied murderers, so the findings may not generalise to Henrietta, and brain scans only show a correlation, not that the brain damage caused the aggression.

The prefrontal cortex explanation focuses on nature and ignores nurture factors, such as negative childhood experiences. Anjum et al. (2019) found a significant positive relationship between how

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authoritarian parents were and levels of aggression. Henrietta's parents are telling her to leave home, which may suggest a strict, authoritarian parenting style, so her aggression may be partly due to her upbringing rather than only her brain damage or the film.

In conclusion, the prefrontal cortex better explains the impulsive, reactive nature of Henrietta's aggression, which happens on the spot in response to a complaint or an argument, and the timing after her fall supports this. Social learning theory explains less, as her aggressive acts do not match the martial arts film. However, both explanations ignore other factors such as parenting, so Henrietta's behaviour is best explained by an interaction of brain damage, which reduces her impulse control, with learned and environmental influences.

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