Please check the examination details below before entering your candidate information

Candidate surname	Other names
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Pearson Edexcel
International Advanced Level

Centre Number | | | | | |

Candidate Number | | | | |

Friday 7 June 2019

Afternoon (Time: 2 hours) | Paper Reference **WPS04/01**

Psychology

International Advanced Level

Paper 4: Clinical Psychology and Psychological Skills

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.

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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

CLINICAL PSYCHOLOGY

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

1 In your studies of clinical psychology you will have learned about mental health disorders such as schizophrenia.

(a) Describe the symptoms and/or features of schizophrenia.

(3)

Schizophrenia is a psychotic disorder where the person loses contact with reality. Positive symptoms include auditory hallucinations, where the person hears things that are not there, such as voices telling them they are useless, and delusions, which are false beliefs held with conviction, such as delusions of persecution. Negative symptoms include flat affect, alogia (poverty of speech) and avolition (lack of motivation).

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(b) You will have also learned about either unipolar depression or anorexia nervosa.

Explain **two** strengths of one biological explanation for either unipolar depression or anorexia nervosa.

(4)

Chosen disorder

Anorexia nervosa

Strength 1

There is research support for the genetic explanation. Kortegaard et al. (2001) found that concordance for anorexia was higher in MZ twins than in DZ twins, in a sample of 34,142 young Danish twins, with a heritability estimate of 0.48 for narrowly defined anorexia. As MZ twins share 100% of their genes, this suggests genes contribute to anorexia, giving the explanation validity.

Strength 2

The findings have been replicated in a different large sample. Bulik et al. (2006) assessed 31,406 twins in Sweden and found a heritability of 0.56 for narrowly defined anorexia, suggesting more than half of the cause is heritable. This consistency makes the genetic explanation more reliable.

(Total for Question 1 = 7 marks)

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2 In your studies of clinical psychology you will have learned about the classic study by Rosenhan (1973) in detail.

(a) State **one** aim of the classic study by Rosenhan (1973).

(1)

To see whether sane people could be distinguished from the insane by psychiatrists using the DSM, ie whether diagnosis of mental disorder is valid.

(b) Explain **one** strength and **one** weakness of the classic study by Rosenhan (1973).

(4)

Strength

Rosenhan (1973) has high ecological validity, as it took place in a real-life setting: the pseudo-patients were admitted to 12 real psychiatric hospitals and staff did not know they were being studied. So the staff behaved naturally, and the findings about diagnosis reflect real practice.

Weakness

It can be considered unethical due to deception, as the hospital staff were deceived about the pseudo-patients' symptoms (hearing "empty", "hollow" and "thud") and were not told that they were being studied, so they could not give informed consent or withdraw.

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(c) Explain **one** way Rosenhan's (1973) study could have been improved.

(2)

Rosenhan could have gained informed consent from the staff within the hospitals, not just from the person in charge (eg the hospital administrator). This would have given the staff a choice about whether to participate, which they did not have in the original study, so it would be more ethical.

(Total for Question 2 = 7 marks)

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3 Henima goes to Clinic A and is diagnosed with a mental health disorder. Henima is unhappy with her diagnosis so she goes to Clinic B and is not diagnosed with a mental health disorder.

Henima is worried about the reliability and validity of the diagnosis of mental health disorders after her recent experience.

Explain whether Henima should be worried about the reliability **and** validity of the diagnosis of mental health disorders.

(6)

Henima has some reason to be worried about reliability. Reliability means that the same diagnosis is given by different clinicians (inter-rater reliability). As Clinic A diagnosed a disorder and Clinic B did not, the two clinicians did not agree, so her own experience suggests diagnosis is not always consistent. This could be because the clinics used different classification systems or versions (eg DSM-IV-TR or DSM-5, or the ICD-10), which have different criteria for the same disorder.

However, Henima does not need to be overly concerned, as research suggests reliability is usually good. Brown et al. (2001) assessed 362 outpatients with two independent interviews using the DSM-IV and found good-to-excellent agreement for most of the anxiety and mood disorder categories. So if both clinics used the same system carefully, they should normally reach the same diagnosis.

Henima may be more concerned about validity, which is whether the diagnosis is accurate and measures the disorder it claims to. Rosenhan (1973) found that pseudo-patients who reported hearing voices were admitted to psychiatric hospitals and labelled with schizophrenia, suggesting that clinicians cannot always tell the sane from the insane, so Clinic A may have given a false diagnosis.

On the other hand, Andrews et al. (1999) compared the DSM-IV and ICD-10 when assessing about 1500 people and found good agreement for diagnoses of depression, substance dependence

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and anxiety, which shows good concurrent (criterion) validity. So, overall, Henima should be a little cautious and could ask for a third opinion, but diagnosis is mostly reliable and valid.

(Total for Question 3 = 6 marks)

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4 Sadiah is a clinical psychologist who has just been approached by a prestigious journal called 'Super Psychology Research' to conduct peer reviews on unpublished research articles.

Sadiah has received an article about the effectiveness of family therapy for the treatment of schizophrenia.

Describe how Sadiah would carry out a peer review of the article she has received for the journal 'Super Psychology Research'.

(4)

Sadiah would read the family therapy article carefully and give her main impression of it, saying whether the research is original and adds to the knowledge base on treating schizophrenia. She would check that the article meets the standards and format of 'Super Psychology Research', pointing out any sections that need updating to make them consistent. She would give specific comments and suggestions about the method, eg the sample of families, the measures of relapse and whether the conclusions about the effectiveness of family therapy are supported by the data. Finally, she would make a recommendation to the editor: accept without revision, accept if certain revisions are made, or reject, giving her reasons. It would usually be anonymous so her review is honest.

(Total for Question 4 = 4 marks)

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5 When diagnosing mental health issues clinicians use classification systems such as the ICD or DSM.

(a) State **two** features of the ICD.

(2)

1 *The ICD (published by the World Health Organisation) covers all health conditions, not only mental disorders, which are in one chapter (Chapter F in ICD-10).*

2 *The ICD is multilingual and used internationally, so it is not restricted to a single country or language (unlike the DSM, which is American).*

(b) Compare the DSM IVR with the DSM V.

(2)

A similarity is that both the DSM IVR and DSM V use a categorical classification of separate disorders, each with a list of symptoms that must be present for a diagnosis. A difference is that the DSM V has a single condition, autism spectrum disorder, which includes four separate disorders from the DSM IVR (eg Asperger's disorder), and the DSM V removed the multiaxial system of the DSM IVR.

(Total for Question 5 = 4 marks)

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6 Abbas used a questionnaire to investigate the attitude of young people (16 to 20 years old) towards those who have been diagnosed with a mental health issue.

Abbas used a number of ranked scale questions to determine how positive attitudes were towards those with a mental health issue.

On the ranked scale, mean scores of 1-3 indicated a negative attitude, 4 indicated a neutral attitude, and 5-7 indicated a positive attitude towards those with a mental health issue.

A tally of Abbas's results are shown in **Table 1**.

Negative attitude (mean score of 1-3)	Neutral attitude (mean score of 4)	Positive attitude (mean score of 5-7)
𝍸	///	𝍸 𝍸 ///

Table 1

(a) Explain **one** conclusion that you could make from the data shown in **Table 1**.

(2)

Most young people (16 to 20 years old) held a positive attitude towards those diagnosed with a mental health issue, as 13 out of 21 young people had a positive attitude (mean score 5-7), compared with only 3 with a neutral attitude and 5 with a negative attitude.

(b) Explain **one** weakness of Abbas using a questionnaire in his investigation.

(2)

The young people may not have answered honestly because of social desirability bias, giving a more positive attitude to people with a mental health issue than they really held, so as not to appear prejudiced. This means Abbas's results may lack validity.

(Total for Question 6 = 4 marks)

TOTAL FOR SECTION A = 32 MARKS

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SECTION B

Answer the question. Write your answer in the space provided.

7 Evaluate drug therapy as a treatment for schizophrenia.

(16)

Drug therapy for schizophrenia uses antipsychotic drugs, which aim to change the chemistry of the brain. It is based on biological explanations such as the dopamine hypothesis, which claims that excess dopamine activity in the mesolimbic pathway causes positive symptoms. Typical antipsychotics such as phenothiazines (eg chlorpromazine) and haloperidol block D2 dopamine receptors, minimising the effect of dopamine and suppressing hallucinations and delusions. Atypical antipsychotics such as clozapine and risperidone block dopamine and also serotonin receptors, and aim to treat negative symptoms too. Drugs can be taken as tablets or syrup, or given as a depot injection if patients forget to take them, and can be used alongside antidepressants.

A strength is that there is evidence that antipsychotics are effective. Meltzer et al. (2004) found that patients taking haloperidol had reduced symptoms of schizophrenia and showed improvements in day-to-day functioning. Emsley (2008) found that risperidone given by injection reduced both positive and negative symptoms, with 64% of patients having no symptoms two years later. Pickar et al. (1992) gave 21 patients a placebo, clozapine or fluphenazine and found clozapine was the most effective and the placebo the least. As the drugs work better than a placebo, the improvement is caused by the drug rather than expectations, which also supports the dopamine hypothesis.

Drug therapy also has practical benefits. It works relatively quickly, is cheap and needs little effort from the patient compared with therapies such as CBT, which require insight and motivation that patients with negative symptoms may lack. By reducing symptoms, drugs allow patients to stay in society and live independently rather than becoming institutionalised in

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hospital.

However, antipsychotics have serious side effects. Typical antipsychotics can cause tardive dyskinesia (involuntary movements), and drugs can cause weight gain and a decrease in motivation. Adityanjee and Kaizad (2005) found that in 0.05% of patients antipsychotics lead to neuroleptic malignant syndrome, which causes nausea, high blood pressure, confusion and coma, and in 10% of these cases, death. So there are ethical issues in prescribing them.

Because of these side effects, compliance is a problem. Rosa et al. (2005) found that only 50% of patients complied with taking their antipsychotics. If patients stop taking the drugs, symptoms are likely to return, so the treatment is less effective in real life than in controlled trials, and it treats the symptoms rather than curing the cause.

Drugs may also not be sufficient on their own. Bustillo et al. (2001) found that Assertive Community Treatment (ACT) had clear effects on preventing psychotic relapse and rehospitalisation, suggesting that social and psychological support is also needed. Drug therapy also ignores environmental factors such as family relationships, so it may be reductionist.

Finally, the evidence itself has limitations. A meta-analysis by Hartling et al. (2012) reviewed 114 studies and found it difficult to reach overall conclusions about the effectiveness of antipsychotics because of possible bias, brief follow-up periods and selective samples. Many trials are funded by drug companies, which may reduce the objectivity of the findings.

In conclusion, drug therapy is an effective treatment for many patients, especially for the positive symptoms, and there is good evidence from placebo-controlled studies to support it. However, side effects reduce compliance and drugs do not address the social causes of relapse,

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so drug therapy is most effective when combined with psychological treatments such as family therapy or ACT.

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(Total for Question 7 = 16 marks)

TOTAL FOR SECTION B = 16 MARKS

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SECTION C

PSYCHOLOGICAL SKILLS

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

8 Arina has been asked to conduct an investigation into how the brain responds when a person is told a joke. Arina has decided to use positron emission tomography (PET) scanning for her investigation.

(a) Describe how PET scanning could be used by Arina to investigate how the brain responds when a person is told a joke.

(4)

PET scanning is a functional scanning technique, so Arina could use it to see which parts of the brain are active while a joke is being told. She would first inject the participant with a radioactive tracer such as radioactive glucose, then the participant would lie in the scanner and watch a video of comedians telling jokes. Active brain areas use more glucose, so the tracer collects there and breaks down, emitting positrons. The positrons collide with electrons to produce gamma rays, which are detected by the scanner. A computer turns this into a colour map, so Arina could compare brain activity during the jokes with a baseline scan when no joke is told.

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(b) Explain **one** strength and **one** weakness of using PET scanning in psychology.

(4)

Strength

PET scanning is an objective method, as it produces a scan of brain activity that can be interpreted by several researchers. This means the interpretation of brain activity is reliable, because there is consistency between the researchers looking at the same scan.

Weakness

PET scanning takes place in artificial surroundings, with participants lying still on a table in a scanner. Brain activity may differ from that in the real world, where people are active, so findings lack ecological validity. It also involves injecting a radioactive substance, which is invasive.

(Total for Question 8 = 8 marks)

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9 Skylar wanted to investigate the influence of a reward on the behaviour of rats.

Skylar set up a maze and recorded how long, in seconds, it took rats to complete the maze. The time taken to complete the maze was recorded for each rat without a reward (Condition A) and for the same rats with a reward (Condition B).

Skylar's results are shown in **Table 2**.

Rat	Condition A Time taken (seconds) to complete the maze without a reward	Condition B Time taken (seconds) to complete the maze with a reward
A	20.14	10.02
B	19.89	15.21
C	15.14	9.86
D	25.21	19.86
E	20.08	15.01
Estimated total time for all rats (in seconds) to complete the maze	*100*	*70*

Table 2

(a) Complete **Table 2** with the estimated total time to complete the maze for Condition A and Condition B.

(2)

Space for calculations

Condition A: 20 + 20 + 15 + 25 + 20 = 100 seconds

Condition B: 10 + 15 + 10 + 20 + 15 = 70 seconds

(b) Calculate the mean score of Condition B in **Table 2** to **four** significant figures.

(1)

Space for calculations

10.02 + 15.21 + 9.86 + 19.86 + 15.01 = 69.96

69.96 ÷ 5 = 13.992 = 13.99 (4 s.f.)

Mean score to four significant figures ..... *13.99* .....

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(c) Skylar decided to conduct a statistical test on her data.

Explain which statistical test Skylar should use for her investigation.

(3)

Skylar should use a Wilcoxon signed ranks test. This is because she is looking for a difference between two conditions (with and without a reward), and she used a repeated measures design, as each rat completed the maze in both Condition A and Condition B. The data are at least ordinal, in fact interval/ratio data, as she measured the number of seconds it took the rats to complete the maze.

(Total for Question 9 = 6 marks)

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10 Ahmed wanted to investigate the influence of violent video games on aggression.

Ahmed had two groups of different participants. Group 1 played a violent video game and Group 2 played a non-violent video game.

After playing the game, participants were asked how many aggressive thoughts they experienced. They were categorised as having less than 10 aggressive thoughts or more than 10 aggressive thoughts.

Ahmed's results are shown in **Table 3**.

	Less than 10 aggressive thoughts	More than 10 aggressive thoughts	Totals
Group 1: Violent video game	𝍸 //	𝍸 𝍸 ///	20
Group 2: Non-violent video game	𝍸 𝍸 𝍸 /	////	20

Table 3

(a) Explain **one** extraneous variable that Ahmed could have controlled for when conducting his investigation.

(2)

Ahmed should have made sure that all participants played their video game for the same amount of time, eg 20 minutes. If Group 1 played the violent game for longer, they may report more aggressive thoughts just because of the time spent playing (eg frustration), rather than the violent content.

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(b) Complete **Table 4** and calculate chi-squared for Ahmed's investigation.

You **must** give all your answers to **one** decimal place.

(4)

		Observed	Expected	O-E	$(O-E)^2$	$(O-E)^2/E$
Violent video game	Less than 10 aggressive thoughts	7	11.5	−4.5	20.3	1.8
	More than 10 aggressive thoughts	13	8.5	4.5	20.3	2.4
Non-violent video game	Less than 10 aggressive thoughts	16	11.5	4.5	20.3	1.8
	More than 10 aggressive thoughts	4	8.5	−4.5	20.3	2.4
				Chi-squared =		8.4

Table 4

Space for calculations

O − E: 7 − 11.5 = −4.5, 13 − 8.5 = 4.5, 16 − 11.5 = 4.5, 4 − 8.5 = −4.5

$(O - E)^2 = 4.5^2 = 20.25 = 20.3$

20.3 ÷ 11.5 = 1.765 = 1.8 20.3 ÷ 8.5 = 2.388 = 2.4

$X^2 = 1.8 + 2.4 + 1.8 + 2.4 = 8.4$

$X^2 =$ 8.4

(Total for Question 10 = 6 marks)

TOTAL FOR SECTION C = 20 MARKS

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SECTION D

Answer the question. Write your answer in the space provided.

11 A key question for society is whether biological factors are responsible for drug taking. Understanding this may help with the prevention of drug taking and avoid the damage it does to individuals and the costs to society.

Newton et al. (2009) asked drug users why they continue using drugs and take drugs again after they have not taken drugs for some time. The majority of respondents cited "pleasure seeking" and "impulsivity" as their primary reasons for taking drugs.

One explanation for the reasons given by the drug users is that repeated exposure to the drug changes the way the brain works and stimulates reward pathways. The dopamine reward system is stimulated and drugs affect synaptic functioning, which can lead to the user craving more drugs.

Another explanation for drug taking could be that drug users copy significant others who might take drugs in front of them. This behaviour might be reinforced by other factors, such as friends, when taking drugs.

Discuss the key question of whether biological factors are responsible for drug taking in society. You should use concepts, theories and/or research studied in your psychology course.

You must make reference to the context in your answer.

(8)

There is evidence that biological factors are responsible for drug taking. Drugs act on the dopamine reward system (the mesolimbic pathway): drugs such as cocaine increase dopamine at the synapse, for example by blocking its reuptake, so the user feels intense pleasure. This explains why the majority of drug users in Newton et al. (2009) cited "pleasure seeking" as a main reason for taking drugs. Olds and Milner (1954) showed that rats would repeatedly press a lever to receive electrical stimulation of reward areas of the brain, suggesting the brain is wired to repeat rewarding behaviour.

Repeated exposure changes synaptic functioning: the brain reduces its own dopamine response and the number of receptors (tolerance), so the user needs more of the drug and feels craving without it. This explains why the users in the context took drugs again after not taking them for some time. Impulsivity, also cited by Newton et al. (2009), is a personality trait that may be partly genetic, and genes may give some people a predisposition to addiction, which further

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supports a biological cause.

However, biology cannot be wholly responsible. A genetic predisposition makes someone vulnerable to drug taking but does not mean they will definitely take drugs, and people first have to be exposed to the drug, so environmental factors must be involved. Social learning theory (Bandura) argues that people observe and imitate role models, as in the context where users copy significant others who take drugs in front of them. Role models such as musicians may show drug taking in videos, and the behaviour is reinforced vicariously and directly, eg by approval from friends when taking drugs.

In conclusion, biological factors such as the dopamine reward system help explain why drug taking is pleasurable and why people crave drugs and relapse, but social learning explains why people start taking drugs. So prevention for society should target both, for example combining treatment for cravings with reducing exposure to role models who take drugs.

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SECTION E

Answer the question. Write your answer in the space provided.

12 Assess whether psychology has developed over time.

(20)

Psychology has developed over time in its theories, its research methods and its applications, as new research has tested, refined and sometimes replaced earlier ideas. However, in some areas newer research shows that behaviour has stayed much the same, so the degree of development varies.

Understanding of obedience has developed through repeated testing in different settings since Milgram (1963), who found 65% of participants obeyed up to 450 volts. Variations and replications in other countries and settings identified factors such as proximity and the legitimacy of authority. However, Burger (2009) carried out a partial replication and found that levels of obedience were similar to Milgram's in the 1960s. This suggests that the behaviour itself has not changed, even though ethical guidelines have developed so research is now done more safely, by stopping at 150 volts. So understanding has developed, but the conclusions are largely the same.

Theories of prejudice have developed. Adorno et al. (1950) focused on a single personality type, the authoritarian personality, measured by the F-scale (fascism). Later research broadened this: Cohrs et al. (2012) found that right-wing authoritarianism, social dominance orientation, agreeableness and openness to experience were all related to prejudice. Social identity theory (Tajfel and Turner, 1979) also added group-level explanations, so understanding has clearly developed from one cause to several interacting factors.

Memory research shows clear development. The multi-store model (Atkinson and Shiffrin, 1968) offered a simplified view with a single unitary short-term store and long-term store. The

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working memory model (Baddeley and Hitch, 1974) split short-term memory into the central executive, phonological loop and visuospatial sketchpad, and Baddeley (2000) later added the episodic buffer, linking working memory and long-term memory. Tulving split long-term memory into episodic and semantic memory. Each model built on the weaknesses of the last, so this is strong evidence that psychology develops in a scientific, cumulative way, although models such as the WMM are still being tested.

Research methods and technology have also developed. Early studies of the brain relied on case studies of brain damage, such as HM. Later, PET scans allowed functional imaging, as in Raine et al. (1997), who found differences in the brains of murderers, but PET involves radiation. MRI shows only structure, while fMRI shows both structure and function without radiation, so studies can now safely be done on children and pregnant women. This has greatly developed understanding of brain function and behaviour. However, scans show correlation, not cause, so some issues remain.

Explanations of aggression have developed too. Bandura et al. (1961) showed that children imitated aggressive role models, and more recent research has looked at video games, finding that violent video game play can reduce the perceived humanness of the player and of others (Bastian et al.), which may increase aggression. This shows that psychology develops to study new behaviours as society and technology change. Similarly, Becker et al. (2002) found that after Western television was introduced to Fiji, girls developed disordered eating, which developed understanding of the social causes of eating disorders.

Clinical psychology has developed. The DSM has been revised over time to reflect new understanding, and the DSM-5 integrated findings from genetics and neuroimaging. For example, it now recognises that ADHD can continue into adulthood and combined four separate disorders

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into autism spectrum disorder. Treatment has also developed from institutionalisation to drug therapy and CBT. However, some argue that changes to the DSM reflect social values as much as scientific progress, and the reliability and validity of diagnosis are still debated, so development is not always improvement.

Some argue psychology has not developed as much as natural sciences, because the same debates, such as nature-nurture and free will, remain unresolved and many theories cannot be falsified. Also, much research still uses WEIRD (Western) samples, so findings may not apply to all cultures.

In conclusion, psychology has clearly developed over time: theories such as memory models and explanations of prejudice have become more detailed, and technology such as fMRI and revisions of the DSM have improved methods and practice. However, development is uneven, as some findings such as obedience have stayed similar and key debates remain, so psychology has developed considerably but is still a developing science.

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