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Unit 03 – Child Psychology

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Contents

Introduction

This resource has been produced by a senior member of the A Level Psychology examining team to offer teachers an insight into how the assessment objectives are applied.

As these responses have not been through full moderation, they are banded to give an indication of the level of each response.

Please note that this resource is provided for advice and guidance only and does not in any way constitute an indication of grade boundaries or endorsed answers.

The sample assessment material for these answers and commentary can be found on the A Level Psychology web page and accessed via the following link: http://www.ocr.org.uk/Images/171772-unit-h567-03-applied-psychology-sample-assessment-materials.pdf

Question 6a

Question 6a

Using the research by Barkley-Levenson et al. (2014), explain the relationship between brain development and risk taking behaviour.

[10]

Mark scheme

Answer	Marks
AO1 (5 marks) Candidates must refer to the key study by Barkley-Levenson et al. to access the top band. Candidates will describe the psychological evidence of the key study appropriately and effectively. **AO2 (5 marks)** In order to achieve credit for application of knowledge and understanding in a theoretical context, candidates must make a link to explain the relationship between brain development and risk taking behaviour. They might consider the finding of the study as evidence which suggests hyper activation of reward circuitry (ventral striatum) response in adolescence may be a normal response and this could be linked with the lack of development of the pre-frontal cortex. It is important for the answer to make the link between hypersensitivity to reward and risk taking behaviour, for example the gambling referred to in the key study, the reward gained, or the dopamine rush of alcohol leading to more alcohol intake. Other appropriate responses should be credited.	10

High band answer

Barkley-Levenson et al. (2014) investigated the influence of brain development on risk taking behaviour. They compared the risk taking of 19 adults and 22 adolescents on a gambling task while having an fMRI scan. They were presented with a number of different gambles which had a 50% chance of gaining the amount shown on one side of a spinner and a 50% probability of losing the amount shown on the other side. The study found that acceptance rates did not change in either adolescents or adults when there was no risk involved in both gain-only and loss-only trials. It can therefore be concluded that the adolescent brain is no different to adults when there is no risk taking behaviour involved. However, the higher the Expected Value (EV) of the win then the more likely adolescents were to gamble compared to adults. The researchers found that these results correlated with greater activation of part of the brain called the ventral striatum, which is sensitive to rewards, in the adolescents. This significant brain activation in the ventral striatum of adolescents was still apparent even after controls had been applied, by matching groups on acceptance behaviour. It has been suggested that the maturation of the adolescent brain is linked to such risk taking.

Different areas of the under-developed adolescent brain were also found to be different to adults. Brain imaging showed decreased activity in the amygdala, which controls fear. This may explain why adolescents showed more risk taking behaviour, because there was no fear of consequences of their risk taking behaviour. There was also found to be an increased activity in the medial prefrontal cortex which is responsible for memory and decision making, this part of the brain is not thought to fully develop until our mid-20s, this under development of the brain would further explain risk taking behaviour in these individuals.

This study explains the neural differences in sensitivity to EV change across development, particularly in the ventral striatum. Hyper activation in this area of the brain appears to be a specific response of the adolescent brain to rewards, which are mediated by developmental differences in valuation. Barkley-Levenson et al. argue that these results are not a methodological consequence of using money as the rewarding stimulus, but can explain the relationship between brain development and any risk taking behaviour such as gambling, drinking and risky driving behaviours. Brain development therefore explains that adolescents are more likely to engage in risk tasking that may be advantageous to them.

Research suggests that the ventral striatum is responsible for decision-making, risk, and reward. Therefore, the adolescent brain area can be associated with poor decision making, risk taking and supressing the fear response in the amygdala. As well as mediating reinforcement and motivation. When there are thoughts of monetary or emotional gains, dopamine levels in the ventral striatum of the adolescent brain will increase, which in turn impacts reward related behaviour - the hyper active ventral striatum is part of the reward circuitry of the brain, which therefore explains high levels of risk taking. This response in adolescents is understood to be linked with the under-development of the pre-frontal cortex and it also explains the dopamine rush of alcohol which leads to more alcohol intake. Because of its involvement in reward pathways, the hypersensitive ventral striatum has also been implicated in playing an important role in addiction and risk taking behaviour.

Commentary

As there is reference to the key study by Barkley-Levenson et al. to the top band can be accessed. Appropriate evidence from the study is included, which effectively addresses the question. AO2 content also meets the requirements of the top band. There are clear links made to explain the relationship between brain development and risk taking behaviour. The link between hypersensitivity of the ventral striatum to reward and risk taking behaviour is clearly made.

Middle/lower band answer

Barkley-Levenson et al. investigated the relationship between brain development and risk taking behaviour. Their aims were to see whether adolescents would accept more gambles of increasing expected values than adults and if adolescent Ventral Striatum activation will increase in proportion to increasing expected values.

They found that all trials with positive expected values were accepted significantly more than trials with an expected value of zero, these were also accepted significantly more than trials with negative expected value. Therefore, the greater the potential win, the more likely adolescents were to gamble compared to adults. When the adolescents gambled, brain scans showed that there was more activity in the ventral striatum. Adolescent brains also showed less activity in the amygdala and more activity in the prefrontal cortex.

It can be concluded that because adolescent brains are not fully developed, adolescents are more likely to engage in risk taking behaviour such as gambling, compared to adults. This is particularly true of the ventral striatum which appears to be hyperactive in adolescents, which is rewarding, this is not the case in adults.

Commentary

As there is reference to the key research which demonstrates reasonable knowledge and understanding. This is generally accurate and relevant to the question, although some detail is lacking. There is also some evidence of selection of material from the key research study to address the question to explain the relationship between brain development and risk taking behaviour.

Bottom band answer

Teenagers' brains are less developed than those of adults, therefore they are more likely to show risk taking behaviour because their brains are hyperactive which can also cause addictions. Adolescents also seek out more rewards.

This was found by Barkley-Levenson who conducted a quasi-experiment in a lab, with 11 female and 8 male adults aged between 25 and 30 and some adolescents. It was a volunteer sample who had responded to posters and internet adverts. Participants attended the lab to give consent and were asked about their primary source of income and amount of money they spent per month. This was about the mean for adolescents was $50 for adolescents and almost $500 for the adults. A week later, participants returned for a brain scan and took part in a gambling task involving a spinner. Profits of up to $20 could be made, as could losses in a total of 144 trials. Participants were also informed that one of the trials that they chose to accept would be selected at the end of the scan to play for real money.

Commentary

Although there is evidence of knowledge and understanding of the key research, this is not used effectively to answer the question. There is little evidence of selection of material to address the question. Features from the study are simply identified and there is no content to explain the relationship between brain development and risk taking behaviour.

Question 6b

Question 6b

Assess ethical problems with using brain structure as an explanation of risk taking behaviour. **[15]**

Mark scheme

Answer	Marks
AO1 (2 marks) Candidates could demonstrate knowledge and understanding of ethical problems by making reference to the ethical considerations of research into brain structure as an explanation of risk taking behaviour. For example, one ethical problem with the explanation is the need to carry out brain scans on adolescents and children, which entails the consideration of issues such as consent and protection **AO3 (13 marks)** Examples from appropriate studies should be used to show the analysis of these issues. Candidates could also refer to issues such as the social sensitivity of adopting brain structure as an explanation for risk taking behaviour, the target population and samples used, the issue of banning teenagers from drinking, or the use of information such as increasing car insurance premiums for teenagers. Again, reference to appropriate research could help demonstrate development and elaboration of the points made. Other appropriate responses should be credited.	15

High band answer

An inevitable problem with conducting research in this area is that the brain structure of adults needs to be compared to that of children in order to see if these variations explain the differences in risk taking behaviour between the two groups. Carrying out research on children raises the issues of consent and protection from harm.

In Barkley-Levenson's study, participants initially attended the laboratory for 'an intake session' for neuro-imaging where the adults gave fully informed consent. However, as some of the adolescents were under 16 they were unable to consent to take part, this potential ethical issue was overcome as consent was given by their parents. All participants also volunteered to take part, as they responded to posters and internet adverts.

However, the use of brain scans on children and exposing them to gambling could both be harmful and therefore breaks the ethical guideline of protection from harm. As we know from this research study, because of a hypersensitive ventral striatum, adolescents are more likely to show risk taking behaviour and place greater value on rewards. This study could cause the adolescents to associate positive emotions and motivation when making risky choices and the experiences of the monetary rewards could cause risky behaviour being maintained through operant conditioning. As a result, the children who take part in this study may engage in further risk taking behaviours such as gambling after this study, which would again further reinforce such undesirable behaviours. Furthermore, although the adolescents were debriefed, they would also be informed that they were likely to engage in negative risk taking behaviours which could also lead to psychological harm. Although it could be argued that if children are aware of their risk to such behaviours and the potential negative consequences this may reduce the chances of such behaviours occurring.

Psychological harm could also be caused by MRI scans if the participants are claustrophobic or even if they do not like confined spaces and overweight people, while there may be physical harm for pregnant women or for individuals with tattoos, pacemakers, metal dental implants, hearing aids or a prosthetics. As a result, such individuals would be excluded from taking part in such research.

Socially sensitive research has ethical implications that go beyond the research situation and affect people or groups in the wider society. Barkley-Levenson et al.'s research has a negative effect on adolescents, as they may be stigmatised for being more prone to advantageous anti-social risk taking behaviour because of their brain structures that are beyond their control.

Moreover, this explanation is biologically deterministic. It is unethical to suggest that teenagers will take risks such as drinking more than other groups which could lead to calls for increasing the age for drinking. By proposing that teenagers are more likely to engage in risk taking behaviours could lead to insurance companies increasing insurance premiums for this group of people and wrongly generalising that all young people will drive in a risky and dangerous way. However, this view is not without evidence and findings from research such as Barkley-Levenson et al. suggest that a hypersensitive ventral striatum leads to risk taking in adolescents. With this in mind, it would be unethical not to highlight the potential dangers to young drivers and therefore they should be educated accordingly.

Tymula et al. (2012) found that adolescents engage in the most risk taking behaviours compared to other children and adults and have the highest rates of sexually transmitted diseases, thrill-seeking behaviours and even drive faster than adults. Furthermore, mortality rates of adolescents are 200% greater than their younger peers. Our awareness from research of adolescents being prone to such risk taking behaviours allows us to protect them from the consequences of their decisions. Tymula et al. (2012) suggest that enforcing age limits on gambling, drinking, driving and smoking and limiting their engagement through educational programs inform them of the risks and consequences of their behaviours which would in the hope that they will limit dangerous behaviours on their own. Therefore, through our understanding that brain structures can explain risk taking behaviour in adolescents and can actually reduce such risky behaviours.

In conclusion, there are possible benefits of brain structure explanation as they can predict and therefore potential harm for adolescents. However, this must be carefully weighed not only against possible harm but also against the burden of knowledge and the possible discrimination against such groups as adolescents.

Commentary

This is a top band response. The answer demonstrates knowledge and understanding of ethical problems, with reference to the ethical considerations of research into brain structure as an explanation of risk taking behaviour. A range of ethical problems are identified and examples from appropriate studies are used to show the analysis of these issues, research is also used effectively to help demonstrate development and elaboration of the points made.

Middle band answer

One ethical problem with using brain structure as an explanation for risk taking behaviour is that if the adolescents show abnormal activity in areas of the brain such as the ventral striatum (VS) or the amygdala, it may not be appropriate to tell the participant of these findings, as it could cause them psychological harm.

However, it would also be unethical not to tell them, as they should be fully informed about the aims and the findings of psychological research they are taking part in. Furthermore, if such brain activity is apparent in adolescents this may lead to socially sensitive conclusions whereby society may view teenagers' behaviour as being determined by their brain structure and that they have no freewill in deciding whether to take risks or not.

Research studies such as Barkley-Levenson et al. support the brain structure explanation, they found that the higher the expected value of winning on a gambling task, the more likely they were to gamble. In these circumstances there was more activation in the VS in adolescents, so there was a positive correlation between gambling and brain activation. Supporters of the brain explanation would apply these findings to other risk taking behaviours in addition to gambling and as a result of this there may be implications such as increasing the legal age of drinking and increasing insurance premiums for teenage drivers. These consequences could be seen as unjust and unethical because teenagers are being punished for the likelihood of engaging in certain behaviours.

Commentary

This is a band 2 or 3 response, there are examples of good and reasonable knowledge and understanding. There a limited number of points of analysis, interpretation and evaluation which are limited at times. Generally, points are related to the context of the question and are relevant, with some supporting evidence from the key research, although this lacks some focus.

Bottom band answer

As children are participants in this research, they would be unable to give informed consent in order to take part in the research. However, permission was gained from parents.

Another ethical problem with such research would be psychological harm. If teenagers were given brain scans, which indicate they were more likely to show that they are likely to show risk taking behaviour this could cause psychological harm as they may believe they are unable to control their behaviour. This research could also be classed as socially sensitive, the findings would be give teenagers a bad name and be judged negatively by other people and society.

Commentary

This is a bottom band response, although there is reasonable knowledge and understanding the answer lacks detail. There are a few basic points of analysis, interpretation and evaluation but there is no evidence of an argument. The use of supporting examples and evidence is limited and there are no valid conclusions that attempt to summarise the issues and arguments show little understanding.

Question 6c

Question 6c

Max has just passed his driving test and often breaks the speed limit. He enjoys driving fast and even a police warning has not stopped him. Max's parents have tried to punish him for this behaviour but their interventions have not been successful.

(c)* Discuss how a psychologist could investigate whether Max's behaviour is due to brain development. **[10]**

Mark scheme

Answer	Marks
Candidates need to show their knowledge and understanding of methods and processes of researching brain development and apply this specifically to the context of the study of Max's behaviour. It would be acceptable to consider the problems which derive from such research as the question has the injunction 'discuss' rather than outline or describe, indicating some acknowledgement of the strengths and weakness, but the focus is on the application of knowledge of the methods as well as the application of evaluation issues. Other appropriate responses should be credited.	10

High band answer

Max's risk taking behaviour, namely dangerous driving could be investigated through the use of brain scans. It seems that Max's behaviour cannot be explained by behaviourism, as the police warning and attempts by his parents to punish him have not been successful. Therefore, operant conditioning is unlikely to be the cause, as this behaviour is not being unlearnt through consequences. It seems likely that as Max is a teenager then his behaviour is due to the under-development of his brain.

A psychologist could carry out neuroimaging, using an fMRI scan to measure Max's brain activity when carrying out risk taking behaviour. Max could be asked to play a video game in which there are opportunities to take risks and gambles, whereby the rewards for such risks would vary throughout the game. In order to make the experiment relevant to Max's risk taking behaviour this could be a driving simulation game, with virtual rewards and punishments being available for Max. While Max is offered the opportunity to take risks while playing the game, the psychologist would look at the brain activity in different areas of the brain. The psychologist would be particularly interested in the activity levels of Max's ventral striatum, if this part of the brain is hyper-active then the psychologist could assume that this could explain the risk taking behaviour. The psychologist would also measure activity in the prefrontal cortex, increased activity in this area would lead to the psychologist concluding that under-development in this part of the brain could also explain Max's risk taking behaviour. The combination of the lack of maturation of these areas in Max's brain may explain a lack of understanding of acceptable social behaviour such as dangerous driving. While if Max also tries to maximise rewards in the game which hold a potential risk, the psychologist could look at the correlation with brain activity at these times.

By investigating Max's risk taking behaviour in a highly controlled and standardised laboratory the psychologist could easily replicate the investigation with a larger sample and can compare his brain activity with that of adults. By investigating Max's risk taking behaviour in a lab experiment there would be greater controls over confounding variables, which may impact his behaviour when driving a car. Furthermore, it would be impractical and dangerous to carry out a brain scan while Max was actually driving and he would also be more likely to show social desirability and change his driving to be less risk taking if he knew a psychologist was observing his behaviour. However, measuring risk taking behaviour in a lab on a video game is not comparable to Max breaking the speed limit, police warnings and punishments from parents. Therefore investigating Max's behaviour in this way would be invalid.

However, the use of an fMRI is very scientific and provides us with objective results that are falsifiable. Deduction was used as a hypothesis that Max's risk taking behaviour is due to an under-developed brain could be tested and useful causal conclusions were then made.

Commentary

This is a clear top band answer (9-10 marks) This answer demonstrates good knowledge and understanding of methods and processes of researching brain development which is applied specifically to the context of the study of Max's behaviour. There is also some sound discussion of the strengths and weaknesses of this investigation, thus focuses on the application of knowledge of the methods as well as the application of evaluation issues.

Middle/lower band answer

In order to investigate whether Max's enjoyment of fast driving is due to his brain development, a risk task would be set up for him in which has brain activity would be measured using an fMRI scan. The psychologist would be particularly interested in the activity within the ventral striatum which is thought to be hypersensitive in adolescents like Max.

Max's brain could be compared to an adult's brain and to see whether Max responds differently to rewards than the adult does. Tasks with varying expected values, which are concerned with the amount of risk involved in a task which might affect the amount of brain activity, could be used. Max and the adult would be given the opportunity to gamble money on the outcome of a spinner, which has two possible outcomes. A range of profit values between +$5 and +$20 and loss amounts between−$5 and −$20 could be given. Within the trials there could also be gain-only trials and loss-only trials. Max and the adult could also be given the opportunity to gamble for real money.

When completing these gambling tasks, the psychologist would examine the brain activity in the ventral striatum and compare the activity between Max and the adult, as well as activity in the amygdala, which could be linked to Max's fear when driving fast and the medial prefrontal cortex, which could explain Max's poor decision making when driving.

This method of investigation is highly scientific in that it is in controlled lab conditions and is easily to replicate with other adolescents. However, it could give us an insight into Max's behaviour, it would be unable to explain why Max's driving behaviour specifically. The artificial conditions would also lack mundane realism and may lack in ecological validity.

Commentary

This is a band 2 or 3 response, with examples of both limited and reasonable application of knowledge to the case of Max. The information included is in the mostly relevant to the question and supported by some evidence. In order to improve, the response should be more applicable to particularly features of the case of Max, rather than simply repeating the procedures from the key research study.

Bottom band answer

A brain scan could be used to measure risk taking behaviour. A quasi-experiment could be carried out where a psychologist could compare the brain activity of children to adults. Participants could be given $20 for playing a game and could be told that there is a chance to win up to $20 more. They could complete the gambling task while having an fMRI scan. They could be presented with a series of gambles which have a 50% chance of winning the amount shown on one side of a spinner and a 50% probability of losing the amount of money indicated on the other side of the spinner. The psychologist could see which parts of the brain are active during the task, we could therefore see what part of the brain explains risk taking behaviour.

Commentary

This is a bottom band response, although there is some psychological knowledge and understanding of brain development and risk taking behaviour, the answer is not effectively applied to the question. The response is generalised and lacks focus to the requirements of question. Reference to the key research is made, rather than to the case of Max.

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