(a) Use the key research by Barkley-Levenson and Galvan to explain how brain development can impact on risk taking behaviour.
(10 marks)

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. The research suggests that 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. This study explains the neural differences in sensitivity to Expected Value change across development, particularly in the ventral striatum. 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 suppressing the fear response in the amygdala. 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 which leads to more risky behaviours. This helps our understanding of how brain development can impact on risk taking behaviour.