Candidate 1 evidence

Title of Research Assignment	Word count (Max 1200)
The effect of caffine on the quality of sleep	1305

A Describe behaviour associated with a chosen psychological topic. (maximum of 2 marks available) The effect of caffeine on the quality of sleep.

Firth (2019:52) "*sleep can be defined as a state of reduced conscious awareness during which the body is less active and less responsive to the outside world*". Sleep is thought to be made up of several different stages, recent studies suggest 1-3 cycles of nREM and an REM stage. This topic is of importance because it studies the effect that caffeine has on the quality of sleep.

Adenosine is an inhibitory neurotransmitter which acts as a depressant on the central nervous system. It increases throughout the day giving the individual an idea of how long they have been awake and therefore also indicating when it is time to sleep. [Benington & Heller, 1995 cited in Firth 2019]. When we sleep this build-up of Adenosine is cleared and is replaced by glycogen. Caffeine blocks Adenosine receptors in neurons, which in turn makes the body less responsive to the build-up of the Adenosine and the feeling of fatigue and tiredness. This could have an impact on sleep quality and amount of time available for restoration of the body and brain.

B Explain features of the topic with reference to psychological research evidence (maximum of **8** marks available)

Both adenosine and melatonin are biological chemicals which influence our sleep wake cycle. A study which investigated the effect of coffee consumption on sleep and melatonin secretion was conducted by Shiro *et al.* (2002).
The aim of the study was to determine if caffeine consumption had an effect on Melatonin secretion and sleep quality. This experimental study was composed of 6 volunteers, 3 male and 3 female, with the participants regularly consuming caffeine. They worked in a hospital and were informed of the study. The participants were either given a standard cup of coffee, which contained 130 mg of caffeine, or a decaffeinated version of the same product. They were given one of the products in different study sessions, which were separated by a week-long gap. The participants were instructed to keep their caffeine consumption to their regular levels and keep their routines as regular as possible. All participants repeated the study conditions twice, with the first to record the sleep patterns using actigraphy, and the second to collect urine samples which contained 6-SMT, which is the main metabolite found inside melatonin. Participants were also asked to fill out a questionnaire after each study period, with them asked to say whether they had consumed regular coffee or decaffeinated, and an approximate sleep quality rating. The conclusions of this study show that when caffeine had been consumed by the participants, both the quality of sleep and the rate of melatonin secretion were decreased.

Oswald's (1966 cited in Firth 2019) Restoration theory suggests that the function of nREM sleep is essential for restoring the body. This is seen in the Shapiro (1981 cited in Firth 2019) study, which found that ultra runners had an increase in nREM sleep after an event. It is a time where growth development takes place, this may be why infants spend more time in nREM sleep than adults. Oswald sees sleep as a homeostatic process. nREM sees increased hormone secretion into blood which assists the repairs of damaged muscles and tissues throughout the body.

Another research study that looks at the effects of caffeine on sleep taken 0, 3, 6 hours before going to bed, was conducted by Drake *et al.* (2013).
The aim was to determine whether a fixed amount of caffeine (400mg) taken 0,3, or 6 hours before sleep would have an effect on the quality of sleep.
This experimental study compared the possible disruptive effects of a fixed dosage of caffeine, which was 400mg taken at 0, 3 and 6 hours before the participants self-reported "usual bedtime". Sleep disturbance was also measured on a portable sleep monitor. They concluded that the significant effect that the caffeine dosage had on sleep taken 6 hours before sleep shows support that caffeine use should be taken at least 6 hours before planned sleep time. These research studies relate to my topic as they research how sleep is affected by caffeinated stimulants.

C Describe an aim for research on this topic (maximum of 1 mark available)

The aim of this quasi-experiment is to find out whether people who use caffeinated products at different times during the day have differing levels of sleep quality.

D Give an experimental / alternative hypothesis for the proposed research study (maximum of **2** marks available)

Based on what we know about the effects of caffeine on adenosine levels and the findings of past research a one tailed experimental hypothesis predicts that participants whose use caffeinated products after 2 pm will have lower quality sleep ratings than participants who do not use it after 2 pm.

Null hypothesis: There will be no difference in the quality of sleep ratings between participants who use caffeinated products before 2pm compared participants who use caffeinated products after 2pm.

E Describe a suitable research plan, including method, sampling, variables and procedures (maximum of **12** marks available)

The method I will use is a quasi-experiment with an independent groups design. A quasi-experiment is a research method that aims to find a cause-and-effect relationship, a feature of this method is that the groups are not randomly assigned. This would be the most suitable method as it involves recruiting participants who already consume caffeinated products. My plan is to create posters including the details of the study, including when it will be happening to gather participants. I would then gather participants that have applied in their groups, consisting of group A who take caffeine before 2pm and group B after 2pm. I would ask the participants to fill out a sheet with their details, asking them to create a password so I can identify them anonymously. I would then ask them to take their caffeine as usual. The following morning they would complete the questionnaire. The questionnaire would consist of a scale for them to rate their sleep quality and a further question asking to rate how they feel after their sleep. I would then debrief the participants about the study. I would then analyse the data and produce a graph showing the effects that the caffeine has had on a person's sleep.

A strength of this research method is that it can allows me to test cause and effect while ensuring ethics. It allows me to gather quantitative data in the form of the participants rating their quality of sleep, which will allow me to compare the results of each condition.

A weakness of this method is that because I am using a quasi-experimental design, there may be extraneous variables that I cannot control, which may affect the results of the outcome making it harder to establish a cause-and-effect relationship. A further weakness of this method is randomization is not used, this affect the validity of the outcome.

I would use a volunteer sampling method, as this would be the most ethical approach. Participants would be self-selecting if they meet the criteria of the study and are interested in taking part.

My independent variable for this experiment will be the time that the caffeine is taken. Condition A is consuming caffeine before 2pm, and condition B is consuming caffeine after 2pm. The dependent variable will be the participants self-reported quality of sleep rating.

The quality and amount of sleep the night previous to the study may be an extraneous variable, this could be accounted for by gathering data on the consent stage. When creating the volunteer poster, I would make it clear that participants should apply if they work shifts, as this will affect the quality of their sleep.

F Describe ethical issues and ways of addressing these in the research plan (maximum of 4 marks available)

It would be unethical to perform a lab experiment as this would include the use of giving the participants caffeinated products which they may not consume during their regular routines, therefore I am using a quasi-experiment. I will also ensure that any participants that take part in the study will be over 16 and will have fully informed consent and will be able to withdraw at any time. Research by Curran and Marczynski (2017) suggests that adolescents may suffer ill effects from high dosages of caffeine.

Total word count 1305.

G References (maximum of 1 mark available)

Drake, C. (2013) [Online] Available from < https://doi.org/10.5664/jcsm.3170 > [10th Feb 2025]

Firth, J (2019) N5 & Higher psychology student book.
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Shiro, L (2002) [online] available from < https://doi.org/10.1016/S1389-9457(02)00015-1 > [10th Feb 2025]