

Candidate 1 evidence



SLEEP AND MEMORY

The relationship between sleep and memory recall



Word Count: 2,714

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Sleep and Memory

Introduction

Sleep is very important for memory and learning. Animal and human studies suggest that the amount and quality of sleep have a significant impact on learning and memory. Research suggests that a sleep-deprived person cannot focus attention optimally and therefore cannot learn efficiently. Sleep itself has a role in the consolidation of memory, which is essential for learning new information. Lack of sleep has a significant effect on our ability to function. Sleep deprivation has negative effect on mood, ability to focus, memory and performance. Staying well rested can help protect and improve learning memory function and so it is a worthy topic of study.

Restoration theory suggests that the function of sleep is to repair and restore the brain and body. Oswald (1966) suggested that sleep is essential to the body to repair itself and restore different physiological functions including memory. During NREM (non rapid eye movement) growth hormones are released which are essential for growth, repair and reorganisation. During REM sleep psychological functions are restored such as problem solving and memory. REM sleep is important for long-term memory creation.

Reverse learning theory suggests that we dream, in order to forget irrelevant information. The brain is unable to handle the vast amount of information received in a day. It would be pointless to store and retain irrelevant information so this theory suggests our brain cleans itself out by dreaming. Francis Crick and Graeme Mitchison (1983) suggested that the neocortex (the part of the brain that is involved with higher levels of thought) is a network in which neural connections are constantly being made. Dreaming eliminates unnecessary connections in the neocortex and so prevents it from becoming overloaded and malfunctioning.

Wolfson and Carskadon (1998) researched sleep schedules and day time functioning and aimed to describe the relationship between adolescents sleep/wake habits, characteristics of students (age, sex, school), and daytime functioning (mood, school performance and behaviour). A Sleep Habits Survey was administered to 3,120 high school students at 4 public high schools (Rhode Island, U.S). The study reported that almost all adolescents were not getting enough sleep. Students who described themselves as struggling or failing school reported that they obtained less sleep, had later bed times, and had more irregular sleep/wake cycles than students who had better grades. It was concluded that there was a relationship between sleep and memory retention, specifically regarding performance. This study showed that sleep is essential for memory and learning function.

Gais, Lucas, and Born (2006) found that sleep after learning had a beneficial effect on declarative memory consolidation. They also found that this beneficial effect of sleep was stable over 48 hours. These findings were independent of time of day and not due to acute fatigue. Fourteen male high school students were trained on a paired-associate declarative memory task and a control working memory task at 9am, and tested at night (12 hours later) without sleep. The same number of participants were trained at 9pm and tested 9am following sleep. An increase of 20.6% in declarative memory, as measured by the number of correctly recalled pairs in a paired-associate test, following sleep was observed. This was an improvement compared to the group which was tested at the same time interval but who did not have sleep. These results suggest that declarative memory consolidation is improved after sleep that it is a good idea to be well rested and have a good sleep before an exam.

Aim

The aim of this research is to investigate the relationship between sleep and memory.

Hypothesis

The experimental hypothesis of this research is one tailed – “The group that slept fewer than 7 hours on the night before the memory test will score lower by recalling fewer concrete nouns than the group that slept over 7 hours.”

The null hypothesis is that there will be no difference in memory test results and the recall of concrete nouns between the group that slept fewer than 7 hours and the group that slept 7 or more hours before the memory test.

Method

Method chosen for this research was a quasi-experiment. This was chosen because the researcher wanted to test the dependent variable avoiding manipulation of the length of sleep.

The independent variable was the length of sleep therefore it was not possible to conduct a laboratory or field experiment as the manipulation of length of sleep would be unethical and may have had an effect on mental abilities and put physical health at real risk. The participants were not randomly allocated to the conditions as the independent variable was naturally occurring.

Design

Independent measures were used.

Variables

The independent variable (IV) was the hours slept the night before; conditions being less than 7 hours, or more than 7 hours sleep. The dependent variable (DV) was the score in the memory test i.e. accurate recall of concrete nouns.

All participants were in the same room and were tested at the same time in order to control extraneous variable (EV) such as distractions, temperature and brightness of the room.

There were a few extraneous variables (EV) that were not controlled and might have affected the results of the study such as life style of the participants – use of alcohol the night before the test might have a negative effect. Also use of electronic devices before sleep might make the participants not to have a good night sleep therefore they might score less on memory test.

Sampling method

Participants were selected using opportunity sample. It was easy and convenient to get students as participants as they are more likely to be available at the time.

Participants

20 college students available at the time were used as participants. They were all psychology students over the age of 16. 14 of the participants were female and 6 were male. Out of all 20 students, 17 participants slept for 7 hours or less and 3 participants slept over 7 hours the night before the test.

Materials

- To collect the data a Power point presentation was used with the words to be recalled. See Appendix 1.
- Brief and consent form. See Appendix 2.
- Standardised instructions and a separate page to write down the words recalled were used. See Appendix 3.
- Debrief. See Appendix 4.

Procedure

- Opportunity sample from college students was used to select participants.
- The participants were informed about the aim of the study and were given brief and consent form to sign. (See Appendix 2)
- The participants were given a random number - personal identification number.
- 20 college students were asked if they slept less than 7 or more than 7 hours the night before.
- Standardised instructions were given to the participants. (See Appendix 3)
- Students were given the same short memory test – recall of concrete nouns – each word was presented individually. Power Point slide show with concrete nouns was used to test participants' memory. (See Appendix 1)
- Participants had 5 minutes to finish the task – write down the concrete nouns they can recall.
- Participants were split in to two groups for analysis of the data – 1. Those who slept less than 7 hours; 2. Those who slept more than 7 hours
- The tests and quantitative data was collected.
- The participants were debriefed.

Ethics

Protection from physical and psychological harm was guaranteed for the participants. This has been done by using a naturally occurring IV – participants were asked if they slept less or more than 7 hours the night before. Participants were not asked to sleep less or more than 7 hours the night before the experiment. Sleep manipulation has been avoided as this may have affected mental abilities and puts physical health at real risk.

Participants were also informed that the aim of the experiment was to test their memory, not intelligence. Tables were separated to make sure participants could not see each other's results and avoid participants feeling pressure and to stop them from comparing their scores which may have affected their self-esteem.

Participants were reassured that even if they performed badly in this recall test it did not mean they will perform badly in exams as exams measure understanding, unlike a 5 minute recall test.

Participants had the right to withdraw at any time. They were also allowed to withdraw their data from the study.

At the start of the research participants were given a random personal identification number which allowed them to withdraw at any time. That also guaranteed confidentiality. Therefore, participants did not feel any pressure to continue if they did not want to.

Results

The Mean which is the arithmetic average was not used as two participants were outliers scoring very high and very low on memory recall test (P1 scored 16 and P14 scored only 6). Therefore, the mean is not representative as it would be skewed by outliers.

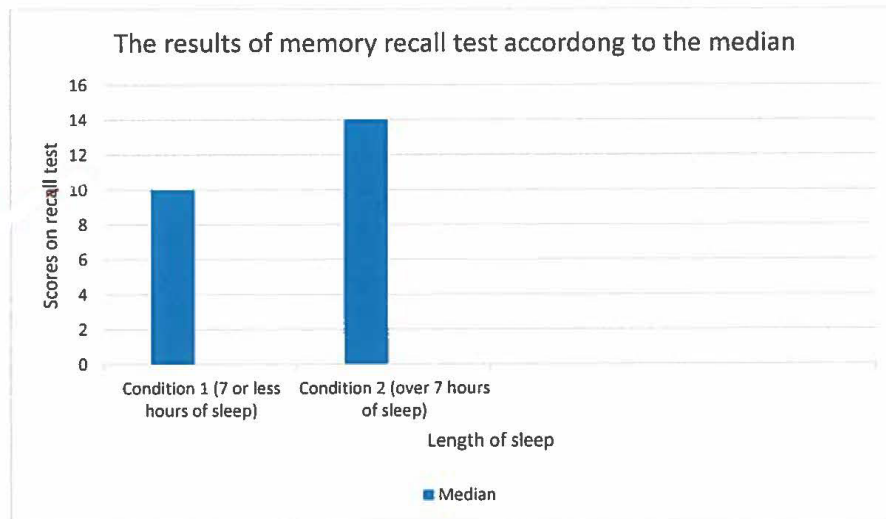
The scores were analysed using the mode and the median as these calculations are not affected by outliers therefore are more reliable. See Appendix 5 for calculations and the results of the recall test. Raw data table shows the recall scores for Condition 1 (7 hour of sleep) and Condition 2 (over 7 hours of sleep).

A summary table with these calculations can be seen here:

Summary table: Mode and median scores on recall test

	Mode recall score	Median recall score
Condition 1 7 or less hours of sleep	10/8	10
Condition 2 Over 7 hours of sleep	14	14

The summary table shows that for Condition 1 the mode was 10 and 8. For Condition 2 the mode was 14. These were the most frequently occurring scores on the recall test.



This graph shows that the participants that had less than 7 hours of sleep scored less in memory recall test than the participants that slept over 7 hours. That leads to acceptance of the hypothesis: "The group that slept fewer than 7 hours on the night before the memory test will score lower and recall fewer concrete nouns than the group that slept over 7 hours."

Discussion

The results suggest that having more sleep improves memory. Participants that had less than 7 hours of sleep scored less in memory recall test than the participants that slept over 7 hours. The results support the hypothesis "The group that slept fewer than 7 hours on the night before the memory test will score lower and recall fewer concrete nouns than the group that slept over 7 hours."

While the recall test is a valid measurement of short term memory some participants might have found it difficult to remember concrete nouns. For example, in the feedback that was received after the memory recall test, one participant responded that she found it difficult to spell the concrete nouns therefore she missed them out of the answer sheet as she was too embarrassed to make spelling mistakes. Foreign students might have had the same problem with spelling and being unconfident with their language skills. That might have had a negative effect on the recall scores.

The results might have been effected by individual differences of the participants such as alcohol use before bed, drug use, mental health etc. For example, if a participant has had alcohol the night before the memory test their score might have been lower than if they have not had any alcohol the night before. Alcohol consumption contributes to poor quality of sleep. It affects the whole night sleep, when the body is metabolising alcohol people spend more time in deep, slow wave stage of sleep and less time in REM stage. Therefore, it may have been the quality of the sleep and not the length of the sleep that affected recall scores.

The current study findings support restoration theory. The participants that slept for over 7 hours scored higher in the memory recall test. That suggests that their psychological function (problem solving and memory) were successfully restored during REM sleep therefore they did better in the memory test.

The statistics provide evidence for the reorganizational theory, which explains sleep and dreams as a way to eliminate unnecessary connections in the neocortex and so prevent the brain and the mind from becoming overloaded and malfunctioning. The results support this theory because the participants that had 7 or less hours of sleep scored less in memory recall test which suggest that their brain was not able to

handle the vast majority of the information received that day. Participants who slept over 7 hours before the memory test scored higher in the memory recall test. That would suggest that the irrelevant information was relearned during the night before therefore the brain was not overloaded and was able to perform better in the memory test.

The Wolfson and Carskadon (1998) study had a much larger sample of 3,120 high school students, whereas in the current study a sample of 20 college students was used. Therefore the findings of the previous study are more representative than the current study and could be generalised to the wider population. The results of both studies might have been affected by cultural differences of the participants. The current study took place in Scotland in winter time. The circadian-rhythm is affected by darkness in the winter months, which could lead to tiredness, sleepiness and a struggle to focus during the day therefore recall scores may have been affected. And Wolfson and Carskadon study was conducted in America.

The Wolfson and Carskadon study used questionnaires that the students had to fill in themselves. The results might have been affected by participants filling the questionnaire incorrectly, being untruthful about their sleep times and habits. The participants in the current study also self-reported their length of sleep. Previous study used grades to measure recall which also measures understanding, unlike a 5 minute recall of concrete nouns test done in current study.

Gais, Lucas, and Born (2006) study used a sample of 14 males therefore it is low in population validity. Current study used both male and female participants (20 in total). The previous study tested long term memory. The participants were trained on a task and then tested later whereas the current study tested short term memory with memory recall test. Both studies found that sleep deprivation has detrimental on memory function.

Conclusion

For Condition 1 (less than 7 hours of sleep) the mode was 10 and 8. For Condition 2 (over 7 hours of sleep) the mode was 14. These were the most frequently occurring scores on the recall test. The median scores were 10 for Condition 1 and 14 for Condition 2.

These statistics showed that participants who had less than 7 hours of sleep scored less in memory recall test than the participants that slept over 7 hours. These results suggest that sleep is essential for memory and learning function. It also suggests that a good night sleep before an exam or a test might have a positive effect on the results.

Evaluation

For this research independent measures were used. A disadvantage of using this design is that the individual differences and abilities which could have affected recall scores between participants cannot be controlled. This would therefore make it difficult to establish a cause-effect relationship between the length of sleep and scores on recall test.

Research method was quasi experiment, which is easy to replicate therefore it is reliable. Furthermore, it is unethical to force sleep deprivation. However, a problem with this method is that there was less control over extraneous variables such as a life style of participants, use of drugs, alcohol or electronic devices before sleep.

The independent variable (IV) was the hours slept the night before; conditions being less than 7 hours, or over 7 hours sleep. It could have been improved by reducing the conditions to less than 6 hours, or over 6 hours. That way there would have been more participants in condition 2 (that slept over 6 hours) which would have had an effect on the results. Some extraneous variables have been controlled such as the tables in the room where the memory recall test took place have been separated. The possibility of participants trying to cheat, copy concrete nouns from other participants sitting next was prevented.

Participants were college students selected using opportunity sample. The sample of college students was used in the current study. College students might have used learning techniques to memorise the concrete nouns of the memory recall test that high school students are not aware of.

It is easy and convenient to get students as participants as they are more likely to be available at the time however the results may not be representative of the general population therefore lack generalisability.

References:

1. Francis Crick and Graeme Mitchison (1983) Reorganizational theory, Leckie Leckie N5 & Higher Psychology student book
2. <http://healthysleep.med.harvard.edu/healthy/matters/benefits-of-sleep/learning-memory> (Accessed: 15 January 2019)
3. <https://psychcentral.com/lib/sleep-and-memory/> (Accessed: 24 January 2019)
4. Oswald (1966) Restoration theory, Leckie Leckie N5 & Higher Psychology student book
5. Wolfson and Carskadon (1998) Sleep Schedules And Day Time Functioning In Adolescents, www.sleepforscience.org
6. Steffen Gais, Brian Lucas, and Jan Born (2006) Sleep after learning aids memory recall, www.brianjlucas.com

Appendix 1
Power point presentation

Slide 1

Good afternoon

Slide 2

Tie

Slide 3

Judge

Slide 4

Onion

Slide 5

Pigeon

Slide 6

Noodles

Slide 7

Slide 8

Shed	Blackboard
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Slide 9

Slide 10

Pancake	Farm
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Slide 11

Slide 12

Balloon	Poison
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Slide 13

Slide 14

Ocean	Storm
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Slide 15

Slide 16

Cookies	Radio
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Slide 17

Slide 18

Newspaper	Artist
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Slide 19

Wallet

Slide 20

Sandwich

Slide 21

Elephant

Slide 22

Now you have 2 minutes to write down as many words as you can remember on the sheet provided.

22

Slide 23

Debrief

Thank you very much for taking part in this experiment. The results will be analysed, and a report will be produced. The aim of this research was to investigate a potential link between sleep deprivation and memory recall. Sleep has a role in the consolidation of memories, which is the process of converting short-term memories into long-term memories and helps make them permanent. This test measured short time memory, not intelligence. If you performed badly in this recall test it doesn't mean that you will perform badly in exams. Exams measure understanding, unlike a 5-minute recall test.

Your results can be withdrawn from this study at any point should you wish. This study is testing the link between amount of sleep and memory recall and is not a test of participant's intelligence.

If you have any questions about the research or would like to see the finished report, please contact me at (email address).

If you would like to withdraw your data from this study, please contact me at (email address).

Appendix 2

Brief and consent form

Memory recall test

Before you decide to take part in this study it is important for you to understand why this research is being conducted and what it will involve. Please take the time to read the following information carefully. Please ask if there is anything that is not clear or if you would like more information.

I am a higher psychology student conducting a study investigating sleep and memory.

The aim of this research is to investigate a potential link between lack of sleep and memory recall. Sleep itself has a role in the consolidation of memory, which is essential for learning new information and every day functioning. It has been found that a lack of sleep can cause multiple effects such as memory issues, trouble with concentration, problem solving and judgement, therefore educators, psychologists and health professionals are interested in investigating this topic. Please note that this experiment is a test of your memory, not intelligence.

You will be given a short memory test in the form of a Power point slide show with 20 concrete nouns, shown for 5 seconds each, from which you must attempt to remember as many words as you can. You will be given a separate sheet on which to fill out your details prior to being shown the power point. Once the power point is finished, in the box write as many words as you can recall from the power point. You will be given 2 minutes to do this. During which time you should not confer with any other participants. This should take approximately 20 minutes in total.

The research is confidential, and the data collected will not contain any personal information. The scores of the memory recall test will not be shared.

You can withdraw at any time during the experiment.

Please sign this consent form to confirm that you understand the above information, that you are over 16 years old and that you agree to take part in this research.

Signature of the participant

Date

Appendix 3

Standardised instructions

If at any time you feel uncomfortable and wish to leave the experiment you may do so. If at the end you wish for your results to be removed, they can be.

All results will be kept confidential.

- You will be given a random number - participant identification number.
- You will be given a form on which to fill out your details. The blank box on this page will be used to write the words that you can recall, this box is not to be filled out until you are told to do so.
- The power point will start, you will be shown 20 concrete nouns for 5 seconds each, you should attempt to remember as many of these as you can.
- Once the power point has concluded you will be asked to write down as many of the words that you can recall in the blank box, you will be given 2 minutes to do this. Please do not confer with other participants.
- As soon as you have finished writing the words that you are able to recall fold your page in half. When the 2 minutes is over a researcher will collect these papers from you.


Again, this is a test of memory recall in relation to sleep and NOT a test of intelligence.

Participant Identification number: _____

Gender: _____
(If you prefer not to say – leave this section blank)

Approximately how much sleep did you get last night?

7 hours or less Over 7 hours



Appendix 4

Debrief

Thank you very much for taking part in this experiment. The results will be analysed, and a report will be produced. The aim of this research was to investigate a potential link between sleep deprivation and memory recall. Sleep has a role in the consolidation of memories, which is the process of converting short-term memories into long-term memories and helps make them permanent. This test measured short time memory, not intelligence. If you performed badly in this recall test it doesn't mean that you will perform badly in exams. Exams measure understanding, unlike a 5-minute recall test.

Your results can be withdrawn from this study at any point should you wish. This study is testing the link between amount of sleep and memory recall and is not a test of participant's intelligence.

If you have any questions about the research or would like to see the finished report, please contact me at (email address).

If you would like to withdraw your data from this study, please contact me at (email address).

Appendix 5

Raw data table: Scores on recall test

Condition 1 7 hours or less of sleep	Condition 2 Over 7 hours of sleep
P1 (f) 16	P1 (f) 10
P2 (f) 8	P2 (f) 14
P3 (f) 12	P3 (m) 14
P4 (f) 11	
P5 (f) 10	
P6 (f) 8	
P7 (m) 11	
P8 (m) 8	
P9 (m) 11	
P10 (m) 13	
P11 (m) 10	
P12 (f) 10	
P13 (f) 9	
P14 (f) 6	
P15 (f) 8	
P16 (f) 10	
P17 (f) 12	

Calculations**Median calculations:**

Condition 1 (7 or less hours of sleep): 6, 8, 8, 8, 8, 9, 10, 10, **10**, 10, 11, 11, 11, 12, 12, 13, 16.

Condition 2 (Over 7 hours of sleep): 10, **14**, 14.

Mode calculations:

Condition 1 (7 or less hours of sleep): 6, **8, 8, 8, 8**, 9, **10, 10, 10, 10**, 11, 11, 11, 12, 12, 13, 16.

Condition 2 (Over 7 hours of sleep): 10, **14, 14**.

Candidate 2 evidence

Gender and Length of Sleep

Level 6 Higher Psychology

Word Count- 2,590

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Sleep is one of the most important parts of life that has a huge effect on the human body. It can have lasting mental, emotional and physical damages if the body does not get enough and it affects everyone. Sleeping for too long is associated with reduced short-term memory and learning ability; it also will affect a person's mood, usually making them more negative, and make their performance and productivity drop.

The sleep cycle comprises 5 stages that each take up to 90 minutes. Stages 1-4 are called NREM (non-rapid eye movement) and in those stages, the body begins to shut itself down and starts to restore itself and stage 5, also known as the REM stage (rapid eye movement), is when your brain activity begins and dreams can occur whilst the rest of your body is essentially paralysed. The body requires the 5 90 minute cycles to ensure sufficient REM/NREM sleep; without this cycle, the body will not have time to restore itself, rest fully and the person would be left feeling tired throughout the day.

The Restoration Theory by Oswald (1966) suggests that slow-wave sleep (NREM) sleep is mainly to restore physiological functions and physical aspects (such as minor injuries and removal of waste chemicals in the muscles). Adam and Oswald (1983) also believed that REM sleep was beneficial as it restored the nervous system and brain but also cleared the build-up of toxins and by-products and replenished neurotransmitters in the nervous system. This theory was tested on animals, such as a platypus and dolphin, to discover the effect of REM sleep on brain growth and how it affects the immaturity of new-borns and it was revealed that the platypus would sleep in the REM stage for 8 hours, whereas the dolphin had close to no sleep during the REM stage. This showed that there is a relationship between neural development and sleep. Another study that shows how the body needs sleep is the study on Peter Tripp (1959). He underwent an experiment for charity, in which he did not sleep for 201 hours and was constantly under watch. He began to hallucinate and argued with and insulted some of his closest friends due to the negative affect that took over him. The study shows how badly the body and mind relies on a good night's sleep as it physically and mentally restores you.

Alexandros Vgontzas (2011) aimed to see how men and women differ in their moods and general performance after being made to sleep with irregular sleeping patterns. The study included 34 participants (16 men, 18 women) at the average age of 24.5, sleeping in a lab overnight for 13 days. In the first 4 nights, the participants would be allowed to sleep for 8 hours but the next 6 nights were lowered to only 6 hours per night and for the following 3 days, they were told to have 'recovery nights' by sleeping for 10 hours. The researchers measured the participants' sleepiness using a Stanford Sleepiness Scale and also a Multiple Sleep Latency Test which were only used on the 4th day, 10th day and 13th day. Results showed that, in both men and women, performance had decreased after 6 nights of sleep restriction and did not improve after 2 nights of recovery; however, sleepiness did improve after the recovery. It was discovered that women

have less subjective sleepiness, less performance deterioration and had better improvements after the recovery nights. These differences were associated with increased amounts of slow-wave sleep in women.

Carla de Souza et al (2017) focused on the different sleep habits, quality of sleep and daytime sleepiness between men and women teachers. To carry out this study, they used 243 teachers (77 men, 166 women) and made them answer questionnaires. They were also recorded using a linear regression model to examine the relationship between the dependant variable and the independent variable. The study discovered that women would sleep earlier than men during the week and later on the weekend which was associated with their teaching schedule. Also, the women were found to have higher sleepiness levels and worse sleep quality compared to men. Women do not fulfil their sleep needs and it is believed that is due to workload stress and other attributes.

Aim:

To investigate if the male gender between ages 18-25 sleep longer than the female gender of the same age group.

Experimental Hypothesis:

Men aged 18-25 will sleep longer than women aged 18-25.

Null Hypothesis

Men aged 18-25 will not sleep longer than women aged 18-25. Any difference will be due to chance factor.

Method

Research Method

A quasi-experiment was used as the independent variable (gender) was natural and could not be manipulated by the researcher. Participants were not randomly allocated to the conditions as the independent variable was naturally occurring. Data was collected by the completion of a short questionnaire (see Appendix One) once the participants had woken up. The questionnaire was the best method choice as it was the easiest way to collect data in a short period of time and it was also easiest for participants to do without putting them in an uncomfortable situation.

Research Design

The research design was an independent group.

Variables

The independent variable was the gender (male and female) of the participants and the dependant variable was the self-reported length of sleep. The extraneous variables that were controlled were giving out the questionnaires to the participants at the same time in the same room to avoid any tampering with the questionnaire. The possible confounding variables would be mainly based on the participant such as their mental health, sleeping habits, daily caffeine intake or overall stress and workload as these are all things that could affect the way a person sleeps.

Sampling Method

Quota sampling was the most effective way of selecting participants to ensure an equal number of males and females within the age range.

Participants

10 participants were asked to take part in this study. 5 were men and 5 were women. All participants were aged between 18 and 25.

Materials

A questionnaire was used (see Appendix One).

For the brief and consent form (see Appendix Two).

For the standardised instructions (see Appendix Three).

For the debrief (see Appendix Four).

Procedure

- The researcher entered psychology classroom to ask students to take place in the study.
- The brief and standardised instructions were read out to them and they signed the consent form under supervision.
- 10 participants (5 men, 5 women) agreed to take part.
- The participants took the questionnaire home with them.
- They would go to sleep like normal and once they awoken, they would fill out the questionnaire.
- The same day, they would bring the questionnaire back to the psychology classroom to return the results.
- The debrief would be read out to the participants.
- The results would be calculated and then destroyed by shredding the paper copies.

Ethics

The study only included people over the age of 16. Only participants between ages 18 and 25 were asked to take part as people under the age of 16 are vulnerable and cannot give their informed consent

Steps were taken to ensure that all personal information given were kept private. Participants were only required to sign their name as a form of identification and their age. If the participant wished to be removed from the study and have their results and information destroyed, then all data would be abolished.

To avoid any psychological harm to participants, it was made clear during the brief and debrief that this study was not to judge anyone or to belittle anyone. This study was primarily for research and not to make men or women feel superior in any way. In addition, sleep was not manipulated by the researcher as this could have had negative psychological and physical consequences.

The participants were also made aware in the debrief that this study was not to question their health and if they were “larks or owls”. Recently, there was an article released expressing that “owls” have a greater chance of getting breast cancer (see references for article). It was made clear that these findings would need to be investigated deeper before it becomes a worry for people.

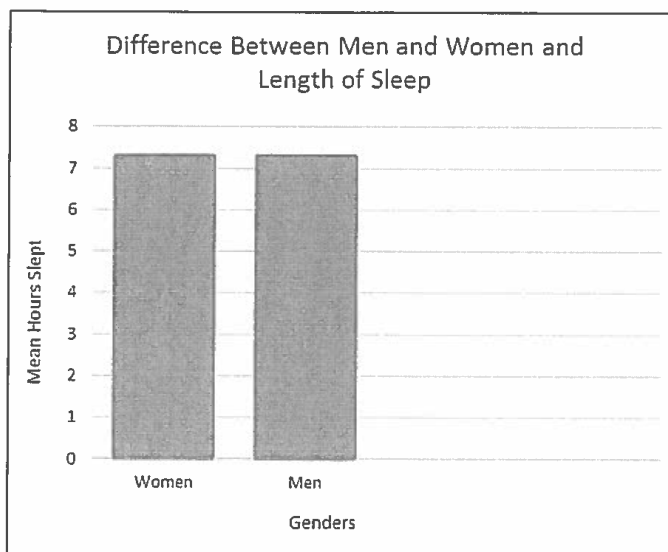
The study was not made to make people feel insecure about their habits; as made clear in the debrief. Everyone sleeps at a different time and is unique and that is respected. The participants were asked to not share their results as a way to make everyone feel secure and as a way to not breach the ethical guidelines. The results are also kept anonymous and only the researcher would have seen the information gathered which was later destroyed.

Results

A raw data table (see Appendix 5) shows the length of sleep for each participant.

The mean was chosen as the statistical procedure as the mode and median do not use all the data. The mean therefore is more representative of all the data. As the scores were all close numbers, it was useful to use the mean as there were no outlying scores to skew the average.

A simplified bar graph was made to express the mean length of sleep:



A simplified table to express the mean score was made:

Participant (gender)	Mean length of sleep
Male	7.3
Female	7.3

The experimental hypothesis for this study suggested that men would sleep longer than women; but the results showed that within this group of students, men and women were equal with their length of sleep as the mean for both men and women was 7.3. Therefore, the null hypothesis was accepted and the experimental rejected.

Discussion

Analysis

The results of the study suggested that the males and females who took had the same mean length of sleep. Due to the results, the experimental hypothesis was refuted which then confirmed the null hypothesis explaining that men aged 18-25 will not sleep longer than women aged 18-25 and that any difference will be due to chance factors. The evidence of this was supported by the mean calculation (see Appendix 5). The mean calculation showed that on average, the men and women studied had the same average length of sleep which was 7.3.

The results could have been very similar due to the fact that all the students are studying the same course and doing the same work therefore, they are most likely on the same stress-load from college. These similarities may have had more of an impact on sleep than gender which made no difference to the length of sleep.

The participants' personal lives, such as work, home-life and mental/physical problems would also have had an effect on their length of sleep, as each thing can have a negative effect on the body and mind which in turn may affect length of sleep. Such individual differences could have been more significant than gender.

Carla de Souza et al (2017) investigated the difference between men and women teachers and how their different sleep habits, quality of sleep and daytime sleepiness would affect them during the day. The study revealed that women slept earlier than men during the week and longer on the weekend which was linked with their teaching schedule. The differences between this study and the study that had recently took place was that the age of the participants was not the same, as students were used in the more recent study whereas teachers were used previously. In the de Souza et al (2017) study, the length of sleep was not calculated (only the timing of sleep was calculated) but in the current study, only the length of sleep was calculated. Findings from the previous study imply that women may have a morning chronotype as they slept earlier than the men, which is why it was surprising that they did not sleep for longer in the current study because all the participants had to get up early in the morning for college; but if males tend to have an evening chronotype then they would have slept for a shorter length of time.

Alexandros Vgontzas (2011) investigated the difference between men and women and their mood/performance after being made to sleep with irregular sleeping patterns. The study had revealed that in both men and women their performance had decreased after 6 nights of sleep restriction and after 2 nights of sleep recovery, it did not get better even though the sleepiness levels did. This current study showed that

both males and females had under the recommended hours of sleep so they may not be performing at their best and may be experiencing more negative moods.

The findings of the current study are relevant for real life as it showed that male and female students are not getting enough sleep and that the effects of their home/work life, mental health problems, caffeine and dietary intake and usual sleep schedule could be taking a toll on them. According to the National Sleep Foundation, the recommended length of sleep for people between the ages 18-60 is 7.5+ hours every night. If students slept for 7.5 + hours every night then it could affect their motivation and concentration in their studies and work as they would have had more sleep, therefore will not be as lethargic. Further research should go underway as there needs to be more understanding of what specifically is the most damaging to students and ways to prevent negative activity.

It can be concluded from the results that in this particular group, the male and female participants' lengths of sleep were similar and had no differences as the mean for men is 7.3 and women is 7.3. On a wider scale, this could vary and be different whilst also taking into account, the personal issues that the participant could have been experiencing or doing (caffeine intake, mental problems, etc.).

Evaluation

A questionnaire was used which was an efficient way to gather a lot of quantifiable data in a short space of time however participants may have given responses that they believed were socially desirable therefore findings may not be valid.

A strength of this study was that it was high in ecological validity as the participants were asked to sleep in their own bed and environment that they were accustomed to, making the results more accurate.

A drawback of this study was that the participants' mental health and usual daily tasks were not made aware to the researcher. The mental state, daily workload and stress levels, caffeine intake and personal responsibilities such as family or for women, pregnancy, could all have influenced the length of sleep that a person had, therefore it may not have been possible to establish a cause-effect relationship between gender and length of sleep due to these uncontrolled variables.

This study could be seen as unreliable as the standardised instructions inform that the participants are required to take the questionnaire home and complete it the next morning. It is unclear if every participant followed the instructions or if they completed it at any time which may have affected the results as they may have forgotten how long they had slept for. If this happened, then the results would not be accurate and would have false results making it an unreliable source of information on the students' length of sleep.

References

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Appendix 1.

Questionnaire for participants.

1. Do you associate yourself with the female gender or the male gender?
2. How old are you? (between 18-25)
3. In a normal night, how long do you usually sleep?
4. How long did you sleep for last night?

Appendix 2.

Brief and Consent Form for participants.

My name is I am a psychology student who is investigating the length of sleep in both men and women between the ages of 18 and 25; to see how they are different and to see if men do sleep longer than women. This study is being conducted as it will bring further knowledge into previous research on the differences between men and women and how sleep effects them. This study was not made to judge or belittle anyone and is not to define your health; it is purely being used for research purposes. Everyone sleeps at different times and this study is not to make you feel insecure about your personal habits. As a participant, you will be required to sleep normally at home and answer a questionnaire following that night. The questionnaire will only take 1 minute. All information that is gathered will be fully confidential (other than your gender and age) and once the study is complete, the information will be destroyed. You are allowed to withdraw at any time if that is what you desire and if so, all information will be destroyed immediately.

I have read and understood the above brief and I willingly consent to be a participant in this study. I also confirm that I am over the age of 16.

Name:

Date:

Appendix 3.

Standardised Instructions.

To ensure you all have the same experience, please answer the questionnaire immediately after you have woken up. I will collect the questionnaire at the next psychology class at the same time to ensure that it is all gathered without being tampered with.

Appendix 4.

Debrief.

I would like to thank you all for participating in my study by filling out the questionnaire which will help in the investigation that is to see if men and women differ in sleep length. I will use the information gathered by you to draw a conclusion. I hope everything was answered and clear to you. This evidence will be destroyed after all the information is taken. Just to remind you from the brief, this study is not to judge or belittle anyone involved and is not a test to define your health. It is primarily for a psychological study and it is not intended to make either gender feel superior. This study is purely being used for research purposes. Everyone sleeps at different times and this study is not to make you feel insecure about your personal habits. There was a report recently claiming a link between being an owl and getting breast cancer. I would like to stress that this study was not investigating your chronotype and that this link is not based on reliable evidence.

Thank you so much once again. If you have any more questions, feel free to ask me and if you want to withdraw your data from the research, please let me know.

Appendix 5.

The table of raw data gathered from the participants showing the mean average of length of sleep of men and women.

Participant Number	Gender	Hours Slept
1.	Male	7 hours
2.	Female	8 hours
3.	Female	7 hours 30 minutes
4.	Male	8 hours
5.	Male	8 hours
6.	Female	6 hours
7.	Male	6 hours 30 minutes
8.	Female	7 hours
9.	Male	7 hours
10.	Female	8 hours

The mean calculations.

Mean calculation of men: $7 + 8 + 8 + 6.5 + 7 = 36.5$ divided by $5 = 7.3$

Mean calculation of women: $8 + 7.5 + 6 + 7 + 8 = 36.5$ divided by $5 = 7.3$

Candidate 3 evidence

The effect of majority on conformity

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Introduction

Conformity can be described as social pressure which alters one's behaviours and beliefs so as to fit in with group norms. Norms help us understand social influence for the most part and conformity especially. Social norms are the approved levels of behaviours in social groups. Norms encourage discipline in society, and it is hard to imagine how human society could successfully function without social norms.

Conformity usually occurs due to peer pressure and is normally silent, it can be described as a conscious or unconscious response to observing the actions and behaviours of others. In 1955 Deutsch and Gerard established two main causes for people to conform:

- ❖ **Normative Social Influence** is when a person conforms in order to be apart of a group and feel welcomed and liked by a group. It can also take place to refrain from punishment and receive awards.
- ❖ **Informational Social Influence** is when uneasiness causes a person to take on behaviours of others. They conform as a result of not knowing what to do and to acquire knowledge.

There are many factors that can affect conformity which can be split into two kinds: Situational factors and individual differences. Situational factors are things that differ from one circumstance to the next they include group size, similarity of group, social support and secrecy of response. Individual differences point out that some people are more prone to conform than others as a result of things such as their age, other individual differences include gender, culture, personality and thought processes.

Jenness (1932) was the first psychologist to carry out experiments studying conformity. His experiment used an ambiguous situation featuring a glass full of 811 white beans. His sample was made up of 101 psychology students and the participants were asked to estimate how many beans there were individually. Next the participants were put into groups of three and asked to deliberate the number of beans and provide a group estimate. The participants were then asked individually once again to provide an estimate and most of the participants altered their estimate so as to make it nearer to the group estimate. The participants were eager to be right due to Jenness offering the award of an A grade for the closest estimation in the class.

Jenness's study was backed up by Muzafer Sherif who carried out a study on conformity in 1935. Sherif acquired similar results to that of Jenness's study. His experiment involved using an illusion known as the auto-kinetic effect which is when a light appears to move in a dim/dark room. He asked the group of three participants to estimate how far they thought the light moved. The light did not actually move, yet when estimates were shouted out loud in a group the participants were more likely to conform to the group and estimate similar to the group.

A classic study to investigate the level to which social influence from a majority group could change whether or not a person conformed was conducted by Asch in 1951. Asch's experiment was conducted in a laboratory. He used 50 American male participants who were told they were participating in a 'visual test'. They were then placed in groups of 8 and unbeknown to the true participant the other seven individuals were confederates (actors) who had answers prepared. The participants carried out a line judgement task. Each participant had to state which line they believed was the longest with the answer always being evident. The true participant always gave their answer last. There were 18 trials overall, with 12 of the trials being 'critical trials' which is when the confederates gave the wrong answer. It was clear that the majority group normally had a big impact on the true participant with one third of the participants conformed.

Aim: As can be distinguished from earlier research, a group majority can have a considerable influence on an individual and the larger the majority the more likely an individual is to conform. The aim of this study therefore is to study whether or not people will conform to other participant's wrong answers even though the answer is evident simply due to group majority.

Hypothesis: The experimental hypothesis was that the true participants who were in a group with more confederates were more likely to conform whereas in the control group there should be no conformity.

Method

Design:

This experiment was conducted in a laboratory. It took place in a classroom at a secondary school () in Scotland and the classroom was transformed to appear as a laboratory. The study was independent groups – there were 3 groups of 7, 1 with 4 confederates, 1 with 2 confederates and a control group with no confederates. Allocation of what participants would be a confederate was done randomly.

The independent variable of the study was the presence or absence of a confederates in the group and the dependent variable was the number of true participants who conformed.

All of the groups were provided with the same set of instructions and the same exercise to complete. Each group was allocated the same amount of time (10 minutes) to complete the task. In order to control extraneous variables such as distraction, the study was carried out in a small

noiseless classroom transferred into a laboratory and each group took turns to do the experiment. The experiment was also carried out at the same time of day, which was lunch time, however o

Participants:

The study used a sample of 21 randomly selected pupils from a secondary school in [redacted]. The age range of these pupils was 16-18. The mean age of these pupils was 16.95 and out of the 21 participants, 11 were female and 10 were male. All the participants were known by the researcher, however none of them were psychology students so they were naïve to the research.

Upon agreeing to participating in the study, some of the participants were randomly selected and told they were to be confederates, to no acknowledgement of the true participants. Once it was decided who the confederates and true participants were, a time and place were arranged for the experiment to take place the same week.

Materials:

The researcher prepared a sheet of paper for each group that had the instructions at the top and the task on it. The task consisted of a list of countries which the groups then needed to discuss and write down the capital of each of the countries beside the country. There were 14 countries listed on the paper. This sheet can be found at the end of the assignment (see Appendix 1).

The group were allowed to work on the task for 10 minutes which was being timed by the researcher on a stop watch.

Procedure:

All of the groups of participants were tested at lunchtime. Each group were allocated a time to come to the student laboratory which was a vacant classroom. So, the 3 groups of 7 came to the laboratory at different times. They were then all instructed to sit in a small circle and then asked if they could read an ethical statement and sign a consent form (see appendix 2). They were next told that they had the right to withdraw from the experiment at any time.

The researcher then read out standardised instructions to all the participants. The instructions informed the participants that they were taking part in a study of memory and they had to complete the task in 10 minutes. They were also told they could leave the experiment at any time.

The group of participants were then handed the sheet of paper with the instructions and task on it, but it was turned over. They were told not to turn the paper over until the researcher said they could. Once the researcher asked them to turn the paper, which had a list of countries on it that the participants had to name the capitals of, the researcher started the stop clock. The confederates in each of the group were to convince the true participants that the capital of France was Lyon as opposed to Paris. The true participants had no clue that some of the other participants were confederates. In the case of the control group, there were no confederates.

The experiment was then finished as soon as the stop watch reached 10 minutes or as soon as the group said they had completed the task or given up.

Once the experiment was complete, the researcher debriefed and told the real purpose of the experiment. The participants were then asked if they had actually known that the capital of France is Paris instead of Lyon and all the participants who conformed said yes but they conformed purely due to peer pressure. The participants were then thanked for taking part in the experiment. The aims of the study were then explained to them, and they were reaffirmed that they could withdraw.

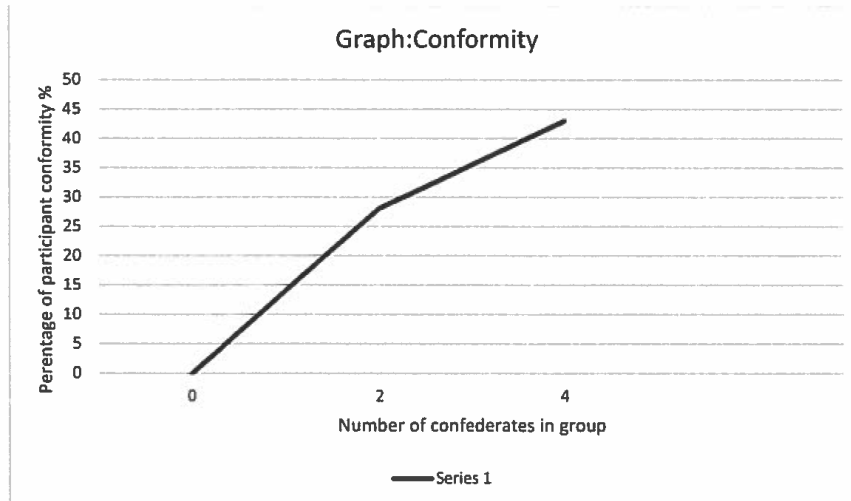
Results:

The results were collected and a percentage of the true participants who conformed in each of the groups was calculated. This was achieved by collating the overall persons in each group, the number of confederates and the number of participants who conformed. From these figures I divided the number of true participants who conformed by the number of participants in the group and multiplied this by 100 to obtain a percentage of conformity in each group.

Table 1: Results of study

Number of participants in the group	Number of confederates in the group	Number of true participants who conformed	Percentage of true participants who conformed
7	4	3	43%
7	2	2	28%
7	0	0	0%

The main findings are shown on the following graph, which gives a helpful visual summary. As the number of confederates in the groups is increased, the percentage of participant conformity increases. With 4 confederates in the group, 43% of participants conformed, with 2 confederates 28% of participants conformed and in the control group where there were no confederates, there was no conformity at all.



Discussion

These findings link group majority influence on conformity, backing up previous research studies. A group majority can make people feel peer pressured and make them conform simply to fit in with the group.

Indeed, from the results it is evident that the larger the majority exhibited within a group, the stronger the pressure is on the remaining individuals within to conform and fit in with their peers, whether through desire for acceptance, or fear of getting the answer wrong and appearing foolish. This pressure has the effect of prompting an incorrect answer from a person even when the correct answer is obvious.

In this case the group that contained 4 confederates 43% of participants conformed to the incorrect answer, in the group with 2 confederates 28% of participants conformed and in the control group with no confederates there was no conformity as predicted. This backs up the work of Asch (1951), Jenness (1932) and Sherif (1935).

These findings support the significance of peer pressure on our decision making in day to day life and is particularly relevant in our current political, commercial and social climate where peers and external parties seek to manipulate our responses to further certain causes and reject others.

However, this study contained some weaknesses. Firstly, the experiment lacked ecological validity as it was conducted in an artificial laboratory. Controlled environments can sometimes

influence a study as participants are aware they are taking part in an experiment. The natural environment is less quiet and distraction free, contrary to a laboratory environment, so may provide a variation in interaction and response.

Another shortcoming is that this experiment only used participants aged 16 -17 which means that the results cannot be generalised having omitted members of the elderly population or a younger population. In addition to this, the participants knew each other, which could have made participants conform less or more.

The sample size is relatively small as well, so a third consideration for future experiments would be to use a larger sample size with more variations in confederates to participants ratio, which would hopefully consolidate the results already achieved.

Lastly it would be beneficial to carry out a more thorough debrief of the participants at the conclusion experiment, questioning them as to why those conforming chose the wrong answer in contradiction to their beliefs. This would ascertain the level of self-awareness participants have in relation to their behaviour and thought processes behind their actions.

To conclude, from the results of this study and previous studies have confirmed the hypothesis that people will conform even if the answer is obviously wrong, simply due to group majority.

References

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Sherif (1935) Conformity and group norms. Retrieved 14 March 2019 from <https://www.psywww.com/intropsych/ch15-social/conformity.html>

Asch (1951) experiment into length of lines. Retrieved 13 March 2019 from <https://www.simplypsychology.org/asch-conformity.html>

Appendices**Appendix 1: Copy of task used**

Below is a list of countries, you have 15 minutes in your group to write down the capital of each of the countries beside. You can stop (quit) the experiment at any time.

Country	Capital
England	
Spain	
Brazil	
Portugal	
France	
Germany	
America	
Canada	
Ireland	
Scotland	

Appendix 2: Copy of the consent form

I consent to take part in this psychology research study. I have received information about the nature of the research and I understand that I have the right to withdraw at any time. I understand that the researcher is working under a code of ethics, which prohibits them from putting me in harmful situations and any data obtained from my participation will be treated confidentially.

Signature:

Date:

Print name: