Candidate 1 evidence

Higher Psychology Assignment

Usage of Technology and its Effect on Sleep

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Introduction

Our body keeps track of time using our circadian clock or 'body clock' which controls our circadian rhythms or our body's natural processes over a 24-hour cycle e.g., sleep/wake cycle and our appetite for food, body temperature and our hormone levels. Neurons are cells in the nervous system that send information, using chemical and electrical signals. Messages in the brain are sent using electrical impulses and chemicals called neurotransmitters.

During the day, the chemical adenosine builds up in our brains neurons as a natural by-product. When we sleep this build up is cleared, and the adenosine is replaced by energy in the form of glycogen, this is called homeostasis which creates balance within the brain and body. The consumption of caffeine during the day blocks adenosine and reduces tiredness keeping us awake for longer which ends up changing our circadian rhythms. The SCN receives information about whether its light or dark then neurons send information to the pineal gland which then releases the hormone melatonin to induce sleepiness. The more light there is, less melatonin is produced and the less light there is, more melatonin is produced. If the SCN is confused about what time it is due to zeitgebers, it may release melatonin at the wrong time, causing us to get sleepy at the wrong times. An example of this is in modern times, most people are using mobile phones, the blue light from them could trick our circadian rhythms causing us to stay awake for longer and it becomes more difficult to fall asleep.

During adolescence, alertness increases later in the evening which makes it more difficult for younger people to fall asleep at an acceptable hour meaning they are awake for longer and need to find ways to pass the time or initiate sleep, usually they turn to their mobile phone, PC or video games which could be making it more difficult for them to fall asleep. Weaver et al (2010) wanted to find out if video-gaming, compared with an opposing pre-sleep activity requiring passive observation would result in participants having greater arousal that subsequently affects the sleep initiation process. The experiment used thirteen male adolescents aged between 14 and 18 years and were recruited by a sample of convenience. The experiment contained two conditions: a video game was chosen for the study and a DVD for the control condition. Weaver et al (2010) found that pre-sleep video gaming increases the sleep onset latency (SOL). The difference between both conditions confirmed that pre-sleep video gaming would lead to increased SOL and reduced subjective sleepiness following pre-sleep video gaming compared with a passive control. However, this study generalises to frequent gamers who may be used to the effects of pre-sleep gaming, if they're even affected by any. This doesn't fully represent the full impact of pre-sleep video gaming on adolescents who aren't regular players.

Technology has become a major part of our lives, especially before we go to sleep. Hysing et al (2015) wanted to see if the use of electronic devices by adolescents before sleep was related to short sleep duration and going to sleep late at night. The researchers used a total sample of 9875 participants. The majority of participants were high school students and there were more girls than boys used in the sample. The participants stated what electronic devices they used and if they used them in their bedroom before going to sleep. They were also asked about their electronic usage throughout the day outside of school and were also asked how much sleep they felt they needed to feel rested. Hysing et al (2015) found that most adolescents used an electronic device within the hour before falling asleep and total

daytime screen use after school of more than four hours was positively related to sleep deficit. Some gender differences were found with more boys using games consoles and more girls using mobile phones and MP3 players. However, this cannot be generalised as sleep is different for everyone and it can be argued that with less need for sleep, adolescents can spend more time on their electronic devices.

Aim:
The aim of this study is to investigate the relationship between the usage of mobile phones before falling asleep and sleep onset latency. This study is a variation of the Hysing et al (2015) study with a focus only on smartphones along with a wider age range of participants.

Hypothesis:
The correlational hypothesis is the more an individual uses their mobile phone before they fall asleep (minutes), the higher their sleep onset latency (minutes).

Null Hypothesis:
The null hypothesis is there will be no correlation between participants mobile phone usage (minutes) before sleep and sleep onset latency (SOL) (minutes).

Method

Design
This study used a non-experimental method which allows to quickly and easily gather information about participants sleeping habits. This method allows for larger samples to be collected which increases the ecological validity of the study. A correlational design was used to investigate the differences between the covariables of this study. The covariables in this study are the amount of time spent on one's mobile device before bed and how long it then takes one to fall asleep (SOL)(minutes). The study was formed as a questionnaire which allows for a large sample of data from a wide range of people to be collected along with greater generalisation being applied as many different people from different age groups and of a different gender participated. Extraneous variables that could have affected results include participants being influenced by other participants. For example, if more than one person done the questionnaire in the same room, they could have talked about answers which potentially could have affected results. Another extraneous variable that could have affected results of the study is that every participants sleeping routines will be different and they will use their mobile devices for different reasons so they may be unable to give perfectly accurate answers which may have affected the outcome and validity of results.

Sample and Participants
This study used opportunity sampling which allowed for easily accessible samples and results from participants. However, this strategy of sampling can generate unrepresentative samples potentially decreasing the ecological validity of a study. This study used 51 people from a wide range of age groups, from 16-69 years of age. The study used a mixed sample of both males and females to allow for a wider generalisation of results. Participants were family members and friends with the experimenter and the study received some email correspondence and many paper samples from conversations with friends and family.

Materials
This study used various materials to complete and is as follows; a pen was used so that the participants were able to give their answers on the questionnaire (appendix 4) and fill out the consent form (appendix 1). This was then followed by written instructions (appendix 2) being read aloud to participants after they filled out the consent form (appendix 1) then were left to fill out the questionnaire (appendix 4) and were finally given a debrief (appendix 3) to remind them of the code of ethics. An electronic device was also used to give and receive answers from the questionnaire from participants completing the form online.

Procedure
This study carried out several steps to protect participants and their personal information. Firstly, the experimenter created and prepared the brief, debrief, questionnaire and consent forms ready for participants to fill out and created a table with participants numbers with a code relating to their name and how many participants took part. Secondly, potential participants were contacted and approached by the experimenter through school and family and friends outside of school to allow for a wider range age variation, and agreement was gained to take part in the study. Thirdly, participants were read the brief out loud and signed the consent forms and had the opportunity to fill out the questionnaire in private. A table

was then created containing the participants details and the results from the questionnaire. Lastly, participants were debriefed and ensured that their participation in the study would always remain confidential and were also thanked for their participation.

Ethics
While completing this study all the ethical guidelines produced by the British Psychological Society (BPS) were always followed and to their fullest extent to ensure all rights were protected and all participants knew what they were taking part in.
One ethical concern that had to be taken into consideration was the privacy of participants. Participant's identities were always kept anonymous and confidential. To ensure the personal information of participants was kept confidential the experimenter made sure the correct measures were put in place to keep participants anonymous. To identify participants answers, a coding system was used, numbers were used instead of names and the only information about the consent form was their signature on their consent forms. To maintain confidentiality consent forms and the questionnaires were always kept separate from one another and only kept in reach of the experimenter.
Another ethical concern considered was the amount of deception used within the study. The study used no deception towards participants as none of the questions in the questionnaire were misleading and remained neutral. During the briefing, debriefing and on the consent form no participants were misinformed about the purpose of the study and the research process being carried out as they had several opportunities to ask questions if needed.
Another ethical concern considered was the participants protection from harm. To ensure that participants were always fully aware of their rights the experimenter explained a full brief and debrief to them explaining what they were entailing to along with explaining their right to withdraw from the study at any stage of the research. All documents containing participants personal details were always kept confidential and only in reach of the experimenter.

Results

After all the results were collected, the experimenter created a raw data table (appendix 6) and the mean, mode and range were calculated for both covariables. These can be found in table 1 and graph 1 below. The mean was used to calculate the average and allows for all calculations to be included in the results however does have the risk of negatively affecting results if there are extremely high or low values included. The mode was used to calculate the most common value recorded; this allows for a better description of the data to be given as extreme values can be avoided, however sometimes results can be bi-modal or multi-modal meaning there are 2 or more modes in results. The range is based on the difference between the lowest and highest scores, it is useful as it can be very easily calculated by subtracting the lowest from the highest value however, it may not reflect the distribution of the other data in the results as it is limited.

Table 1 – The relationship between mobile device usage before bed and sleep onset latency

	How long mobile device is used before bed (minutes)	How long it takes one to fall asleep (SOL) (minutes)
mean	74.1	33.5
mode	30	10
range	150	140

Graph 1 – The relationship between mobile device usage before bed and sleep onset latency
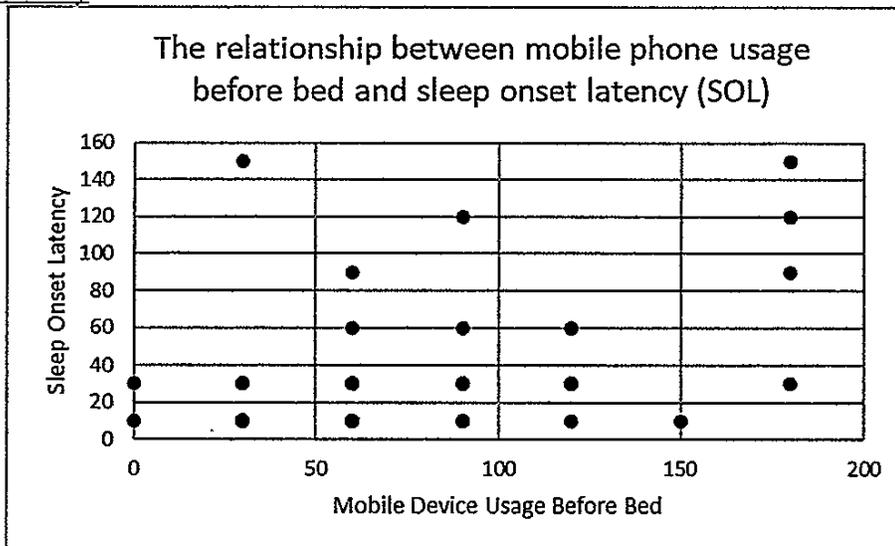
Graph 1 shows the relationship between the usage of mobile phones and its effect on SOL. This study aimed to find a positive correlation between one's mobile phone usage before bed and its effect on sleep onset latency. As we can see from graph 1, the results of this study oppose this hypothesis as no correlation was found between the covariables. Overall, the results indicate an opposition for this hypothesis and support the null hypothesis of no correlation found between participants mobile phone usage hours before sleep no SOL to be found.

Discussion

This study aimed to find a correlation between mobile device usage before bed and its effect on sleep onset latency. The results of this study do not support the correlational hypothesis that the usage of mobile devices before bed increase the sleep onset latency. Statistics show that the average amount of time participants spent on their mobile phone was 74.1 minutes with the average time estimated to fall asleep was 33.5 minutes. The average time participants spent on their mobile phone was higher compared to the average time taken to fall asleep, this shows that the usage of mobile phones before bed do not influence sleep onset latency. These results also do not support the null hypothesis.

An extraneous variable that could have affected the reliability of results is participants may not have fully reflected on their sleep pattern meaning their response may not have been an accurate representation of human behaviour. This decreases the ecological validity and reliability of results. Also, if participants were potentially distracted or their full attention was not put on filling out the questionnaire then this could have also decreased ecological validity along with the reliability of results and may not have been a full representation of what they would have said if they had absolutely no distractions around them.

This study relates to the biological approach. This is when adenosine builds up in the brain throughout the day and clears when we sleep. Adenosine then turns into glycogen during the night which is called homeostasis creating balance in the brain. The SCN receives information whether it is light or dark outside which releases melatonin to induce sleepiness. If the SCN is confused about what time it is due to zeitgebers, melatonin may be released at the wrong time. Thus, relating to the study by the impact of blue light from mobile phones acting as a zeitgeber potentially confusing the SCN which causes our sleep onset latency to increase.

Hysing et al (2015) conducted a similar study where they wanted to find if the use of electronic devices by adolescents before sleep was related to short sleep duration and going to bed late at night. They found that most adolescents used a mobile device within an hour of falling asleep and more than four hours spent on their mobile phone, which showed it had an influence on their SOL. Hysing et al relates to this study as both studies contained adolescents, however this study found no correlation between mobile device usage and SOL in young people. The difference between the Hysing et al (2015) study and this study is that no correlation was found in this study, a potential reason for this may be that this study used a wider age range of participants meaning these results can be more widely generalised showing the impact of mobile usage on sleep onset latency of all ages.

A strength of using a questionnaire when doing research is they are fast and practical. They also allow for straightforward and clear quantitative data to be found which allows for it to be categorised easily. However, due to the simplicity of questionnaires, data may lack ecological validity and depth as the experimenter did not get any explanations as to why the participants chose their answers. Future researchers may want to look further into why humans have the sleeping pattern they do when carrying out this experiment.

This study used opportunity sampling meaning results and samples could be easily analysed and accessed by the experimenter. This method of sampling however does not give an

ecological valid representation of society as it will not apply to all members of the public meaning the ecological validity of the study is decreased.

A strength of this study is that is can be described as extremely ethical. Throughout the research process, all participants were reminded of their right to withdraw from the study and that all their personal details would always remain confidential and anonymous. This allows for the participants to feel safe in that their identity would not be revealed at any stage of the research process.

This study used a wide range of participants of different ages and gender. This meant that the experimenter could receive a greater generalisation of results for a wide range of data. This allows for a more reliable range of data to be gathered meaning the ecological validity of this study is increased. By using a wider participant sample, the experimenter can find a better understanding of human behaviour and the effect of mobile phone usage on SOL. Overall, the results of this study do not support the findings of Hysing et al and shows that there is no correlation between the usage of mobile devices before bed and the effect it has on sleep onset latency (SOL). The alternative is hypothesis is the more an individual uses their mobile phone before they fall asleep (minutes), the higher their sleep onset latency (minutes). As a result of this research the use of electronic devices before sleep has no effect on ones SOL.

References

- Hysing, M., Pallesen, S., Stormark, K.M., Jakobsen, R., Lundervold, A.J. and Sivertsen, B. (2015). Sleep and use of electronic devices in adolescence: results from a large population-based study. *BMJ Open*, [online] 5(1), pp.e006748–e006748.
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- Weaver, E., Gradisar, M., Dohnt, H., Lovato, N. and Douglas, P. (2010). The effect of presleep video-game playing on adolescent sleep. *Journal of clinical sleep medicine: JCSM: official publication of the American Academy of Sleep Medicine*, [online] 6(2), pp.184–189.
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<u>Appendix 1</u>

<u>Consent Form</u>

Please read this form carefully and to its fullest extent:

Thank you for choosing to participate in this process. You will be completing a questionnaire about the amount of time you spend on your mobile phone before falling asleep and how long after it takes to fall asleep. This study supports the ethical guidelines produced by the British Psychological Society (BPS). You have the right to withdraw from this study at any point and your data will not be used in the results. Your identity will also remain anonymous throughout the whole process, and you will not be identified at any time. The questionnaire will take a few minutes to complete, and all participants will be debriefed after the study has been completed.

By signing this form, I agree:
- I understand I have the right to withdraw from the study at any point in time.
- I understand my data will be published, but my identity will remain anonymous.
- To take part in this study.

Signed: Date:

Appendix 2

Brief

Thank you for your participation in this study. You will be completing a questionnaire about your mobile phone usage before you fall asleep and how long it takes you to fall asleep afterwards and during the questionnaire you will be given privacy to complete it comfortably. Please try to answer truthfully and remember there are no right or wrong answers to the questions asked. Once you have completed the questionnaire you will be given a debrief to ensure you are completely comfortable with being included in this study. Remember that throughout this study you have the right to withdraw at any time and your identity will always remain confidential and anonymous.

Instructions:

1. Read the questions asked carefully.
1. Answer the questions truthfully.
1. Give the questionnaire back when fully completed.

Once again, thank you for your participation in this study.

Appendix 3

Debrief

Thank you for taking part in this study. The aim of this study is to investigate the relationship between the usage of mobile phones before falling asleep and sleep onset latency. This study will use data from a questionnaire completed by participants to see if the usage of mobile phones affects how long it takes them to fall asleep. Please remember that you have the right to withdraw at any point during this study and your identity will always remain anonymous. If you would like to withdraw at any point, then you can contact me at ▓▓▓▓▓▓▓▓▓▓▓▓ Again, I would like to thank you for your participation in this study and if you have any questions please do not hesitate to ask.

Appendix 4

Questionnaire

1. What age are you?

2. Please state your gender (if comfortable)

3. Do you use a mobile phone before bed? Please circle below.
   YES   NO

4. How long do you use your mobile phone before bed? Please circle below.
   30 minutes   2 hours
   60 minutes   2 hours 30 minutes
   1   hour 30 minutes   3 hours

5. Approximately how long does it take you to fall asleep once ready to sleep? Please circle the most applicable to you below.
   10 minutes or less   1 hour 30 minutes
   30 minutes   2 hours
   1 hour   2 hours 30 minutes

Appendix 5
Raw Data

Participant No.	Age	Gender	If they use a mobile phone	How long mobile is used before bed	How long it takes to fall asleep
1	52	female	yes	1 hour 30 minutes	10 minutes or less
2	19	male	yes	30 minutes	30 minutes
3	17	female	yes	1 hour 30 minutes	30 minutes
4	52	male	yes	30 minutes	10 minutes or less
5	18	female	yes	2 hours	10 minutes or less
6	17	female	yes	30 minutes	10 minutes or less
7	18	female	yes	60 minutes	10 minutes or less
8	17	male	yes	30 minutes	10 minutes or less
9	17	female	yes	60 minutes	10 minutes or less
10	17	male	yes	60 minutes	1 hour 30 minutes
11	17	female	yes	1 hour 30 minutes	10 minutes or less
12	17	female	yes	30 minutes	10 minutes or less
13	17	female	yes	1 hour 30 minutes	30 minutes
14	17	male	yes	30 minutes	10 minutes or less
15	24	female	yes	60 minutes	30 minutes
16	62	female	no	•	30 minutes
17	16	female	yes	1 hour 30 minutes	30 minutes
18	16	female	yes	1 hour 30 minutes	60 minutes
19	16	female	yes	2 hours	30 minutes
20	16	female	yes	2 hours	30 minutes
21	19	male	yes	1 hour 30 minutes	30 minutes
22	18	female	yes	3 hours	2 hours
23	19	male	yes	2 hours	30 minutes
24	25	female	yes	60 minutes	30 minutes

25	47	female	yes	30 minutes	10 minutes
26	27	male	yes	60 minutes	30 minutes
27	48	female	yes	60 minutes	10 minutes
28	52	female	yes	60 minutes	30 minutes
29	24	female	yes	30 minutes	10 minutes or less
30	52	female	no	•	10 minutes or less
31	62	female	yes	30 minutes	30 minutes
32	66	male	yes	60 minutes	60 minutes
33	25	male	yes	30 minutes	10 minutes or less
34	31	female	yes	30 minutes	10 minutes or less
35	24	female	yes	60 minutes	10 minutes or less
36	69	female	yes	30 minutes	30 minutes
37	18	female	yes	60 minutes	10 minutes or less
38	17	female	yes	2 hours	30 minutes
39	17	female	yes	3 hours	1 hour 30 minutes
40	17	female	yes	2 hours 30 minutes	10 minutes or less
41	17	female	yes	1 hour 30 minutes	10 minutes or less
42	17	female	yes	30 minutes	2 hours 30 minutes
43	17	female	yes	3 hours	30 minutes
44	24	male	yes	2 hours	1 hour
45	26	female	yes	1 hour 30 minutes	2 hours
46	17	male	yes	30 minutes	10 minutes or less
47	17	PNTS	yes	3 hours	2 hours 30 minutes
48	17	male	yes	60 minutes	10 minutes or less
49	17	female	yes	2 hours	1 hour
50	17	male	yes	1 hour 30 minutes	10 minutes or less
51	37	female	yes	30 minutes	10 minutes or less

Appendix 6

Calculations

Amount of time spent on mobile device before bed

Mean:
90 + 30 + 90 + 30 + 120 + 30 + 60 + 60 + 90 + 30 + 90 + 30 + 60 + 0 + 90 + 90 + 120 + 120 + 90 + 180 + 120 + 60 + 30 + 60 + 0 + 30 + 60 + 30 + 30 + 60 + 30 + 60 + 120 + 180 + 150 + 90 + 30 + 180 + 120 + 90 + 30 + 180 + 60 + 120 + 90 + 30 = **74.1**

Mode:
30 = 15   120 = 7
60 = 12   150 = 1
90 = 10   180 = 4
= **30 minutes**

Range:
180 − 30 = **150**

Amount of time it takes to fall asleep

Mean:
10 + 30 + 30 + 10 + 10 + 10 + 10 + 10 + 10 + 90 + 10 + 10 + 30 + 10 + 30 + 30 + 30 + 60 + 30 + 30 + 30 + 120 + 30 + 30 + 10 + 30 + 10 + 30 + 10 + 10 + 30 + 60 + 10 + 10 + 10 + 30 + 10 + 30 + 90 + 10 + 10 + 150 + 30 + 60 + 120 + 10 + 150 + 10 + 60 + 10 + 10 = **33.5**

Mode:
10 = 24   90 = 2
30 = 17   120 = 2
60 = 4   150 = 2
= **10 minutes**

Range:
150 − 10 = **140**

Appendix G

Raw data

False estimate Form		Blank Form	
Guess	Gender	Guess	Gender
58	M	42	M
82	M	42	M
34	M	47	M
35	M	40	M
35	M	37	F
44	F	36	M
48	M	60	M
50	M	32	M

Appendix H

Standardised Instructions

When the participant enters the room, they will be greeted by the research team and asked to take a seat, they will then be thanked for coming. The participant will then be given a consent form and a member of the research team will say "please fill out this form," the consent form will inform the participants that they can withdraw at any point and the research team will repeat this to them by saying "you can withdraw from this experiment at any point." The research team will then show the participants the jar of sweets and inform them that they have 7 seconds to look at the jar of sweets before being given an answer sheet to write down their estimate number of sweets in the jar. The jar of sweets will then be hidden, and the participant will be given an answer form, either condition A or condition B, and asked to fill out their estimate. After they have written their estimate then they will be given a debrief form and thanked for participating.