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Sleepless Nights and Impulsivity: Hidden Cost of Sleep Deprivation

[1]Tahira Riaz, [1]Sadia Mushtaq, [2]Lubna Nazneen [1]Amna Ambreen, [2]M Naveed Umar

1. Department of Psychology, National University of Medical Sciences (NUMS), Rawalpindi, Pakistan
2. Department of Psychology Islamia College University, Peshawar, Pakistan

Correspondence: sadia.mushtaq@numspak.edu.pk

Abstract
The purpose of the study was to study the relationship between no sleep and impulsive behaviors in University students at Malakand. Someone who is impulsive may go ahead with risky actions that could lead to self-harm. Sleep deprivation is caused by either getting fewer hours of sleep or sleeping well, yet for too many hours. Barrett's impulsivity scale was applied for a psychological evaluation of sleep deprivation. The questionnaire has 30 questions on a 4-point Likert scale to determine impulsivity's presence among students. The value for reliability of Barrett's impulsivity scale comes to 0.64, suggesting there is a high level of Cronbach's alpha. Impulsivity in the adolescents was reflected in poor sleep. A total of 50 students were chosen for the study. In 50 students, those with poor sleep before the first 25 were put into the sleep-deprived group, and those with sufficient sleep were named non-deprived after the first 25 students. The data was analyzed with the help of SPSS (version 21) software. The researchers also conducted an independent samples t-test to see if the mean scores of impulsivity were different for those who were sleep deprived and others who slept well. A linear regression was done to check if being sleep-deprived results in greater impulsivity. Comparisons were made to check the levels of impulsivity (measured by the BIS scale) in two groups. Those who did not get enough sleep had a slightly elevated level of impulsive behavior. But, the gap between the two groups is not very significant.

Keywords: Sleepless Nights, Impulsivity, Hidden Cost, Sleep Deprivation

Introduction

During sleep, a person has strong immobility and pays very little attention to outside factors. (Cirelli C, Tononi G, 2015). In order to have good health and perform well, every person needs a healthy amount of sleep. Getting proper sleep is necessary for your body as well as your mind. (Buysse, D. J, 2014).) It has been found that a good quality and sufficient duration of sleep is what fits the physiological need in humans. Duration of sleep is linked to quantity whereas perceived relaxation and difficulty in waking are what quality means. (Buysse D.J, 2014). Sleep was found to be connected with several areas of the brain such as the neocortex and the cortex. Golgi tendon organs and muscle spindles are involved in adjusting sleep. The research by Polack and colleagues as well as by Poulet and Petersen in 2008 and 2013, respectively, describes methods for this task. While sleeping, the brain is able to trigger synaptic activity and also stop it. This article was written

by Carskadon and Acebo in 2004. A recent study showed that if there is less movement while sleeping, subcortical neurotransmitters are less active and this promotes normal sleep cycles. (Grush R. 2004). Sleeping in a cycle of 90 minutes and maintaining a rhythm in that sleep is known as an ultradian sleep cycle. The report relies on the work of Fuller Patrick, Gooley Joshua, and Saper Clifford, published in 2016.

Polysomnography is used by scientists and neurobiologists to examine sleep patterns and different sleep disorders. In Polysomnography, the different stages of sleep, the circadian rhythm, electrical activity in the brain, eye movements, and makings of mussels are monitored. (Grig,2017). Polysomnography allows clinicians to detect several sleep disorders like sleep apnea, hypopnea, insomnia, parasomnias, nightmare, restless leg syndrome, seizures, and REM sleep disorders. (Fuller, 2016). (Littner, Hirshkowitz et al., 2003). Lack of sleep could result in feeling very sleepy, being unable to stay awake, and experiencing cognitive deficits. Lack of sleep causes someone to feel sleepy during the day and often makes it difficult to perform and decide on important issues. According to Zhang, et al, 2024) Sleep deprivation can result in making momentary decisions, forgetfulness, difficulty concentrating, quick mistaking, low motivation, and different night-time disturbances. Baschiera et. al ,2021). Experts have discussed impulsivity in more than one way and introduced several possible explanations. Eysenck suggested that a person is impulsive when choosing fast and without thinking, reaching a conclusion too quickly, and making decisions that end in pain. (Moeller, et al., 2001). Dickman states that impaired impulsivity occurs when kids take actions with not much consideration and are unlike their peers with the same level of understanding. It was also found by the author that impulsivity is linked to having a distracted mind. (Aron, A. R.2014). In another study, impulsivity can be understood as motor impulsivity or cognitive impulsivity. Motor impulsivity appears as an inhibited response to what's going on around you, while cognitive impulsivity is shown in someone's manner of processing reward delay. (Bechara A. 2002). Berlin, et al described impulsivity and impulsive actions as separate concepts. Impulsivity means someone cannot wait for a large reward in the future, while impulsive action is choosing a mere present reward instead of a big reward due later.

According to Stanford et al. there are three factors contributing to impulsivity, A. taking decision quickly without thinking. B. distractibility, C. lack of planning or careful thinking. Barkley et al enlighten impulsivity through bio-psycho-social model in which biologically impulsivity specified with lack of inhibition to control oneself in a situation. From cognitive perspective impulsivity has an aspect of risky and quick decision making. Whereas social aspects show an individual's learned behavior to respond back so quickly without judgements for one own self and around others. Among cognitive models kagan theory has more influence on learning and processing memory. (Kagan J. Galen's prophecy1994). From a behavioral perspective, impulsivity includes quick decisions making with painful consequences (Badre, 2018). Impulsive individuals cannot tolerate delaying and often lose control for less worthy reward as compared to worthy ones. The study revealed that using 5-HT release in prefrontal cortex cuases impulsivity. (Dalley, J, Theobald, D., Eagle, D. *et al,2002*). Researches linked that sleep deprivation might lead abrupt change in work, addictive behaviors and even change in overall lifestyle. (Lockley et al,2004). Scientists discovered the role of sleep in cognitive functions. The link between sleep and insightful learning and memory consolidation was found. (Killgore, W. D. S. (2010). Insufficient sleep link with cognitive functions. A study revealed that poor quality of sleep led to impaired memory, which included working memory and logical reasoning and reduced alertness. One night of deprive

sleep resulted in poor knowledge retention, and difficulty in memory encoding. Killgore, W. D. S. (2010). Zhang, et al, 2024.

Actigraphy helps track sleep -wake cycles, and when necessary, it also contributes to the treatment of out-of-season sleep disorders such as insomnia and nightmares. (Kearns et al, 2023). Specific stages in sleep cycles are influenced by different factors such as age, rate, and pattern. According to the AASM, sleep cycle consists of three parts: N1, N2, and N3. Overall, the sequence of this phase goes from N1, to N2, then to N3, next to N2, finally to REM. (Waterhouse Jim; Fukuda Yumi; Morita Takeshi 2012) Sleep is very important for all ages and conditions, according to another study, newborns need 14 to 17 hours sleep; children aged 3 months need 11 to 14 hours, preschool children require 9 to 11 hours, young adolescents need 8 to 10 hours, while adults require 7 to 9 hours and the elderly require only 7 to 8 hours. The guidelines for sleep depend on a person's age, gender, how fit they are, and how well they sleep. (Hirshkowitz, Max, Whiton & Kaitlyn, 2015). A study made the difference between functional impulsivity and dysfunctional impulsivity clear. Being functional, the brain can make decisions quickly, but dysfunction results in many issues, including becoming highly aggressive, thinking very quickly, moving much, and participating in dangerous activities. There was evidence in the study that dysfunctional impulsivity is common among psychotic conditions like personality, bipolar, ADHD, addiction, and eating disorders. The work of Chamberlain and Sahakian (2007) is:

The impact of adequate sleep in young graduates has been linked with academic performance. The study corelates good quality of sleep with improved physical health, mood and mental capacity. The students who have poor performance academically found have troubles and complaints of insufficient sleep. (Wolfson,2003) Researchers Concerns about the effects of sleep deprivation on academic performance of students. The study observed that poor quality of sleep during night time led students to have daytime sleepiness and ultimately with poor academic performance, social competence and behavioral issues with admins. (Warner, Murray, & Meyer, 2008). A study revealed that sharing bed and place with other person of family member also affect sleep in terms of quality. The disturbance is not limited to only the person who's has sleep issue but it ultimately disturbs the sleep of other person who is laying by side. About 76% married couples in America reported to have an Insomnia and relationship crises who are sharing a common place. (Carskadon., & Acebo, 2004). Bechara et al. reported that patients with impulsive tendencies have impairments to recognize between two choices which have positive and negative consequence. Impulsive patients were not able to distinguish positive consequence over negative one.

Proper sleep regardless of an individual's age brings improvement in memory, focus, physical fitness and mental capability to cope with stress and anxiety. Most of physical recovery and repairing of cells, tissues and muscles happened during sleep time. (Cirelli C, Tononi G.2015). Insufficient sleep in adults and more specifically in adolescents linked with addictive behaviors, mood swings, emotional instability and poor impulse control Drummond et al., 2000). (Frings, 2012) (Kendall, Kautz, Russo, & Killgore, 2006). It has been examined in research if aspects of psychotic disorders and certain personality disorders such as antisocial and borderline personality disorder are linked to difficulties with hyperactivity, acting without thinking, paying attention, and planning. Berlin, H. A., & Rolls, E. T (2004). During this time, teens tend to act before thinking. It has been discovered that adolescents are more likely to act impulsively due to pressures from the environment, changes in genes, and certain hormones. (Warner,2008). Impulsivity was found to have a link with committing suicide, according to researches. It was

observed by Soloff et al. that borderline personality disorder is associated with a strong sense of aggression and impulsivity. The study indicates that idea of self-harm, attempts of suicide, and threats of self-harm are linked to being impulsive. It was observed by researchers that impulsivity can be related to drug addiction. The study further reported that having multiple addiction to drugs leads to stronger symptoms than when a patient is addicted to only one drug. Drug addicts find rewards less satisfying than non-abused individuals do. It was discovered that some drug addicts and people with depression often turn to suicidal attempts because of their impulsive behavior. (Soloff, Lynch & Kelly TM, 2000)

The study carried out by Linnoila et al. looked at subjects who were aggressively planned and compared them with those who were more impulsive. People who acted out of anger had less serotonin than people who had a plan. A lack of sleep can result in problems with attention, increased anger, hyperactive behavior, and rash decisions leading to upsetting results in ADHD, Borderline Personality Disorder, and Antisocial Personality Disorder. Lack of sleep has been linked in studies to impaired ability to control behavior, making decisions that are risky, and having more urges to take risks, especially in people over the age of 18. All in all, the research demonstrates that a lack of sleep may cause impulsive behavior in some neuropsychic-logical areas. Experimental studies involved healthy volunteered subjects who were deprived from sleep showed impulsive behaviors such as low level of concentration, irritability, low level of work performance and cognitive impairment. (Bonnet MH, Arand DL, 2003)

The workers with poor quality of sleep or shift changed were found more inclined to errors, poor health, delay responses and traffic accidents. (Akerstedt, 2009). Koopmans, I., et al investigated that drivers who were driving for prolonged period and deprived from proper sleep found symptoms of impulsive behavior. Those drivers taking risk during driving, irritable and taking risks while overtaking from another vehicle.

Objective of the Study

This study has the following goals:

1. To see if a significant difference in impulsivity is found between people who did not sleep well and those who got a good sleep.
2. To figure out if lack of sleep is a good predictor of impulsivity by applying linear regression analysis.

A relationship was examined between impulsivity and the lack of sleep.

Rationale of the Study

For emotional and mental control, and for making decisions, a healthy amount of sleep is very important. Some studies show that missing out on sleep can make a person act more impulsively (Killgore, 2010). Still, the results obtained so far are not always the same, stressing the importance of more research. The purpose of this study is to increase our knowledge by analyzing the relationship between lack of sleep and impulse using two statistical techniques. Group comparison and prediction. By doing this analysis, we can see whether lack of sleep is just tied to impulsivity or can also be used to predict it. Knowing about this relationship could be crucial during times when self-regulation is necessary, like in healthcare, transportation, or school environment.

Instrument

The BIS-11 was used in the survey to measure the different facets of impulsiveness. The participants were asked to select an answer from a four-point Likert scale. How frequently/infrequently does each statement fit your actions and thoughts? The Total BIS was computed, and scores for each of the three subscales were obtained as well. Shows three aspects: more movement, less attention, and difficulties with choosing the right course of action. Less attention and poor planning are the main reasons behind being impulsive. Barratt impulsivity scale Sleep was broken down by both how relaxed students felt and the number of hours they reported sleeping, based on their responses while being given the BIS.

Statement of the Problem

This research addresses the degree of importance of sleep impact on impulsive behavior among University students. To inquire the association of sleep and impulsivity among University Students would have great significance to improve performance and Psychological well-being. Lack of sleep in students during studies could have great influence on their concentration, vigilance and interest during class.

Hypotheses

Hypotheses for T-test

This method compares the mean impulsivity scores between two groups (sleep-deprived vs. non-deprived).

Null Hypothesis (H_0):

There is no significant difference in impulsivity scores between sleep-deprived and non-deprived participants.

Alternative Hypothesis (H_1):

There is a significant difference in impulsivity scores between sleep-deprived and non-deprived participants.

Hypotheses for regression

This examines whether sleep deprivation predicts impulsivity**,** treating sleep deprivation as a predictor.

Null Hypothesis (H_0):

Sleep deprivation does not significantly predict impulsivity scores.

Alternative Hypothesis (H_1):

Sleep deprivation significantly predicts impulsivity scores.

Research Methodology

Nature of Research

The research design was descriptive in nature, survey method was used to collect data. Data analyzed through quantitative method. Barratt impulsivity scale was used for research purpose among students. Scale was consisting of 30 items and it has 4 Likert points.

Population and Sample

The population of the study included all students of Malakand University. The sample of 50 students was taken for convenience. As to concern student's population the study was confide to 50 students of undergrad of various departments of natural sciences and social sciences. This research was concerned with case studies so 25 students who were sleep deprived were taken and other 25 students were non-deprived for comparison. Participants were assigned either sleep deprived (0) or non- deprived (1). After the sleep manipulation on the top of BIS scale, the responses of students were taken on impulsivity items on BIS-11.

Research Instruments and Data Collection

The research instruments for collecting of data was psychological scale of a 30 -items consist of 4-point Likert points. (Impulsivity scale) This scale was a data collecting tool for the study and was personally administered to the targeted sample.

Data analysis and Treatment of Data

The results are presented in the light of objectives, two statistical tests were used:

1. An independent samples t-**test** was conducted to compare mean impulsivity scores between the sleep-deprived (insufficient sleep in terms of quality and quantity) and non-deprived groups. (sufficient sleep in terms of quality and quantity)
2. A simple linear regression was conducted to examine whether sleep deprivation significantly predicted impulsivity scores.

Table# 1 Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
BIS1	73.34	82.800	.377	.621
BIS2	73.48	83.193	.413	.620
BIS3	73.18	82.314	.450	.616
BIS4	73.32	90.549	.036	.652
BIS5	73.72	91.757	-.031	.659
BIS6	73.28	87.144	.201	.639
BIS7	73.30	88.745	.114	.646
BIS8	73.28	85.430	.226	.636
BIS9	73.14	86.858	.227	.636
BIS10	73.48	85.193	.313	.629
BIS11	73.52	87.193	.241	.636
BIS12	73.62	88.159	.188	.640
BIS13	73.64	86.358	.224	.636
BIS14	73.54	88.539	.136	.644
BIS15	73.12	87.455	.161	.642
BIS16	73.76	92.798	-.082	.663
BIS17	73.44	85.802	.225	.636

BIS18	73.60	88.163	.138	.644
BIS19	73.60	88.286	.151	.643
BIS20	73.32	87.487	.162	.642
BIS21	73.86	86.858	.224	.637
BIS22	73.36	87.664	.182	.640
BIS23	73.84	87.076	.193	.639
BIS24	73.58	92.249	-.055	.660
BIS25	73.32	86.100	.219	.637
BIS26	73.36	83.460	.410	.620
BIS27	73.28	84.328	.341	.626
BIS28	73.54	88.172	.155	.643
BIS29	73.28	87.349	.180	.640
BIS30	72.74	89.870	.073	.649

The table presents item-total statistics for the 30 items of the BIS scale, helping evaluate how each item contributes to the overall internal consistency (reliability) of the scale. Most items show moderate positive correlations (e.g., BIS1 = .377, BIS3 = .450), implying they align reasonably well with the overall construct. However, a few items (e.g**.,** BIS5 = –.031**,** BIS16 = –.082**,** and BIS24 = –.055) show negative or very low correlations, suggesting they may not be measuring the same construct as the rest of the scale. These items might be considered for revision or removal, especially if supported by theoretical reasoning or poor performance in further validation studies. Overall, the BIS scale demonstrates acceptable internal consistency. While a few items show weak correlations with the total score, the impact on Cronbach's alpha is small. This suggests the scale is generally reliable for measuring impulsivity in this sample.

Table#2 Reliability Statistics

Cronbach's Alpha	N of Items
.647	30

Barrett's impulsivity scale items (N=30) among University students' sample(n=50) has Cronbach's Alpha have 0.64 reliability which shows strong positive Reliability.

Table#3

Mean, Mode and median for university students on sleep deprivation and Impulsivity (N= 50)		
	Valid	50
		0
Mean		75.9600
Median		76.5000
Mode		71.00[a]

Mean=75, Median=76, Mode=71 among university students (n==50)

Table 4 Group statistics

Group	N	Mean	Std. Deviation	Std. Error Mean
Less than 5 hours sleep	25	75.64	6.415	1.283
More than 5 hours sleep	25	75.00	5.123	1.025

Note. Group comparison of impulsivity (BIS scores) between participants with less than and more than 5 hours of sleep.

A comparison was conducted to examine the difference in impulsivity scores (measured by the BIS scale) between individuals who reported sleeping less than 5 hours and those who reported sleeping more than 5 hours. The group with less than 5 hours of sleep (M = 75.64, SD = 6.42) had slightly higher impulsivity scores than the group with more than 5 hours of sleep (M = 75.00, SD = 5.12). However, the mean difference between the two groups appears minimal.

Table#5 *Independent Samples t-test for BIS Scores by Group*

Levene's Test for Equality of Variances	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI Lower	95% CI Upper
Equal variances assumed	0.74	.394	0.39	48	.698	0.640	1.642	-2.662	3.942
Equal variances not assumed			0.39	45.76	.699	0.640	1.642	-2.666	3.946

Note. BIS = Behavioral Inhibition System. Equal variances assumed/not assumed refers to the results of Levene's test for homogeneity of variance.

The p-value which is 0.6 > 0.05, which means we fail to reject the null hypothesis that the variances are equal across the two groups (sleep-deprived vs. non-deprived). Therefore, we assume equal variances when interpreting the t-test results.

Equal variances assumed:

- t = 0.390, df = 48, Sig. (2-tailed) = 0.698.
- Mean Difference = 0.640, Std. Error Difference = 1.642.
- 95% Confidence Interval of the Difference: [-2.662, 3.942].

The p-value (0.698) is greater than 0.05, which means that there is no significant difference in the total BIS Scores between the sleep-deprived and non-deprived groups. The Mean Difference of 0.640 suggests that, on average, the non-deprived group has slightly higher impulsivity scores than the sleep-deprived group, but this difference is not statistically significant. The 95% Confidence Interval of the mean difference (-2.662 to 3.942) includes **0**, which further indicates that the observed difference is not statistically significant.

Equal variances not assumed:

- t = 0.390, df = 45.762, Sig. (2-tailed) = 0.699.
- The Mean Difference and Confidence Interval values are nearly identical to the previous result.

p-value (0.699) is greater than 0.05, so the result confirms that there is no significant difference in the impulsivity scores between the two groups.

Based on the t-test results (both assuming equal and unequal variances), there is no significant difference between the sleep-deprived and non-deprived groups in terms of impulsivity scores (BIS). The p-value is much greater than 0.05, indicating that sleep deprivation does not have a statistically significant effect on impulsivity in this dataset. **Levene's Test for Equality of Variances**: The result showed no significant difference in variances between the sleep-deprived and non-deprived groups (p = 0.394). This means we can assume equal variances for the t-test analysis.

Table No 6 *ANOVA Table for Regression Analysis Predicting Impulsivity from Sleep Deprivation*

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	13.291	1	13.291	0.193	.664
Residual	1583.372	23	68.842		
Total	1596.662	24			

Note. Dependent variable: Impulsivity. Predictor: Sleep Deprivation.

A simple linear regression was conducted to examine whether sleep deprivation predicted impulsivity. The model was not significant, F (1, 23) = 0.19, p = .664, R^2 = .008, suggesting that sleep deprivation did not significantly predict impulsivity. As p <0.05 and here p=0 .664 the effect is not statistically significant**.** This means sleep deprivation did not significantly predict impulsivity in the sample**.** R^2 = 13.291 / 1596.662 ≈ 0.0083 (0.83%). Very little of the variance in impulsivity is explained by sleep deprivation.

Table No 7 ***Coefficients Table for Regression Analysis Predicting Impulsivity from Sleep Deprivation***

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	65.128	14.014		4.648	.000
Sleep Deprivation	-.103	.235	-.091	-.439	.664

Note. **Dependent variable: Impulsivity. Coded 0 = Deprived, 1 = Non-Deprived.**

A simple linear regression was conducted to predict impulsivity based on sleep deprivation status (0 = deprived, 1 = non-deprived). The results indicated that sleep deprivation was not a significant predictor of impulsivity, B = -0.103, SE = 0.235, β = -0.091, t (23) = -0.44, p = .664. This means that non-deprived individuals scored, on average, 0.103 points lower in impulsivity than deprived individuals, but the difference was not statistically significant.

Conclusion

According to these findings, lacking sleep does not influence impulsivity in the participants. Although there seems to be a small decrease in impulsivity when people are sleep deprived, this change is not significant enough to mean anything. According to the study, sleep deprivation might affect impulsivity differently based on how it is measured by the BIS. The reason for this variation may be found in the kinds of impulsivity measured, how long people went without sleep, and the differences between individuals. Examining these points in future studies may lead to a better insight into the relationship between sleep deprivation and impulsivity.

Discussion

The point of the study was to explore the link between sleep deprivation and impulsivity. Evidence from previous studies that sleep loss increases impulsive actions, goes against our finding, which did not link the two. As a result, this may suggest that sleep deprivation cannot always predict impulsivity in the study group. Therefore, the results of the study suggest that the lack of a strong relationship could be due to varying examples like total versus partial sleep deprivation. Baseline levels of impulsivity and the different methods to measure it. More studies should focus on these factors to explain better the link between sleep and impulsiveness. Furthermore, a research study by Tempesta et al. (2020) highlighted that having less than the normal amount of sleep raised impulsive and risky actions, mainly on tasks that needed careful consideration and planning. In addition, those who were generally more thoughtful and careful seemed to be more strongly influenced by sleep deprivation, indicating that basic traits play an important part.

Also, a study carried out by Farrell et al. (2024) noted that poor sleep quality was linked to higher impulsivity levels in students, and this impulsivity was responsible for affecting their relationships with others. It appears that the benefits of restful sleep are more important than how much sleep a person misses when looking at impulsivity. The main aim of this study was to see how lack of sleep impacts a person's impulsivity. Even though it was assumed that sleep loss might increase impulsivity, we did not detect any significant difference between people with and without proper sleep. Impulsivity scores between the two groups did not show a statistically significant difference as seen by the independent samples t-test ($t(48) = 0.390$, $p = 0.698$). As a result, we cannot see any difference in impulsivity caused by sleep deprivation in our sample. This model likewise did not point to any strong connection between sleep deprivation and impulsivity ($\beta = -0.091$, $p = 0.664$), explaining only a small part of the data ($R^2 = 0.008$). The findings are different from those of past experiments suggesting that lack of sleep makes people more likely to make impulsive decisions. Killgore (2010) and Tempesta et al. (2020) both discovered that when sleep is reduced, the prefrontal cortex does not function well and makes decision making more impulsive. Even so, it is necessary to pay attention to the specifics and approach used in the study. Same as above, Farrell and his team found out that clear sleep quality matters more for impulsivity than simply less sleep, and the connection could be driven by how individuals manage stress, and react to their environment.

A factor that may explain the current results is that the sample was too similar or sleep deprivation was not long or severe enough. Impulsivity being a multidimensional feature may also be affected by other influences, namely mood, stress, and personality, which were not covered in this research. Despite the numerous research projects that have been undertaken in recent years, looking at impulsivity and its bio-psycho-social regulation, this lack of a clear and standard definition for impulsivity, as well as disagreement over main features, remains a challenge. As a result, experts

have not been able to develop a single theory that explains the cause of impulsivity and its relationship with different factors. (Soloff, Lis, Kelly T, 2000)

Limitations of the Study

- Having fewer participants may have made the study less powerful.
- The research group used an only a binary measurement of sleep deprivation, which could make the analysis of it too simple.
- The tool used may have only revealed one aspect of impulsivity

Research shows that each adult's body works best if they get about 7 to 8 hours of sleep in 24 hours. Still, we should not depend only on how much we read. Every adult deserves to have improved cognitive functions from having a higher quality sleep. Sleep quality is often influenced by several things, for example mental health problems, how much oxygen is in the air, the air temperature, presence of light, electronic screens, noises, and the way a person lives. Some people get only few hours of sleep (below 4 or 5) and manage to have a good mental state, powerful decisions and more focus when needed. Studies have shown that men generally need less time for sleep as part of their regular needs than women do. Differences between people and different kinds of work (such as night shifts) also play a role in causing lack of sleep. Not being active enough, not exercising enough, and having poor eating habits can cause someone to have difficulties falling asleep.

References

Akerstedt, T., & Wright, K. P. (2009). Sleep loss and fatigue in shift work and shift work disorder. *Sleep Medicine Clinics, 4*(2), 257–271. https://doi.org/10.1016/j.jsmc.2009.03.001

Aron, A. R., & Poldrack, R. A. (2014). Cortical and subcortical contributions to stop signal response inhibition: Role of the subthalamic nucleus. *Journal of Neuroscience, 34*(1), 136–145. https://doi.org/10.1523/JNEUROSCI.4682-13.2014

Badre, D., & Nee, D. E. (2018). Frontal cortex and the hierarchical control of behavior. *Trends in Cognitive Sciences, 22*(2), 170–188. https://doi.org/10.1016/j.tics.2017.11.005

Barkley, R. A., & Murphy, K. R. (2010). Deficient emotional self-regulation in adults with attention-deficit/hyperactivity disorder (ADHD): The relative contributions of emotional impulsiveness and ADHD symptoms to adaptive impairments in major life activities. *Journal of ADHD and Related Disorders, 1*(1), 5–28.

Barratt, E. S., & Patton, J. H. (1995). *Barratt Impulsiveness Scale–11: Handbook of psychiatric measures*. American Psychiatric Association.

Baschiera, B., Mazzoni, G., Trovò, G., & Scabini, D. (2022). Effects of sleep deprivation on memory errors: A study in a naturalistic setting. *Bulletin of Biological Education, 56*(4), 335–345. https://bbejournal.com/BBE/article/view/1073

Bechara, A. (2005). Decision making, impulse control, and loss of willpower to resist drugs: A

neurocognitive perspective. *Nature Neuroscience, 8*(11), 1458-1463. https://doi.org/10.1038/nn1584

Berlin, H. A., & Hollander, E. (2008). Understanding the differences between impulsivity and compulsivity. *Psychiatric Times, 25*(8), 1–4.

Bonnet, M. H., & Arand, D. L. (2003). Clinical effects of sleep fragmentation versus sleep deprivation. *Sleep Medicine Reviews, 7*(4), 297–310. https://doi.org/10.1053/smrv.2003.19

Bonnet, M. H., & Arand, D. L. (2015). Clinical effects of sleep fragmentation versus sleep deprivation. *Sleep Medicine Reviews, 22*, 1–12. https://doi.org/10.1016/j.smrv.2014.10.002

Buysse, D. J. (2014). Sleep health: Can we define it? Does it matter? *Sleep, 37*(1), 9–17. https://doi.org/10.5665/sleep.3298

Carskadon, M. A., & Acebo, C. (2004). Regulation of sleepiness in adolescents: Update, insights, and speculation. *Sleep, 27*(5), 978–986. https://doi.org/10.1093/sleep/27.5.978

Chamberlain, S. R., & Sahakian, B. J. (2007). The neuropsychology of impulsivity and impulsive disorders. *Current Opinion in Psychiatry, 20*(3), 255–261. https://doi.org/10.1097/YCO.0b013e3280a9a970

Cirelli, C., & Tononi, G. (2015). Cortical development, electroencephalogram rhythms, and the sleep/wake cycle. *Biological Psychiatry, 77*(12), 1071–1078. https://doi.org/10.1016/j.biopsych.2015.03.002

Fuller, P. M., Gooley, J. J., & Saper, C. B. (2016). Neurobiology of the sleep-wake cycle: Sleep architecture, circadian regulation, and regulatory feedback. *Journal of Biological Rhythms, 31*(6), 547–559. https://doi.org/10.1177/0748730416669045

Grigg-Damberger, M. M., & Gozal, D. (2017). The visual scoring of sleep and arousal in infants and children. *Journal of Clinical Sleep Medicine, 13*(4), 645–664.

Grigg-Damberger, M. M. (2016). The visual scoring of sleep in infants 0 to 2 months of age. *Journal of Clinical Sleep Medicine, 12*(3), 429-445. https://doi.org/10.5664/jcsm.5600

Grush, R. (2004). The emulation theory of representation: Motor control, imagery, and perception. *Behavioral and Brain Sciences, 27*(3), 377–396. https://doi.org/10.1017/S0140525X04000093

Hirshkowitz, M., & Whiton, K. (2015). National Sleep Foundation's sleep time duration recommendations: Methodology and results summary. *Sleep Health: Journal of the National Sleep Foundation, 1*(1), 40-43. https://doi.org/10.1016/j.sleh.2014.12.010

Jaclyn C. Kearns, Mark Lachowitz, Todd M. Bishop, Wilfred R. Pigeon, & Catherine R. Glenn.

(2023). Agreement between actigraphy and sleep diaries: A 28-day real-time monitoring study among suicidal adolescents following acute psychiatric care. *Journal of Psychosomatic Research, 164*, 111110. https://doi.org/10.1016/j.jpsychores.2023.111110

Kagan, J. (1994). *Galen's prophecy: Temperament in human nature*. New York.

Killgore, W. D. S. (2010). Effects of sleep deprivation on cognition. *Progress in Brain Research, 185*, 105–129. https://doi.org/10.1016/B978-0-444-53702-7.00007-5

Koopmans, I., et al. (2023). Fit for purpose of on-the-road driving and simulated driving: A randomised crossover study using the effect of sleep deprivation. *PLOS ONE*, 18(2), e0278300. https://doi.org/10.1371/journal.pone.0278300

Lockley, S. W., Cronin, J. W., Evans, E. E., et al. (2004). Effect of reducing interns' weekly work hours on sleep and attentional failures. *New England Journal of Medicine, 351*(18), 1829-1837. https://doi.org/10.1056/NEJMoa041404

Moeller, F. G., Barratt, E. S., Dougherty, D. M., Schmitz, J. M., & Swann, A. C. (2001). Psychiatric aspects of impulsivity. *The American Journal of Psychiatry, 158*(11), 1783-1793. https://doi.org/10.1176/appi.ajp.158.11.1783

Polack, P. O., Friedman, J., & Golshani, P. (2013). Cellular mechanisms of brain state-dependent gain modulation in visual cortex. *Nature Neuroscience, 16*(1), 27–36. https://doi.org/10.1038/nn.3279

Poulet, J. F. A., & Petersen, C. C. H. (2008). Internal brain state regulates membrane potential synchrony in barrel cortex of behaving mice. *Nature, 454*(7206), 881–885. https://doi.org/10.1038/nature07150

Stanford, M. S., Mathias, C. W., Dougherty, D. M., Lake, S. L., Anderson, N. E., & Patton, J. H. (2009). Fifty years of the Barratt Impulsiveness Scale: An update and review. *Personality and Individual Differences, 47*(5), 385–395. https://doi.org/10.1016/j.paid.2009.04.008

Tempesta, D., Curcio, G., De Gennaro, L., & Ferrara, M. (2020). Sleep loss and emotional reactivity: A review of neuroimaging studies. *Cognitive, Affective, & Behavioral Neuroscience, 20*(1), 21–33. https://doi.org/10.3758/s13415-019-00745-5

Waterhouse, J., Fukuda, Y., & Morita, T. (2012). Daily rhythms of the sleep–wake cycle. *Journal of Physiological Anthropology, 31*, Article 5. https://doi.org/10.1186/1880-6805-31-5

Wolfson, A. R. (2003). Understanding adolescents' sleep patterns and school performance: A critical appraisal. *Sleep Medicine Reviews, 7*(6), 491–506. https://doi.org/10.1053/smrv.2002.0251

Zhang, Y., Liu, H., Wang, X., & Chen, L. (2024). The impact of sleep deprivation on cognitive function in healthy adults. *Frontiers in Neuroscience, 18*, Article 12014645. https://doi.org/10.3389/fnins.2024.12014645