A Study Examining The Effects of Naps on Self-Reported Impulsivity

by

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Abstract

Research has recently investigated impulsivity as a precursor for aggressive behavior and substance abuse disorders (Evenden, 1999; Swann, 2002; Hayes & Lovejoy, 1999). This study focused on the effects of sleep deprivation on self reported state impulsivity in a college-aged sample. State impulsivity was measured utilizing a previously validated instrument, STIMP, which uses fourteen continuous visual analogue scales. Three constructs of impulsivity were measured in all participants: feelings of impatience, control of thought, and impulsivity of behavior. Participants were randomized into either a nap or no nap condition and electroencephalography was used to determine if slow wave sleep was experienced during the 60-minute nap opportunity during the mid-afternoon. The nap condition participants showed a significant decrease in one STIMP construct, self reported state impulsivity of behavior and a significant decrease in total overall state impulsivity. These results may point to beneficial effects of a nap on a college-aged sample, a population with a high-risk of impulsivity and alcohol abuse.

Keywords: impulsivity, sleep deprivation, slow wave sleep, nap, state impulsivity

Impulsivity has a range of definitions, including actions that are poorly conceived, prematurely expressed, unduly risky or inappropriate to the situation that usually result in undesirable consequences or the tendency to act with less forethought than do most individuals (Evenden, 1999; de Wit, 2009; International Society for Research on Impulsivity). Impulsivity is linked to psychological disorders such as bipolar disorder, alcohol abuse, and eating disorders in adolescents. Critically, most previous research on the effects of impulsivity has focused on trait characteristics of impulsivity. This is problematic because there may be environmental factors, which may change one's likelihood of being impulsive. This study explores the effects that naps may have on state impulsivity.

Effects of Impulsivity on Psychiatric Disorders

Recent research has focused on impulsivity as a trait characteristic and predictor of psychiatric disorders. For example, bipolar disorder has been associated with both aggression and impulsivity and it is suggested that impulsivity may exist in bipolar as both a trait and a state characteristic (Najt et al., 2009). Adolescents with bipolar disorder have also been found to show higher levels of impulsivity than healthy controls (Gilbert et al., 2011). Impulsive characteristics have also been seen in patients with eating disorders (Fahy & Eisler, 1993). Anorexia nervosa and bulimia nervosa patients, who exhibited high trait impulsivity characteristics showed less improvement during treatment than those without high impulsive characteristics. In addition, most previous research has focused on impulsivity as a predictor of substance abuse and addiction (Winstanley, Olausson, Taylor & Jentsch 2010). For example, Winstanley, et al. (2010) found that increases in impulsivity are not only predictive of addiction, but of drug dependency by studying cocaine addiction in a rat animal model. Impulsivity has also been closely linked to

substance abuse, both as a contributing factor and as a consequence of use. De Wit (2009) has also shown that trait impulsivity contributes to the likelihood of drug use.

While previous research has focused on trait impulsivity and psychiatric disorders, the study of impulsivity as a state characteristic remains minimal. Studies that do include state impulsivity measures rely on tasks to determine impulsivity such as the go/no-go, which requires participants to perform or withhold from a motor task, and the stop-signal reaction time (SSRT) task, which measures inhibition of a response that has already been initiated (Band & Van Boxtel, 1999). Established by Wingrove & Bond in 1997, the STIMP is the only validated state impulsivity self-report questionnaire at this time.

Adolescence: a period of increased sleep dysfunction and impulsivity

A recent survey of college students showed that sleep problems were among one of the most common causes of stress (Ross, Niebling & Heckert. 1999). College-aged students also display a large number of sleep-related changes. Research has shown that this population of students show an increase in eveningness, the characteristic of being most active in the evening (Giannotti, Cortesi, Sebastiani & Ottaviano, 2002), and a circadian phase delay that results in the preference for later bedtimes (Hagenauer, Perryman, Lee, & Carskadon, 2009). Utilizing the Multiple Sleep Latency Test (MSLT), Carskadon has also shown that college-aged students have a biological need for increased sleep although they tend to reduce their total sleep time as a result of social and cultural activities. The effect of these sleep changes have shown to be related to decreased functioning, increased accidental injury, poor sleep quality and excessive daytime sleepiness (Dahl, 2008). Changes in behavior have also been noted in the college-aged population. Research shows that sensation-seeking behavior increases from childhood through young adulthood on both self-reported and behavioral measures (Steinberg, Albert, Cauffman,

Banich, & Graham, 2008). Steinberg illustrated that impulsivity decreases as a linear function with age, with the college-age student still being at high risk for impulsive behavior. Therefore, due to the previously well-established link between stress, impulsivity and alcohol dependence by Lejuez et al., (2010), the sleep disturbances of these high-risk individuals may put them at a higher risk of substance abuse and other psychological disorders.

Impulsivity, Sleep and Alcohol Use

Sleep may be the missing link in the research of impulsivity as a state characteristic, especially in this specific, high risk, high stress, participant population. With increased impulsivity, adolescents may be at risk for psychological disorders including substance abuse. This study utilized the Alcohol Use Disorders Identification Test (AUDIT) that assessed the individual risk for the participants. While the AUDIT has been mostly employed in adult target groups, a previous study validated the use of the AUDIT to assess risky alcohol use in adolescence (Santis, Garmendia, Acuna, Alvarado & Arteaga, 2009). According to this study, the AUDIT can be used as a tool to test for hazardous, harmful and dependent alcohol use in an adolescent population.

Using the STIMP as a measure of state impulsivity, this study proposes to examine the characteristics of state impulsivity in relation to sleep. While sleep propensity, the time when the human body is inclined to risk, is at its highest during the night, between 4am-6am, research has also shown a peak in the mid-afternoon (Borb & Acherman, 1999), colloquially known as the 'Siesta Dip'. Utilizing a previously used nap paradigm, this study compared a nap to a no nap group, whose increased sleep drive has been used as an analogue for sleep deprivation (Walker, 2008). This study hypothesized that overall state impulsivity will decrease after a 60-minute nap,

and the amount of slow wave sleep during this nap opportunity will have a direct relationship to the decrease in impulsivity.

Method

Participants

This study was part of a larger study examining the role of naps on mood and emotional reactivity. 17 participants (9 males, 8 females) ranging in age from 18-26, were recruited by flyers and internet recruitment sites from the Ann Arbor area. In order to determine study eligibility, all participants underwent an initial phone screen. Inclusion criteria included the ability to speak and understand English fluently, ability to keep a consistent sleep schedule, as well as participants were screened for excessive or inconsistent medications. Exclusion criteria included any history of serious medical disorders, sleep disorders, or pregnancy. The 17 participants were randomly assigned to either a Nap or No Nap condition (See Table 1). All participants were instructed to refrain from alcohol and caffeine prior to day of participation and to keep a consistent sleep schedule for three nights prior to the study. Participants were compensated up to forty dollars for participation. All subjects gave informed consent prior to the beginning of study. The study was approved by the Institutional Review Board at the University of Michigan (IRB Number HUM00042268).

Materials

Electroencephalography. EEG recordings were used to determine the sleep duration and the amount of each sleep stage for the nap condition participants. They were also used as confirmation that the no nap participants remained awake for the duration of the video. Recordings were collected by standardized techniques (Rechtschaffen & Kales, 1968) using EEG, electrooculography and electromyography signals acquired by the Siesta system (The

Siesta Group, 2012). This study utilized a Cz referenced PSG electrode montage, made up of EEG sites F3/F4, C3/C4, P3/P4, and O1/O2. The electrodes were applied in concordance with the international 10-20 system. The EEG recordings were scored in 30-second epochs, according to Rechtschaffen and Kales (1968) scoring criteria, and each was given a score of Awake, Movement, Stage 1, Stage 2, Stage 3, Stage 4 or REM sleep.

State Impulsivity. The STIMP (Wingrove, & Bond, 1997) assesses state impulsivity using a set of fourteen visual analogue items (See Appendix A). Organized into three constructs, control of behavior, determined with statements such as "*likelihood to behave spontaneously" or "difficulty to control actions*", control of thoughts with statements such as "*easily distracted or difficulty to concentrate"* and of feelings of impatience determined by statements such as "*feeling restless*" or "*want to get things done quickly*".

Alcohol Use Disorders Identification Test. The AUDIT, created by the World Heath Organization, is used to identify and assess one's risk of alcohol dependence through a set of 10 self-reported items identifying hazardous and harmful patterns of alcohol consumption (See Appendix B). Risk is assessed with questions regarding recent alcohol use, alcohol dependence symptoms and alcohol-related problems (Babor, Higgins-Biddle, Saunders & Monteiro, 2001).

Procedure

All participants were required to keep a consistent sleep schedule for three days prior to the study, monitored by a sleep diary (National Sleep Foundation) and a time-stamped voicemail system.

On the day of the study, all participants were asked to come to the sleep lab at 1pm. The participants then filled out a battery of questionnaires examining trait characteristics such as the Pittsburgh Sleep Quality Index and Alcohol Use Disorders Identification Test. The overarching

research study included tasks that this particular study did not, which looked at decision-making, risk taking and frustration tolerance in relation to daytime napping. Participants completed these four tasks prior to the nap opportunity with the order of the tasks counterbalanced to prevent any order effects. Prior to the beginning of the tasks, participants were told that based on their performance on the following tasks they could earn up to an additional ten dollars. This additional compensation was included to provide extra motivation, and to prevent complacency when completing the tasks. After the tasks were completed, participants filled out a battery of questionnaires examining state characteristics such as sleepiness, mood, and impulsivity using the Karolinska Sleepiness Scale (Akerstedt & Gillberg, 1990), Stanford Sleepiness Scale (Hoddes, Zarcone, Smythe, Phillips & Dement, 1973), Positive and Negative Affect Scale, (Watson, Clark, & Tellegen, 1988), and the STIMP Visual Analog Scale (Wingrove & Bond, 1997), respectively. Participants were then randomized into a 60-minute nap opportunity condition or a no nap condition where they were asked to watch a 60-minute nature documentary chosen for its emotionally neutral nature. Research assistants monitored all participants, via two-way mirror, to ensure the participant was awake or to monitor the EEG to ensure proper recording. Following the nap, participants were asked to, once again, complete a battery of state questionnaires and were given a brief waiting period to provide ample time to recover from sleep inertia, the initial feeling of grogginess, disorientation, and decrease in performance that can result from abrupt arousal from slow wave sleep (Tassi & Muzet, 2000). The tasks were then presented again, in the same order as prior to the recording.

At the completion of the study participants were debriefed and provided with a list of resources for counseling in the case of emotional stress due to any material viewed in the study.

Data Analysis

EEG data was scored according to standard Rechtschaffen and Kales definitions of sleep stages. The EEG was recorded for 60 minutes allowing for 120 stage scored epochs. Each stage of sleep was converted into a percentage of total sleep for that participant. The amount of slow wave sleep, the combination of stages 3 and 4 of NREM sleep (Schultz, 2008), experienced by the nap condition participants determined whether the participant's sleep fell into a high slow wave sleep group, or a low slow wave sleep group, used to determine if the amount of slow wave sleep had an effect on state impulsivity.

The STIMP gives self-reported values of impulsivity on a continuous scale from 0-100, with 0 representing the least amount of impulsivity, and 100 representing the highest amount. The STIMP data was calculated by averaging the visual analogue scale scores, and difference scores were then calculated for both trials and compared between conditions. Statistical analyses were then performed using between and within group analysis of variance (ANOVA) models together with post hoc comparisons. Difference scores were analyzed for the total scores, as well as for the three individual constructs of the STIMP (See Figure 3). After separating the nap participants into the low or high slow wave sleep group, ANOVA was repeated to test for significance between these groups (See Figure 4).

The mean AUDIT scores for all participants were calculated, and an ANOVA was run to test for significance between the nap and no nap group. A score of 8 or greater resulted in placement of participant into the high-risk group. ANOVA was run to test for significance between the low and high risk group and state impulsivity scores.

All analyses were performed using the IBM SPSS Statistics 20 software, with $P < 0.05$ being considered significant.

Results

A total of 19 participants, 11 of which were randomized into the nap condition were included in this study. The first two participants of this study were excluded from this analysis due to hardware malfunction with the siesta-recording device as well as non-compliance with the consistent sleeping schedule, leaving the total sample size for this study at 17. Sleep schedules were then monitored prior to the day in the sleep lab. (See table for demographics)

EEG stage scoring was performed for all participants' data. Stage scoring confirmed that those in the no nap condition remained awake for the duration of the 60-minute video, while those in the nap condition were analyzed for sleep stages (See Table 2). These data were then split into high amount of slow wave sleep, and low amount of slow wave sleep groups based on the percentage of slow wave sleep. (Low SWS mean = 16.04%, High SWS mean = 50.62%). Those in the high slow wave sleep group had a significantly higher percentage of slow wave sleep than those in the low slow wave sleep group ($F(5) = 11.800$, $p = .019$). The average sleep time for participants was 59.9586 ± 11.8063.

Participants who were given a nap opportunity showed significantly less impulsivity overall on the 14 item test, Group, $F(15) = 4.403$, $p = .053$, in addition to a significant decrease in one of the three constructs of the STIMP, "impulsivity of behavior", Group, $F(15) = 6.295$, $p = .024$,. In contrast, there was no main effect of condition for the other two STIMP constructs, control of thought, Group $F(15) = 0.491$, $p = .495$, and feelings of impatience, $F(15) = 1.325$, $p = .269$.

In addition, analyses were done within the nap group to examine if there were changes in STIMP scores between the low and high slow wave sleep groups. No significant differences were found between these groups for any of the STIMP constructs or total STIMP scores (See Table 4).

Data were then analyzed to assess the levels of risky alcohol use in this participant population. Initially, 35% of the participants in this study scored as high risk for alcohol use. High risk participants, those with scores of 8 or higher on the AUDIT, trended toward higher overall impulsivity than those in the low risk group, Group, $F(15) = 3.224$, $p = .093$. Independent of nap or no nap condition, STIMP difference scores from before to after the nap opportunity showed that high risk participants also showed greater impulsivity following the nap or no nap condition, Group, $F(15) = 7.818$, $p = .014$.

Discussion

This study explored the effects of a mid day nap on different components of state impulsivity in a college student population. The results suggest that state impulsivity decreases after a 60-minute nap occurring during the afternoon. Specifically, self-reported scores of one construct of impulsivity, 'impulsivity of behavior', significantly decreased after a nap, compared to those who were not given a nap opportunity. In contrast, no significant differences were found when comparing the nap participants who experienced low amounts of slow wave sleep with those who had high amounts of slow wave sleep. All participants in this study experienced slow wave sleep during their nap and self-reported higher impulse control than those who were deprived of the nap opportunity. The percentage of slow wave sleep in this set of data did not have an effect on one's change in impulsivity, suggesting it may only be the presence of slow wave sleep during the nap that is critical in reducing impulsivity, not the amount of slow wave sleep. Since all nap condition participants did achieve slow wave sleep, future studies would need to selectively deprive those in the nap condition of slow wave sleep to determine more conclusively the effects of slow wave sleep on impulsivity.

This study may also support the research that has shown that impulsivity is a predictor of alcohol abuse. Participants who scored as high risk for alcohol dependence on the AUDIT, independent of sleep condition, initially scored higher overall on the STIMP compared to those who scored as low risk, supporting the claim that impulsivity is a predictor of alcohol abuse. This finding is indicative of the importance of the nature of this study to find a biological factor that may be effective in decreasing one's state impulsivity. This study suggests that sleep may be effective for decreasing impulsivity, and potentially decreasing the risk for alcohol abuse, down the line.

The largest limitation of this study was the small number of participants, due to the fact that this honor's thesis was a part of a larger study that was just beginning, and due to participants non-compliance to the to the sleep schedule. As a result, the study design was adjusted including the shortening of the sleep schedule from five nights to three nights. Another limitation may include the fact that sleeping in an artificial environment, such as a sleep lab, may create qualitative differences in the sleep achieved compared to sleeping in a home environment. This may limit the assumptions one can make with regard to our results.

While impulsivity has been tested and studied in relation to psychological disorders, including excessive aggression and substance abuse, trait impulsivity usually is the focus. Wingrove and Bond (1997) suggest that impulsivity may not be a particularly stable characteristic, and established the STIMP to assess state impulsivity via self-reported questionnaires. This study, however, was limited by using this measure, which arbitrarily divided impulsivity into three categories. Because the previous research using self-reported questionnaires in assessing state impulsivity is minimal, the validity of these constructs is called into question.

This study's results, while not entirely conclusive, can draw implications about the results of the study, especially the importance of naps for the college student aged population to reduce negative affects of impulsivity and risk taking behavior, including alcohol abuse. Future studies may consider looking into increasing the length of the nap which may provide more information regarding the effects of sleep stages, including light sleep, slow wave sleep, and REM sleep on state impulsivity.

References

Åkerstedt, T., Gillberg, M. (1990). Subjective and objective sleepiness in the active individual. *Int. J Neurosci, 52,* 29-37.

Babor, T.F., Higgins-Biddle, J.C., Saunders, J.B., & Monteiro, M.G. (2001) *The Alcohol use disorders identification test: Guidelines for use in primary care.* Geneva, Switzerland: World Health Organization

Borb, A.A., & Achermann, P. (1999). Sleep homeostasis and models of sleep regulation. *Journal of Biological Rhythms, 14*(559), doi: 10.1177/074873099129000894

Dahl, R.E., (1999). The Consequences of insufficient sleep for adolescents: Links between sleep and emotional regulation. *Phi Delta Kappan, 80*(5), 354-359.

Evenden, J.L. (1999). Varieties of impulsivity. *Psychopharmacology, 146,* 348-361.

Fahy, T., & Eisler, I. (1993) Impulsivity and eating disorders. *British Journal of Psychiatry, 162,* 193-7.

Giannotti, F., Cortesi, F., Teresa, S., Ottaviano, S. (2001). Circadian preference, sleep and daytime behaviour in adolescence. *Journal of Sleep Research, 11,* 191-199.

Gilbert, K.E., Kalmar, J.H., Markovich, P.J., Pittman, B., Nolen-Hoeksema, S., & Blumberg, H.P. (2011). Impulsivity in adolescent bipolar disorder. *Acta Neuropsychiatry, 2, 57-61.*

Gujar, N., McDonald, S.A., Nishida, M., & Walker, M.P. (2011). A Role for REM sleep in recalibrating the sensitivity of the human brain to specific emotions. *Cerebral Cortex, 21,* 115-123.

Hagenauer, M.H., Perryman, J.I., Lee, T.M., & Carskadon, M.A. (2009). Adolescent changes in the homeostatic and circadian regulation of sleep. *Devlopmental Neuroscience, 31,* 276-

284. doi: 10.1159/000216538

Hoddes E., Zarcone V., Smythe H., Phillips R., & Dement W.C. (1973). Quantification of sleepiness: a new approach. *Psychophysiology, 10,* 431-6.

Lejuez, C.W., Magidson, J.F., Mitchell, S.H., Sinha, H., Stevens, M.C., & de Wit, H. (2010). Behavioral and biological indicators of impulsivity in the development of alcohol use, problems, and disorders. *Alcoholism Clinical & Experimental Research, 34*(8), 1134-1345.

Najt, P., Perez, J., Sanches, M., Peluso, M.A.M., Glahn, D., & Soares, J.C. (2007). Impulsivity and bipolar disorder. *European Neuropsychopharmacology, 17,* 313-320.

Ross, S.E., Niebling, B.C., & Heckert, T.M. (1999). Project Innovation. *College Student Journal Publisher, 33*(2)

Rechtschaffen, A. & Kales, A. (1968) A Manual of Standardized Terminology, Techniques, and Scoring System for Sleep Stages of Human Subjects. *US Department of Health, Education, and Welfare Public Health Service*

Santis, R., Garmendia, M.L., Acuna, G., Alvarado, M.E., & Arteaga, O. (2009). The Alcohol Use Disorders Identification Test (AUDIT) as a screening instrument for adolescents. *Drug and Alcohol Dependence, 103,* 155-158.

Schultz, H. (2008) Rethinking sleep analysis. *Journal of Clinical Sleep Medicine, 4*(2), 99-103.

Steinberg, L., Albert, D., Cauffman, E., Banich, M., Graham, S., & Woolard, J. (2008). Age differences in sensation seeking and impulsivity as indexed by behavior and self report: Evidence for a dual systems model. *Developmental Psychology, 44*(6), 1764-1778. doi: 10.1037/a0012955

Tassi, P., & Muzet, A. (2000). Sleep Inertia. *Sleep Medicine Reviews, 4*(4), 341-353

The Siesta Group (2012). Measuring Sleep and Brain Activity. Retrieved from http://www.thesiestagroup.com/

Ursin, R. (2002). Serotonin and sleep. *Sleep Medicine Reviews, 6*(1), 57-69.

Walker, M.P. (2008). Cognitive consequences of sleep and sleep loss. *Sleep Medicine, 9, 29-34.*

Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of the brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070.

Wingrove, J., & Bond, A. J. (1997). Impulsivity: A state as well as trait variable. Does mood awareness explain low correlations between trait and behavioural measures of impulsivity? *Personality and Individual Differences, 22*, 333–339.

Winstanley, C.A., Olausson, P., Taylor, J.R., & Jentsch, D.J. (2010). Insight into the relationship between impulsivity and substance abuse from studies using animal models. *Alcoholism Clinical and Experimental Research, 34*(8), 1-13.

Author Note

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Table 1

Demographic and AUDIT Information

Condition	N(females)	Age (mean)	Mean AUDIT score	High Risk (low risk)
Nap	9 (4)	20.00 (1.323)	7.38 (4.57)	3 (6)
No Nap	8 (4)	22.00 (2.00)	7.22 (5.38)	3 (5)

Note. A score of 8 or more reflects the probability of alcoholism, defined here as "High Risk"

Table 2

Average Percent of Stages in Low and High SWS Condition

	% Stage 1	% Stage 2	% Stage 3	% Stage 4	% REM
Low SWS	7.04 (5.53)	43.82 (21.31)	11.31 (7.61)	4.73 (6.94)	4.87 (6.72)
High SWS	0.52 (.45)	27.21(1.77)	16.61 (11.83)	34.00 (9.99)	0

Table 3

STIMP Data

	Nap	No Nap	p-value
Total STIMP difference	-34.11	63.25	.053
Feelings of Impatience	-11.63	25.630	.269
Control of Thought	16.630	34.750	.495
Impulsivity of Behavior	-34.78	2.880	.024

Note. Total STIMP difference represents the change in total self-reported state impulsivity measures recorded via visual analogue scale. Feelings of impatience, Control of Thought, and Impulsivity of Behavior show the individual sub categories within the STIMP.

Table 4.

STIMP and Slow Wave Sleep Data

	Low SWS	High SWS	p-value
Total STIMP difference	-25.75	-30.33	.998
Feelings of Impatience	5.00	-3.33	.987
Control of Thought	16.00	4.33	.963
Impulsivity of Behavior	-33.00	-31.33	.998

Note. Values represent average difference scores. Post condition – Pre condition scores for total STIMP and all three constructs for the Low and High SWS groups.

Table 5

Audit Data

	Low Risk	High Risk	P-value
Total STIMP Difference	-20.00 (73.17)	69.00 (132.377)	.081
Impulsivity of Behavior	-8.25 (40.786)	-22.33 (35.781)	.484
Control of Thought	-3.42(50.211)	68.80 (48.597)	.016
Feelings of Impatience	-8.67 (54.582)	47.60 (71.71)	.096

Note. Values represent average difference scores of the STIMP for both groups (High Risk and Low Risk) determined by total AUDIT score where 8 or above is indicative of alcohol dependence

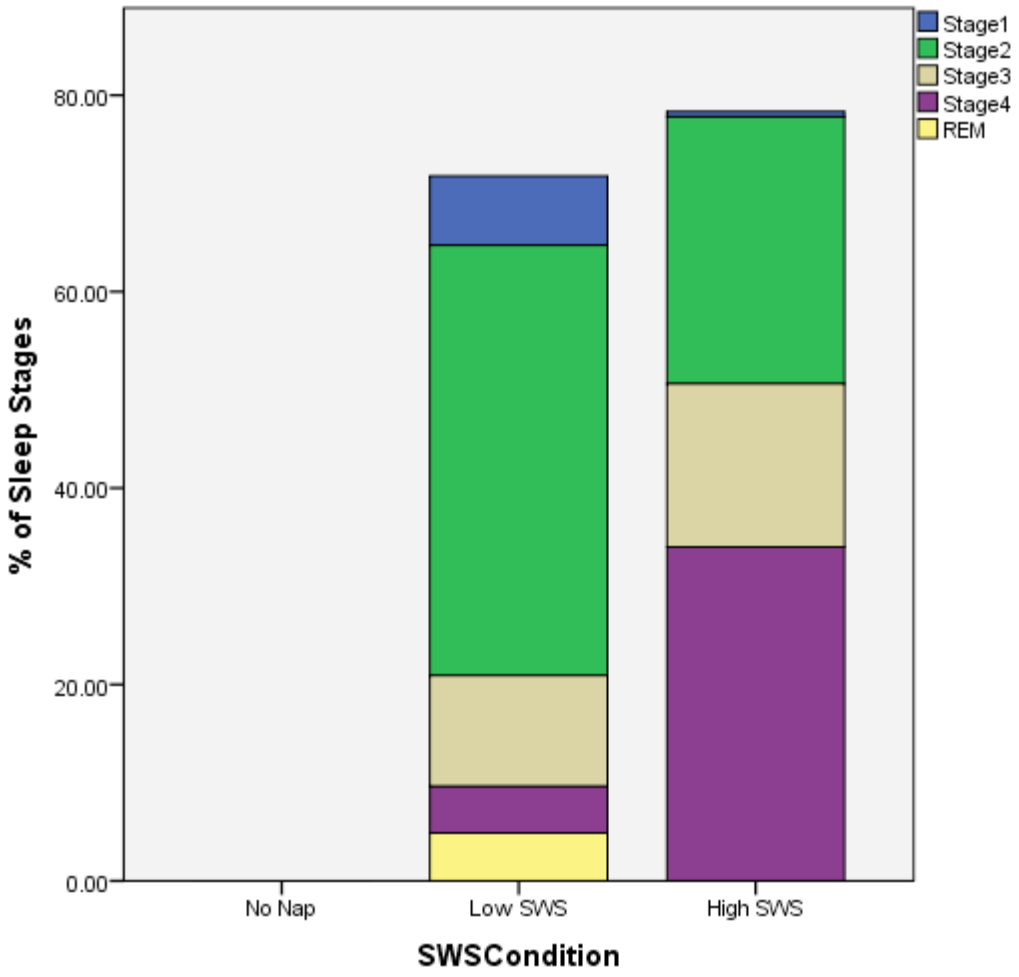

Figure 1. Electroencephalography sleep stage data. Average percent of time spent in each stage for the low and high groups.

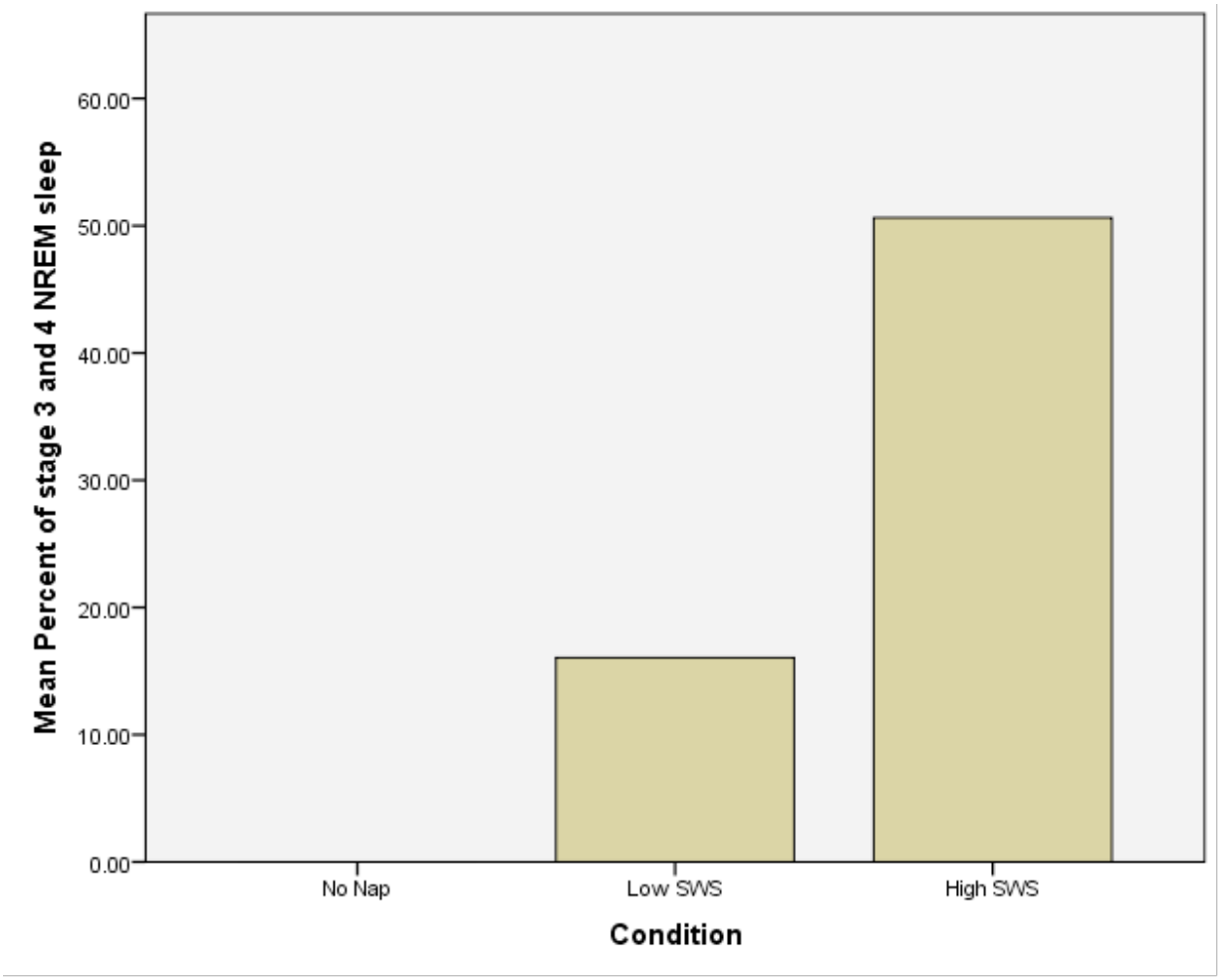

Figure 2. Average slow wave sleep in low and high groups. Percent of time spent in stages 3 and 4.

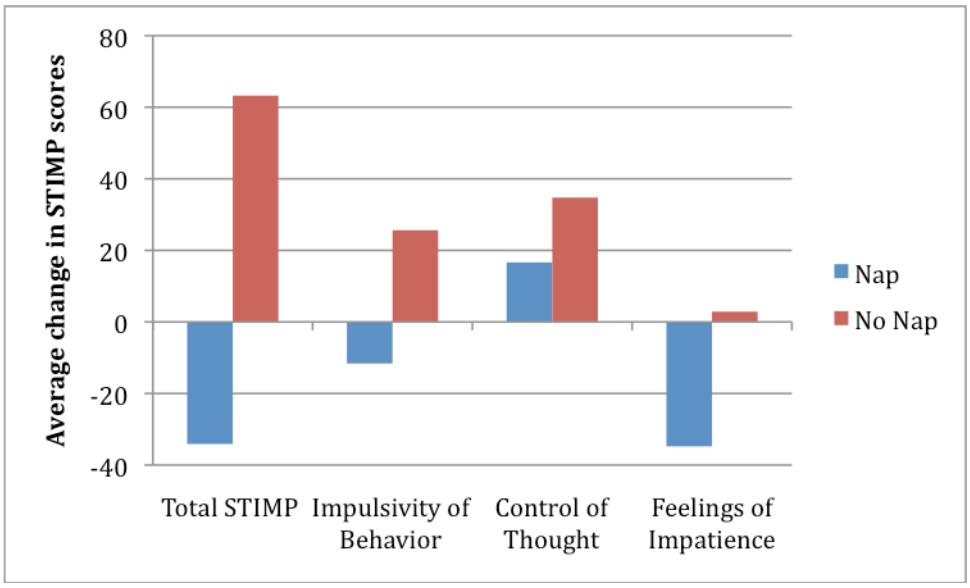

Figure 3. STIMP difference data for nap and no nap conditions. Average change in impulsivity for both conditions.

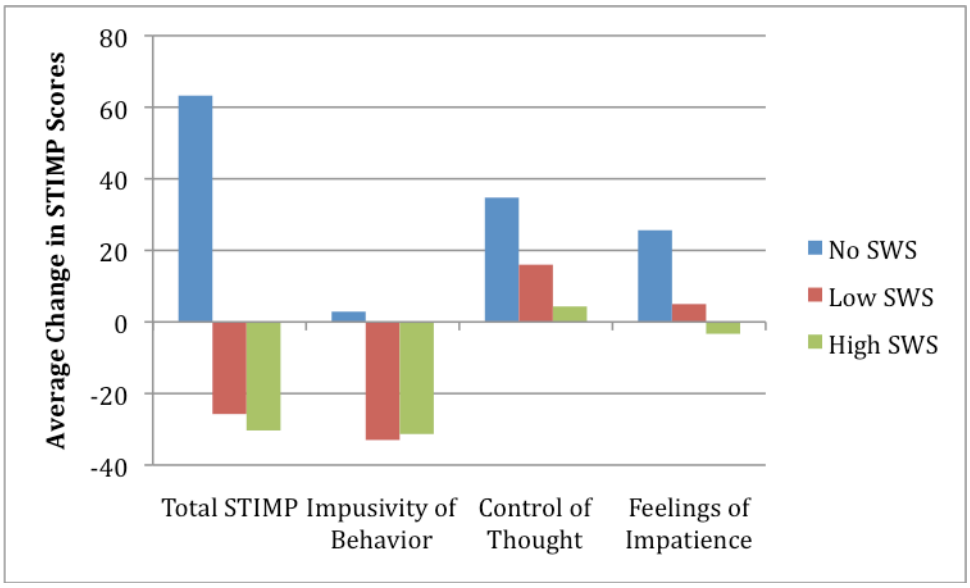

Figure 4. STIMP difference data for low and high SWS groups.

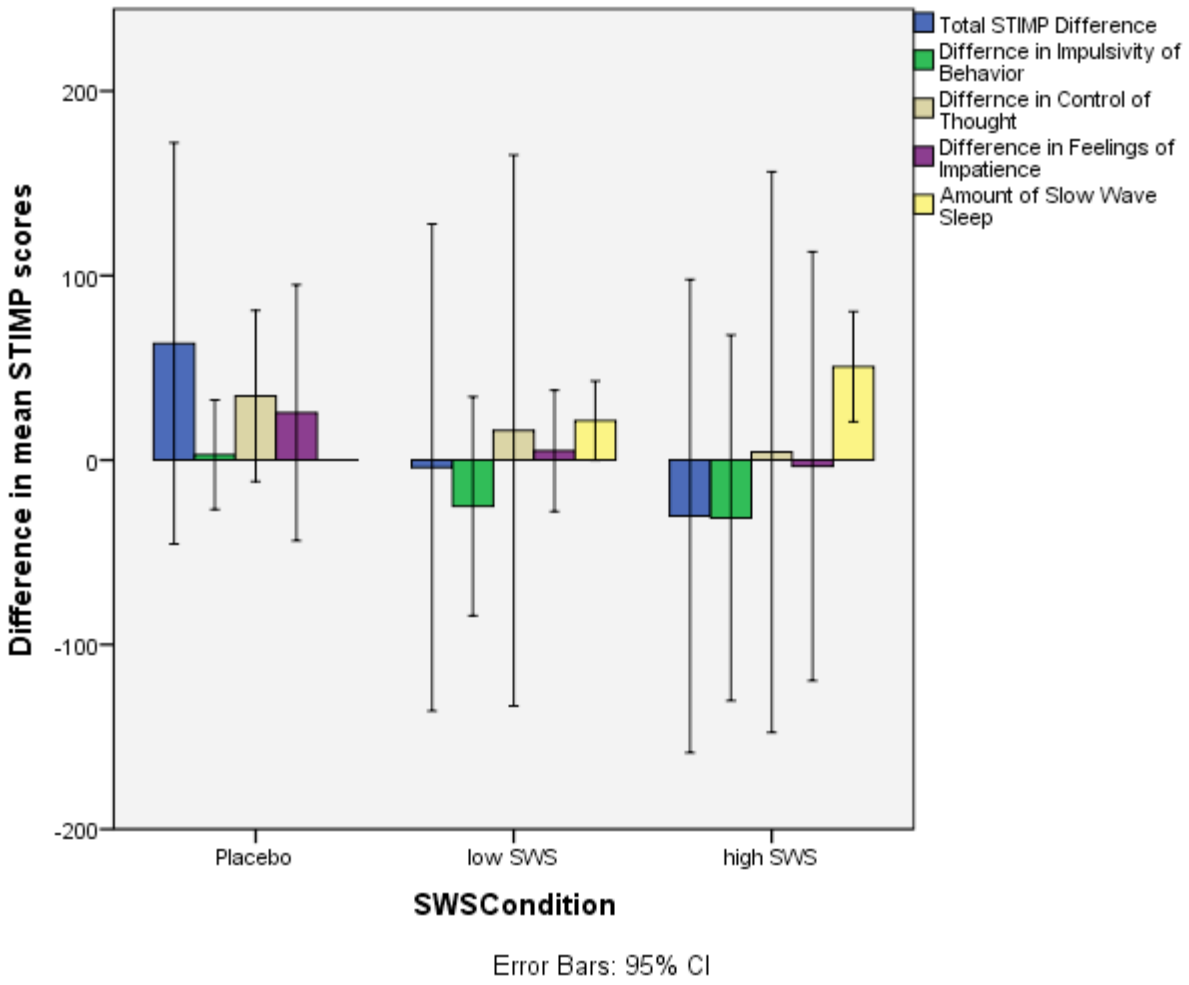

Figure 5. Summary of EEG and STIMP data across all conditions

Appendix A

State impulsivity. (STIMP)

This was assessed using the STIMP (STate IMPulsivity) which consists of a

set of 14 visual analogue items designed to assess impulsive mood. The items were grouped into those relating to:

(1) impulsivity and control of behaviour (five items),

Behave spontaneously

Hard to control actions

Say whatever comes into my head

Do things in a slap-dash way

Tend not to think about consequences of actions

(2) control of thoughts (five items),

Hard to think straight

Hard to take in what's going on around me

Easily caught off guard

Easily distracted

Difficult to concentrate

(3) feelings of impatience (four items).

Tend to be impatient

Feel restless

Find waiting difficult

Want to get things done quickly

Appendix B

Alcohol Use Disorders Identification Test (AUDIT)

Please circle the answer that is correct for you

1. How often do you have a drink containing alcohol?

Never	Monthly or less	Two to four times a month	Two to three times a week	Four or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?

1 or 2	3 or 4	5 or 6	7 to 9	10 or more

3. How often do you have six or more drinks on one occasion?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

4. How often during the last year have you found that you were not able to stop drinking once you had started?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

5. How often during the last year have you failed to do what was normally expected from you because of drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

7. How often during the last year have you had a feeling of guilt or remorse after drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily

9. Have you or someone else been injured as a result of your drinking?

No	Yes, but not in the last year	Yes, during the last year

10. Has a relative or friend, or a doctor or other health worker been concerned about your drinking or suggested you cut down?

No	Yes, but not in the last year	Yes, during the last year

Procedure for Scoring AUDIT

Questions 1-8 are scored 0, 1, 2, 3 or 4. Questions 9 and 10 are scored 0, 2 or 4 only. The response coding is as
follows:

	0	1	2	3	4
Question 1	Never	Monthly or less	Two to four times per month	Two to three times per week	Four or more times per week
Question 2	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
Questions 3 - 8	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
Questions 9 - 10	No		Yes, but not in the last year		Yes, during the last year

The minimum score (for non-drinkers) is 0 and the maximum possible score is 40.
A score of 8 or more indicates a strong likelihood of hazardous or harmful alcohol consumption.