

UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Nap Duration & Psychological Outcomes for Students

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Executive Summary

With the upcoming implementation of napping facilities on the UBC Vancouver campus for the Arts Students' Centre, we sought to better understand the current sleep and napping habits of UBC students and if a length of nap was had an association with scores subjective psychological outcomes, whether positive or negative. We hypothesize that nap length should show some relationship with psychological outcomes. Through online survey, 55 participants that identified as UBC students were asked to self-report their average length of nap and the perceived frequency of experiencing several psychological outcomes as a result of their nap. Psychological outcomes were defined as positively or negatively valenced experiences/states such as alertness, readiness to work, feeling energized, satisfaction, fatigue, irritability, and anxiousness. Analysis using Spearman's Rank Correlation Coefficient showed no significant correlations between nap length and any of the variables, as correlations were both extremely weak and not statistically significant.

Keywords: napping, sleep, psychology, university students, affect, surveys and questionnaires, correlational analysis

Nap Duration & Psychological Outcomes for Students

Introduction

Previous studies on napping have shown the effect of ‘power nap’ (i.e., short session of sleep) to be beneficial for a number of outcomes, such as reducing fatigue¹ and improving performance based on accuracy and reaction time². A different study found that a 20 minute nap in the mid-afternoon improved performance level and self-confidence on task performance³.

However a study examining Australian university student’s napping behaviour found that, compared to students that did not nap, students that did nap had worse daytime functioning. A majority of these nappers (77%) were found to take naps for longer than 30 minutes⁴. So, research on nap length shows mixed results, but indicates a potential relationship between time and beneficial effects from napping.

Based on the results of the previous studies, we expect to find a relationship between nap duration and perceived psychological outcomes in the UBC student population as well. With the data obtained through our experiment, we hope to contribute to the planning and implementation of nap pods that would be beneficial for the UBC students.

Research question

In our study, we hope to examine the sleep and nap habits of students at the University of British Columbia (such as how long they nap for), and what is the relationship between nap duration and psychological outcomes?

Hypothesis

Our hypothesis for this study is that the data should show some relationship between nap duration and perceived psychological outcomes (e.g. alertness, fatigue) through correlational analysis.

Method

Participants

Fifty-five students from the University of British Columbia were surveyed for our study. 29 identified as women, 25 identified as men, and 1 unspecified. 53 were currently undergraduate students, 1 was a graduate student, and 1 was pursuing a professional degree. Ages ranged from 18 to 23 years old ($M = 20.7$, $SD = 1.1$).

Among this sample, the most common amount of sleep per night in hours was 7 hours ($n = 22$), with amounts ranging from 4 to 9 hours ($M = 6.8$, $SD = 1.0$). Regularity of napping in an average month was assessed through self-report on a subjective scale ranging from “never”, “occasionally”, “once a week”, “several days a week”, and “everyday”. The majority of participants reported napping “occasionally” ($n = 20$), which we defined as a only a few days a month; in decreasing order of popularity the rest of the participants reported napping “several days a week” ($n = 14$), “once a week” ($n = 12$), “never” ($n = 5$), and “everyday” ($n = 4$).

Measures

With the intent of utilizing a correlational research design, an online self-report survey was created via Google Forms to assess 1) student sleep and nap behaviours and preferences, and 2) student demographics.

The main variables of interest for our study were seven perceived psychological outcomes: fatigue, alertness, readiness to work, energized, irritable, satisfied, and anxious. We believed that these moods would be most pertinent for a student’s well-being, without significant

conceptual overlap that could cause any confusion as to their definitions. We assessed the frequency of occurrence of these outcomes from napping through the question: “Thinking About How You Feel Before And After A Nap, Rate How You Tend To Feel After A Nap”, with responses on a scale ranging from “not at all”, “rarely”, “sometimes”, “often”, and “always”.

Conditions

Though all participants received the same survey, for our analysis of nap length we had participants identify approximately how long their naps tended to be on average by indicating which range of nap length they best identified with, to create conditions to study. Ranges under an hour spanned 9 minute periods (E.g., 0-9 minutes, 20-29 minutes), while ranges over an hour spanned 1 hour periods (I.e., 1-2 hours, 2-3 hours, or +3 hours for naps exceeding the previous ranges). Ranges were preferred over asking for specific measurements of time under the assumption that participants were more likely to report rough estimates of their nap length, rather than know exactly how many minutes they napped for.

Procedures

All participants were given a link to the online survey, to fill in on their own time. A majority of participants were recruited through social media (I.e., Facebook), with the remaining participants contacted through the researchers’ social networks. Responses to the survey were collected until March 19, 2019 at 11:59pm.

Results from the survey were then coded to make numerical analysis possible, with nap length responses being coded from 1 to 9, with 1 being our smallest nap range (0-9 minutes) and 9 being our largest nap range (+3 hours). Psychological outcome frequency was coded from 1 to 5, with 1 being our smallest frequency (“not at all”) and 5 being our largest frequency (“always”). Data was first plotted onto scatter plot graphs to create a visual depiction before being analyzed through Spearman’s rank order correlation to determine the potential strength and linear relationship between nap length and the psychological outcomes.

Results

The most common nap duration as reported by our participants is 1-2 hrs ($n = 12$, 23.5% of the sample population), followed by 10-19 mins ($n = 9$, 17.6% of the sample population). From the scale of 1 to 5 (1 = not at all, 5 = all the time), participants reported that after their nap the average frequency of feeling alert was 3.12 ($SD = .89$), the average frequency of feeling ready to work was 3.29 ($SD = .88$), the average frequency of feeling energized was 3.35 ($SD = .84$), the average frequency of feeling satisfied was 3.29 ($SD = .88$), the average frequency of feeling fatigue was 2.71 ($SD = .83$), the average frequency of feeling irritable was 2.27 ($SD = .96$), and the average frequency of feeling anxious was 1.88 ($SD = .93$).

We used Spearman’s rho to measure the correlation between reported nap duration and the average frequency of feeling each of the 7 psychological outcomes resulted by napping. The outcome showed that there are no significant correlation between alertness and nap duration ($r_s(49) = .08$, $p = .56$), no significant correlation between ready to work and nap duration ($r_s(49) = -.15$, $p = .29$), no significant correlation between energized and nap duration ($r_s(49) = -.13$, $p = .38$), no significant correlation between satisfied and nap duration ($r_s(49) = .01$, $p = .97$), no significant correlation between fatigue and nap duration ($r_s(49) = -.16$, $p = .27$), no significant correlation between irritable and nap duration ($r_s(49) = .01$, $p = .96$), and no significant correlation between anxious and nap duration ($r_s(49) = -.06$, $p = .68$).

None of the results were statistically significant enough to show a correlation between nap duration and any psychological outcomes, with $p > .05$ for all the hypothesis tests.

Discussion

When we first began looking for correlations between nap duration and each of the perceived psychological outcomes, we made a series of scatterplots (see Appendix, Figure 1-7), but patterns were not clear to see from looking at the graphs. We then ran the data through Spearman's Rank-Order Correlation tests to discover the strength and direction of the monotonic relationships between our variables. As expected, none of pairs showed any sort of significant correlation, just as the scatterplots suggested.

When we created the survey, our main way of assessing nap duration was by asking, "Approximately, how long do these naps tend to be?". Originally, we wanted the participants to report their responses in terms of precise minutes (e.g. 4 minutes, 110 minutes), but we decided against it from the understanding that participants won't be able to report the exact time of their nap durations. Thus, we changed the response options to be categorical ranges of time (e.g. 0-9 minutes, 1-2 hrs) that participants would estimate their naps tend to fall into. The result of such change affected the way our scatterplots were presented, as a lot of the data points overlapped instead of being clustered. This is one of the explanations for why correlations were not observed in our scatterplots.

Overall, the results of our study suggest that there were no significant relationships between the nap duration and perceived psychological outcomes tested. All Spearman's rho values were close to 0, which indicate that the correlations were very weak (I.e., close to no relationship). The p-values were all above 0.05, which indicate that our data is not statistically significant. Thus, it could be said that the results do not support our hypothesis, which was that we would find a relationship between nap duration and perceived psychological outcomes.

It was suggested to our group that we run a post-hoc analysis on our data to see if there were potential curvilinear relationships between nap length and the outcomes. To facilitate this we first grouped nap lengths into three groups: "low duration" (encompassing naps 0-9, 10-19, and 20-29 minutes long), "medium duration" (encompassing naps 30-39, 40-49, and 50-59 minutes long), and "high duration" (encompassing naps 1 hour, 2-3 hours, or more than 3 hours long). We then ran the data through one-way ANOVA to see if the differences in mean scores between the groups could show a pattern suggestive of a relationship. We would predict that if there were potential curvilinear relationships in the data that graphs should show inverted u-shapes for scores on the positive outcomes and upright u-shapes for the negative outcomes. Though some graphs did show u-shaped patterns (like the inverted u seen in the data for anxiousness and irritability), the direction of the u-shape did not align with our expectations and results of this analysis were still statistically insignificant for all the outcomes. So, we still cannot use our data to reject the null hypothesis (see Figure 10 and Table 2 in the appendix for more details).

There are several limitations to our research. First, our survey only had 55 participants who were mainly recruited through social media and convenience sampling (I.e., our peers), so the representativeness is questionable and our study was underpowered. Second, our measures were based on self-reported feelings or experiences of nap outcomes, so the data obtained may

be unreliable. To obtain a more reliable data, psychological outcomes of naps would need to be studied experimentally with validated constructs (e.g. having participants actually take naps, using devices capable of measuring brain activity in regions associated with affective responses). Third, our psychological outcome constructs lacked clarity. For example, psychological constructs such as "alertness" is subjective, and thus the measure lacks consistency between subjects. In other words, the understanding of the constructs used may vary for each participant. As well, it may not have been clear to our participants that our question to gauge the psychological outcomes was meant to assess how often napping resulted in that outcome being brought about, rather than assessing to what degree one felt that outcome as a result of napping.

We believe that activity performed before and after a nap may serve as an alternative explanation for/directly affect the perceived psychological outcomes. Intuitively speaking, you may experience more negative psychological outcomes if you had a stressful event (E.g., a midterm) right after your nap, as opposed to having a pleasurable experience (E.g., a friendly gathering). These situational factors were hard to eliminate from our survey study, and therefore may be affecting the accuracy of our results. We suggest future studies to focus on designing an experimental study run at several points throughout the year (to account for situational factors/time of measurement effects) to discover a more accurate relationship between nap duration and perceived psychological outcomes.

Recommendations for client

Although the survey we conducted did not show any correlations between nap duration and psychological outcomes, there are recommendations we can make based on our research. First, as 36.4% of our participants reported that they take naps occasionally (a few days per month) and 25.5% reported that they take naps several days a week, it could still be said that the implementation of nap pods will be beneficial for the UBC students. Regardless of whether the naps leads to better psychological outcomes, the nap pods will be widely used by students. The majority of participants of our study reported that their nap duration tends to be 1 to 2 hours or any time less than an hour, and that they often nap in the afternoon.

However, in contrast to our survey findings (in our prior literature review on the research that has already been done) we found that a nap duration of 20 minutes was the most effective, as it lead to improved performance levels and self-confidence on task performances.

Thus, when implementing the nap pods, each nap period could be timed, as this would lead to better nap outcomes and more efficient use of the facility. For example, each nap period could be set from any time between 0 to 1 hour, to account for individual preferences. Further, the main operation hours for the nap pods could be 1 pm to 5 pm for example, as most students reported taking naps in the afternoon.

Appendix

References

- ¹Brooks, A., & Lack, L. (2006). A brief afternoon nap following nocturnal sleep restriction: Which nap duration is most recuperative? *Sleep*, 29(6), 831-840. doi:10.1093/sleep/29.6.831
- ²Kuriyama, A., Ogawa, K., & Hayashi, M. (2014). Sleep spindle contributes to the recuperative power of a short nap. *International Journal of Psychophysiology*, 94(2), 224-224. doi:10.1016/j.ijpsycho.2014.08.883
- ³Hayashi, M., Watanabe, M., & Hori, T. (1999). The effects of a 20 min nap in the mid-afternoon on mood, performance and EEG activity. *Clinical Neurophysiology*, 110(2), 272-279. doi:10.1016/s1388-2457(98)00003-0
- ⁴Lovato, N., Lack, L., & Wright, H. (2014). The napping behaviour of australian university students. *PloS One*, 9(11), e113666. doi:10.1371/journal.pone.0113666

Figure 1: Relationship between nap duration and average frequency of feeling alert ($r_s(49) = .08, p = .56$)

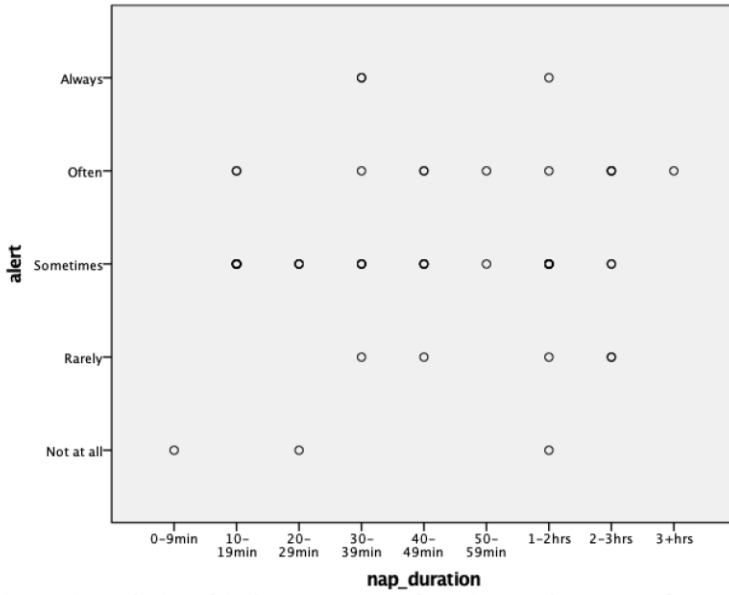


Figure 2: Relationship between nap duration and average frequency of feeling ready to work ($r_s(49) = -.15, p = .29$)

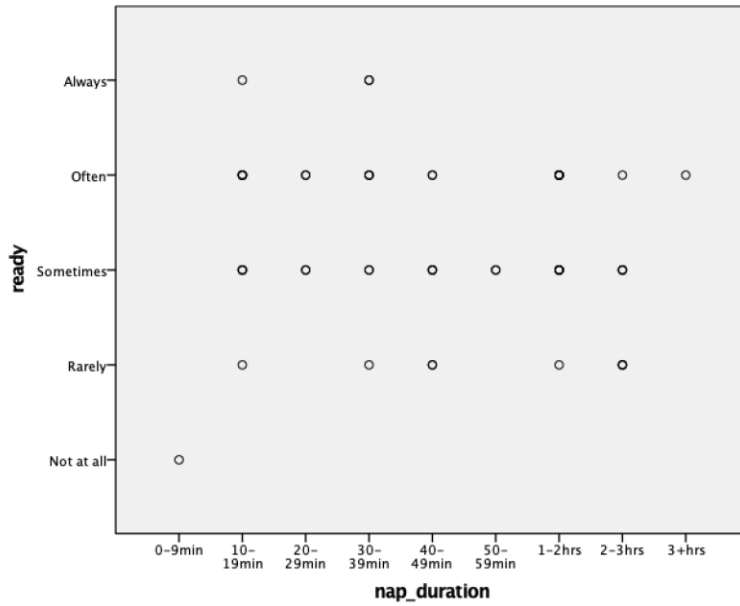


Figure 3: Relationship between nap duration and average frequency of feeling energized ($r_s(49) = -.13, p = .38$)

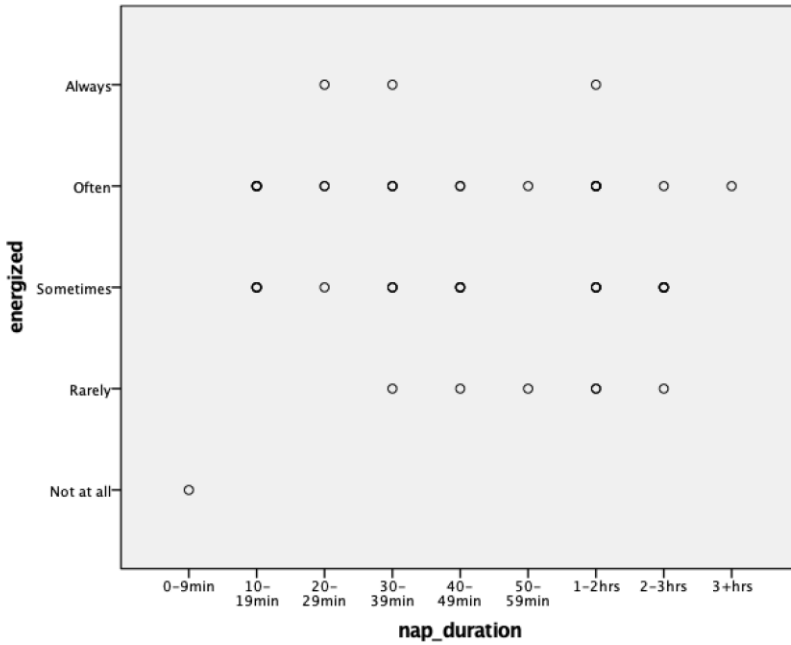


Figure 4: Relationship between nap duration and average frequency of feeling satisfied ($r_s(49) = .01, p = .97$)

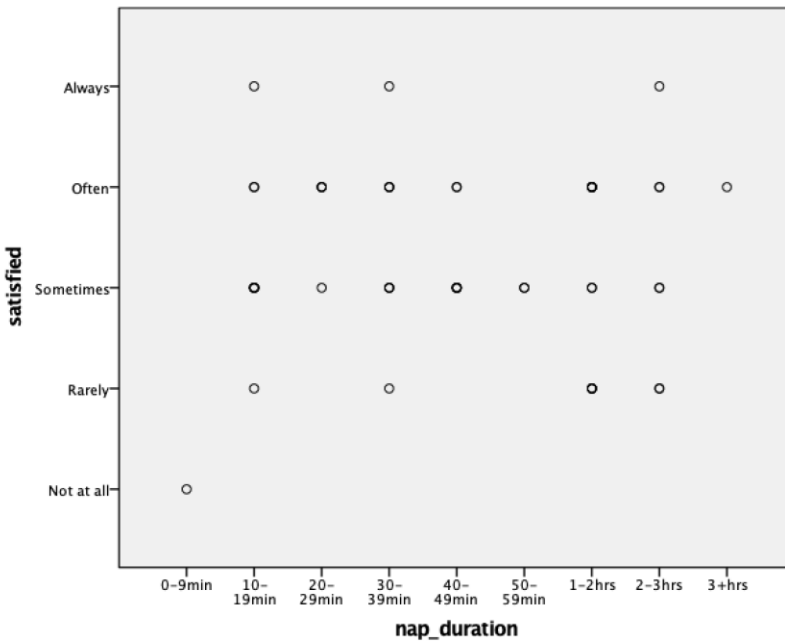


Figure 5: Relationship between nap duration and average frequency of feeling fatigue
 $(r_s(49) = -.16, p = .27)$

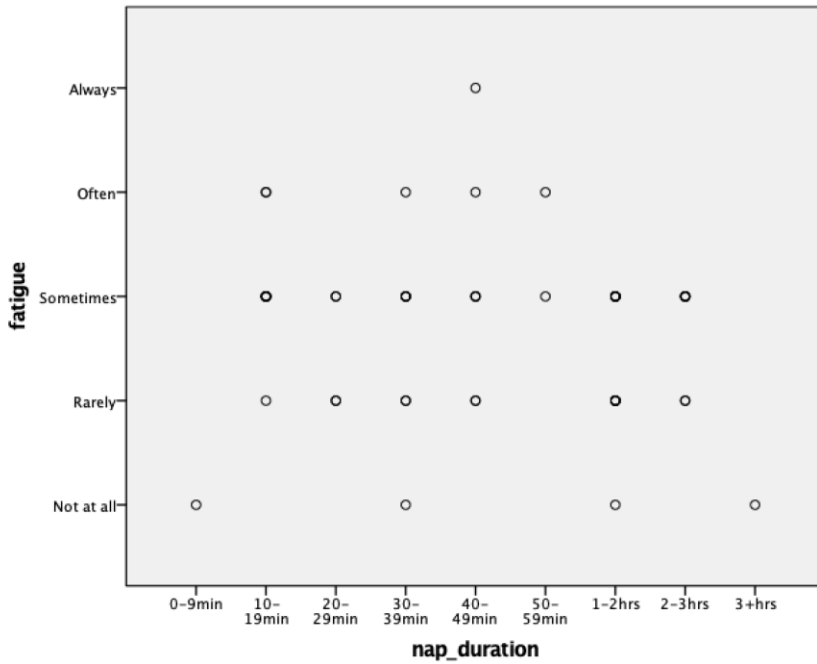


Figure 6: Relationship between nap duration and average frequency of feeling irritable
 $(r_s(49) = .01, p = .96)$

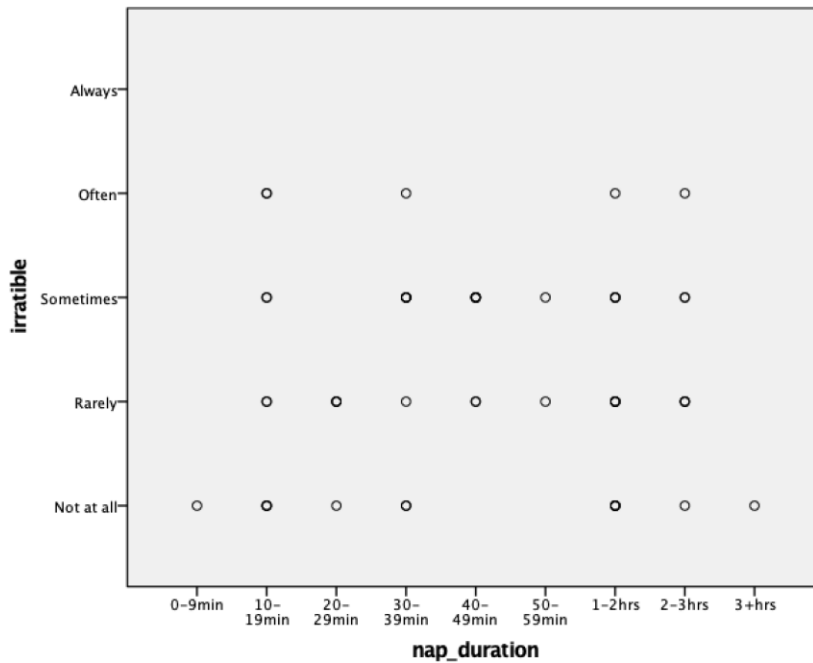


Figure 7: Relationship between nap duration and average frequency of feeling anxious
 $s (r_s(49) = -.06, p = .68)$

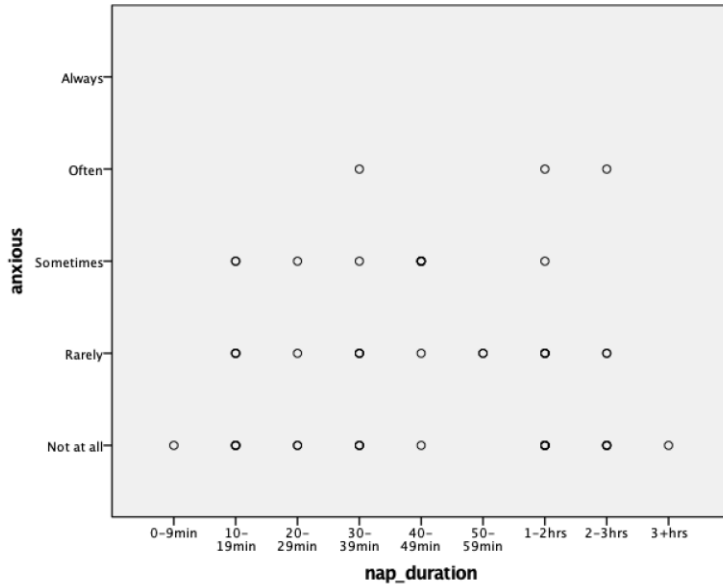
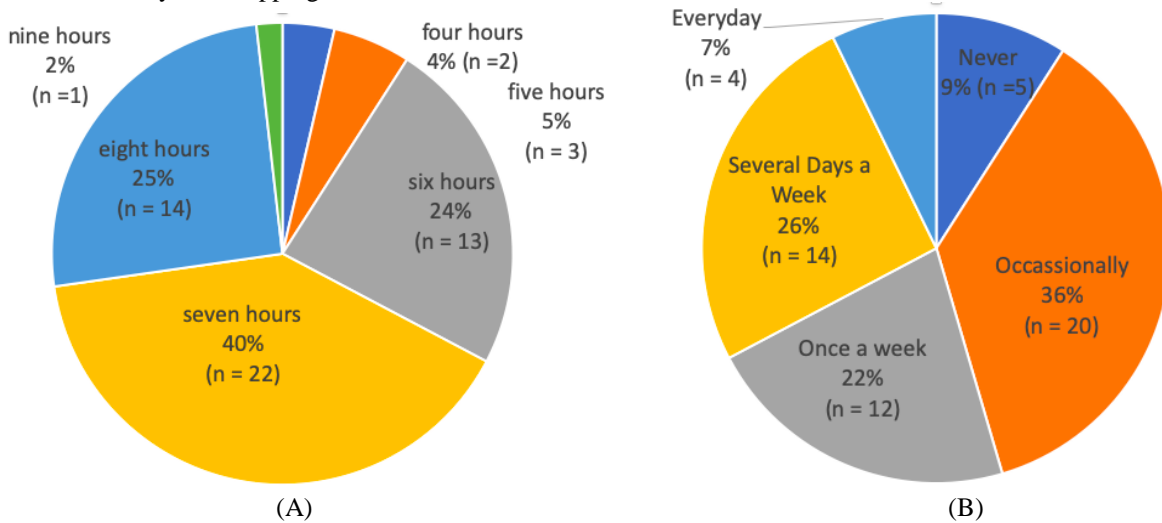
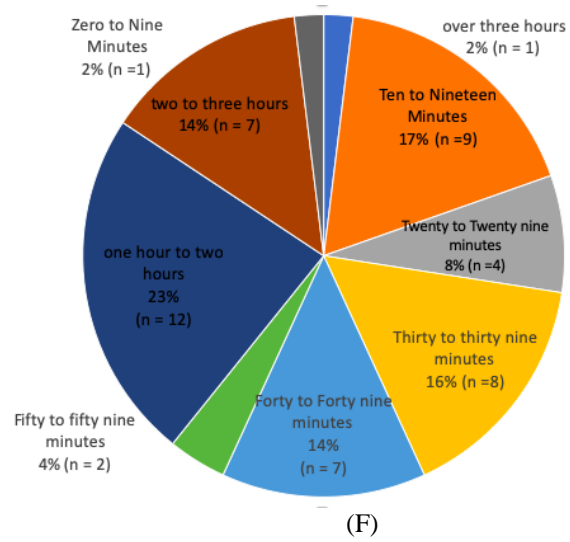
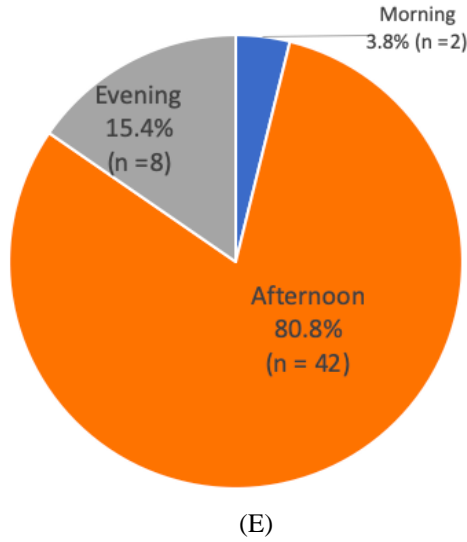


Figure 8: Summary of nap and sleep behaviour of UBC students. (A) hours of sleep per night on average, (B) average frequency of nap within a month, (C) preferred location on campus to nap, (D) preferred location off campus to nap, (E) preferred time of day to nap, (F) nap length, (G) preferred activity prior to napping, & (H) preferred activity after napping.



(C) Preferred on campus locations responses: sitting areas, study spaces, eating areas, parkade/outside areas, friend's dorm, library sofas, lounge, aquatic centre.

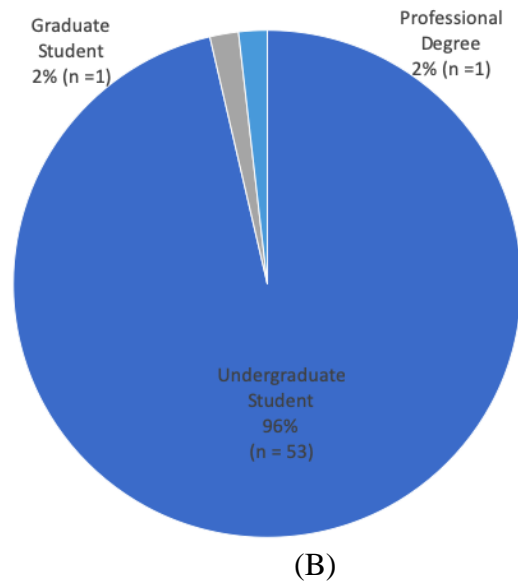
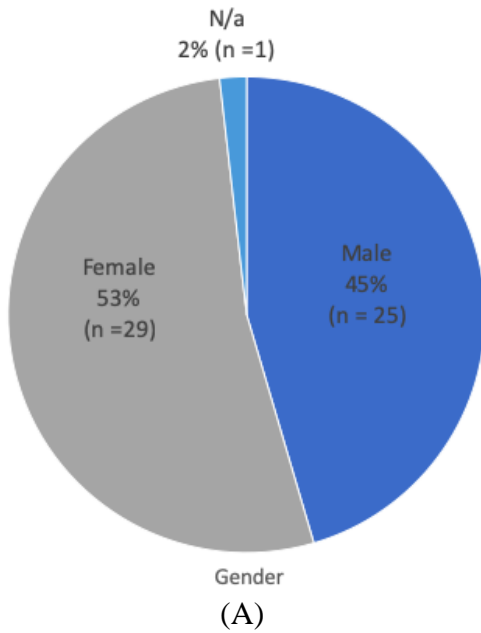
(D) Preferred off campus location responses: in a bed, on a couch, during commute/in transportation, in a car.

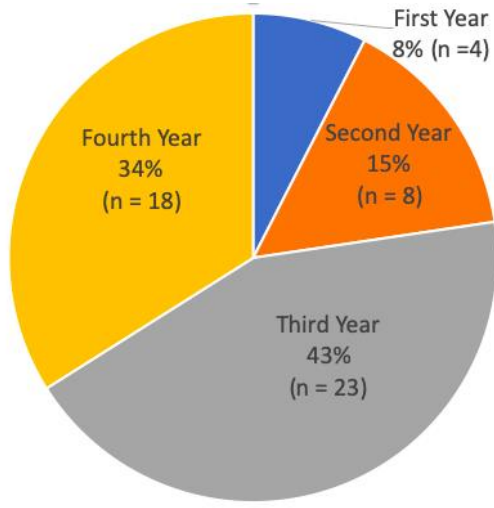


(G) Preferred activity prior to napping responses: studying, using media, exercising, class or work, get up and go to school.

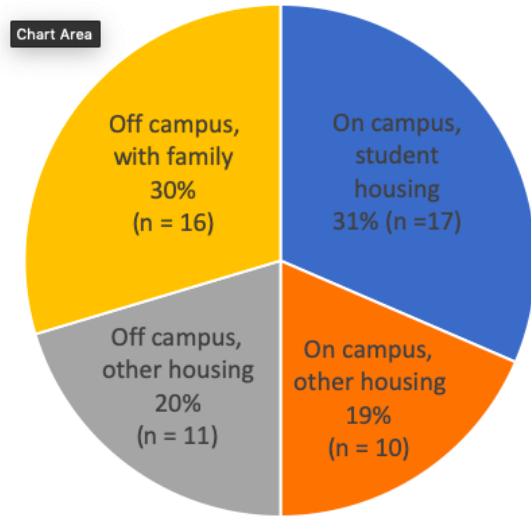
(H) Preferred activity after napping responses: studying, using media, exercise, chores, eating.

Figures 9: Summary of the demographic breakdown of our sample. (A) Gender, (B) student status, (C) year of study, (D) age in years, (E) primary place of residence during the school year, & (F) grade point average estimation.

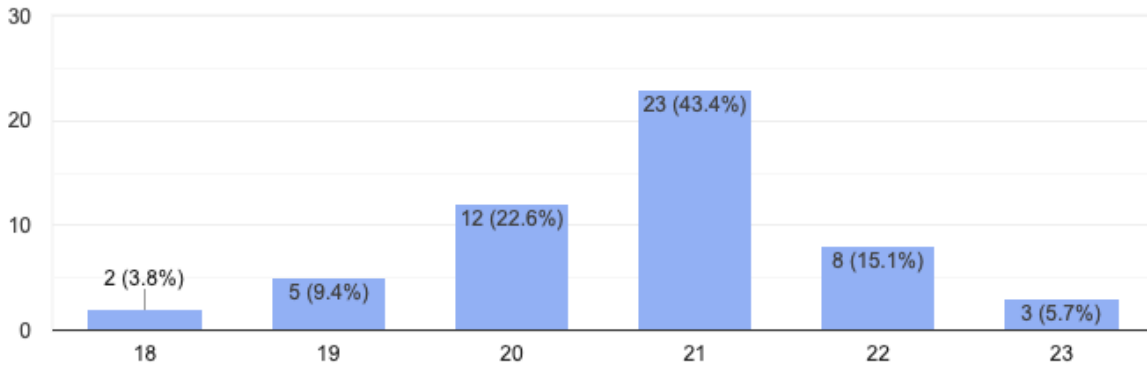




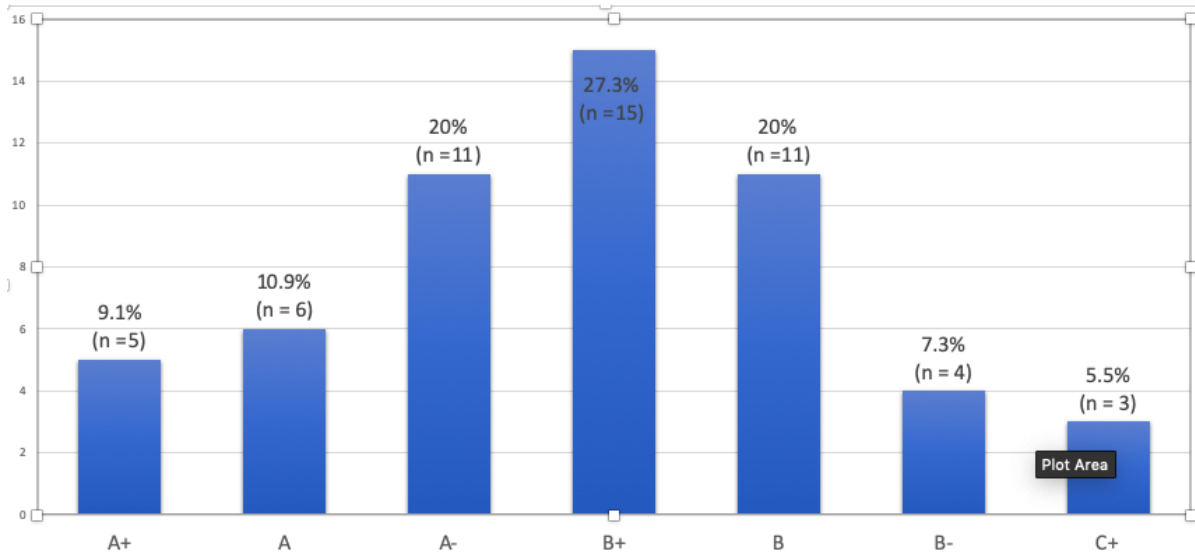
(C)



(E)

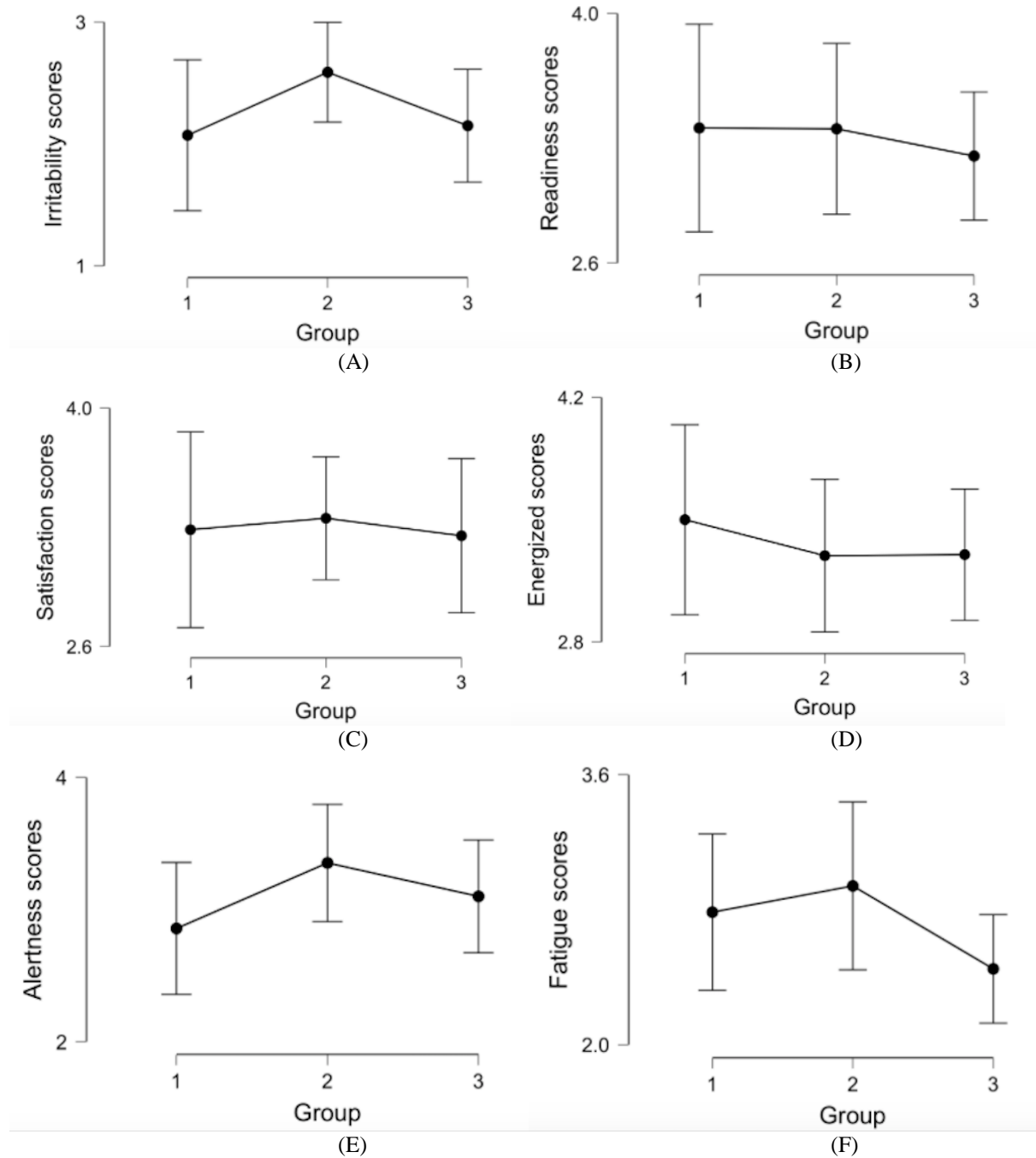


(D)



(F)

Figures 10: Results of Post-Hoc Analysis on the data using one-way between subjects ANOVA. The nap length conditions from the data were grouped into three subsets (low, medium, high duration coded as 1, 2, 3, respectively) to see if there were any potential curvilinear relationships. Scores on psychological outcomes were coded from 0 to 5, with 0 representing a frequency of “not at all” and 5 representing a frequency of “always”. However, the results we did find through ANOVA were still statistically insignificant ($p < .05$). (A) Analysis of frequency of irritability, (B) analysis of frequency of readiness to work, (C) analysis of frequency of satisfaction, (D) analysis of frequency of feeling energized, (E) analysis of frequency of alertness, (F) analysis of frequency of fatigue, (G) analysis of frequency of anxiousness.



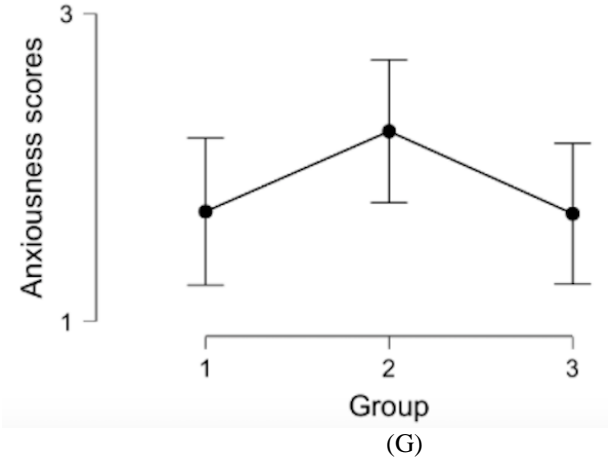


Figure 11: Survey on nap duration. All participants were given this survey to fill out. Responses were meant to gauge sleeping and napping behaviours, and demographic information of current UBC Vancouver students.

Nap Duration Study

* Required

How Many Hours of Sleep Per Night Do You Get, On Average? *

Choose ▼

In An Average Month, How Regularly Do You Nap? *

Never

Occasionally (i.e., only a few days)

Once a week

Several days a week

Everyday

If You Nap Outside Of Campus, Where Do You Prefer To Nap?

In bed

On the couch

During your commute/in transportation

Other:

What Year Of Study Are You In?

- 1st
- 2nd
- 3rd
- 4th
- Other:

How Old Are You? (In years)

Your answer

What Gender Do You Identify As?

- Woman
- Man
- Transgender
- Two spirit
- Non-binary
- Gender non-conforming
- Prefer not to say
- Other:

Where Is Your Primary Place of Residence During The School Year?

- On campus, student housing
- On campus, other housing
- Off campus, other housing
- Off campus, with family
- Other:

To Your Best Estimation, What Range Does Your Overall Grade Point Average Fall Into? *

- A+ (90 - 100%)
- A (85 - 89%)
- A- (80 - 84%)
- B+ (76 - 79%)
- B (72 - 75%)
- B- (68 - 71%)
- C+ (64 - 67%)
- C (60 - 63%)
- C- (55 - 59%)
- D (50 - 54%)
- F (0 - 49%)

If You Nap On Campus, Where Do You Prefer To Nap?

- Study spaces
- Sitting ares
- Eating areas
- Other:

Approximately, How Long Do These Naps Tend To Be?

- 0-9 Minutes
- 10-19 Minutes
- 20-29 Minutes
- 30-39 Minutes
- 40-49 Minutes
- 50-59 Minutes
- 1-2 Hours
- 2-3 Hours
- 3+ Hours

What Time Of Day Do You Tend To Nap?

- Morning
- Afternoon
- Evening



What Activities Do You Tend To Do Before You Nap?

- Study
- Exercise
- Use media (E.g., TV, social media)
- Other:

What Do You Tend To Do After You Nap?

- Study
- Exercise
- Use media (E.g., TV, social media)
- Other:

Thinking About How You Feel Before And After A Nap, Rate How You Tend To Feel After A Nap:

	Not at all	Rarely	Sometimes	Often	Always
Fatigue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ready to Work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energized	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irritable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfied	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anxious	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What Best Describes You? *

- Undergraduate Student
- Graduate Student
- Other:

Table 1: Summary of results from Spearman's Rank Correlation Coefficient Analysis

Variables	P-Value	Spearman's rho
Alertness	.558	.084
Readiness to work	.291	-.151
Energized	.377	-.126
Satisfied	.967	.006
Fatigue	.266	-.159
Irritable	.957	.008
Anxious	.681	-.059

Table 2: Summary of results from post-hoc analysis using one-way between subjects ANOVA.

Variable	F Value	df	P-Value
Irritable	1.410	2	0.254
Ready to Work	0.183	2	0.834
Satisfied	0.062	2	0.940
Energized	0.285	2	0.754
Alert	1.218	2	0.305
Fatigue	1.741	2	0.186
Anxious	1.901	2	0.160