Assignment #3: Final Report

The Impact of Sleep on Academic Performance in UBC Undergraduate Students

Group 18

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Executive Summary

Sleep is essential to an individual's health. Canada's 24 hour movement guidelines state adults aged 18-64 should get seven to nine hours of quality sleep every night (24-Hour Movement Guidelines, 2021). University students who experience poor sleep quality may experience adverse effects on their academic performance and cognitive functioning (Barnes et al., 2000; Hamblin, 2007). Negative sleep behaviours, including phone time, substance abuse, and stress, directly impact sleep quality (Schmickler et al., 2023; Rathakrishnan et al., 2021); consequently leading to negative repercussions on academic performance. Sleep quality encompasses a number of various aspects of sleep habits including sleep disturbances and sleep duration. UBC Recreation disclosed that there is limited information regarding sleep amongst UBC students. We aim to investigate the relationship of sleep and GPA in undergraduate students attending the University of British Columbia, identify at-risk student groups, and provide recommendations to UBC Recreation. We expect to discover significant findings regarding the relationship between sleep and academic performance to make recommendations for UBC Recreation. We hope to enable students to engage in healthy sleep behaviours, improving their academic performance. Our guiding question is: How is sleep specifically related to academic performance among upper year students attending UBC? Secondary guiding questions include investigating unique aspects of sleep as well as differences between GPA in academic faculties.

Third and fourth year undergraduate students at UBC aged 18-25 was the target population for this study. Students who have pre-diagnosed sleep disorders and/or take prescribed sleep medication, or who actively work night shifts were excluded from this study. We received 109 responses and stopped recruitment on April 1st, 2024 — after application of exclusion criteria 89 participants were used for analysis. Participant recruitment consisted of creating a recruitment poster and QR code, posting on social media, and reaching out to UBC clubs and varsity teams to share recruitment materials. The survey included both Quantitative and Qualitative Questions. Question format included multiple choice, Likert sliders, and text entry. Topics surrounded perceived sleep quality, daytime sleepiness, stress levels, sleep disturbances, and screen time. Completion of the survey offered the chance to win prizes. Analysis was done through descriptive statistical analysis and descriptive qualitative analysis. We imported our data into JASP software where we labeled our measurements, examined the data, conducted calculations, and created figures.

Stress and screen time were consistently reported as sleep behaviors that impact sleep quality. Reducing screen time was overwhelmingly the most reported strategy needed. Good, very good, and excellent sleep quality was conducive with higher GPA's. Poor and fair sleep quality was prevalent in those with lower GPA's. Many students experience daytime sleepiness and report their sleep quality is impacted by feeling exhausted upon wake-up. Sleep duration was not significantly associated with GPA. However, students with a lower GPA slept 2 hours more during the weekend vs week whereas students with a higher GPA slept 51 minutes longer; having a consistent routine with minimal sleep duration fluctuation can contribute to improved academic performance. Lastly, lower GPAs indicated higher prevalence of sleep disturbances.

We propose three recommendations for UBC Recreation. First of all, the creation of a UBC Sleep Website that provides education and resources for healthy sleep habits. Second, future research should be conducted to investigate the relationships between sleep, mental health outcomes, and academic performance. Third, the development of a UBC Sleep application could translate knowledge while using push notifications to decrease screen time and sleep tracking.

Literature Review

Introduction

Sleep is essential to the health and well-being of individuals. The newest recommendation of Canada's 24 hour movement guideline for adults aged 18-64 is seven to nine hours of good quality sleep on a regular basis to ensure adequate health (24-Hour Movement Guidelines, 2021). Disordered sleeping can impact both physical and mental health (Hamblin, 2007). In particular, Zochil and Thorsteinsson (2018) investigated the relationship between sleep quality, mental health issues, and help seeking tendencies — high levels of depression, anxiety, and stress were significantly associated with decreased sleep quality. Consequently, cognitive functioning can be impacted by poor sleep (Hamblin, 2007). The benefit of sleep applies to everyone; however, there is emerging evidence that university students who experience poor sleep quality may experience adverse effects on their academic performance (Barnes et al., 2000). The overall implications of these findings are significant regarding the wellbeing and academic repercussions of poor sleep amongst university students. Students may not be reaching their full potential during their degree due to poor sleep habits. Negative sleep behaviours — including phone time, substance abuse, and stress — can directly impact sleep quality (Schmickler et al., 2023; Rathakrishnan et al., 2021); consequently leading to negative repercussions on academic performance.

Our project partner, UBC Recreation, disclosed that there is limited information regarding sleep behaviors amongst UBC students. Through our research, we aim to identify at-risk student groups through analyzing sleep behaviours. This will allow us to provide recommendations to support better sleep amongst UBC students as well as increase wellbeing, promote health and academic success, and raise awareness. Focusing on the relationship between

sleep and academic performance amongst UBC undergraduate students allows for a targeted investigation into how the transition to university impacts sleep behaviours and subsequently grade-point average (GPA). Understanding this relationship can inform targeted interventions and programs to support students' overall well-being and academic success. This Literature Review will delve into sleep quality and healthy sleep habits, specifically analyzing research that investigates the impact of poor sleep on academic performance in undergraduate university students. Different academic demands, academic success, sleep disorders, and negative sleep habits are specifically discussed. Causes and behaviours of poor sleep are highlighted, explicitly substance abuse, stress, and screen time.

Sleep Quality

Sleep quality encompasses a number of various aspects of sleep habits and behaviors. So, what is sleep quality and how is it measured? Sleep quality is measured in several parts: the time it takes an individual to fall asleep (sleep latency), the total time one is asleep divided by the total time one is in bed (sleep efficiency), sleep disturbances, and sleep duration (Schmickler et al., 2023). A common tool utilized throughout the research to analyze sleep quality is the Pittsburgh Sleep Quality Index (PSQI) (Ahrberg et al., 2012; Lemma et al., 2014; Schmickler et al., 2019). The PSQI tool is one of the most widely used sleep questionnaires to assess sleep quality, becoming a gold standard for understanding patterns in sleep behaviours (Pilz et al., 2018). This tool involves the measures of sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of medications, and daytime dysfunction (Schmickler et al., 2019). Our research will aim to incorporate some of these elements addressed by the PSQI tool. Sleep quality is critical to ensure proper physical, mental, and cognitive performance, however, research suggests that a significant proportion of university students fail to sleep adequately

(Schmickler et al., 2019; Gaultney, 2010). According to a study conducted by Schmickler (2019), 48.7% of university students are categorized as poor sleepers given their PSQI scores. Further research found that during exam preparation, sleep quality was overall worse, with approximately 59% of students exhibiting poor sleep quality, compared to alternate times throughout the semester (Ahrberg et al., 2012). Not only do academic demands contribute to students' sleep quality, but also the presence of sleep disorders (Gaultney, 2010). Sleep disorders are especially common among students, with commonly reported conditions including narcolepsy (a chronic disorder that consists of sleepiness and uncontrollable sleep episodes) and insomnia (difficulty falling asleep or staying asleep) (Gaulney, 2010).

Of the components of sleep quality, sleep duration was one that frequently arose throughout the research. While adults require 7-9 hours of sleep per night, students reported only sleeping 6.79 hours on nights they had school/work the following day (Gaultney, 2010). This was consistent with other research that suggests that between 20-40% of university students are getting less sleep than what has been recommended for their age group (Schmickler, 2019). Daytime sleepiness and sleep disturbances were also extremely prevalent among students, suggesting inadequate sleep quality (Orzech et al., 2011; Hartmann & Prichard, 2018). More than two-thirds of students reported experiencing daytime sleepiness, with more than one-quarter of those expressed concern over their sleep habits, describing them as traumatic or difficult to handle (Hartmann & Prichard, 2018).

Sleep Behaviours

As indicated by previous studies, a lack of sleep quality is associated with decreased academic performance among university students (Gaultney, 2010; Rathakrishnan et al., 2021). Due to this association, exploring the behaviours that negatively affect sleep quality amongst

university students can provide insight on how to improve their quality of sleep, and therefore, academic performance. Negative sleep behaviours such as perceived stress, cell phone use, and substance use are prevalent within university students and have adverse effects on sleep quality (Schmickler et al., 2023; Rathakrishnan et al., 2021).

According to Schmickler et al. (2023), perceived stress was a significant predictor of sleep quality. As students transition to university, their lives become characterized by late study nights due to a demanding academic workload, social responsibilities, and irregular schedules, accompanied by insufficient coping mechanisms (Schmickler et al., 2023). The concessive strain and stressors of university life may lead to substance abuse among this population, resulting in increased sleep difficulties. Navarro-Martínez et al. (2020), found that self-reported sleep problems are highly prevalent among alcohol users with a rate of approximately 35% to 70% with clinical insomnia. Additional research by Singleton and Wolfson (2009), found that university students who drank more alcohol had less nighttime sleep, later sleep schedules, and greater delays between weekday and weekend bedtimes. Navarro-Martínez et al. (2020) inferred that the relationship between sleep disturbances and substance use is bidirectional as sleep issues increase the risk for developing substance use disorders and substance use can lead to problems with sleep, indicating a vicious cycle among university students. Furthermore, a study by Alamir et al. (2019) explores the use of nonmedical prescription drugs and sleep quality in university students and found that the most common reasons for engaging in prescription drugs were to "stay awake to study" or to "increase concentration." The findings of this study, however, indicated significant associations between prescription drug use and poor sleep quality, with 90% of participants reporting problems with daytime sleepiness (Alamir et al., 2019). In assessing

underlying sleep behaviours that contribute to overall sleep quality, we will be looking at the use of drugs, specifically unprescribed drugs, among students.

Accompanying stress and substance use, a study by Rathakrishnan et al. (2021) found that the frequent use of technology at bedtime can also adversely affect sleep quality. Along with the excessive use of smartphones, university students are consistently working on and staring at screens throughout the day in an effort to complete their school work (Rathakrishnan et al., 2021). Poor sleep quality caused by the excessive use of smartphones can cause memory deficits, issues with decision, learning, and concentration level, and may result in poor academic performance for university students (Rathakrishnan et al., 2021). The findings of these studies illustrate the prevalence of these behaviours among university students and contribute to our understanding of sleep quality and its significant association with academic performance.

Academic Performance

Many university students strive to achieve academic success while completing their degree. Students require specific grades to pass classes, get into master's programs, and to graduate. Academic success can be measured by using a student's grade-point average (GPA) (Abdelaziz et al ., 2021; Barnes et al., 2000; Clanton et al., 2001; Singleton & Wolfson., 2009). Performing well in university is thought to be related to career success post-graduation (Barnes et al., 2000). Given the current understanding of sleep behaviours among university students, poor sleep could be a determining factor for whether individuals reach their career goals or find success post graduation. Studies have examined a variety of different predictor variables in relation to academic success. We have chosen sleep as our main point of focus.

Barnes et al. (2000) conducted a study looking at the implications of health variables on GPA – such as exercise, sleep habits, eating, stress, social support, time management, and

volunteer/work hours. Sleep habits stood out among all the health variables, specifically wake-up times, which accounted for the largest discrepancy in grade-point averages (Barnes et al., 2000). Barnes et al. (2000) found that "for each hour of delay in reported average weekday wake-up times, the predicted GPA decreased by 0.132" (pg.128).

Berhane et al. (2014) conducted a study looking at how sleep quality impacts academic performance in Ethiopian university students. Sleep is thought to have a large role in the cognitive processes of learning and memory (Ahrberg et al., 2012; Berhane et al., 2014). As well, Berhane et al. (2014) states that sleep deprivation results in "impairment of performance, vigilance, attention, concentration, and memory" (pg.257). Berhane et al. (2014) found that sleep quality was associated with higher GPAs while sleep duration did not have an effect on GPA. Furthermore, Gaultney (2010) found that students who slept more prior to school and had a consistent sleep routine received higher grades than their counterparts.

Upon conducting this literature review, we developed our primary research question: How is sleep specifically related to academic performance among upper year students attending the University of British Columbia? We further aimed to investigate the different aspects of sleep quality and behaviour within our sample population, taking a multifaceted approach to measuring sleep within university students. Consequently, an additional guiding research inquiry focused on identifying the precise factors of sleep that influence academic achievement in third and fourth year students attending the University of British Columbia. Lastly, we inquire into and acknowledge differences in GPA among academic faculties.

Methods

Introduction

Due to the demanding workload of a university student, having high sleep quality is essential to their health and wellbeing. Disordered sleeping can impact both physical and mental health and is significantly associated with depression, anxiety, stress, and cognitive functioning (Hamblin, 2007; Zochil & Thorsteinsson, 2018). With emerging evidence determining that university students' academic performance is negatively associated with poor sleep quality (Barnes et al., 2000), understanding the sleep habits among students attending UBC can help provide a clear representation of this association and deliver awareness of the importance of sleep quality to this population. Our method of data collection was through a Qualtrics survey consisting of both qualitative and quantitative questions which was delivered to our population via email and social media. These questions assessed the sleep quality, sleep behaviours, and academic performance of upper year UBC students. Identifying at-risk student groups through analyzing the relationship between sleep and GPA was intended to help us provide recommendations to our campus partner, UBC recreation, to support better sleep amongst UBC students and thereby increase wellbeing and promote health and academic success.

Population

Our target population is undergraduate students at UBC who are third or fourth year standing. We decided to focus on students in their third or fourth year standing for a two reasons: (1) students in upper year standing are more likely to have other obligations such as a job as they prepare for graduation and potentially apply for postgraduate studies; therefore, they are more likely to to engage in certain sleep behaviours which impact their overall sleep quality, and (2) students are more adjusted to the workload associated with university level courses.

To ensure our results are as accurate as possible, we set both inclusion and exclusion criteria for our population. When looking at inclusion criteria, we decided students must be of the age range of 18-25. We chose 25 as our upper limit to allow for the flexibility of gap years among students. Further, this age range created continuity with previous research that indicated that after 25, there were more confounding factors affecting GPA including life stressors such as children, a full-time job, etc. (Hartmann & Prichard, 2018). As well, students were required to be a UBC third or fourth year undergraduate student. When choosing our exclusion criteria, we wanted to exclude any student who had a higher chance of their GPA being affected due to external factors we cannot control for; therefore, we chose to exclude students who have sleep disorders (Arora et al., 2013), students who take sleep medication (Arora et al., 2013), students who work night shifts. By creating these exclusion/inclusion criteria we were able to ensure the validity of our results.

Recruitment

As previously mentioned, we will aim to recruit third and fourth year undergraduate students at UBC. We decided to include all undergraduate students within third and fourth year to capture the sleep behaviors of a diverse number of students from various faculties. This allowed us to compare how particular academic disciplines differentially influenced sleep quality. We utilized social media platforms including instagram and facebook to recruit students. Social media content included a post to our group members' stories, and the stories of relevant university profiles (Appendix A, Image 1.0; Appendix A, Image 3.0). Profiles that shared our recruitment media included UBC yoga club, agora cafe, UBC meditation community and wisp UBC. Further, an email was sent to the Thunderbirds media team inquiring about recruiting Thunderbirds athletes, however, it was unclear whether this influenced the number of

participants given that we did not hear back (Appendix A, Image 2.0). The email and social media posts detailed relevant information regarding the study including what we are measuring, who we are looking for and links to get involved. Through these strategies, our intentions were to recruit at least 100 students that fit our inclusion criteria. Further, recruitment was to be stopped when we reached 200 students or by April 1st, 2024 if we were under our desired target. Information was collected by a survey, which will ask participants various questions relating to their sleep behaviors and academic performance.

Data Collection and Analysis

Our method of data collection consisted of a Qualtrics survey delivered to our target population through email and social media (Appendix A, Image 4.0). It explored topics of sleep quality, sleep behaviours, and academic performance among upper year (3rd and 4th year standing) UBC students. Our survey included both quantitative and qualitative questions to be analyzed by descriptive statistical analysis and descriptive qualitative analysis. Quantitative questions allow for precise and objective measurements. Qualitative questions allow for insight regarding participants' perceptions. By including both forms of information, we allowed ourselves to gain a comprehensive understanding of the influence on sleep on GPA. We used various forms of questions including multiple choice, Likert sliders, and four text entry questions.

The survey opened by ensuring that students meet our inclusion and exclusion criteria. We asked the students to self report if they are 3rd/4th year students at UBC, if they have a sleep disorder or use sleep medications, if they have a full time job (40 hours per week), and if they are consistently working overnight shifts.

Measurements

Our survey inquired students' perceived sleep quality, daytime sleepiness, stress levels, sleep disturbances, and screen time in an open-ended and Likert type format. We analyzed through descriptive qualitative and descriptive statistical analysis by examining the trends in the answers and dividing them into relevant categories (Lofgren, 2013). Investigating sleep quality can provide a comprehensive understanding of sleep habits and behaviours as it encompasses sleep latency, sleep efficiency, sleep disturbances, and sleep duration (Schmickler et al., 2023). Additionally, daytime sleepiness and dysfunction indicate poor sleep quality while perceived stress is found to be a significant predictor of sleep quality (Hartmann & Prichard, 2018; Schmickler et al., 2023). Asking about these subjective experiences allowed us to interpret results and identify patterns with the quantitative data.

Descriptive Statistical Analysis. Quantitative standard measure questions targeting sleep quality include the hours of sleep per night, how long it takes an individual to fall asleep, and how often sleep disturbances occur. Sleep quality is measured in several parts; by asking these questions we thoroughly measure sleep quality. As indicated by previous studies, a lack of sleep quality is associated with decreased academic performance among university students (Gaultney, 2010; Rathakrishnan et al., 2021). Quantitative questions relating to sleep behaviours included the frequency of participation in substances that adversely affect sleep quality and the wake up times on a weekday vs. weekend were posed. Academic performance measures included a quantitative question to determine GPA range. Using GPA is a straight-forward way to measure academic performance. We posed one question for students' program/major. We asked for students' programs to eliminate differences in program difficulty, average grades between programs, account for variability, and to understand academic context.

Descriptive Qualitative Analysis. The survey also included qualitative questions for participants to elaborate on their sleep quality, the sources of their sleep disturbances, resources to help improve their sleep quality, and anything else important about their sleep patterns for UBC Recreation to know. Academics can contribute to a student's stress; Zochil and Thorsteinsson (2018) found stress was significantly associated with decreased sleep quality. Measuring students' perceived relationship between stress and academics and then subsequently analyzing this in contrast with sleep quality allowed us to build validity in this relationship. Self-reported sleep problems are highly prevalent among alcohol users (Navarro-Martínez et al. 2020), and increased alcohol consumption in university students is related to less nighttime sleep, later bedtimes, greater differences between weekday and weekend bedtimes (Singleton and Wolfson 2009). The question regarding substance abuse further elaborated that prescription drugs are included; a study by Alamir et al. (2019) indicated significant associations between prescription drug use and poor sleep quality.

Analysis

Our data analysis for the quantitative and qualitative questions included descriptive statistical analysis and descriptive qualitative analysis. We summarized the data through descriptive statistical tables, bar, pie and donut graphs. For the quantitative data, we wanted to see the relationship between GPA and variables such as sleep quality, sleep disturbances, faculty/program, sleep duration, rise times, sleep times, and full-time job/volunteering. We utilized two methods: (1) stratifying the variable data (ex: sleep disturbances) based on GPA group and then calculating the percentage of each response within the variable for each GPA group, and (2) stratifying the variable data (ex: sleep duration) based on GPA group and then calculating the mean of the responses for each GPA group . We then created pie, donut and bar

charts displaying the data. For the qualitative data, we looked at the number of responses per option for each qualitative question, and then displayed the data in a bar chart. For survey statistical confidence, rough guidelines indicate that 100 survey responses is the minimum number for acceptable accuracy (*Survey Statistical Confidence: How Many Is Enough?*, 2003). Therefore, we aimed to reach 100 survey responses and planned to stop our survey once we reached 200 responses or by April 1st, 2024 if we had not reached our target. We downloaded our survey responses as a csv file from the Qualtrics platform and then imported our quantitative and qualitative data into the JASP software where we labeled our measurements, edited and examined the data, calculated means and percentages, and created tables and figures.

Results/Findings

Quantitative Findings

      Survey Respondents. After distributing the survey, we received 109 responses. 20 people were ineligible for the study, resulting in 89 valid participants. This in turn resulted in an 81.65% survey completion rate (Appendix A, Table 1.0). Out of the 89 participants, 71 participants indicated their faculty/program; we found that Arts led the way with 38%, followed by Kinesiology with 18.3%, Science and Land and Food Systems with 11.3%, Applied Science with 7%, Commerce and Other with 5.6%, and Forestry and Pharmacy with 1.4% (Appendix A, Figure 1.0). All respondents are 3rd or 4th year standing UBC undergraduate students, aged 18-25, who do not have a diagnosed sleep disorder and do not work night shifts.

      GPA & Sleep Duration. When examining the data we wanted to see the relationships between GPA and the various variables: average sleep duration (week day and weekend night), rise times, sleep times, sleep disturbances, sleep quality, full-time job/volunteering, and faculty/program. When looking at the relationship between GPA and average sleep duration

during the week (Appendix A, Figure 3.0) we found that students with a GPA of 4.00-4.33 (7.15 hours) and 3.70-3.95 (7.16 hours) slept more than students with a GPA of 2.20-2.60 (6.67 hours), 2.65-3.00 (6.75 hours), and 3.10-3.60 (6.42 hours). The largest difference being 44.4 minutes between students with a GPA of 3.70-3.95 and 3.10-3.60. When comparing GPA to average sleep duration during the weekend (Appendix A, Figure 3.1; Appendix A, Table 3.1) we found that students with a GPA of 2.20-2.60 (8.67 hours) and 3.70-3.95 (8.52 hours) slept more than students with a GPA of 2.65 (8.25 hours), 3.10-3.60 (8.08 hours), and 4.00-4.33 (8 hours). The largest difference being 40.2 minutes between students with a GPA of 2.20-2.60 and 4.00-4.33. What is most significant from these results is the difference in average sleep duration during the week versus the weekend between students with a GPA of 2.20-2.60 and students with a GPA of 4.00-4.33. Students with a GPA of 2.20-2.60 slept an average of 2 hours more on the weekend versus during the week compared to students with a GPA of 4.00-4.33 who slept an average of 51 minutes more on a weekend versus during the week. See Appendix A, Table 2.0 and Appendix A, Table 3.0 for more.

 GPA & Average Rise Times. When looking at the relationship between GPA and average rise times (Appendix A, Figure 6.0) we found that students with a GPA of 4.00-4.33 had 51.9% reporting they wake up from 7am-8am, followed by 18.5% waking up at 6am-7am, 14.8% at 8am-9am, 7.4% at 10am-11am, 3.7% at 9am-10am, and 3.7% at 11am-12pm. Students with a GPA of 3.70-3.95 had 48% reporting they wake up at 8am-9am, followed by 12% waking up at 6am-7am, 12% at 7am-8am, 12% at 9am-10am, 8% at 10am-11am, 4% at 4am-5am and 4% at 5am-6am. Students with a GPA of 3.10-3.60 had 41.7% reporting they wake up at 8am-9am, followed by 25% waking up at 7am-8am, 16.7% at 6am-7am, 8.3% 4am-5am, and 8.3% at 10am-11am. Students with a GPA of 2.65-3.00 had 50% students reporting they wake up at

8am-9am, followed by 25% waking up at 5am-6am, and 25% at 7am-8am. Finally, students with

a GPA of 2.20-2.60 had 66.7% reporting they wake up from 7am-8am, followed by 33.3%

waking up at 10am-11am. These results indicate that average rise times vary between individual

students and GPA groups. What did stand out was that the most reported rise time was 8am-9am

and the least reported was 4am-5am.

GPA & Average Sleep Times. When looking at the relationship between GPA and

average sleep times (Appendix A, Figure 6.1) we found that students with a GPA of 4.00-4.33

had 33.3% of students reporting they fall asleep from 12am-1am, followed by 18.5% falling

asleep from 11pm-12am, 18.5% from 1am-2am, 14.8% from 10pm-11pm, 7.4% from

9pm-10pm, 3.7% from 8pm-9pm, and 3.7% from 4am-5am. Students with a GPA of 3.70-3.95

had 32% reporting they fell asleep at 12am-1am, followed by 28% falling asleep from

11pm-12am, 16% from 10pm-11pm, 8% from 1am-2am, 8% 2am-3am, 4% from 3am-4am and

4% from 9pm-10pm. Students with a GPA of 3.10-3.60 had 41.7% reporting they fell asleep

from 11pm-12am, followed by 25% falling asleep from 2am-3am, 16.7% from 1am-2am, 8.3%

from 9pm-10pm, and 8.3% from 10pm-11pm. Students with a GPA of 2.65-3.00 had 50%

reporting they fell asleep from 12am-1am, followed by 25% falling asleep from 9pm-10pm, and

25% from 1am-2am. Finally, students with a GPA of 2.20-2.60 had 66.7% reporting they fall

asleep from 12am-1am, followed by 33.3% falling asleep from 2am-3am. These results indicate

that the average sleep times vary between individual students and GPA groups. What needs to be

highlighted is the most reported average sleep time which was 12am-1am and the least reported

was 8pm-9pm.

GPA & Sleep Disturbances. When looking at the relationship between GPA and

presence of sleep disturbances (Appendix A, Table 4.0; Appendix A, Figure 8.0) we found that

students with a GPA of 4.00-4.33 reported 'rarely' 51.9%, 'sometimes' 40.7%, 'often' 3.7% and 'never' 3.7%. Students with a GPA of 3.70-3.95 reported 'sometimes' 52%, 'often' 28%, and 'rarely' 20%. Students with a GPA of 3.10-3.60 reported 'rarely' 50%, 'sometimes' 41.7%, and 'never' 8.3%. Students with a GPA of 2.65-3.00 reported 'often' 50%, 'always' 25%, and 'sometimes' 25%. Finally, students with a GPA of 2.20-2.60 reported 'rarely' 33.3%, 'sometimes' 33.3% and 'always' 33.3%. These results indicate that students with a GPA of 2.20-2.60 and 2.65-3.00 tend to experience sleep disturbances more than the other students with higher GPA's.

GPA & Sleep Quality. When looking at the relationship between GPA and sleep quality (Appendix A, Figure 9.0) we found that students with a GPA of 4.00-4.33 reported 'good' 33.3%, 'very good' 29.6%, 'fair' 22.2%, 'poor' 11.1%, and 'excellent' 3.7%. Students with a GPA of 3.70-3.95 reported 'good' 36%, 'fair' 28%, 'poor' 20%, and 'very good' 16%. Students with a GPA of 3.10-3.60 reported 'fair' 58.3%, 'good' 16.7%, 'very good' 16.7% and 'poor' 8.3%. Students with a GPA of 2.65-3.00 reported 'fair' 75% and 'good' 25%. Finally, students with a GPA of 2.20-2.60 reported 'fair' 66.7% and 'poor' 33.3%. These results indicate that students with a GPA of 2.20-2.60 and 2.65-3.00 tend to experience worse sleep quality compared to the other students with higher GPA's.

GPA & Full-Time Job/Volunteering. When looking at the relationship between GPA and full-time job/volunteer commitment (Appendix A, Figure 5.0) we found that students with a GPA of 2.00-2.60 and 3.70-3.95 did not work or volunteer full-time, with 100% of responses answering 'no'. On the contrary, 25% of students with a GPA of 2.60-3.00 responded 'yes' to full-time hours, followed by 18.5% students with a GPA of 4.00-4.33, and 16.7% of students with a GPA of 3.10-3.60.

GPA & Faculty/Program. When looking at the relationship between GPA and faculty/program (Appendix A, Figure 7.0) we found that students with a GPA of 4.00-4.33 had 40.7% students in Arts, followed by 25.9% in Kinesiology, 11.1% in Land and Food Systems, 7.4% in Commerce, 3.7% in Science, 3.7% in Pharmacy, 3.7% in Applied Science, and 3.7% in other. Students with a GPA of 3.70-3.95, 24% in Arts, 16% in Kinesiology, 16% in Land and Food Systems, 12% in Science, 12% in Applied Science, 12% in other, and 8% in Commerce. Students with a GPA of 3.10-3.60, 58.3% in Arts, 16.7% in Kinesiology, 16.7% in Science, and 8.3% in Applied Science. Students with a GPA of 2.65-3.00, 50% in Arts, 25% in Land and Food Systems, and 25% in Science. Finally, students with a GPA of 2.20-2.60, 33.3% in Arts, 33.3% in Science, and 33.3% in Forestry.

Other Findings. Beyond looking at the relationship between GPA and various variables, we found that when looking at whether students felt rested during the day, 53.4% reported 'no', while 46.6% reported 'yes'. We then looked at whether students felt that stress negatively impacted their academic performance, 62.5% reported 'always', 26.4% reported 'sometimes', and only 11.1% reported 'never'. We also looked at how often students participate in screen time directly (30 minutes) before sleeping, 56.9% reported 'always', 29.2% reported 'often', 12.5% 'sometimes', and 1.4% 'rarely'.

Qualitative Findings

When asked what students believed the reason of their sleep disturbances the most repeated answers were as follows; noise from family/roommates/neighbors (found in 12 responses), waking up for schoolwork (found in 8 responses), stress/anxiety (found in 7 responses), noise/movement from their partner (found in 4 responses), stomach or bladder issues (found in 4 responses), substances (found in 4 responses), and restlessness (found in 2 responses)

(Appendix A, Figure 11.0). Students perceived their sleep quality was poorly impacted due to waking up still feeling tired (found in 16 responses), waking up in the middle of the night (found in 13 responses), difficulty staying asleep (found in 10 responses), stress (found in 3 responses), dreams (found in 2 responses), and inconsistent sleep schedule (found in 2 responses) (Appendix A, Figure 12.0). Lastly, when asked to reflect on what resources or strategies that could help students sleep; respondents answered as follows. Twenty seven respondents mentioned decreasing screen time, 11 mentioned exercise, 6 stated they needed to finish their school earlier, and 6 participants described needing more access to sleep related information (Appendix A, Figure 13.0). Additionally, 5 responded that they require more darkness, 4 stated they needed to decrease stress, 4 more stated they needed to sleep earlier, and 3 participants wished to practice more wellness and meditation (Appendix A, Figure 13.0).

Discussion

Findings from the survey indicated that a 'very good' and 'good' sleep quality is associated with a GPA of 4.00 to 4.33. This aligns with previous research by Rathakrishnan and colleagues (2021) whereby a lack of sleep quality was associated with decreased academic performance among university students. This finding, however, could be attributed to differences among faculties as Art student's took up the majority of participants and had the highest number of participants with a GPA of 4.00 to 4.33. Participants who reported a 'poor' sleep quality commonly attributed it to not getting enough sleep at night, taking a long time to fall asleep, and that they experienced exhaustion throughout the following day. Daytime sleepiness is associated with inadequate sleep quality and is prevalent among university students (Orzech et al., 2011). Our research confirmed this finding as the majority of students reported that they do not feel rested during the day. As both sleep latency and duration are a part of sleep quality, improving

these factors can contribute to a better sleep quality and feeling well rested in the morning (Schmickler et al., 2019; Orzech et al., 2011).

The variance between sleep duration among participants was evident in this study. When comparing sleep duration during the week and GPA, the largest difference was found to be between students with a GPA of 3.70 to 3.95 and 3.10 to 3.60, with the students receiving 3.70 to 3.95 reporting the longest sleep duration. When comparing GPA to sleep duration during the weekend, the largest difference was found to be between students with a GPA of 2.20 to 2.60 and 4.00-4.33, with the students receiving 2.20 to 2.60 reporting the longest sleep duration. These results do not indicate that sleep duration is associated with GPA, aligning with previous research by Berhane and colleagues (2014) who found that overall sleep quality was associated with higher GPA while sleep duration, specifically, did not have an effect on GPA. However, the difference in average sleep duration during the week compared to the weekend between students with a GPA of 2.20 to 2.60 and 4.00 to 4.33 is significant. Students with the lower GPA slept on average 2 hours more during the week, compared with students receiving the higher GPA, who slept on average 51 minutes longer during the week. This finding suggests that having a consistent routine with minimal sleep duration fluctuation can contribute to improved academic performance. This finding is also consistent with previous research by Gaultney (2010) who found that students who had a consistent sleep routine received higher grades than their counterparts.

When comparing GPA and average sleep and rise times among participants, we noticed a wide range of answers and variability within and between GPA groups. The majority of students with a GPA of 4.00 to 4.33 and 2.20 to 2.60 reported waking up between 7am to 8am, indicating that rise time does not play a role in predicting GPA. This finding does not align with previous

research which determined that wake-up times accounted for the largest discrepancy in GPA, with students achieving a higher GPA also waking up earlier than those achieving a lower GPA (Barnes et al., 2000). In terms of sleep times, students with a GPA of 4.00 to 4.33, 3.70 to 3.95, 2.65 to 3.00, and 2.20 to 2.60 most commonly went to sleep from 12am to 1am. This time period was reported most frequently among participants indicating that 12am to 1am is the most common time to sleep among university students, however, it does not suggest that sleep time plays a role in academic performance. In terms of academic performance, these findings contribute to the understanding that sleep quality may be independent from sleep duration or sleep and rise times as these factors do not predict GPA to the same level as perceived sleep quality.

Sleep disturbances were prevalent among students, with the majority of students indicating that they either 'sometimes,' 'often,' or 'always' experience disruptions or changes in their normal sleep pattern. Participants indicated that most often these sleep disturbances were a result of roommates or family they live with, loud environment (ex: construction noises), and school work and exam preparation pushing sleep time later. Additionally, the majority of participants who indicated they experience 'poor' sleep quality also reported that they 'sometimes,' 'often,' or 'always' experience sleep disturbances. In terms of sleep disturbances and GPA, findings indicate that participants reporting that they 'always' experience sleep disturbances achieve a GPA of 2.20 to 3.00. Conversely, the majority of students with a GPA of 4.00 to 4.33, reported experiencing sleep disturbances 'sometimes' or 'rarely'. These findings suggest that sleep disturbances are both associated with overall sleep quality and academic performance. Consistent with our findings, the prevalence of sleep disturbances among

university students is highlighted through previous research by Hartmann and Prichard (2018), who determined that sleep disturbances were a significant predictor of academic problems.

In terms of sleep behaviours that negatively impact sleep quality, stress and screen time were consistently reported by the majority of participants. As expected and indicated by previous research (Schmickler et al., 2023), participants, on average, indicated increased stress during the school term with 88.9% of participants reporting that they either 'always' or 'sometimes' feel that stress negatively impacts their academic performance. Additionally, when asked what resources or strategies could improve their sleep quality, the findings indicate that stress and time management techniques are needed among this population to help manage students' course load and other commitments. In regards to screen time, 86% of participants indicated that they 'always' or 'often' engage in screen time within 30 minutes of sleeping, with the majority (57%) indicating that they 'always' do. Reducing screen time was also overwhelmingly the most reported strategy to improve sleep quality, with 27 responses indicating that screen time during the day and before bed negatively impacts their sleep. As this is consistent with previous research by Rathakrishnan and colleagues (2021), methods to reduce screen time among this population are needed to improve sleep quality. Lastly, findings regarding substance use (alcohol and unprescribed drugs) were insignificant as the majority of responses reported that they only engage in alcohol use one to two times per month and never engage in substances or drugs not prescribed by medical professionals. These findings do not align with previous research finding significant associations between substance use and poor sleep quality (Alamir et al., 2019; Singleton & Wolfson, 2009).

The survey concluded with two qualitative questions prompting participants to indicate various resources or strategies that would improve their sleep quality and to share anything else

important regarding their sleep patterns. After analyzing the responses, a few common themes emerged. Reducing screen time (overall and prior to sleep) was most frequently reported, followed by increasing exercise during the day (including yoga and sport), engaging in a wellness activity before bed (such as meditation, reading, or stretching), and having an earlier and consistent sleep and wake time. When asked to share anything else related to sleep patterns, participants indicated that mental health issues (PTSD, anxiety, stress, OCD) and health issues (PCOS, iron deficiency) negatively impact their sleep quality. Additionally, having an inconsistent schedule and variable sleep and wake times was commonly reported as negatively affecting sleep. These responses provided insight into the best ways to improve sleep quality among undergraduate students and helped with providing recommendations to UBC Recreation.

These findings contribute to our understanding of sleep quality and how it impacts academic performance among university students. While sleep duration and sleep and rise times do not have a significant impact on GPA, there is an association between sleep quality, sleep disturbances, and GPA, along with negative sleep behaviours, such as screen time and stress, which lead to poor sleep quality.

Limitations in this study include failing to specify the questions regarding sleep medication and substance use in our survey. At the beginning of the survey we asked if participants took sleep medication. After ending the survey, we realized that this could be confusing to participants as we did not explain the parameters of 'sleep medication' and therefore supplements, such as melatonin, may have been included. However, the majority of students (95%) indicated that they did not have a diagnosed sleep disorder and/or take sleep medication. Additionally, we received feedback from a participant who did not understand what sleep quality entails. As sleep quality could have been interpreted differently among participants,

defining it either in the introduction page or in the question may have impacted our findings. Another limitation is self-report bias, specifically in the questions regarding alcohol and substance use. As this survey was self-report, we risk participants providing socially desirable answers, leading to response bias. Additionally, due to using a range of GPA scores, we were unable to calculate correlation coefficients for the relationships involving GPA. Lastly, as GPA is not the sole indicator of academic performance, future studies could utilize students' academic satisfaction as an additional measurement.

Recommendations

Based on our findings and participants' responses to questions regarding their sleep patterns and what resources or strategies will improve their sleep quality, we compiled a few recommendations for our project partner, UBC Recreation, that can be implemented among UBC undergraduate students and be utilized for future research directions.

The first recommendation involves implementing a UBC sleep website to provide education on healthy sleep habits and include resources for sleep-promoting activities, such as yoga and meditation. When asked what resources and strategies might help improve their sleep quality, a large number of participants indicated that exercise, practices such as meditation, reducing screen time before bed, stress- and time-management techniques, and information on healthy sleep habits would help improve their sleep. Specifically, participants' indicated that they would appreciate information on the "best [late night] meal to eat and how to fall asleep faster" and that "a resource for knowing exactly how much sleep a student needs to thrive in academics and life, [along with] a resource about the importance of deep vs. light sleep." Based on these responses, creating a website would be an immediate recommendation dedicated to informing students on the importance of sleep, including information about the different stages of sleep,

how to know if you are getting a quality sleep, various tips to promote sleep quality, and resources leading to online yoga and other exercise classes and meditation videos.

Elevated stress levels during the term impacting students' sleep quality was a common theme throughout the responses. Additionally, participants with mental health disorders, such as anxiety, post-traumatic stress disorder (PTSD), and obsessive-compulsive disorder (OCD) indicated that their disorder may play a role in reduced sleep quality and contribute to difficulty falling asleep. Due to these responses, a future study recommendation is to examine the bidirectional relationship between sleep quality and mental health outcomes among UBC students. Investigating how sleep disturbances contribute to stress, anxiety, depression, and other mental health issues, along with how improving sleep quality can enhance mental well-being would provide insight into the interaction of this relationship and contribute to identifying targeted and individualized strategies to improve sleep quality and mental health among UBC students.

The last recommendation includes developing a UBC sleep phone application with the ability to track sleep patterns and remind users to limit screen time. Along with incorporating important information and resources developed in the UBC sleep website, this app will also be capable of sleep tracking that can increase awareness of the user's sleep habits and provide a better understanding of their sleep phases, such as how much time spent in light, deep, or REM sleep. App users would have the option to share their sleep data with UBC Recreation, to further their knowledge of students' sleep behaviors, or users can opt out of sharing due to privacy reasons. Due to a majority of responses indicating that excessive screen time during the day and prior to sleep is the reasoning for their lack of sleep or poor sleep quality, we recommend that this app has reminders and push-notifications for when the user has been on their phone for an

extended period of time and notifications for when it is time to put their phone away before bed. This app allows users to take accountability for their negative sleep behaviours while providing insight on their sleep patterns and habits, thereby leading to reduced screen time and better overall sleep quality among UBC students.

Conclusion

From our literature review findings, a large number of students suffer from poor sleep, which consequently impacts their ability to achieve their potential in academic performance. Furthermore, poor sleep and sleep behaviours are complex and multifaceted, particularly in university students. We aimed to analyze sleep quality and behaviors in conjunction with different GPA ranges. Understanding the relationship between sleep and GPA highlights the importance of prioritizing good sleep habits for academic success and overall student well-being. We hope to enable students to engage in healthy sleep behaviours and therefore improve their academic performance. With the information our study will provide, UBC Recreation may need to consider implementing a program or simply just raising awareness amongst students to promote healthy sleep habits in order to support their academic achievements. Upon completion of our study, we were able to provide three evidence based recommendations that stemmed from our primary research question: How is sleep quality related to academic performance among upper year students attending the University of British Columbia?

We achieved our goal of investigating different aspects of sleep interrelated to academic performance. The survey findings indicate a correlation between 'very good' and 'good' sleep quality and GPAs; however, we are aware that this may be influenced by differences in faculties, as shown by Arts students predominating among participants with high GPAs. Participants reporting 'poor' sleep quality commonly attributed this to insufficient sleep, prolonged sleep

onset, and daytime/wake-up exhaustion. Daytime sleepiness, indicative of inadequate sleep quality, was prevalent among students, emphasizing the need for interventions. Initially we expected sleep duration to impact academic performance (less sleep associated with a lower GPA), we were surprised to see this relationship was not as expected. While sleep duration alone didn't significantly affect GPA, consistency in sleep routines appeared beneficial. Those with a lower GPA had a less consistent sleep schedule, with varied hours in sleep duration. Opposed to previous studies, wake-up times didn't significantly predict GPA in our sample. Sleep disturbances were associated with both poor sleep quality and lower GPAs; those with the lowest GPA range reported that they 'always' experience sleep disturbances whereas those with the highest GPA range reported experiencing sleep disturbances 'sometimes' or 'rarely.' Sleep disturbances primarily consisted of noise from others and restlessness. Stress and screen time emerged as key factors negatively impacting sleep quality outlining the need for strategies for stress management and screen time reduction in order to improve overall sleep and consequently GPA. Contrary to what we expected, substance use showed a negligible impact on sleep quality in this sample. Qualitative responses from participants demonstrated the importance of stress management, exercise, and consistent sleep schedules in improving sleep quality. These crucial findings were then translated into the recommendations provided for UBC Recreation: creating a UBC sleep website, investigating the relationship between sleep quality and mental health outcomes with academic performance, and the development of a sleep promoting and tracking app with features for stress management and screen time reduction. These interventions aim to address the complex interplay between sleep quality, academic performance, and student well-being. We hope to inform future research as well as UBC Recreation to provide opportunities for health promotion initiatives in university settings.

This study holds significance through shedding light on the correlation between sleep quality and academic performance among third and fourth year university students attending UBC. We hope this work offers valuable insights for improving student well-being and enhancing educational outcomes. By examining this relationship, we provide evidence-based comprehension to how sleep habits impact academic success. This increased understanding can provide crucial insights for future educators, policy makers, health promotion organizations, and health professionals. This paper highlights how understanding the specific factors of sleep quality has broader implications for students' health and wellbeing; the detrimental effects of poor sleep have various negative impacts that require increased education and health implementation efforts. The results from this study outline that sleep is multifaceted; no one factor is the sole determinant of poor sleep. By identifying key factors that contribute to poor sleep, future health promoting interventions can be implemented, and consequently this study can help lead to healthier sleep habits and improve students' overall well-being.

Over the course of this study, various areas for future directions arose. First of all, as previously discussed, mental health outcomes should be further analyzed in a university student population in conjunction with sleep and academic performance. In future studies, different methods of measuring academic performance, such as perceived academic success, should be implemented. This would not only acknowledge and counter the difference in GPA results between faculties and individuals, but this would also allow a more comprehensive understanding of a students academic achievements. Next, implementing a longitudinal study to examine the long-term effects of aspects of sleep on academic performance among university students would provide valuable insights. Furthermore, using this data to introduce an

intervention (such as a mobile application) among university students would enable the

assessment of the effectiveness of health promotion efforts.

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Appendix A

Figure 1.0 Distribution of survey respondents based on faculty/program

What faculty/program are you in?

- Applied Science
- Arts
- Commerce
- Forestry
- Kinesiology
- Land and Food Sys...
- Other
- Pharmacy
- Science
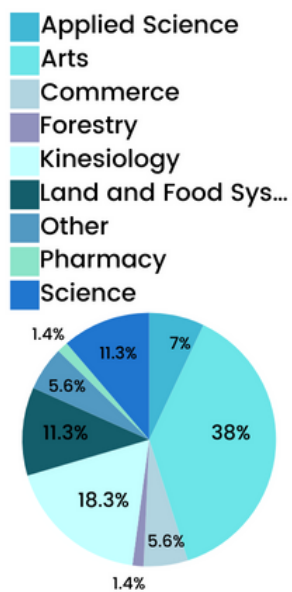
Table 1.0 Completion of Survey

Completion of Survey		
	Participant ID	
	False	**True**
Valid	20	89
%	18.34	81.65

Image 1.0 Recruitment Poster

Figure 2.0 Percentage of students who agreed or disagreed with feeling well-rested during the day
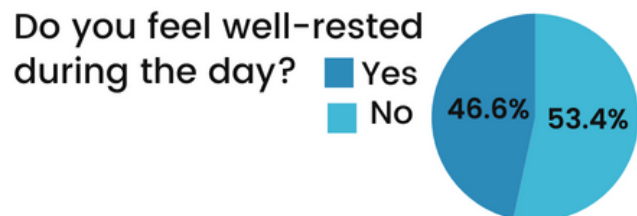
Image 2.0 Recruitment Email

UBC Research Recruitment

haydj02@student.ubc.ca
Fri 3/22, 4:43 PM
Sargeant, Jeff

Reply all

Download

Dear Jeff,

I hope this email finds you well.

I am emailing regarding a research project that fellow students and I are conducting as a part of KIN464. We are looking to recruit undergraduate UBC students in third and fourth year standing to complete a survey which examines the relationship between sleep quality and academic performance. Our research will aim to provide recommendations to our project partner, UBC Recreation, in order to improve the sleep behaviors and overall well-being of UBC students. We would love to hear from some of the Thunderbirds teams and wondered if it would be possible to distribute our information for athletes to participate voluntarily. The survey can be accessed through the following link: https://ubc.ca1.qualtrics.com/jfe/form/SV_40HsdMlZ6K9sw7Q

Thank you so much for your consideration!

Sincerely,

Hailey Jackson

Table 2.0 Comparison of hours slept during the week vs weekend

	On average, how many hours of sleep do you get per week night?	On average, how many hours of sleep do you get per weekend night?
Valid	73	73
Missing	36	36
Median	7.000	8.000
Mean	7.014	8.274
Std. Deviation	1.021	1.272
Variance	1.041	1.618
Minimum	5.000	6.000
Maximum	9.000	13.000

Figure 3.0 Relationship between average hours of sleep per week night and GPA
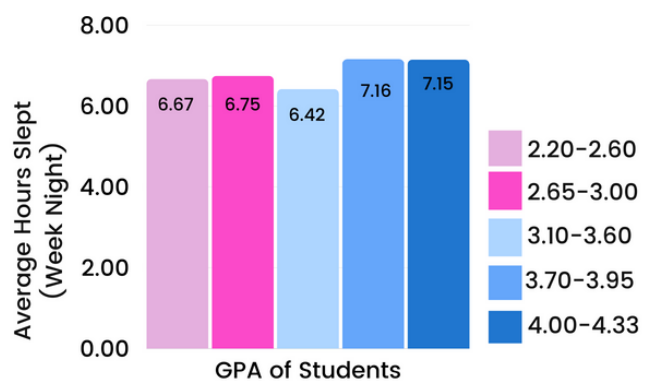
Table 3.0 Relationships between average hours of sleep per week night and GPA

	On average, how many hours of sleep do you get per week night?				
	2.20 (62%) - 2.60 (67%)	2.65 (68%) - 3.00 (73%)	3.10 (74%) - 3.60 (79%)	3.70 (80%) - 3.95 (85%)	4.00 (86%) - 4.33(90%)+
Valid	3	4	12	25	27
Missing	0	0	0	0	0
Mean	6.667	6.750	6.417	7.160	7.148
Minimum	6.000	6.000	6.000	5.000	5.000
Maximum	8.000	7.000	7.000	9.000	9.000

Note. Excluded 38 rows from the analysis that correspond to the missing values of the split-by variable What range does your GPA fall under?

Image 3.0 Club Recruitment

Hello hello!!
We have an opportunity for your club members to win a prize (Lululemon yoga mats or Athletic prize packs). In a class (KIN 464), some other students and I are conducting a survey and write up to provide UBC Recreation with recommendations regarding sleep behaviours/sleep quality in UBC undergraduate students. Our study is specifically on the interaction between GPA and sleep amongst 3rd and 4th year students. We would appreciate it if your club would be willing to repost our study poster with the link! Absolutely no worries if not.

Here is the link to the study!
https://ubc.ca1.qualtrics.com/jfe/form/SV_40HsdMlZ6K9sw7Q

Sleep and Academic Performance in Undergraduate Students Attending UBC
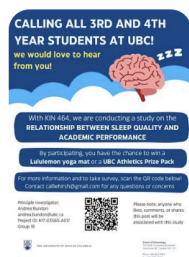
Figure 3.1 Relationship between average hours of sleep per weekend night and GPA
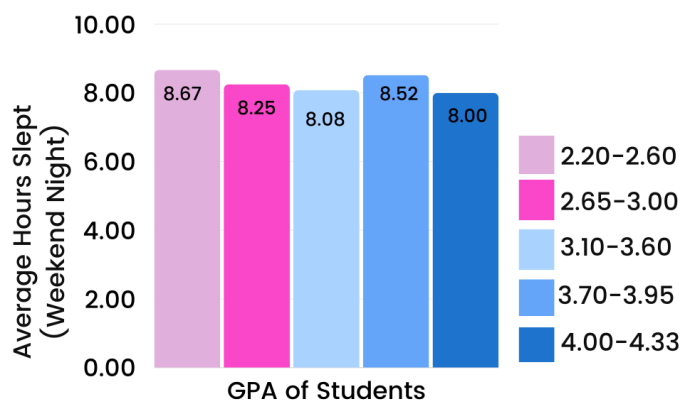
Table 3.1 Relationships between average hours of sleep per weekend night and GPA

|	On average, how many hours of sleep do you get per weekend night?				
	2.20 (62%) - 2.60 (67%)	2.65 (68%) - 3.00 (73%)	3.10 (74%) - 3.60 (79%)	3.70 (80%) - 3.95 (85%)	4.00 (86%) - 4.33(90%)+
Valid	3	4	12	25	27
Missing	0	0	0	0	0
Mean	8.667	8.250	8.083	8.520	8.000
Minimum	8.000	6.000	6.000	7.000	6.000
Maximum	9.000	9.000	10.000	13.000	10.000

Note. Excluded 38 rows from the analysis that correspond to the missing values of the split-by variable What range does your GPA fall under?

Table 4.0 Presence of Sleep Disturbances

How often do you experience sleep disturbances?	Frequency	Percent	Valid Percent	Cumulative Percent
Always	2	1.835	2.740	2.740
Never	2	1.835	2.740	5.479
Often	10	9.174	13.699	19.178
Rarely	26	23.853	35.616	54.795
Sometimes	33	30.275	45.205	100.000
Missing	36	33.028		
Total	109	100.000		

Figure 4.0 Stress and Academic Performance
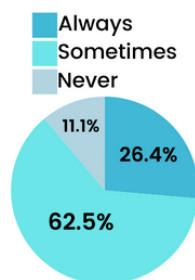
Image 4.0 Survey Questions

Default Question Block

CLASS PROJECT: Health Promotion and Physical Activity (KIN 464)

Participant Consent Form The Impact of Sleep on Academic Performance in UBC Undergraduate Students - Group 18
Project ID: H17-03560-A017
Principal Investigator: Dr. Andrea Bundon (Assistant Professor, School of Kinesiology, Faculty of Education)

The purpose of the class project: To gather knowledge and expertise from community members on the relationship between sleep and academic performance. A large number of students suffer from poor sleep, which consequently impacts their ability to achieve their potential in academic performance. The purpose of our proposed study is to investigate the relationship of sleep and grade-point average (GPA) in undergraduate students attending the University of British Columbia (UBC). We aim to analyze sleep quality and behaviors in conjunction with different GPA ranges. Understanding the relationship between sleep and GPA highlights the importance of prioritizing good

sleep habits for academic success and overall student well-being. We aim to provide recommendations to our project partner, UBC Recreation,to support better sleep amongst UBC students as well as increase wellbeing, promote health and academic success, raise awareness, and identify at-risk student groups through analyzing the relationship between sleep and GPA. Our guiding research questions is; How does sleep impact academic performance (specifically GPA) in undergraduate students attending UBC?

Study Procedures: With your permission, we are asking you to participate in a survey. You may only complete each survey once. With the information gathered, students will critically examine how different individuals understand or engage in health promoting activities or health promotion initiatives.

Project outcomes: The information gathered will be part of a written report for the class project. The written report will be shared with campus partners involved with the project. Summaries of findings will also be posted on the following websites. UBC SEEDS Program Library: https://sustain.ubc.ca/courses-degrees/alternative-credit-options/seeds-sustainability-program/seeds-sustainability-library No personal information/information that could identify participants will be included in these

reports or shared with campus partners.

Potential benefits of class project: There are no explicit benefits to you by taking part in this class project. However, the survey will provide you with the opportunity to voice your opinion on your experiences with health promoting activities or initiatives in a broad sense and will provide the students with an opportunity to learn from your experiences. Confidentiality: Maintaining the confidentiality of the participants involved in the research is paramount, and no names of participants will be linked to the data collected. At the completion of the course, all data (i.e. notes) and signed consent forms will be stored on a secure electronic drive by Dr. Bundon. All data and consent forms will be destroyed 1 year after completion of the course.

Risks: The risks associated with participating in this research are minimal. There are no known physical, economic, or social risks associated with participation in this study. You should know that your participation is completely voluntary and you are free to withdraw from the study and there will not be negative impacts related to your withdrawal. If you withdraw from the study, all of the information you have shared up until that point will be destroyed.

Contact for information about the study: If you have

any questions about this class project, you can contact Andrea Bundon by email at andrea.bundon@ubc.ca

Research ethics complaints: If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or e-mail RSIL@ors.ubc.ca . or call toll free 1-877-822-8598.

Consent: Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time.

By proceeding with this survey, I am confirming I have read the above information and agree to participate in this research project.

This is the text you can highlight with the above color categories. To edit this text, click on the link below. Click between the words to combine or separate them. Clicking directly on words will allow or disallow respondents from highlighting them.

Are you currently an undergraduate student with **3rd or 4th year standing** aged **18–25** attending the **University of British Columbia**?

○ Yes
○ No

Ineligible response

Thank you for your interest. According to your response(s) you are not eligible for this study. Have a good day!

ELIGIBILITY Q2

Do you have a **diagnosed** sleep disorder and/or take sleep medication? (Narcolepsy, insomnia)

○ Yes
○ No

Do you work **night shifts** (*starting in the late evening and ending in the early morning*)?

○ Yes

○ No

Employment question

Do you have a full time job or work/volunteer full time hours **(35-40 hours/week)**?

○ Yes

○ No

Sleep Quality Q 1

How would you describe the **quality** of your sleep?

Very Poor	Poor	Fair	Good	Very Good	Excellent
○	○	○	○	○	○

Sleep Quality Qualitative

Why would you rate your sleep quality as chosen above?

Specifics on Sleep Quality

On average, how many hours of sleep do you get per night?

	0	1	3	4	6	7	8	10	11	13	14	
On a weekday night (Sunday night-Thursday night)	○											[ ]
On a weekend (Friday night-Saturday night)	○											[ ]

On average, how long does it take you to fall asleep once you are in bed? *(in minutes)*

Minutes

0   8   15   23   30   38   45   53   60   68   75   83   90   98   105   113   120

Time spent ◯
awake before
falling asleep
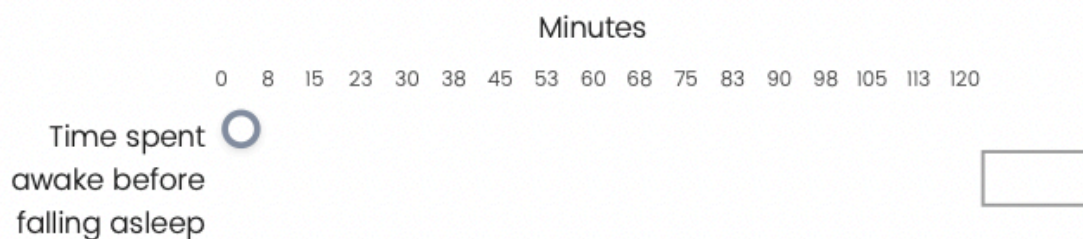
Do you feel well-rested during the day?

◯ Yes

◯ No

Sleep Disturbance Q 1

How often do you experience sleep disturbances?
(ex. interruptions or changes in the normal sleep pattern)

Never   Rarely   Sometimes   Often   Always
◯   ◯   ◯   ◯   ◯

Sleep Disturbance Qualitative Question

What is typically the source of your sleeping disturbances?

[text box]

Sleep Behaviour Questions

How often do you partake in substances/drugs not prescribed by a healthcare professional?

○ Never
○ 1-2 times/month
○ 1-2 times/week
○ 3-4 times/week
○ 5-6 times/week
○ 7+ times/week

How often do you partake in alcohol consumption?

○ Never
○ 1-2 times/month
○ 1-2 times/week
○ 3-4 times/week
○ 5-6 times/week
○ 7+ times/week

On a scale of 1 to 10, with 1 being 'Not stressed at all' and 10 being 'Extremely stressed,' how would you rate your **overall level of stress** during a school term?

0	1	2	3	4	5	6	7	8	9	10

Overall Stress

Do you feel as if your stress levels **negatively impact** your academics?

Never   Sometimes   Always

What time do you **fall asleep** on a **weekday night**?

- ○ 7:00pm-8:00pm
- ○ 8:00pm-9:00pm
- ○ 9:00pm-10:00pm
- ○ 10:00pm-11:00pm
- ○ 11:00pm-12:00am
- ○ 12:00am-1:00am
- ○ 1:00am-2:00am
- ○ 2:00am-3:00am

○ 3:00am-4:00am

○ 4:00am-5:00am

What time do you **wake up** on a **weekday**?

○ 4:00am-5:00am

○ 5:00am-6:00am

○ 6:00am-7:00am

○ 7:00am-8:00am

○ 8:00am-9:00am

○ 9:00am-10:00am

○ 10:00am-11:00am

○ 11:00am-12:00pm

○ 12:00pm-1:00pm

○ 1:00pm-2:00pm

○ 2:00pm-3:00pm

○ Later than 3:00pm

How often do you participate in screen time directly (within *30 minutes)* before sleeping?

Never	Rarely	Sometimes	Often	Always
○	○	○	○	○

Academic Questions

What range does your GPA fall under?

○ 1.00 (50%) –1.50 (55%)
○ 1.60 (56%) – 2.10 (61%)
○ 2.20 (62%) – 2.60 (67%)
○ 2.65 (68%) – 3.00 (73%)
○ 3.10 (74%) – 3.60 (79%)
○ 3.70 (80%) – 3.95 (85%)
○ 4.00 (86%) – 4.33(90%)+

What faculty/program are you in?

○ Applied Science
○ Science
○ Arts
○ Commerce
○ Education
○ Land and Food Systems
○ Kinesiolgy
○ Medicine
○ Law
○ Pharmacy
○ Forestry
○ Economics

◯ [＿＿＿＿＿＿] Other

Other Qualitative Questions

What are 2 resources or strategies that might help improve your sleep quality?

[   ]

Is there anything else you would like to share about your sleep patterns that you feel would be important for us to note?

[   ]

Thank you for completion of the survey

Thank you for completing the survey. The following page will redirect you to a new survey where you can enter the draw for prizes (2 lululemon yoga mats and 4 UBC Athletics Prize Packs).

You will need our group number to enter the draw – GROUP 18

Figure 5.0 Comparison between GPA and Full-time work/volunteer commitments
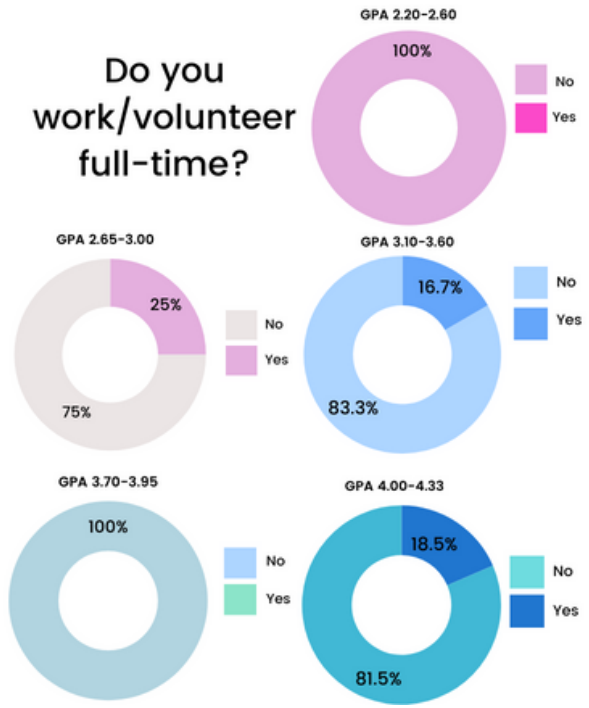
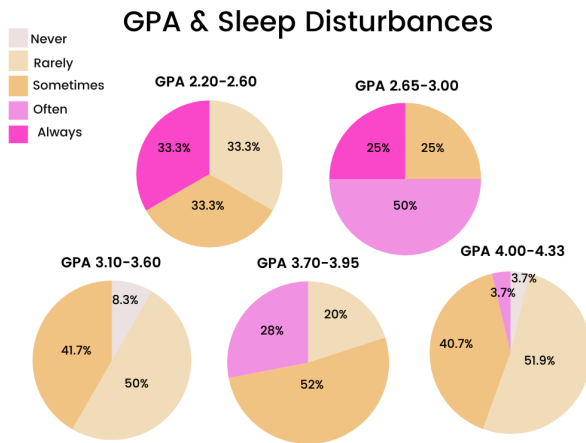**Figure 6.0** Comparison between GPA and Average Rise Time
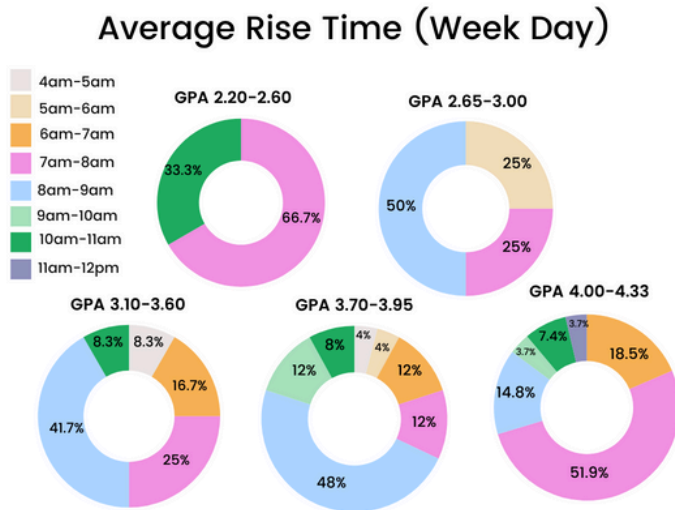
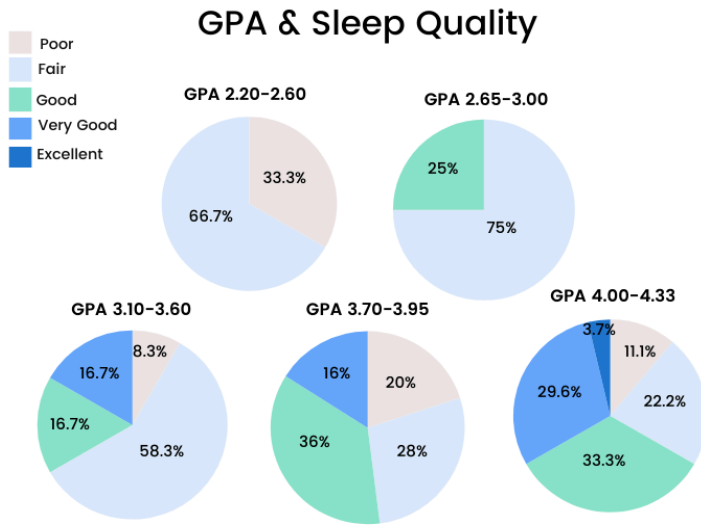**Figure 6.1** Comparison between GPA and Average Sleep Time
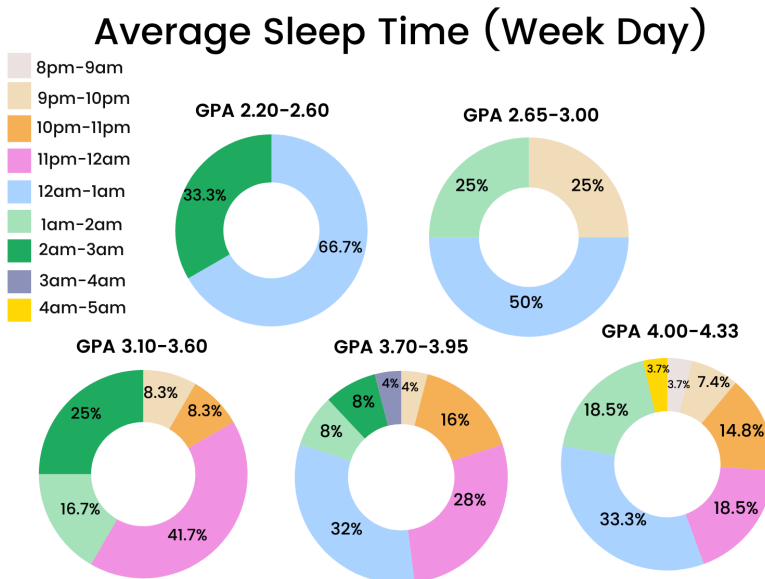
Figure 7.0 Comparison between GPA and Faculty/Program
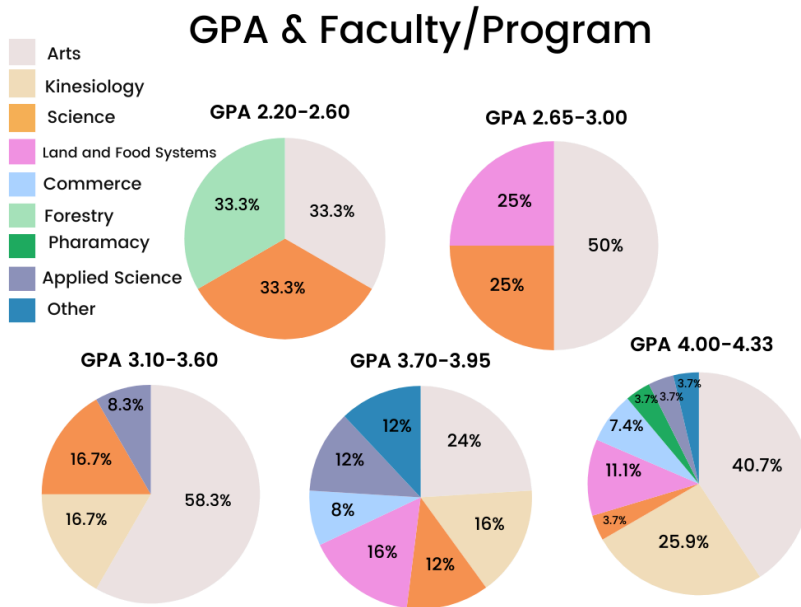
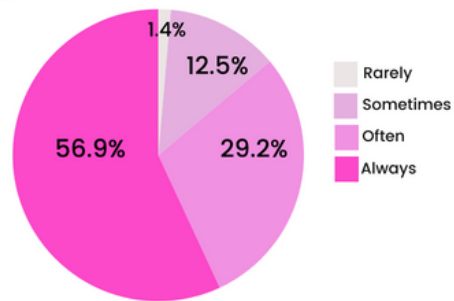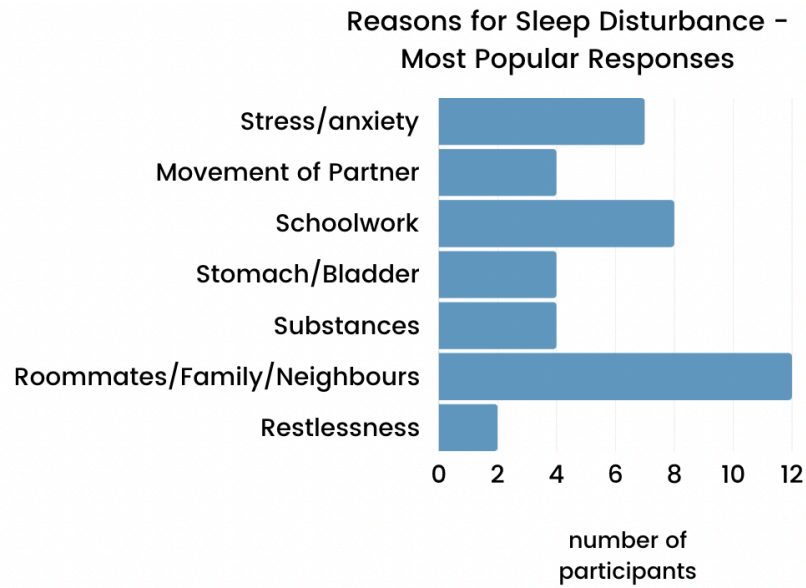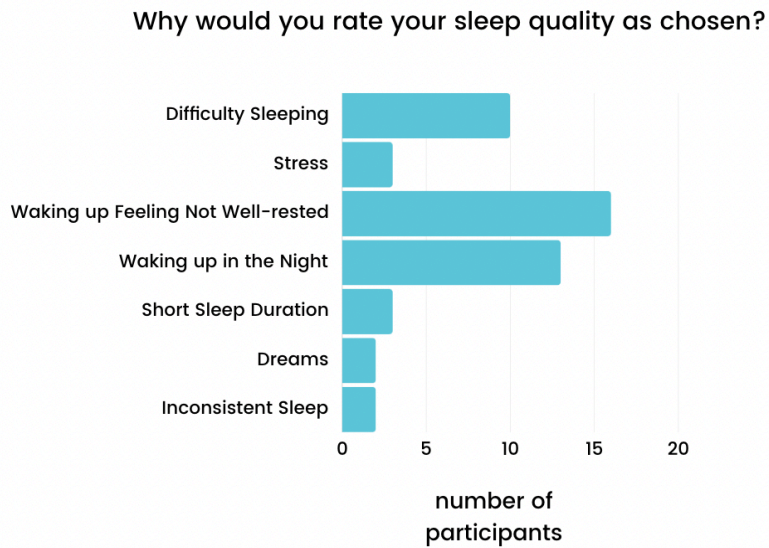**Figure 8.0** Comparison between GPA and Sleep Disturbances

Figure 9.0 Comparison between GPA and Sleep Quality

Figure 10.0 Participation in Screen Time 30 minutes before sleeping

Figure 11.0 Students Perceived Reasons for Sleep Disturbance

Figure 12.0 Students Perceived Reasons for Impacted Sleep Quality

Figure 13.0 Students Perceived Best Strategies and Resources

Resources/Strategies that Could Help - Most Popular Responses