STA304 Report

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1. Abstract

University students frequently face challenges that contribute to mental health issues such as stress and anxiety. This study examines the relationship between mental health and factors such as academic workload, hours of sleep, living situation, and work-life balance. Data were collected through a Google Form survey administered to students in a third-year statistics survey & sampling course, where participants rated their agreement with statements related to various mental health indicators. The results showed a significant relationship between academic workload and stress levels. While no significant relationship was found between stress levels and hours of sleep, we observed a significant association between hours of sleep and missed social events. Additionally, no statistically significant relationship was identified between stress levels and living situation, though a marginally significant relationship was found between living situation and missed social events. Since we were not able to reach most of the conclusions that we expected, we plan to consider other factors that might influence mental health, and also incorporate attention-check questions to identify rushed responses.

2. Introduction

The academic workload faced by university students has increasingly become one of the critical variables for university students concerning mental health. Given a broader context of increasing academic challenges, many students experience heightened stress levels, which impact various aspects of their well-being, including sleep quality, work-life balance, and several mental health issues.

First, commonly reported mental health issues, including anxiety, depression and stress, have been found to correlate with academic pressures in highly competitive or rigorous programs where students may feel unable to meet academic and personal expectations (Beiter et al., 2014). Second, research indicates that students experiencing high academic workload tend to report poorer sleep quality and shorter sleep duration, which, in turn, can exacerbate mental

health problems and academic performance challenges (Hershner & Chervin, 2014). Third, students' living environments and their ability to maintain a balanced lifestyle can also significantly impact mental health, since living in a more supportive and conducive environment positions students to better manage academic responsibilities and personal well-being (Hysing et al., 2016).

Given the above potential factors, we seek to address the following research questions in this report:

- **Research Question 1:** Is there an association between students' academic workload and the amount of mental health issues?
  - **Null Hypothesis:** There is no association between academic workload and the amount of mental health issues.
  - **Alternative Hypothesis:** There is a significant association between academic workload and the amount of mental health issues.
- **Research Question 2:** How does the academic workload affect the quality/length of sleep and its subsequent impact on students' mental health?
  - **Null Hypothesis:** Academic workload does not affect the quality or length of sleep, nor does it affect students' mental health.
  - **Alternative Hypothesis:** Academic workload significantly affects the quality and/or amount of sleep students get, which affects mental health.
- **Research Question 3:** Is mental health affected by students' living situations or students' ability to maintain work-life balance?
  - **Null Hypothesis:** Students' mental health is not affected by their living situation or their ability to maintain a work-life balance.
  - **Alternative Hypothesis:** Students' mental health is significantly affected by their living situation and their ability to maintain a work-life balance.

This study focuses on students enrolled in STA304H5 during Fall 2024, aiming to provide valuable insights into the effects of academic workload on their overall well-being. By exploring these relationships, the findings may inform strategies to enhance student support services and improve academic experiences.

3. Methodology

3.1. Data Collection

Between October 8th, 2024, and October 20th, 2024, the questionnaire's Google Form link was posted on the STA304H5 Piazza course discussion board. We utilized Simple Random Sampling (SRS) by using the R random generator to randomly sample 45 students from the received questionnaire responses. This method was chosen because it gives all respondents an equal chance of being included in the sample, making the sample representative. This experiment does not require methods like stratified or cluster sampling because the population in this experiment is relatively uniform and doesn't need to be divided into strata or clusters.

We considered alternative methods, such as stratified sampling or cluster sampling. However, these methods are more suitable when the characteristics of specific subpopulations need to be accounted for. Since the characteristics of students taking STA304 were expected to be similar, we decided that it would not be meaningful to distinguish between the subpopulations. Since our goal was to capture the characteristics of all students, we determined that SRS was the most appropriate method for this experiment.

On the questionnaire, we asked participants to complete 10 short-answer questions inquiring about academic workload, average hours studied weekly, amounts of experienced stress-related symptoms (stress, anxiety, concentration difficulty), hours of sleep per night, current living situation, and experienced common issues caused by academic workload (time management, social life, financial).

3.2. Target Population

The target population consists of students enrolled in the STA304H5 course during the Fall 2024 semester.

3.3. Sampling Method

We will use **Simple Random Sampling (SRS)** by combining both sections of the STA304H5 course and selecting a random sample of students from the pool.

3.4. Variables of interest

The following variables were identified for the research:

3.4.1. Academic Workload

Academic workload is defined as the number of assignments, projects, and exams and the overall demands of a course. The purpose of this study is to see if a high academic workload is associated with increased mental health problems, such as stress. Academic workload was measured through a questionnaire on a scale of 1 (very light), 2 (light), 3 (moderate), 4 (heavy) and 5 (very heavy).

3.4.2. Living Situation

We divided students' living arrangements into four categories: Living alone, living with family, living with roommates, and living in on-campus housing. These living arrangements are important variables that have a significant impact on students' mental health and academic stress.

3.4.3. Study Hours

Study time is an important indicator of students' time management and academic performance. This study analyzes the relationship between study time and mental health , exploring whether over studying leads to stress reduction or instead causes mental stress and anxiety. Study hours were measured by entering the number of hours of study per week.

3.4.4. Mental Health Symptoms (Stress, Anxiety, and Concentration Difficulties)

Mental health symptoms are key indicators of students' mental health and may be influenced by academic workload and living conditions. Understanding these relationships helps target interventions and support strategies to improve students' mental well-being. These symptoms were measured through a questionnaire on a scale of 1 (Never) 2 (Sometimes) and 3 (Always).

3.4.5. Work-life balance Factors (Financials, Time Management)

Two key indicators of how well a student is adjusting to an independent life in university is their financial status and ability to manage time properly. Therefore, we believe that investing these factors would help to shed light on whether students' work-life balance are being impacted by academic workload. These are measured through a questionnaire of how often students feel these factors are of concern as a result of their workload, on a scale of 1-5 (Never, Rarely, Sometimes, Often, Very Often).

3.5. Sample Size

In our research, we applied Simple Random Sampling (SRS) on 200 students. To determine the sample size using the bound of error as 0.29, we used the following formula to find the magnitude of the confidence interval:

$$D = \frac{B^2}{4}$$

Where $B = 0.29$, giving:

$$D = \frac{(0.29)^2}{4} = 0.021025$$

Using the standard deviation (σ) of the academic workload variable, we computed the required sample size using the formula:

$$n = \frac{N \times \sigma^2}{(N-1) \times D + \sigma^2}$$

Where:

N = 200 (total population size) B = 0.29 (bound of error) D = $B^2/4 = 0.021025$ σ is approximated as (range of academic workload)/4 range = maximum academic workload - minimum academic workload

To randomize our sampling process, we used R's random sampling function `sample()` with a fixed `seed` (`set.seed(1)`) to randomly select participants from the full dataset based on the calculated sample size n.

Thus, below is the initial setup for all of our statistical tests.

4. Analysis

4.1. Analysis of Variance (ANOVA)

RQ1 questions if academic workload contributes to a student's stress levels. To answer this question, ANOVA (analysis of variance) is used to test the difference in average stress levels between students with different academic workloads.

All our assumptions are satisfied, as (1) samples between the groups were randomly sampled and responses are independent from each other, (2) data from each group is normally distributed (large sample size, $n > 30$), and (3) variances are approximately equal (obtained *p-value* of 0.07758 from Barlett's test, which is above the significance level $\alpha = 0.05$.) All categories were converted to categorical data to make them suitable for ANOVA testing.