Stress Analysis at IU Bloomington

By Tauqeer Saleem, Ravi Sharma, Jason Edwards

Abstract

College students are much more vulnerable to stress because of their mental development at that age and because going to college is a significant change in most students' lives. This Stress can negatively impact not only student academic performance, but also quality of life. By gathering information from IU students, we have determined that lack of sleep is increasing stress, along with inefficient study practices. By increasing student socialization though clubs we believe that this will also decrease stress. But with a lack of data more work needs to be done.

Introduction

In the fast-paced world of university life, understanding the factors contributing to stress among students is crucial. This project aims to dive into the variables of stress, well-being, and related factors through data that was collected via a Google Form survey. By exploring various aspects ranging from academic performance to personal well-being, we seek to identify correlations that shed light on the challenges students face. The ultimate goal is to provide insights that may help the university in enhancing the overall well-being of Indiana University (IU) students. This report presents our methodology, findings, and recommendations based on the analysis of the gathered data.

Previous Work

In articles such as *Predictors of Stress in College Students* and *Coping Mechanisms, Stress, Social Support, and Health Problems in College Students*, both recognize that the age of most college students is a vulnerable age mentally. Students who have not reached mental maturity may travel far from home and find themselves in a new environment that they must adapt to. Homesickness, loss of friends, loss of family, academic pressures, and financial hardship all play significant factors in student stress. In *The Academic Impact Of Financial Stress On College Students* it is noted that “The link between financial stress and poor academic performance is noteworthy”(Joo, S. H 303). This can be exacerbated by rising costs of college tuition, which can lead to increased financial stress, which leads to worse academic performance, which in turn creates even more stress. This vicious cycle can destroy a student, especially if a student does not have a proper way to cope with said stress. *College Students' Time Management: Correlations With Academic Performance and Stress* and *An Examination Of The Relationship Among Academic Stress, Coping, Motivation, And Performance In College* state that planning is one of the most important things to help manage stress, If a student can create a comprehensive plan to

not only manage time but also manage emotional stress (such as knowing who to talk to for encouragement or to help in emotional distress), they will succeed more in college and have better mental health in the long run.

Methods

To ensure dataset diversity, we disseminated a survey created with Google Forms across a range of academic disciplines and student years. The survey included the following questions:

1. What is your major/school?
2. Year of Study?
3. How far do you live from campus?
4. Preferred Mode of transportation for getting to campus?
5. How much time do you spend on studying outside class per week? (In hours)
6. How much time do you spend on your hobbies?(Parties,Outings,Painting,Reading,Etc.)
7. How much money do you spend on groceries per week?
8. How often do you work out?
9. On the scale of 1 to 10 how stressful this semester has been for you
10. What factors have contributed the most to your stress?
11. What methods have you used to cope with this stress?
12. Are you employed?
13. On the scale of 1 to 10 how would you rate your academic performance?
14. How often do you meet new people?
15. How many hours of sleep do you get?
16. Please describe/problems you are facing at IU?

Subsequently, we imported the gathered data into a Python environment, using Pandas and other relevant libraries for further analysis.We conducted column renaming to improve clarity for effective manipulation of the data. Following this step, we performed preprocessing tasks such as making formatting adjustments to improve data quality to ensure compatibility with the Python environment.For feature engineering, we applied one-hot encoding to represent categorical variables, this was to ensure that our dataset is compatible with machine learning algorithms and analytical techniques.

After preprocessing our data, we proceeded to identify trends and correlations between different variables, such as Stress vs. Study Hours and other significant factors. These relationships were crucial in uncovering hidden insights.To delve deeper, we employed Natural Language Processing (NLP) techniques for topic modeling, utilizing the NLTK and Gensim libraries. Subsequently, we implemented a linear regression model to predict stress levels based on various features. The model was developed using the sklearn library.

Results

Our results closely match previous literature on stress and also provide a niche insight into the factors affecting stress at Indiana University. We measure the effect of multiple variables on stress and academic performance such as average sleep time, average study time, school students are studying in, workout routine etc.

As expected, we do see a sharp rise in study hours for people reporting higher levels of stress; however, we do not see any significant rise in perceived academic performance (Figure 1). In a similar manner, we see a sharp decrease in sleeping time for people reporting higher levels of stress, which does not correspond to any significant increase in academic performance (Figure 2). Both of these facts highlight the importance of effective time management and learning techniques, something that will be discussed in detail in the recommendation section.

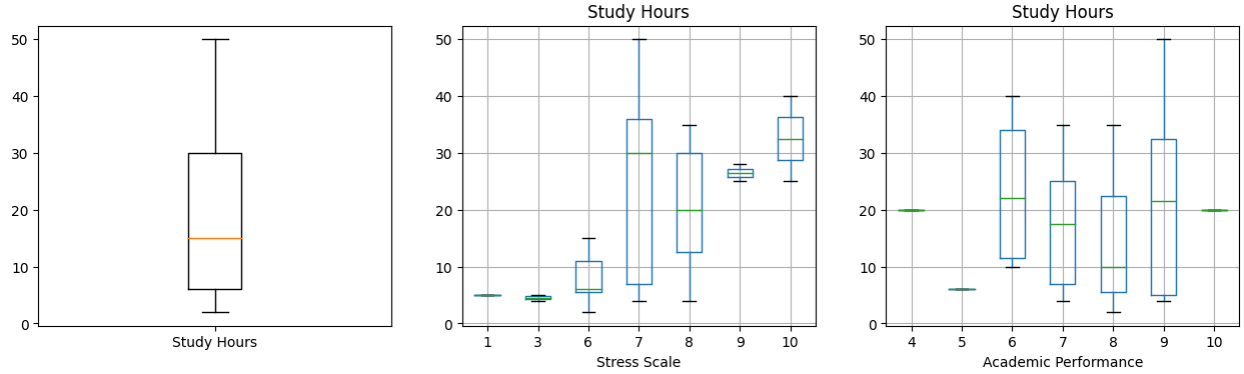

Figure 1: *Boxplot study hours: Individually, compared against stress, and compared against academic performance*

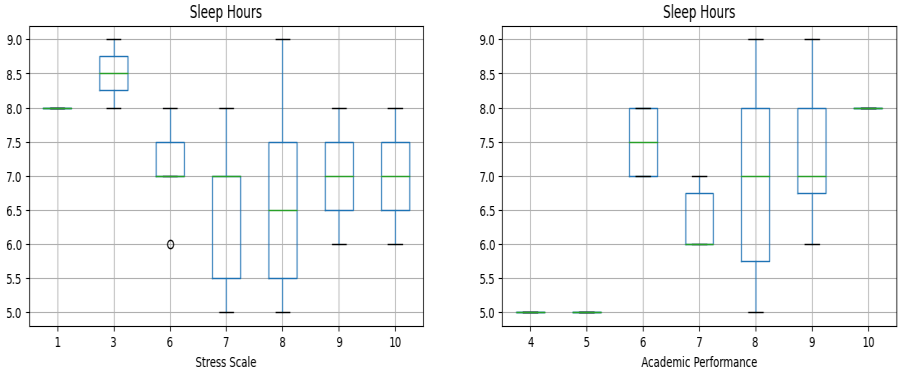

Figure 2: *A comparison of of boxplots for sleep hours compared against reported stress level and academic performance*

Furthermore, we also saw a difference between the average stress level reported by students of different schools. Unfortunately, due to the lack of enough data, we cannot assert the significance of this difference, however, more data can provide a better understanding.

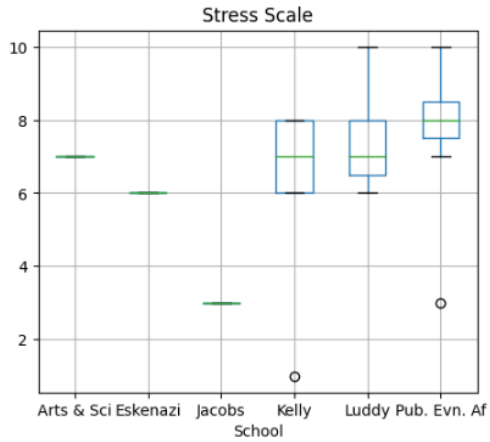

Figure 3: *Boxplot of average reported stress levels by school*

While the effects of a regular workout routine are not as clear as other factors, in general we do see that people reporting higher levels of stress are more likely to be less frequently working out, while people reporting lower levels of stress workout more frequently. Unfortunately, this pattern also falls prey to the lack of data, and only further data can shed light on this phenomenon.

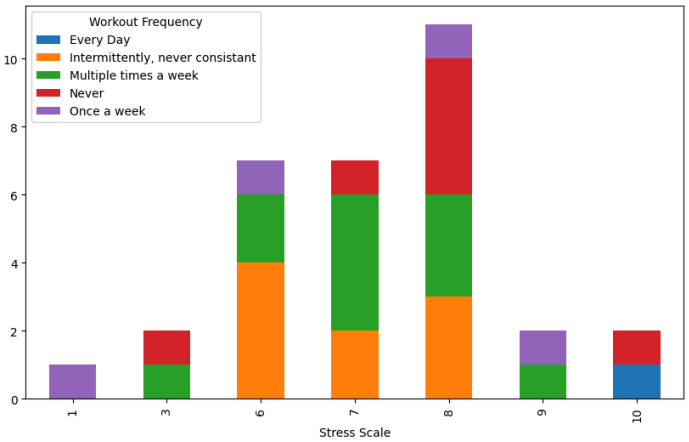

Figure 4: *Stacked bar chart for workout frequency against reported stress levels.*

Interestingly, our data also suggests that people who report lower levels of stress also seem to spend much less time on hobbies along with studies. In figure 5, we can see that data points in the lower left corner correspond to people with lower levels of stress, suggesting a positive correlation between stress levels and time spent on hobbies. This finding goes against the traditional wisdom, and more data can clarify the significance of our findings.

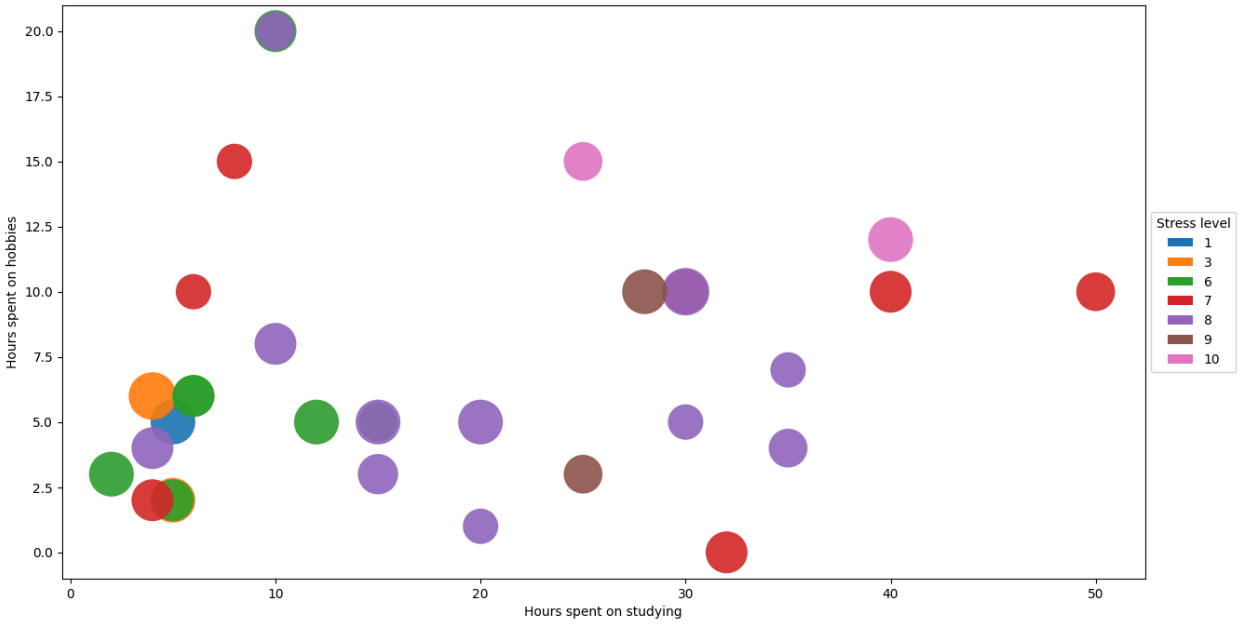

Figure 5: *Scatter plot of time spent on studying vs time spent on hobbies, with dot color representing stress.*

Lastly, as expected, there is a clear distinction between students based on their employment status in a scatter plot of time spent studying against time spent on hobbies (Figure 6). We see that students with no job spend more time on studying instead of hobbies. This pattern points to a lack of opportunities and motivation to spend time on hobbies, which will be further discussed in the policy recommendations section.

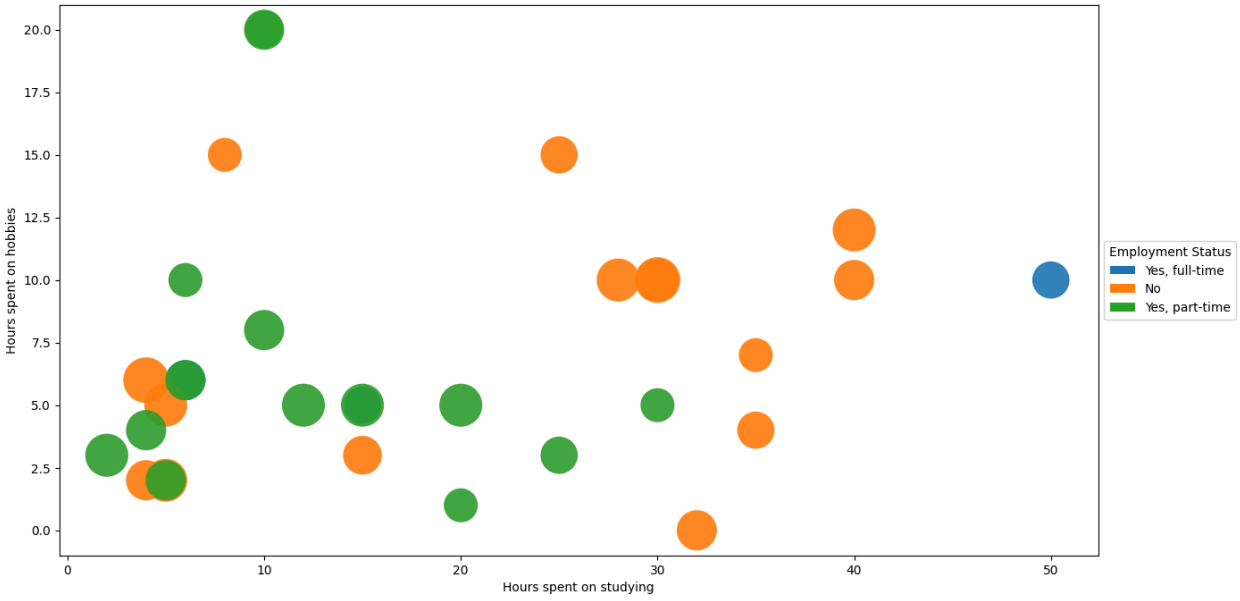

Figure 6: *Scatter plot of time spent on studying vs time spent on hobbies, with dot color representing student employment status.*

Multiple Linear Regression Model

Finally, we aim to make a predictive model for the stress level of a student at IU using student profiles such as school, current year, employment status, socialization, study time, and academic performance. Since most of our variables are categorical variables (except study hours, hobby hours, sleep hours, grocery spent, and academic performance), we have to one-hot encode these variables before using them in our linear regression model. This increases the number of features in the dataset, which further necessitates use of a simple model such as regression.

The linear regression model that we created has a mean-squared-error of 0.545 and the following table summarizes the results of the linear regression model model.

Variable	Coefficient	Variable	Coefficient
School - Eskenazi	-0.33643	Transportation - Bus	1.462065
School - Jacobs	-0.44086	Transportation - Car	0.336432
School - Kelly	3.227943	Transportation- Walking	-0.071228
School - Luddy	3.474357	Job - Full time	1.171289
School - SPEA	3.90969	Job - Part time	1.562268
Year - 1st year undergrad	0.234132	Socialize - Every month	1.353718
Year - 2nd year masters	-4.87163	Socialize - Every week	0.093224
Year - 2nd year undergrad	-2.63615	Socialize - Been a while	-0.33643
Year - 3rd year undergrad	-0.59342	Study Hours	0.005604
Year - Ph.D	-1.47253	Hobbie Hours	0.045344
Distance from campus - Less than 1 mile away	2.649599	Grocery Spends	0.014475
Distance from campus - More than 5 miles away	3.373079	Sleep Hours	-0.00045
Distance from campus - On campus	1.650537	Academic Performance	-0.57128

Some key takeaways from this table is the negative coefficient for between perceived academic performance, which intuitively makes sense as a person more satisfied with academic performance should be less stressed. Furthermore, we also see a negative coefficient for sleep hours, which has been discussed earlier as well. Lastly, we see different coefficients for various schools, suggesting that these schools differ in their stress level inherently.

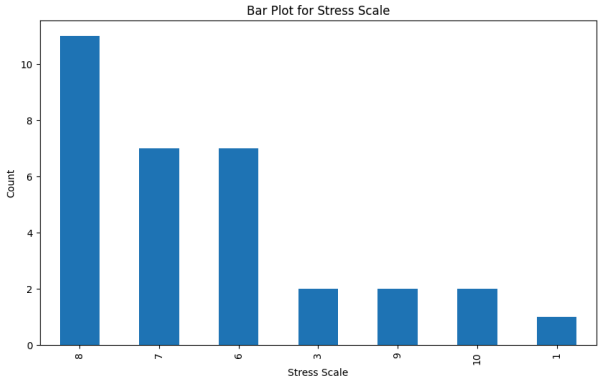

Figure 7: *Barplot for reported stress levels*

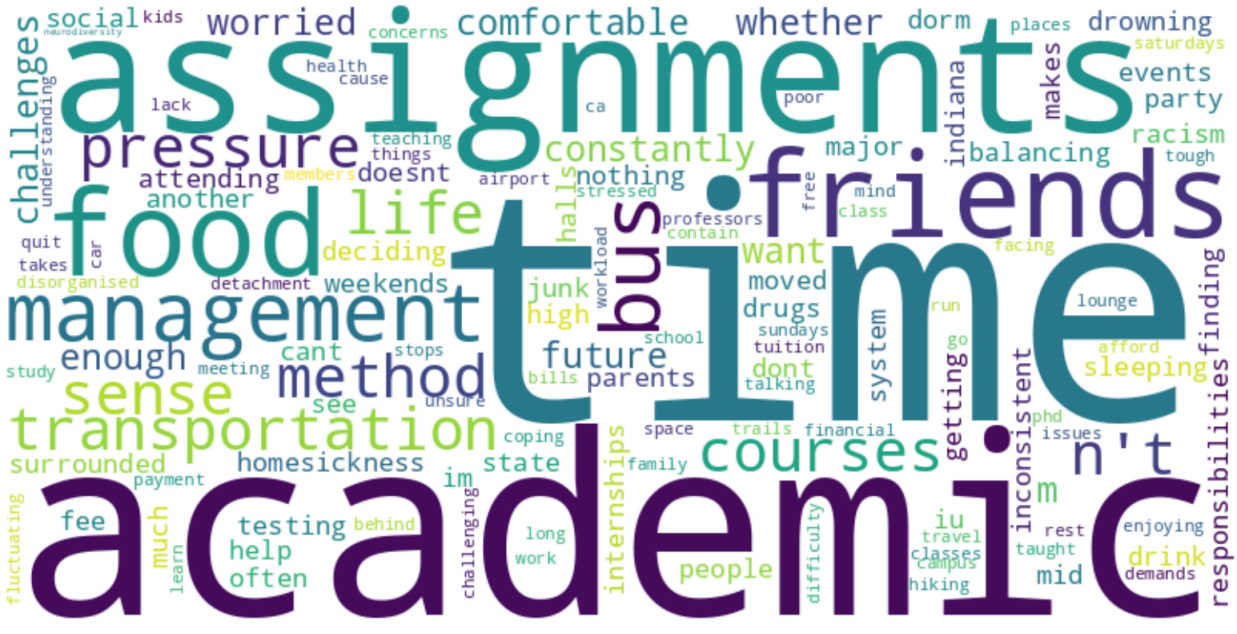

Figure 8: *Word Cloud of problems stated by IU students.*

Figure 9: *Word Cloud of how IU students cope with problems.*

Recommendations

Looking at the most commonly reported stress levels, we see that students predominantly reported stress levels between 6-7, which indicates a dire need of counseling and help at Indiana University. The specific reasons contributing to high levels of stress can be seen in wordcloud (Figure 8) which was generated by asking students to describe problems faced at IU. While students shared a wide range of issues in general we see few issues at the top such as time management and academics/assignments. We also saw earlier that even though we see a sharp rise in study hours for people reporting higher levels of stress, we do not see any significant rise in perceived academic performance. In a similar manner, we see a sharp decrease in sleeping time for people reporting higher levels of stress, which does not correspond to any significant increase in academic performance. Therefore our first policy suggestion would be to train students in effective learning techniques and time management during the starting of a semester, when the average stress levels are expected to be low.

Secondly, when students were asked how they cope with stress, they had a multitude of responses but we again see very frequent responses like friends, reading, music, and talking. Furthermore, as we saw earlier, students who are either unemployed or choose not to work reported spending more time on studies as compared to employed students but they did not show any significant appreciation in time spent on hobbies. This pattern points to a lack of opportunities and motivation to spend time on hobbies, and obstructs students to engage in activities that can help them cope with stress. Therefore, our second policy recommendation to IU would be to encourage such activities among the student body that have been reported to help

students cope with stress by empowering student clubs. Furthermore, several students also indicated the usage of drugs to cope with stress, this is a point of alarm for IU, and therefore our third recommendation would be to active student counseling on drug usage.

Limitations

Unfortunately this research has many limitations, the most limiting being the lack of participation in answering the form. The final count of respondents was 34. This is nowhere near an acceptable number for the types of analysis we wish to run. With a student population of around 47,527 on Bloomington campus (Wright), a more ideal sample size would be 500 to 1000 students. This means that this analysis is almost worthless because of how small it is. Sadly, students seemed to not be super enthusiastic about taking the form and thus, had very limited data. In the future studies we may need to offer some sort of incentive, like a chance to win a gift card. This makes it cheap and easy to implement, but it creates its own issues about who would be willing to fill out a form for a chance to get 50$. Something that IU might do in the future like it does with its course evaluations, is have it built into canvas and encouraged for students to fill out the form.

Another issue was that the data may be skewed based on who we asked and when we asked them. Stress levels change over time, a normal week with no tests and little homework might be low stress, but later in the semester where finals and midterms, final projects, and cumulative grades start affecting students.Since we only asked right before thanksgiving break and that's when most people respond, it might skew are result to make it seem that people are more stressed than they normally are. Furthermore, a large chunk of students were from Luddy, 17 out of 34. That's 50% of our responses. This means that instead of this being a comprehensive analysis of all students at IU, it's more of a study on Luddy students.

Author Contributions

The initial idea for studying stress for IU was from Ravi Sharma. All authors were responsible for setting up the google form, data collection, and preprocessing. Furthermore all authors worked on the presentation and all authors spoke for the presentation.

Ravi Sharma focused on data preprocessing, feature engineering, and wrote on google form part of the method section. He also proofread and assisted in formatting the paper.

Tauqeer Saleem focused on EDA and linear regression, he wrote the results, recommendation and the NLP part of the method sections.

Jason Edwards focused on researching and writing previous works, abstract, limitations and conclusions. He also proofread and assisted in formatting the paper.

Conclusions

In summary, we used Google Forms, NLP, and a Multiple Linear Regression Model (MLRM) to gather, process, and analyze student responses about how they deal with stress at IU. With the student answers we were able to conclude that less sleep leads to higher stress levels and that studying more does increase stress with, but does not increase academic performance. This makes sense in the idea that staring at a formula for hours and not being able to understand it, is not the same as having a professor explain it in 5 minutes. If a Student does not understand a subject and tries to aimlessly study without comprehending the subject, they are wasting time and increasing their stress without seeing a benefit to their grades. We also see that the largest coefficient of stress is if you are at Luddy or SPEA. Most students state that the problems they face are academic/time based and while most try to find healthy ways to deal with stress by hanging out with friends and listening to music, some students take a less healthy approach with smoking and alcohol. The recommendations to the IU staff to help students are first, have time management training/resources for new students. Secondly, for IU to be more forward with clubs, especially if the clubs are closely tied to academic pathways so students can more easily build a knowledgeable network of people that know exactly what each other student is going through so they can more easily help one another. Finally, there is a concerning use of drugs in the study as a way to relieve stress. If the first two recommendations are followed this may be significantly reduced. If not, then more drug counseling may be needed.

This report however should be taken with a grain of salt. With the limited data available, our result might not be entirely accurate. With data being such a small sample size and skewed by an overabundance of Luddy students and the late semester stress, if IU wishes to go forward with this idea a more comprehensive study will be needed.

References

[1] Joo, S. H., Durband, D. B., & Grable, J. (2008). The academic impact of financial stress on college students. *Journal of College Student Retention: Research, Theory & Practice*, *10*(3), 287-305. https://fpperformancelab.org/wp-content/uploads/The-Academic-Impact-of-Financial-Stress-on-College-Students.pdf

[2] Macan, T. H., Shahani, C., Dipboye, R. L., & Phillips, A. P. (1990). College students' time management: Correlations with academic performance and stress. *Journal of educational psychology*, *82*(4), 760. https://www.researchgate.net/profile/Robert-Dipboye/publication/209836182_College_Students%27_Time_Management_Correlations_With_Academic_Performance_and_Stress/links/09e4150fac5cf4799e000000/College-Students-Time-Management-Correlations-With-Academic-Performance-and-Stress.pdf

[3] Saleh, D., Camart, N., & Romo, L. (2017). Predictors of stress in college students. *Frontiers in psychology*, *8*, 19. https://www.frontiersin.org/articles/10.3389/fpsyg.2017.00019/full

[4] Struthers, C. W., Perry, R. P., & Menec, V. H. (2000). An examination of the relationship among academic stress, coping, motivation, and performance in college. *Research in higher education*, *41*, 581-592. http://www.realizingaptitudes.org/wp-content/uploads/2016/07/An-examination-of-the-relationship-among-academic-stress-coping-amotivation-and-performance-in-college.pdf

[5] Wright, Aubrey. "IU Enrollment Slightly up from Last Year, Growth in Bloomington | News - Indiana Public Media." News - Indiana Public Media, Indiana Public Media, 2023, https://indianapublicmedia.org/news/iu-enrollment-slightly-up-from-last-year-growth-in-bloomington.php#:~:text=Posted%20August%2031%2C%202023&text=than%20last%20year.-,In%20Bloomington%2C%20the%20campus%20saw%20record%20enrollment%20for%20the%20third,with%2047%2C527%20students%20this%20fall.&text=The%20release%20states%20IU's%20incoming,increase%20over%20the%20last%20decade

[6] Zaleski, E. H., Levey-Thors, C., & Schiaffino, K. M. (1998). Coping mechanisms, stress, social support, and health problems in college students. *Applied Developmental Science*, *2*(3), 127-137. https://www.researchgate.net/profile/Kathleen-Schiaffino/publication/232830339_Coping_Mechanisms_Stress_Social_Support_and_Health_Problems_in_College_Students/links/56e2f04808aee84447bf3a61/Coping-Mechanisms-Stress-Social-Support-and-Health-Problems-in-College-Students.pdf

[7] Edwards, Jason. Saleem, Tauqeer. Sharma, Ravi. (2023). B565 Student Data Set. *Google Forms*. https://docs.google.com/forms/d/1lDGIKiLIsQnuAPUZtKd93m_p-uf-GXKTQV6s0QErVyk/edit?ts=655688c5