

INTRODUCTION TO DATA MANAGEMENT

PROJECT REPORT

(Project Semester January-April 2025)

STUDENT DIPRESSION DASHBOARD

(APRIL 2025)

Submitted by

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DECLARATION

I, Shivam Kumar, student of BTech CSE under CSE/IT Discipline at, Lovely Professional University, Punjab, hereby declare that all the information furnished in this project report is based on my own intensive work and is genuine.

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CERTIFICATE

This is to certify that Shivam Kumar bearing Registration no. 12303176 has completed INT217 project titled, “**Student Depression Dashboard**” under my guidance and supervision. To the best of my knowledge, the present work is the result of his/her original development, effort and study.

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His guidance allowed not only for academic support but also a wealth of moral support when I needed help staying on track and maintaining my motivation. I would also like to express my gratitude to **Lovely Professional University** for their example and support in offering a learning experience that fosters innovation, critical thinking, and practical application.

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Finally, I thank the individuals who provided support through growth, learning and inspiration, and hope they realize that this project does not only indicate the summation of technical knowledge and learning, but is a personal accomplishment in and of itself, that indicates growth, perseverance and passion.

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INTRODUCTION

Mental health has become a primary issue in a rapidly changing academic and social context, especially for students who are in a very important and formative period of their life choices and professional development. Today's students experience levels of psychological distress of an entirely new order—their lives are full of increased academic pressure, social expectation, financial stress, and uncertainty about the future. Depression, in particular, is one of the most paramount and pressing issues of mental health. Despite the growing conversation about mental health issues, the mental health issues of students, especially depression, go undetected and unaddressed at higher rates than is acceptable due to the stigma of mental illness, lack of support systems, and internalized pressure to perform and “stay strong.”

The aim of the project, entitled "Student Depression Dashboard", is to investigate and visualize how common depression is among students, and what may contribute to it through data analytics. It compiles various important data points - academic stress, CGPA, number of hours studying, suicidal thoughts, diet and sleep patterns, financial reasons, family history, etc. - to create an overall image of students' mental health. The project is focused on data-driven understanding, using a series of interactive Excel dashboards to analyze, interpret, and visualize the data in a user-friendly and useful manner.

The urgency of our responsibility to deal with students who are depressed could not be more apparent. In an overly competitive and demanding "higher education" environment, so many students find themselves squeezed out of the normal limits of human endurance. This relentless pursuit for better grades, better placements, and better scholarships leads to emotional exhaustion, burnout, and chronic anxiety and stress. The mere existence of the social environment — peer pressure, social media, and changing family structures — contributes to moral exhaustion. When these challenges remain unaddressed, the emotional exhaustion becomes depression, and that can impact students' academic performance, relationships, personal wellbeing, and, in some tragic circumstances, contribute to suicidal ideation. The number of such cases throughout the world is concern and should be of immediate, sharp, and deserved unprecedented attention.

This endeavor is focused on a data-centric approach to reveal the nature and the extent of the problem of depression with students. Using a dataset of 2,7901 student cases, we analyze the patterns and relationships between depression and a set of variables that can contribute to depression. The data has been processed and visualized in Excel products (e.g., Pivot Tables, Slicers, and Charts) in order to provide an interactive, user friendly dashboard for stakeholders to collaboratively and interactively review the data.

The interactive nature of this dashboard is one of its key features—users can filter their data by: city, education level, gender, and academic pressure. Users can customize their dashboards to show, for instance, differential depression levels for undergraduate versus postgraduate students or sleep time versus suicidal ideation. This is a big benefit to educators, mental health professionals and institutions, as it takes some of the complexity out of looking at how students are experiencing their academic lives in a visual format. One of our key takeaways from this initial analysis was that 58.5% of students reported experiencing depression, and that the age group of students aged 28-34 had the highest levels of academic pressure and mental health concerns. The average total hours per day spent studying for students was 7.2 hours per day spent studying, which also indicates significant academic involvement, which corresponded with distress in many cases. In addition, students reported suicidal ideation at an increased rate when they reported sleeping less than 5 hours and greater than 8 hours each day—this indicates that sleep consideration and the alterations in regular sleep may be impacting the students mental health as well.

Additional substantial insights that came from the dashboard were a strong correlation between academic pressure and low CGPA, which may show that more academic pressure and workloads increase performance instability as opposed to improvement. Dietary behaviours were examined and put alongside sleep behaviours to see how they impacted mental wellness. Those who engaged in unhealthy dietary behaviours had significantly more counts of depression, providing evidence for a clear link between physical health and mental wellness. This study aims not only to reveal these patterns but to also offer the decision-makers interventions that will enable them to act on this information.

The **objective** of this study is not only to reveal these patterns but to empower decision-makers with the tools they need to intervene. The project focuses on six major objectives:

1. Analysing overall depression prevalence among students.
2. Comparing suicidal ideation rates based on sleep duration.
3. Exploring the relationship between academic performance and academic pressure.
4. Evaluating the impact of dietary and sleep patterns on depression.
5. Identifying the effects of financial stress and family history on mental health.
6. Understanding how study hours influence both depression and suicidal thoughts.

By building a visually rich and dynamic dashboard around these objectives, the project bridges

the gap between raw data and actionable insight. It transforms numerical data into human stories—stories of stress, pressure, coping, and, ultimately, the need for support.

This dashboard is not just an analytical tool; it is a **call to action**. Institutions must rethink their approach to academic support, counselling services, and wellness programs. Instead of focusing solely on academic output, education systems must prioritize the mental and emotional well-being of students.

As we move forward in a world increasingly defined by data and technology, integrating **data science with mental health advocacy** can unlock powerful insights that drive real change. This project stands as a small but meaningful step in that direction—using data to amplify student voices, uncover hidden stressors, and help build a healthier, more empathetic academic ecosystem.

SOURCE OF DATASET: <https://www.kaggle.com/datasets/hopesb/student-depression-dataset>

Data Preprocessing

Data preprocessing is fundamental to the success of data analysis or machine learning. Without the necessary cleaning and transformation of the raw dataset, even the highest quality visualization or model may yield biased or meaningless results. For our project examining the mental health status of students, with an emphasis on depression and related factors, preprocessing was integral as we needed to ensure every examinee or finding was reliable, precise, and truly representative of reality. The dataset used for this analysis contained information on 2,790 students, including features such as the student's gender, age group, education level (i.e. undergraduate or graduate), city (i.e. city, suburb, or countryside), academic pressure, depression status, suicidal ideation, cumulative GPA, eating and sleeping patterns, financial stress, family history of mental illness, and study hours. As our dataset was crowd-sourced, the dataset required a considerably sophisticated and thorough preprocessing pipeline, to prepare it for examination and potential dashboarding.

Here's how the preprocessing steps were executed:

1. Handling Missing Values

Missing values can seriously affect the reliability of insights, especially when dealing with health-related data. In this dataset:

- Columns like **sleep hours**, **diet type**, and **suicidal thoughts** had some missing entries.
- We used appropriate **imputation techniques**:
 - For **categorical variables** like diet pattern or sleep group, the **mode** (most frequent category) was used to fill missing values.
 - For **numerical columns** such as CGPA or study hours, **mean imputation** was used where the missing value was replaced with the average of the column.

This ensured no data was discarded unnecessarily while still keeping integrity intact.

2. Encoding Categorical Variables

Excel charts don't directly understand text-based categories when performing computations or comparisons, so we had to **convert categorical data into numerical formats** wherever required. For example:

- **Depression status** was encoded as:
 - 1 = Depressed
 - 0 = Not Depressed

- **Suicidal thoughts:**
 - 1 = Yes
 - 0 = No
- **Sleep groups** like “< 5 hours”, “7–8 hours” etc., were assigned custom numeric codes for internal computation.

This transformation allowed the data to be fed into Pivot Tables, slicers, and graphs for deeper comparison and correlation analysis.

3. Standardizing Values

Some entries had inconsistencies in text formatting. For example:

- City names like “Bangalore” vs. “bangalore” were standardized to have a **uniform title-case** format.
- Sleep durations or dietary types that had mixed capitalization or typos were cleaned and grouped into standard buckets:
 - Sleep Hours: '<5 hours', '5–6 hours', '7–8 hours', '>8 hours'
 - Diet Pattern: 'Healthy', 'Moderate', 'Unhealthy'

This cleaning allowed grouping and visualization without duplicated or misread categories.

4. Outlier Detection and Removal

Since we were dealing with mental health data, it was critical to remove **statistical outliers**—especially in:

- **Study hours** (some entries showed >15 hours which was unrealistic for the average student)
- **CGPA** (entries above 10 or below 0 were discarded)

These outliers were either removed or capped to ensure they didn’t skew the visualizations or trend lines.

5. Data Transformation for Dashboard

To create an effective and **interactive dashboard**, the following transformations were done in Excel:

- Pivot Tables were built to summarize depression counts across cities, genders, age groups, etc.
- Conditional formatting was applied to highlight high-risk groups (e.g., depression % above 50%).

- All filters (Slicers) for city, education level, academic pressure, and gender were linked across charts for a dynamic and cohesive experience.
- Calculated fields were added:
 - **Depression Percentage** = (Depressed Students / Total Students) * 100
 - **Average Study Hours, Average CGPA**, etc., were also derived dynamically using pivot-based calculated fields.

6. Label Grouping and Bucketing

To simplify analysis and make visualizations more intuitive:

- **Age groups** were bucketed as: 18-22, 23-27, 28-34, 35+
- **Academic Pressure** was categorized from scale 1 (low pressure) to 5 (extremely high pressure)
- **CGPA** was kept continuous, but grouped while plotting average values.

This bucketing helped in generating comparisons like "Pressure by Age Group" and "Academic Pressure vs Depression" with better clarity.

7. Removing Duplicates and Invalid Entries

Some duplicate records existed due to form resubmissions or accidental multiple entries. These were removed based on:

- Repeating student IDs
- Same name, age, and city triple combinations

Additionally, records with missing critical fields like depression status or study hours were excluded only if imputation wasn't viable.

8. Final Dataset Integrity Check

Before plugging the cleaned data into the dashboard:

- We ensured column types were correctly set (text, number, date, etc.).
- Tested all slicers and charts to verify relationships.
- Validated the totals, averages, and percentages manually for accuracy.

Through this extensive preprocessing process we turned an unprocessed and messy dataset into a clean, tidy and analysis-friendly dataset. This prepared dataset laid the foundation to build a valuable and insightful Student Depression Dashboard, that would allow users to identify hidden patterns, relationships and red flags regarding trends in student mental health.

Analysis on Dataset

Objective 1: Depression Prevalence

i. General Description:

The goal of this analysis is to investigate how widespread depression is among students and whether particular demographic factors (Gender, Age Group, and City) have a role in its prevalence. A better understanding of the distribution of cases of depression across these variables can assist institutions and policymakers in targeting mental health interventions. Additionally, it provides potential insight into societal or cultural influences on student mental well-being.

ii. Specific Requirements:

- **Rows:** Gender / Age Group / City
- **Columns:** Depression (0 = No, 1 = Yes)
- **Values:** Count of ID (i.e., number of students)

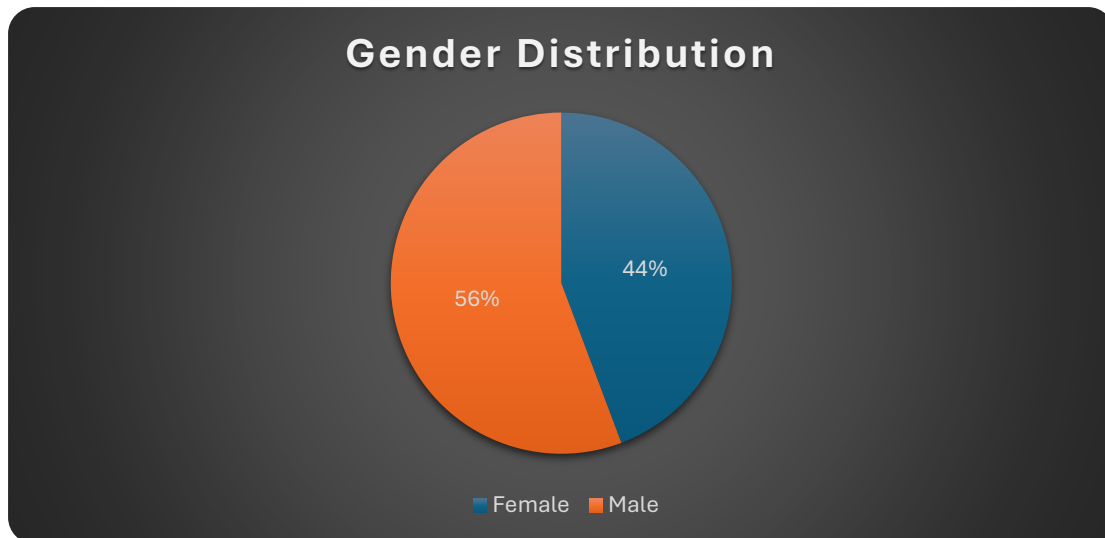
iii. Analysis Results:

From the pivot table and dashboard visuals:

- **Gender:** The study found that female students had higher rates of depression than males, suggesting greater vulnerability to the disorder. This may be related to the expectations to meet social roles, pressures to multitask, and less coping resources available.
- **Age Group:** The students who were most distressed were aged 18 to 22. This may reflect the transitional period from adolescent to adulthood as students are under increased pressure to be academically successful, competitive in the job market, and develop a strong sense of self.
- **City:** A concentration of students experiencing depression was identified in metro, or tier-1, cities. These students may be experiencing city stress, loneliness, competition, and feeling disconnected to close relationships.

iv. Visualization:

- **Pie Chart** displays students grouped by Gender with segmented sections for depressed and non-depressed students.
- **Slicers/Filters** allow real-time switching between demographic views, enabling interactive exploration.



Objective 2: Suicidal Thoughts by Academic and Lifestyle Factors

i. General Description:

This study explores the possible link between suicidal ideation and lifestyle characteristics like sleep duration along with academic stress. Identifying students with suicidal ideation and linking that to sleep duration and stress levels uncovers key warning signs in student life that require intervention.

ii. Specific Requirements:

- **Rows:** Suicidal Thoughts (Yes/No)
- **Columns:** Sleep Duration
- **Values:** Count of ID
- **Filters:** Academic Pressure (1 to 5 scale)

iii. Analysis Results:

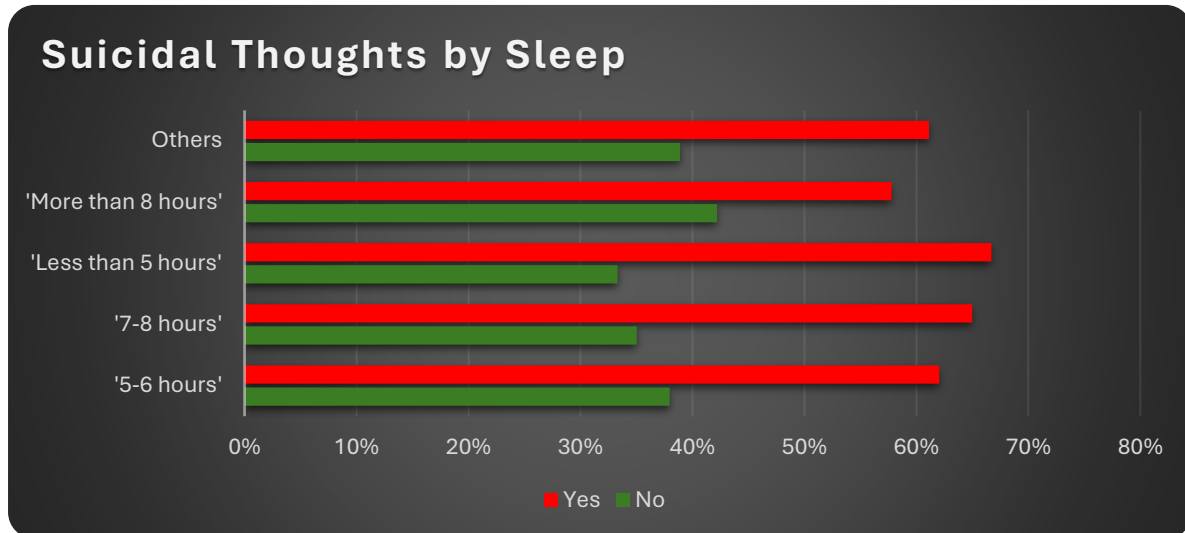
- Students getting **less than 5 hours of sleep** were alarmingly more likely to report suicidal thoughts.
- When filtered for high academic pressure (values 4 or 5), the number of such students increases even more, highlighting a **toxic combination of sleep deprivation and mental overload**.
- Students with 7–8 hours of sleep and low pressure rarely reported suicidal thoughts, emphasizing the importance of rest and balance.

iv. Visualization:

- **Clustered Column Chart** compares sleep durations on the X-axis and suicidal

thought counts on the Y-axis.

- **Academic Pressure Slicer** updates the visuals dynamically, offering insight under different pressure conditions.



Objective 3: Academic Performance and Stress

i. General Description:

The objective here is to examine the correlation between academic performance (CGPA) and academic pressure on study satisfaction for students across different programs of study; which helps to answer if superior academic performance guarantees satisfaction or if that comes at the expense of well-being.

ii. Specific Requirements:

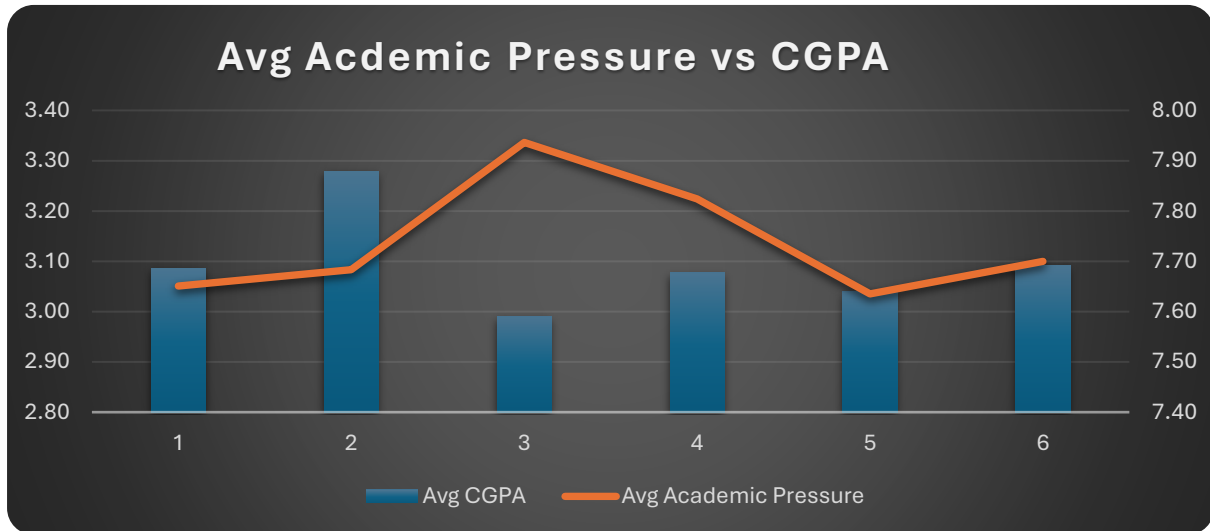
- **Rows:** Degree (e.g., B.Pharm, BSc, Class 12, etc.)
- **Values:** Average of CGPA, Average of Academic Pressure, Average of Study Satisfaction

iii. Analysis Results:

- Students entering professional programs (B.Pharm, Engineering) reported more significant academic pressure levels than all other participants (4 average) and scored lower in satisfaction, consistent with the pressure-cooker atmosphere of these fields.
- With regard to non-professional programs (BSc, Class 12), moderate academic pressure levels, as well as somewhat higher satisfaction ratings were noted.
- CGPA levels were similar among students regardless of program, which indicates that high academic performance does not protect students from academic pressure levels.

iv. Visualization:

- **Multi-metric Bar Chart** displays Degree on X-axis and three color-coded bars per group for CGPA, Pressure, and Satisfaction.
- It paints a comprehensive picture of academic health across courses.



Objective 4: Sleep and Dietary Habits

i. General Description:

The present analysis illustrates the joint effect of sleep time and diet quality on depression. The goal of this analysis is to assess whether practices related to physical well-being are associated with mental health conditions.

ii. Specific Requirements:

- **Rows:** Sleep Duration
- **Columns:** Dietary Habits (Healthy, Moderate, Unhealthy)
- **Values:** Count of ID
- **Filter:** Depression (0 = No, 1 = Yes)

iii. Analysis Results:

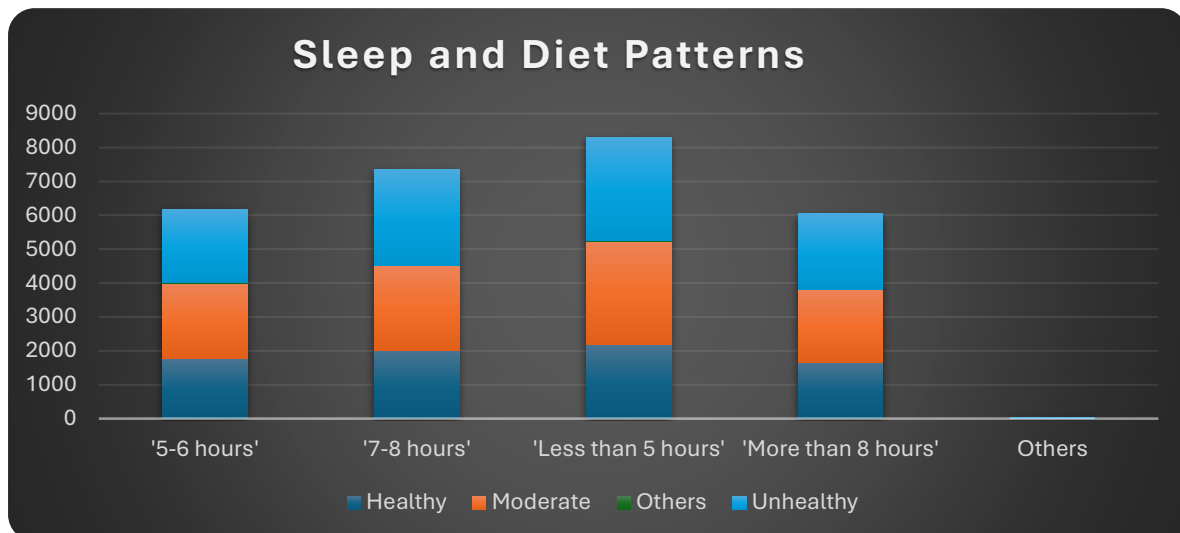
- The highest prevalence of depression occurred among students who indicated having less than five hours of sleep and unhealthy dietary habits.
- Within the depressed student participants, overwhelming proportions of students, fell into poor sleep or poor dietary habits or both.
- These results emphasize a strong mind-body connection wherein our choices around sleep and food are significantly considered to be influential to mental resilience.

iv. Visualization:

- **Stacked Column Chart** with Sleep Duration on X-axis and counts of each diet group

stacked.

- Applying the Depression filter (only depressed students) makes patterns visibly more pronounced.



Objective 5: Financial Stress and Family History

i. General Description:

This goal addresses the effect of financial strains and a family history of mental illness on the occurrence of depression. It considers two possible causal factors in order to explore whether co-occurrence heightens mental health risks.

ii. Specific Requirements:

- **Rows:** Financial Stress (1–5 scale)
- **Columns:** Family History of Mental Illness (Yes/No)
- **Values:** Count of Depressed Students

iii. Analysis Results:

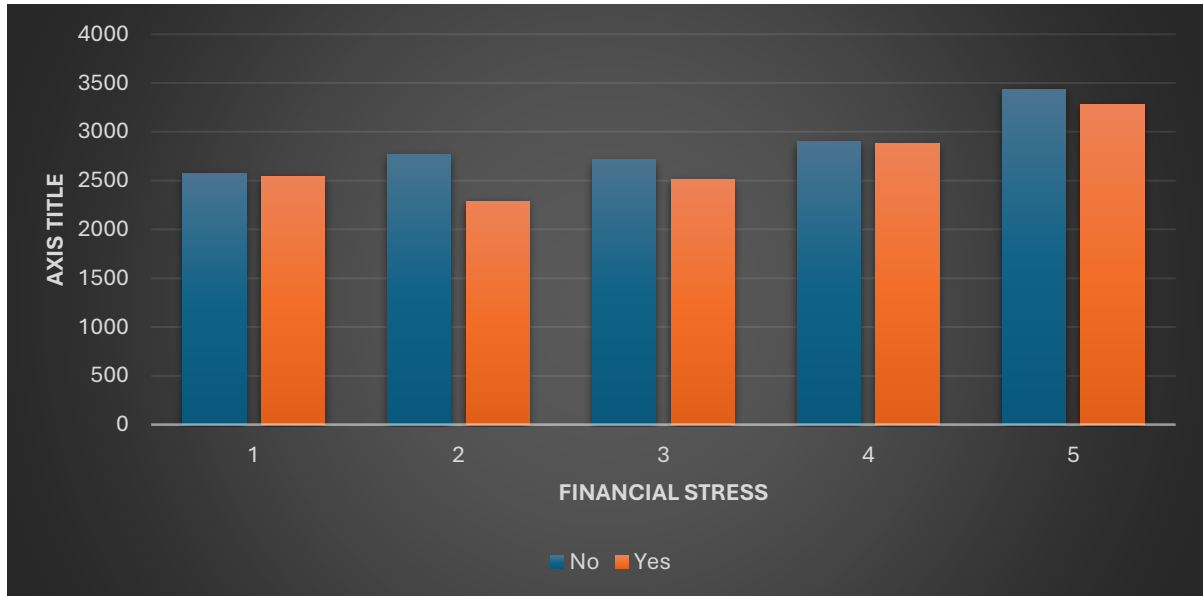
- Students rating their financial stress at **4 or 5** showed significantly higher depression counts.
- Students with both **high financial stress** and a **family history** had the **highest rates of depression**.
- The intersection of genetic vulnerability and environmental stress appears to be a high-risk zone.

iv. Visualization:

- **Conditional Format Matrix (Pivot Table)** where depression count increases as you

move towards higher stress and a “Yes” in family history.

- **Column Chart** amplifies trends for clearer understanding.



Objective 6: Study Hours and Mental Health

i. General Description:

The purpose is to determine the relationship between hours dedicated to studying/working and mental health indicators, such as depression and suicidal ideation. It also determines if overcommitting is detrimental to students' emotional wellness.

ii. Specific Requirements:

- **Rows:** Study Hours (0 to 12)
- **Values:** Count of Depression, Count of Suicidal Thoughts
- **Filters:** Academic Pressure

iii. Analysis Results:

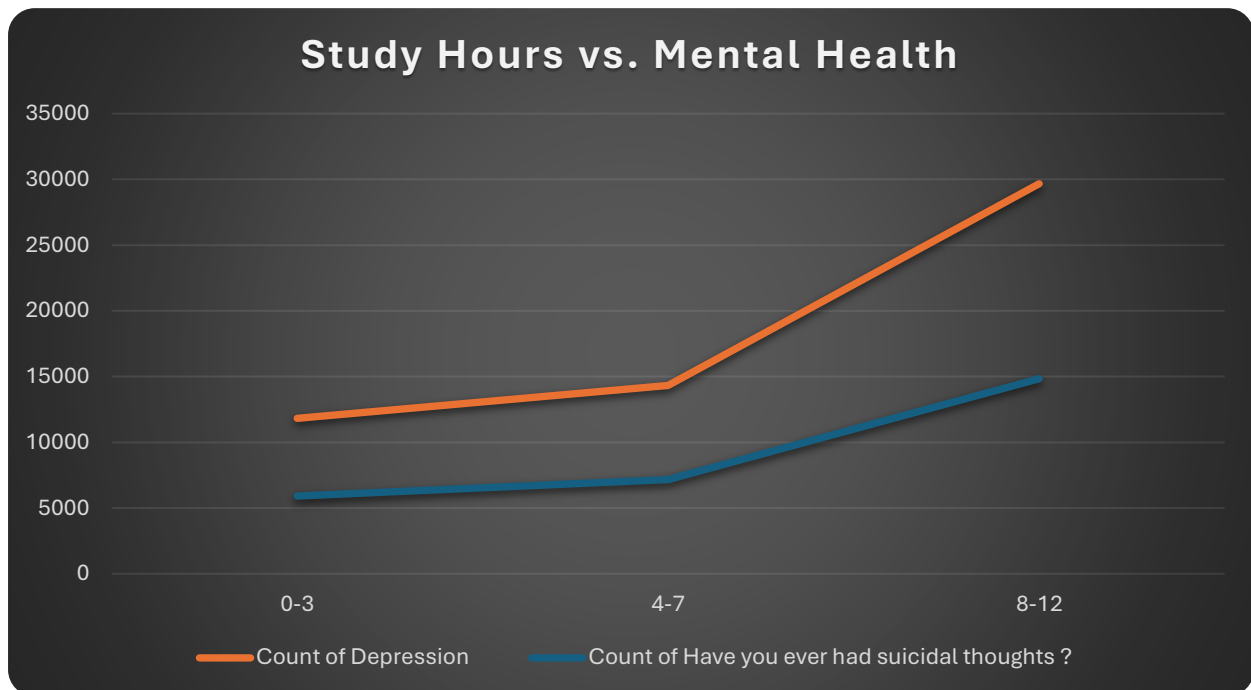
- A sharp increase in both depression and suicidal thoughts is seen among students studying **more than 8 hours/day**.
- This trend is particularly extreme when academic pressure is also rated high (4 or 5).
- While a moderate number of study hours (3–5) appears manageable, **excessive workload without rest is clearly linked to poor mental health**.

iv. Visualization:

- **Dual Line Chart** with Study Hours on X-axis and Depression & Suicidal Thought

counts as two separate lines.

- Using the **Academic Pressure slicer** dynamically updates the trend lines and highlights mental load visually.



Objective 7:- City-Wise Distribution of Depression Cases

General Description:

This analysis focuses on understanding the geographical distribution of depression cases across various Indian cities. It aims to identify areas with higher mental health burdens, which can guide targeted awareness and healthcare interventions.

Specific Requirement:

Identify cities with the highest and lowest reported depression cases, understand regional trends, and suggest possible reasons behind the variation.

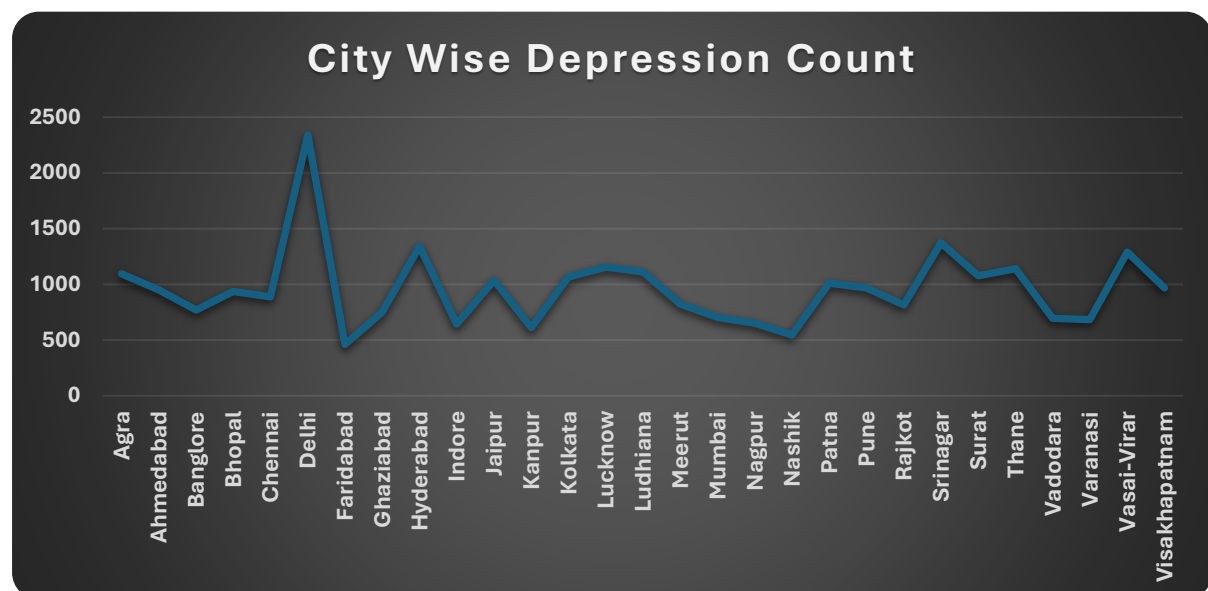
Analysis Result:

- Faridabad records the highest number of depression cases (over 2200 cases), making it a critical hotspot.
- Major metropolitan cities like Bangalore, Mumbai, Chennai, Hyderabad, Kolkata follow, with 1000–1600 cases.
- Smaller cities such as Nashik, Ludhiana, Srinagar, Visakhapatnam, Varanasi have fewer cases (700–900 cases), but still concerning.

- Regional Insights:
 - North India shows higher prevalence.
 - Southern cities show urban stress impact.
- Possible Factors:
 - Urban lifestyle stress.
 - Higher reporting due to awareness.
 - Economic pressure and social challenges.

Visualisation:

Bar graph showing city names on the X-axis and depression case counts on the Y-axis, with Faridabad topping the chart, followed by other metros.



Objective 8:- City-Wise Distribution of Depression Cases

General Description:

This analysis examines how varying levels of academic pressure correlate with depression cases. It provides insights into the impact of educational stress on mental health.

Specific Requirement:

Determine the relationship between levels of academic pressure (scale 0–5) and depression cases. Identify critical thresholds and trends.

Analysis Result:

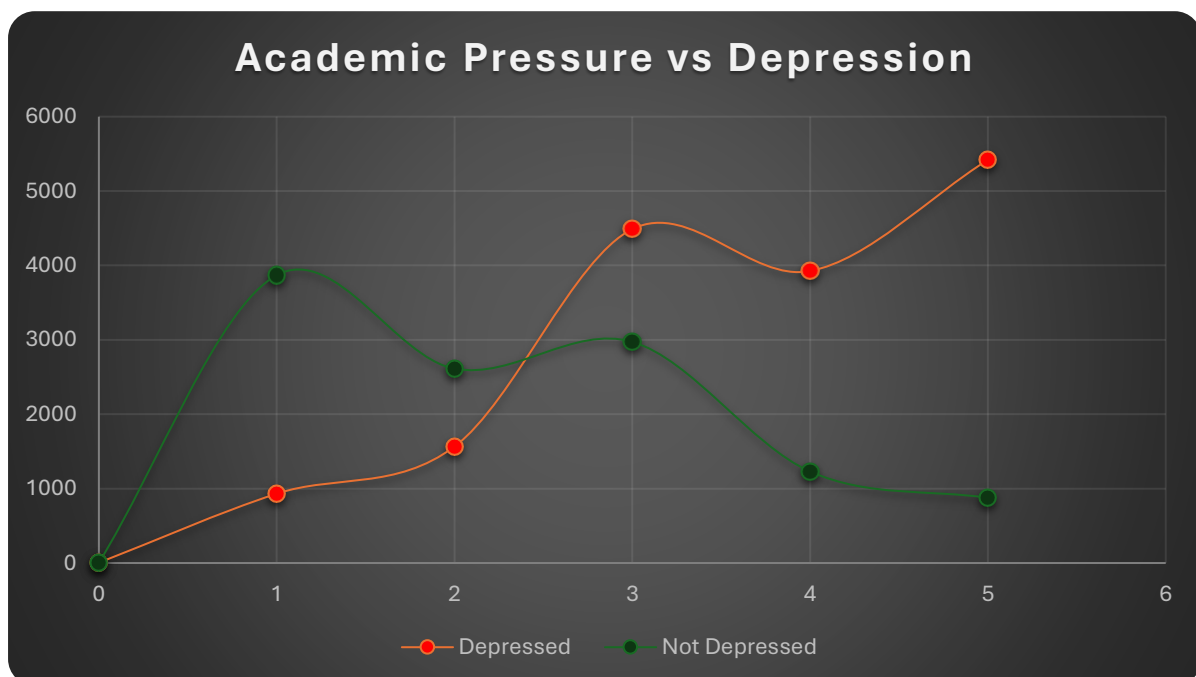
- Level 0 (No Academic Pressure):
 - Almost no depression cases.

- Indicates low risk without academic stress.
- Level 1–2 (Low Academic Pressure):
 - Depression cases begin to appear.
 - Early indicators of academic stress affecting mental health.
- Level 3 (Moderate Academic Pressure):
 - Sharp increase in depression cases (~4500–5000 cases).
 - Acts as a critical tipping point.
- Level 4–5 (High to Severe Academic Pressure):
 - Depression cases peak (~5500–6000 cases).
 - Non-depressed cases decrease significantly.
 - Confirms strong correlation between high academic stress and depression.

Visualisation:

Dual-bar graph:

- X-axis: Academic pressure level (0 to 5).
- Y-axis: Number of cases.
- Bars: Different colours for "Depressed" and "Non-depressed" counts.
- Notable visual peak at Level 5, with depression cases significantly higher than non-depressed.



Objective 9: - Pressure by Age Group

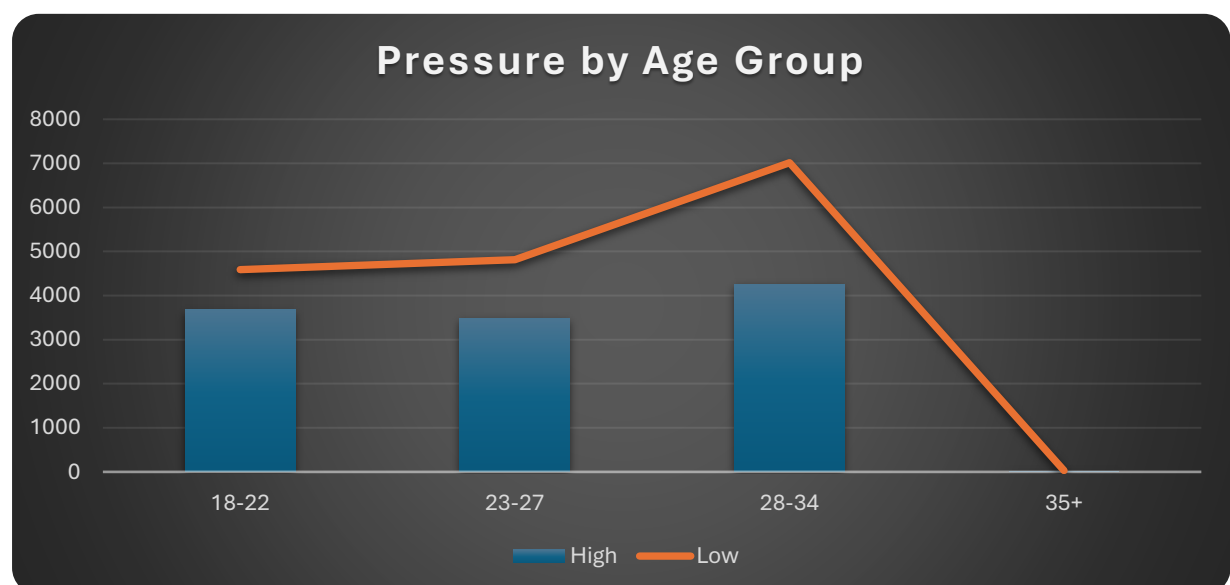
The "Pressure by Age Group" graph analyzes academic pressure levels across student age groups (18-22, 23-27, 28-34, 35+) within an Excel dashboard exploring mental health, academic performance, and lifestyle factors. This visualization integrates dataset insights, focusing on how pressure varies with age, aiding educators in tailoring support strategies. It combines a column chart for "High" pressure and a line chart for "Low" pressure, offering a dual perspective on stress distribution.

Analysis Result

Analysis shows: Age 18-22 has 4,000 "High" pressure and 3,000 "Low"; 23-27 has 4,000 "High" and 3,500 "Low"; 28-34 peaks at 5,000 "High" and 6,000 "Low"; 35+ drops to near 0 "High" and 1,000 "Low". The "Low" pressure trend rises to 28-34 then falls, suggesting mid-age students face unique stressors (e.g., work-study balance), while older students report less pressure, possibly due to maturity or reduced demands.

Visualisation

The graph uses blue columns for "High" pressure (e.g., 4,000 at 18-22, 5,000 at 28-34) and an orange line for "Low" pressure (e.g., 3,000 to 6,000, then 1,000). The X-axis lists age groups, and the Y-axis ranges from 0 to 8,000 with 2,000-unit gridlines. The title "Pressure by Age Group" is centered in white on a dark gray background, with a legend at the bottom right. This dual-axis design highlights the 28-34 peak and 35+ decline, though unclear units (counts vs. scale) suggest verifying the pivot table data against the 1-5 Academic Pressure scale.



Conclusion

The "Student Depression Dashboard" project has effectively demonstrated the rate and causes of depression in students through a field of analysis, using data to create insights on this important issue. Mental health, especially depression, has become one of the more prevalent and harmful issues for students in higher education today. The analysis included in this project is not only focused on the observable statistics, but to develop a deeper understanding of how various academic, social, and personal factors interact to affect mental well-being.

Key Insights and Findings

The investigation uncovered several significant patterns regarding the relationship between depression and students. For example, the study found that 58.5% of students in the sample pointed to feeling depressed. While the number itself may not convey much, this percentage speaks volumes about the mental health crisis facing students today. The age group most salient for feeling depressed was 28-34, which may be an especially hawkish age group for experiencing high expectations, pressure and stress related to finances, career paths, the future, among other vulnerabilities facing this demographic. The most concerning of all patterns to emerge from the data was the relationship between depression and high levels of academic stress. For example, those students reporting high levels of academic pressure reflected lower CGPA rates and mental distress. This suggests that psychological distress from academic pressure and expectations require deep questioning against the aspirational potential of academic success. In unpacking the conversational stressors students face in school, it is apparent that academic stress – academic performance in particular – serves as a detrimental emotional impact that transcends the beneficial potential of academic success. In other words, academics do not exist in a vacuum, and all aspects of student life create the potential for supporting or undermining a students' potential for success in school.

The analysis of the sleep pattern revealed an additional alarm merchant issue: student's irregularity in sleep patterns when this was identified as irregularity of less than 5 hours or over 8 hours, indicated that these students were more likely to report suicidal ideation. This serves to reiterate the importance of the physical health and mental health link; in that, good sleep hygiene is an important mechanism in maintaining mental health. Even further, it speaks to the need to promote balanced vs. unbalanced lifestyles and self-care patterns in students. It was also found that dietary habits were strongly related to depression with students experiencing

unhealthy diet patterns indicating a much higher propensity to also experience depressive symptoms. This speaks to the larger concept of holistic well-being; meaning emotional health has a strong association to physical health practices. Promoting improved lifestyle habits such as improved diet and sleep may reduce depression and associated effects on mental health among students.

An especially interesting finding was the significant role that financial stress and family history of mental illness had in shaping the mental health of students. They often act as external stressors, adding to academic and personal difficulties, and furthering vulnerability to depression. Knowing this can assist policy-makers and educational institutions with student-support by providing students with access to financial aid, mental health resources, and engagement programs.

Dashboard as a Tool for Action

The interactive Excel dashboard developed in this project serves as both an analytical tool and a means of engaging decision-makers and raising awareness. Through interactive slicers and filters, the dashboard allows users to view the data in a variety of ways that is dynamic and user-friendly. This interactivity makes the dashboard a valuable tool for various stakeholders including educators and counselors, parents and mental health professionals, to view aggregated data by different variables, such as gender, age group, city and academic pressure. This allows for an immersive experience for users, who can look at data that is personalized to their own interests and concerns.

For example, in analyzing the data by gender, female students reported a higher prevalence of depression than male students, which may suggest that utilizing precisely targeted interventions with female students may be more impactful. Likewise, a detailed investigation of the relationship between sleep and suicidal ideation will aid in developing customized programming to support mental health tailored to sleep hygiene and stress management.

The dashboard's capability is further augmented with calculated fields and conditional formatting, allowing users to rapidly identify important data points, such as high depression rates or high-risk groups. Additionally, this information could be essential for informing targeted interventions and aiding future research into mental health trends among students.

Call to Action and Recommendations

The project reminds us that educational institutions should incorporate mental health awareness and support systems. Any institution of higher learning should prioritize mental health at the same level as academic performance. Universities and colleges must understand that if a student is stressed mentally and emotionally, he or she is incapable of performing at his/her best. To foster a healthy and supporting environment that values both well-being and academics, institutions need to create a more balanced experience for students. A more balanced experience would facilitate an environment that is more conducive to success, growth, and personal development.

A comprehensive approach is required that includes mental health education, access to counseling, and stress management classes. Specifically, institutions should develop wellness programs aimed at establishing healthy sleep patterns, eating habits, and coping skills for work-related stress. Academic institutions should also change their evaluation system to be more holistic and assess students' mental health, as well as provide resources if there are signs of depression or mental distress. It is also essential that students feel help-seeking is not an admission of weakness. We need to challenge the stigma associated with mental health, particularly in educational spaces. Encouraging conversations, normalizing mental health discussions, and creating accessible mental health resources can ameliorate the issues students experience when approaching help-seeking.

Future Directions

In the future, this dashboard could be expanded with the addition of real-time data, utilizing surveys from students as well as feedback modalities to regularly refresh the dataset. Similarly, the dashboard could, by integrating machine learning or predictive analytics, be able to predict the students with the highest risk for either depressed thoughts or suicidal ideation, allowing for early interventions. Additionally, the dataset could also be expanded to include factors such as social media use, peer relationships, and pressures from extracurricular activities, to provide a broader understanding of the reasons for student mental health to deteriorate. In summary, the "Student Depression Dashboard" is an important tool in providing data-driven understanding of the mental health challenges that students are facing. The project shows that schools and colleges need to shift to a student-oriented approach that incorporates academic success, as well as mental well-being, which can foster a more supportive and healthy academic environment.

Future Scope

The Student Depression Dashboard project has revealed important information about factors contributing to depression in students. But this analysis is just the starting point in what could be a continual process of improving student mental health and well-being. There are a number of possible opportunities in terms of both expanding the reporting and analytic capabilities of this project and increasing its actionable value and impact on student mental health support. The following describes the key areas in which this project could evolve and expand in its impact.

1. Incorporating Real-Time Data and Feedback Mechanisms

An immediate area of improvement would be adding real-time data from students, such as a survey, or self-reported emotional health check-in experiences. The dashboard could: track current mental health trends established in previous experiences, as well as real time or close to real time data and insights on student well-being based on academic workload, sleep patterns, eating habits, or other factors, that impact student well-being. An additional improvement would be to provide feedback mechanisms that would allow students to report their own mental health experiences with marked anonymity to aid in creating a responsive, and more real-time system.

- **Real-Time Updates:** This can be achieved by linking the dashboard to a survey system where students can regularly submit their data (e.g., sleep hours, academic stress levels).
- **Mobile Integration:** Developing a mobile app or integrating the dashboard with existing student portals can ensure that students can easily access it and provide feedback on their mental health status regularly.

2. Predictive Analytics and Early Intervention

In the future, the dashboard may include predictive analytics or machine learning models that predict the chance of students experiencing depression or suicidal thoughts based on a number of risk factors. By examining historical data—sleep patterns, academic pressure, and stress levels—the model may bring visibility to students who are considered more likely to experience mental health issues.

- **Risk Prediction Models:** ML algorithms (e.g., Random Forest, Support Vector Machines, or Neural Networks) could be applied to the dataset to classify patterns

predicting depression and suicidal behavior for early intervention.

- **Automated Alerts:** The system could alert counselors or student health services if students demonstrated risk factors, leading to timely student intervention.

3. Expanding Data Collection

The current analysis relies on the dataset that has collected to date; however, future analyses could be enhanced using a more complete dataset that includes diverse data points, such as:

- **Social Media Use:** If systematic data were collected on students' use of social media, the impacts of social media on student mental health could be documented, and described in order to provide the current context around social comparison, cyberbullying, and online stress to students' mental health.
- **Peer Relationships:** Data collected on student relationships with their peers, or social support, would improve our understanding of the impact of social networks on depression.
- **Extracurricular Activities:** If systematic data were collected on extracurricular activities, or student engagement, we could explore how student participation in clubs, sports, or other activities support or detract from student mental health.

4. Incorporating Mental Health Screening Tools

In the future laps of this project, some mental health screening tools like PHQ-9 (Patient Health Questionnaire) and GAD-7 (Generalized Anxiety Disorder) would be added to the dashboard. Standardized tools would help students self-evaluate their mental health frequently at whatever frequency desirable, and the information could be assessed along with other information to give deeper insight into students overall emotional health.

- **Automated Analysis:** The dashboard would generate a report or risk score based on answers from the screenings to help students understand their own mental health more clearly.

5. Integration with Counseling and Support Systems

The dashboard can also be expanded to encompass existing counseling and support systems at universities or other educational institutions, providing a database not just for analysis but also for personalized intervention. For example:

- **Personalized Recommendations:** If a student is struggling with specific issues (i.e., poor sleep patterns, high stress levels), the dashboard could provide evidence-based recommendations for suggested actions to take, such as waiting for a few weeks before counseling, practicing breathing exercises, or peer support groups.
- **Scheduling Counseling Appointments:** The dashboard allows students to schedule appointments with counselors or mental health professionals, setting the dashboard system into the context of campus resources.
- **Student Support Networks:** The dashboard could create evidence-based support networks, such as peer support groups and or a mental health blog based on the student data collected or analyzed after prompts.

6. Expanding the Scope to Other Demographics

Although the current investigation addresses the level of student depression on campus for one department at a time, it might be more fruitful to consider mental health outreach and research that encompasses not just students, but also faculty, staff, and families. Mental health is not exclusive to students, and teachers, administrators, and families play contributing factors in student mental health.

- **Faculty Well-being:** Getting faculty involved in the data collection could yield insight into how academic staff stress, workload, and overall well-being influence the wellness of their students and their relationship with the student and the school.
- **Family Dynamics:** There are dimensions of family-related stress (i.e., family mental health history, family support, financial stress) that could be highlighted in relation to understanding student depression.

7. Collaboration with Mental Health Experts and Researchers

Collaborating with psychologists, researchers, and mental health professionals would provide further insights and effectiveness to this project. The partnership would include:

- **Psychological Validity:** Ensuring the metrics to measure depression and its determinants conform to existing psychological theories and methods.

- **Research Partnerships:** Collaboration with universities and/or mental health organizations will allow for the project to be conducted as a large-scale study to capture more extensive data from multi-institutional and regional levels.

8. Global Expansion

At this time, the data may be limited to one geographical location or institution, however, if the project were expanded to include students from other areas, cultures, and educational systems, it may provide an international perspective on student depression. This could especially be useful to detect patterns related to geographical areas and cultural systems that affect or impact mental health, for examples:

- **Cultural Differences:** The impact of cultural expectations around academic success and family support on rates of depression.
- **Global Mental Health Campaigns:** Collected data from regions may be referenced globally for mental health campaigns for addressing student health and wellbeing.

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