STUDENT MENTAL HEALTH DATA ANALYSIS

Overview

File Source: StudentDepressionAnalysisDataset.csv

Dataset Dimension

- Id
- Gender
- Age
- City
- Profession
- Academic Pressure
- CGPA
- Study Satisfaction
- Sleep Duration
- Dietary Habits
- Degree
- Have you ever had suicidal thoughts?
- Work Pressure
- Job Satisfaction
- Work/Study Hours
- Financial Stress
- Family History of Mental Illness
- Depression

Business Request for Data Analysis

Client/Stakeholder: University Counseling and Student Services Department

Business Context: The University is concerned about the growing mental health challenges among students, which are believed to be impacting academic performance, well-being, and overall satisfaction. The Student Services Department wants to assess key factors such as academic pressure, financial stress, dietary habits, and sleep patterns, and understand their correlation with mental health conditions like depression and suicidal thoughts.

The University has collected survey data from students, including their academic experiences, health behaviors, and mental health history. The goal is to use data analysis to gain insights that can help in designing better mental health programs, improving academic outcomes, and providing more targeted support to at-risk students.

Specific Deliverables:

- An Overview Dashboard on Excel (For Non-Techy User)
- Visual Correlation Analysis Report
- Risk Group Identification

- Recommendations for Action

Business Requirements

Academic Performance KPIs

- Average Academic Pressure
- Average CGPA
- Average Study Satisfaction

Mental Health KPIs

- Suicidal Thoughts Percentage
- Depression Rate
- Family History Rate

Health and Well-being KPIs

- Average Sleep Duration
- Dietary Habits Percentage
- Work/Study Hours vs. Sleep Duration Ratio

Stress and Financial KPIs

- Average Financial Stress
- Financial Stress and Depression Correlation

Demographic KPIs

- By Gender
    - Suicidal Thoughts Percentage
    - Depression Rate
- By Age Group
    - Suicidal Thoughts Percentage
    - Depression Rate
- By Profession
    - Suicidal Thoughts Percentage
    - Depression Rate
- By Degree
    - Suicidal Thoughts Percentage
    - Depression Rate

Behavioral KPIs

- Academic Pressure vs. Suicidal Thoughts Correlation
- Study Satisfaction vs. CGPA Correlation

Risk Assessment KPIs

- High-Risk Students Count

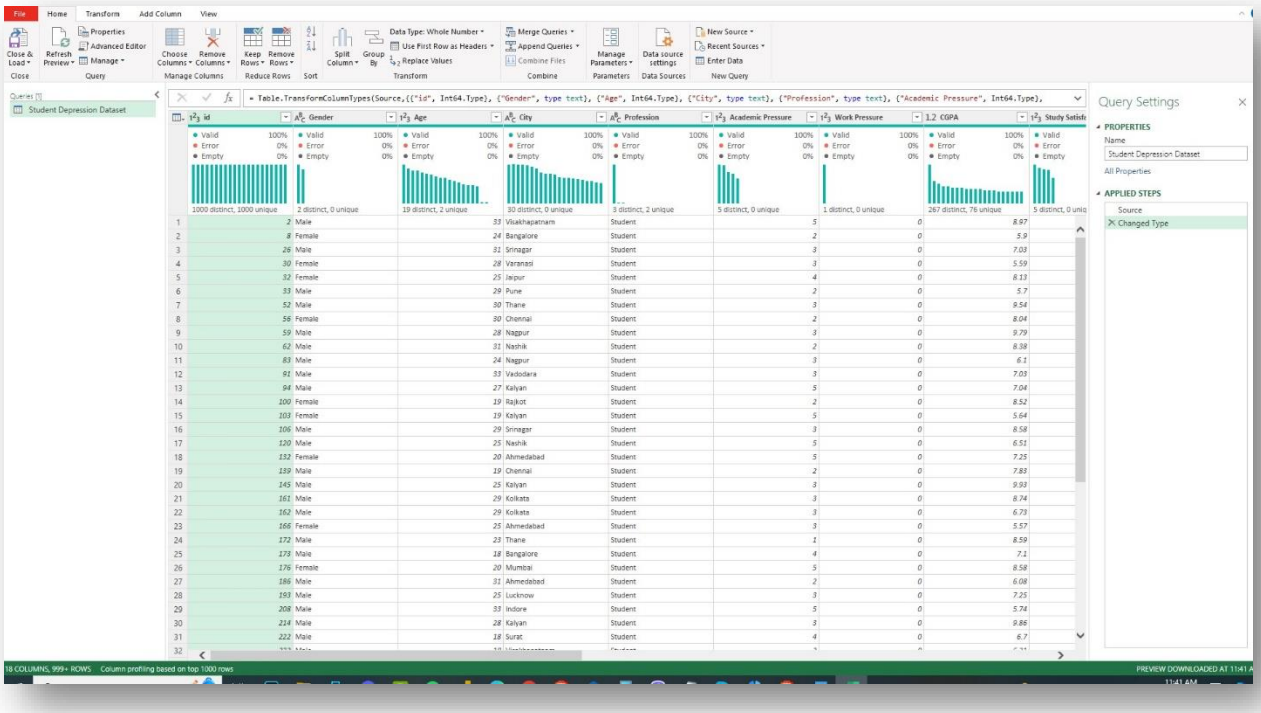
Process for Data Analysis

- Exploratory Data Analysis using Power Query
    - Clean and Transform Dataset
    - Do Initial Analysis by Pivot Tables
- Creating Data Visualization
    - Overview Dashboard
    - Detailed View Report

The Data Analysis Process

- Exploratory Data Analysis using Power Query
- Transorm the Dataset by the following:
    - Filter Profession = *Student* Only
    - Remove **City, Work Pressure,** and **Job Satisfaction** Column
    - Add columns for **Family History of Mental Illness**, and **Suicidal Thoughts** as *1s and 0s*
    - Add columns for **Depression** as *Yes*/*No* values
    - Filter out "*Others*" in **Sleep Duration, Dietary Habit**
    - Filter dataset to include only Ages less or equal to *37*
    - Created Age Group with Rangesize = 5
    - Filter "0" in Study Satisfaction, CGPA, Academic Pressure, and *null* in Financial Stress
    - Remove Duplicates

id	Gender	Age	Age Group	Profession	Academic Pressure	Work Pressure	CGPA	Study Satisfaction	Sleep Duration	Dietary Habits	Degree	Have you ever had suicidal thoughts ?	convertedSuicidal Thoughts	Work/Study Hours	Financial Stress	Famil
2	Male	33	33-38	Student	5	0	8.97	2	5-6 hours	Healthy	B.Pharm	Yes	1	3	1	No
8	Female	24	23-28	Student	2	0	5.9	5	5-6 hours	Moderate	BSc	No	0	3	2	Yes
26	Male	31	28-33	Student	3	0	7.03	5	Less than 5 hours	Healthy	BA	No	0	9	1	Yes
30	Female	28	28-33	Student	3	0	5.59	2	7-8 hours	Moderate	BCA	Yes	1	4	5	Yes
32	Female	25	23-28	Student	4	0	8.13	3	5-6 hours	Moderate	M.Tech	Yes	1	1	1	No
33	Male	29	28-33	Student	2	0	5.7	3	Less than 5 hours	Healthy	PhD	No	0	4	1	No
52	Male	30	28-33	Student	3	0	9.54	4	7-8 hours	Healthy	BSc	No	0	1	2	No
56	Female	30	28-33	Student	2	0	8.04	4	Less than 5 hours	Unhealthy	Class 12	No	0	0	1	Yes
59	Male	28	28-33	Student	3	0	9.79	1	7-8 hours	Moderate	B.Ed	Yes	1	12	3	No
62	Male	31	28-33	Student	2	0	8.38	3	Less than 5 hours	Moderate	LLB	Yes	1	2	5	No
83	Male	24	23-28	Student	3	0	6.1	3	5-6 hours	Moderate	Class 12	Yes	1	11	1	Yes
91	Male	33	33-38	Student	3	0	7.03	4	Less than 5 hours	Healthy	BE	Yes	1	10	2	Yes
94	Male	27	23-28	Student	5	0	7.04	1	Less than 5 hours	Moderate	M.Tech	No	0	10	1	Yes
100	Female	19	18-23	Student	2	0	8.52	4	Less than 5 hours	Unhealthy	Class 12	No	0	6	2	Yes
103	Female	19	18-23	Student	5	0	5.64	5	Less than 5 hours	Moderate	Class 12	Yes	1	4	5	Yes
106	Male	29	28-33	Student	3	0	8.58	3	More than 8 hours	Moderate	M.Tech	Yes	1	10	2	Yes
120	Male	25	23-28	Student	5	0	6.51	2	Less than 5 hours	Unhealthy	M.Ed	Yes	1	2	5	Yes
132	Female	20	18-23	Student	5	0	7.25	3	5-6 hours	Healthy	Class 12	Yes	1	10	3	No
139	Male	19	18-23	Student	2	0	7.83	2	7-8 hours	Unhealthy	Class 12	No	0	6	3	No
145	Male	25	23-28	Student	3	0	9.93	3	5-6 hours	Moderate	B.Ed	No	0	8	3	Yes
161	Male	29	28-33	Student	3	0	8.74	4	5-6 hours	Moderate	B.Ed	Yes	1	1	1	No
162	Male	29	28-33	Student	3	0	6.73	3	7-8 hours	Moderate	M.Tech	No	0	0	1	No
166	Female	25	23-28	Student	3	0	5.57	3	More than 8 hours	Unhealthy	MSc	Yes	1	10	5	No
172	Male	23	23-28	Student	1	0	8.59	4	7-8 hours	Healthy	BHM	No	0	11	3	No
173	Male	18	18-23	Student	4	0	7.1	3	More than 8 hours	Unhealthy	Class 12	Yes	1	11	5	Yes
176	Female	20	18-23	Student	5	0	8.58	5	7-8 hours	Moderate	Class 12	No	0	2	2	Yes
186	Male	31	28-33	Student	2	0	6.08	5	7-8 hours	Moderate	LLB	Yes	1	3	3	Yes
193	Male	25	23-28	Student	3	0	7.25	3	More than 8 hours	Unhealthy	M.Ed	Yes	1	10	5	No
208	Male	33	33-38	Student	5	0	5.74	2	Less than 5 hours	Moderate	M.Pharm	No	0	8	3	Yes
214	Male	28	28-33	Student	3	0	9.86	3	7-8 hours	Unhealthy	M.Pharm	Yes	1	11	2	No
222	Male	18	18-23	Student	4	0	6.7	5	Less than 5 hours	Moderate	Class 12	Yes	1	5	4	Yes
232	Male	18	18-23	Student	2	0	6.21	3	5-6 hours	Unhealthy	Class 12	Yes	1	4	2	No
239	Male	21	18-23	Student	1	0	7.25	1	Less than 5 hours	Healthy	MCA	Yes	1	7	2	No
240	Female	31	28-33	Student	1	0	5.87	3	7-8 hours	Healthy	PhD	No	0	8	4	Yes
242	Male	21	18-23	Student	1	0	8.04	3	More than 8 hours	Healthy	MA	No	0	0	3	Yes
253	Female	25	23-28	Student	1	0	6.37	3	7-8 hours	Moderate	B.Pharm	Yes	1	2	2	No



Initial Analysis

Check all KPIs

Academic Performance KPIs:

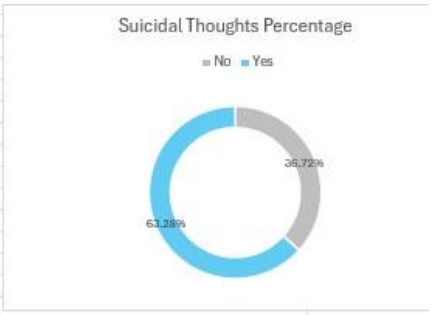
- Average Academic Pressure
- Average CGPA
- Average Study Satisfaction

Academic Performance KPIs		
Avg Acad Pressure	**Avg CGPA**	**Avg Study Satisfaction**
3.14	7.66	2.94

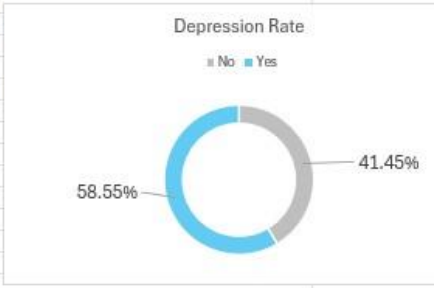
Mental Health KPIs:

- Suicidal Thoughts Percentage
- Depression Rate
- Family History Rate

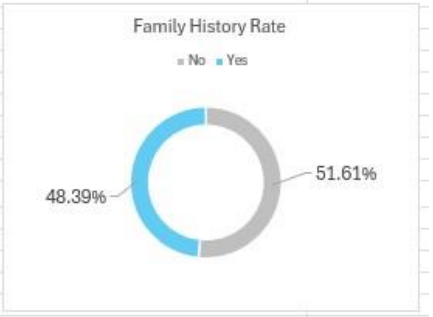
Mental Health KPIs	
Have you ever had suicidal thoughts ?	**Student**
No	36.72%
Yes	63.28%
Grand Total	**100.00%**
Suicidal Thoughts Percentage	63.28%



Mental Health KPIs	
Have you ever had suicidal thoughts ?	**Student**
No	41.45%
Yes	58.55%
Grand Total	**100.00%**
Depression Rate	58.55%

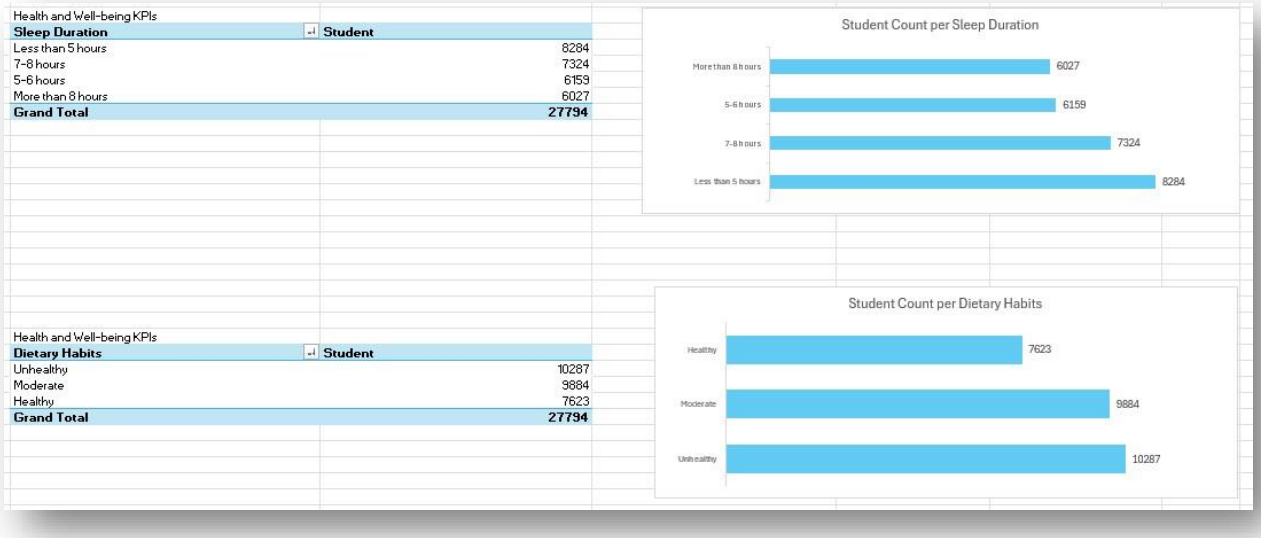


Mental Health KPIs	
Family History Rate	**Student**
No	51.61%
Yes	48.39%
Grand Total	**100.00%**
Family History Rate	48.39%



Health and Well-being KPIs:

- Sleep Duration Student Count
- Dietary Habits Student Count



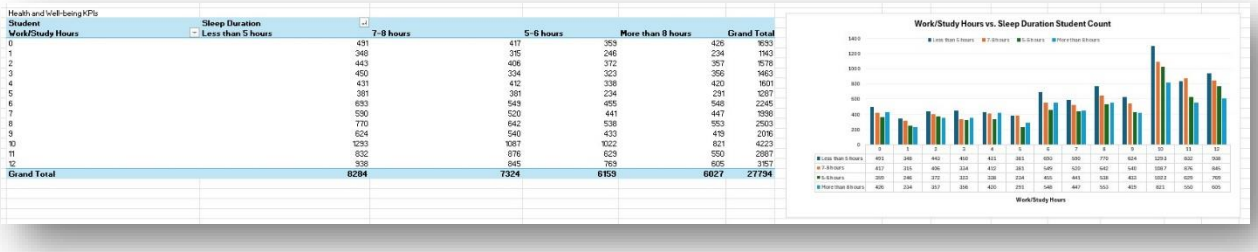
Health and Well-being KPIs

Sleep Duration	Student
Less than 5 hours	8284
7-8 hours	7324
5-6 hours	6159
More than 8 hours	6027
Grand Total	**27794**

Health and Well-being KPIs

Dietary Habits	Student
Unhealthy	10287
Moderate	9884
Healthy	7623
Grand Total	**27794**

- Work/Study Hours vs. Sleep Duration



Health and Well-being KPIs

Student	Sleep Duration				
Work/Study Hours	Less than 5 hours	7-8 hours	5-6 hours	More than 8 hours	Grand Total
0	491	417	359	426	1693
1	348	315	246	234	1143
2	443	406	372	357	1578
3	450	334	323	356	1463
4	431	412	338	420	1601
5	381	381	234	291	1287
6	693	549	455	548	2245
7	590	520	441	447	1998
8	770	642	538	553	2503
9	624	540	433	419	2016
10	1293	1087	1022	821	4223
11	832	876	629	550	2887
12	938	845	783	605	3157
Grand Total	**8284**	**7324**	**6159**	**6027**	**27794**

Stress and Financial KPIs:

- Average Financial Stress

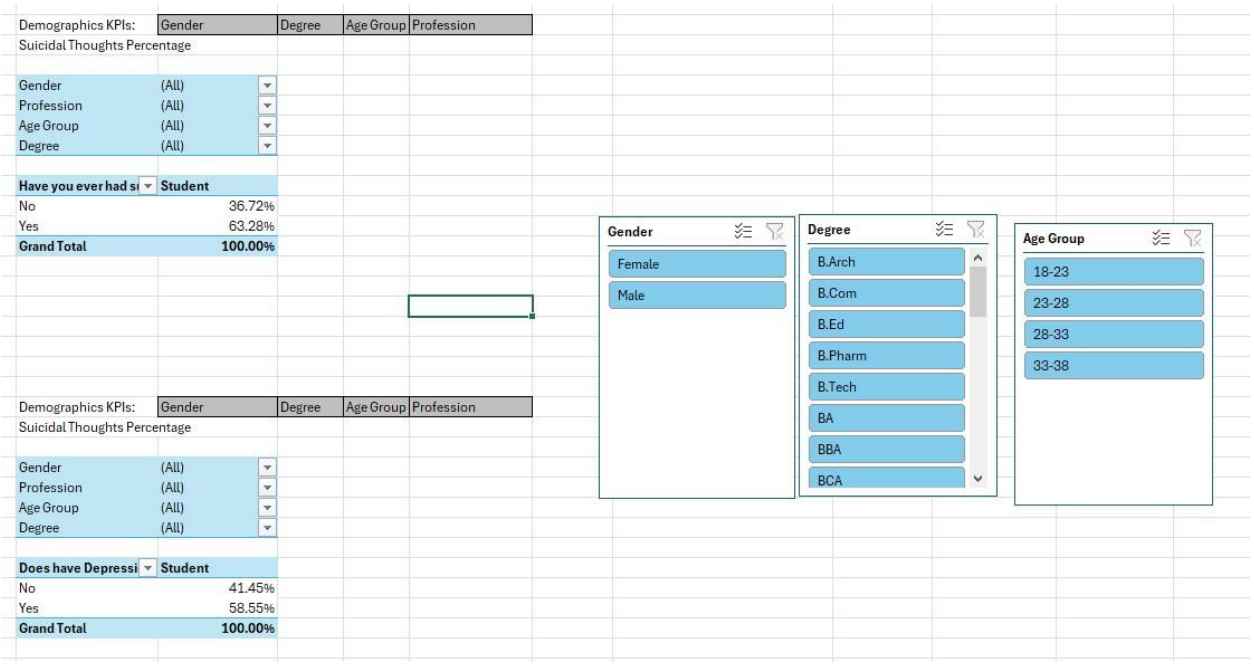
Stress and Financial KPIs:

Avg Financial Stress
3.14
3.14

Demographic KPIs

add slicer:

- Gender
- Degree
- Age Group



Correlation:

- Financial Stress and Depression Correlation
- Academic Pressure vs. Suicidal Thoughts Correlation
- Study Satisfaction vs. CGPA Correlation

Uses Spearman's Rank Correlation Formula

Spearman’s Rank Correlation is used to measure the strength and direction of the relationship between two variables with ordinal data. It doesn’t assume equal differences between ranks, making it suitable for non-normally distributed data. Ordinal data has a natural order, but the distance between categories isn't consistent or meaningful, like satisfaction ratings (1 = Low, 5 = High).

The formula for Spearman's Rank Correlation is:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

Where:

- ρ is the Spearman's rank correlation coefficient.
- d_i is the difference between the ranks of the paired values of the two variables.
- n is the number of data pairs (i.e., the number of observations in your dataset).
- $\sum d_i^2$ is the sum of the squared differences between the ranks of the corresponding values of the two variables.

Formula Breakdown

1. Rank the data:
    - Each data value in both variables is ranked (from 1 to n based on their size). If there are tied values (duplicates), they are assigned the average rank.
2. Calculate the rank differences d_i
    - For each pair of values, you calculate the difference between their ranks in the two variables, d_i=rank of variable 1−rank of variable 2
3. Square the rank differences:
    - For each pair, square the differences to eliminate negative values, i.e., d_i^2
4. Sum of squared differences:
    - Sum all the squared differences, $\sum d_i^2$
5. Substitute in the formula:
    - Finally, substitute the sum of squared differences and the number of data points (n) into the formula. This provides the Spearman's rank correlation coefficient ρ

Solve the Correlation:

Financial Stress and Depression Correlation:	0.460				
Academic Pressure vs. Suicidal Thoughts Correlation:	0.386				
Study Satisfaction vs. CGPA Correlation:	-0.025				
Summation of squared Difference			Count of values		
FinanSt-Dep	AcadPres-Suic	StudySatisf-CGPA	FinanSt-Dep	AcadPres-Suic	StudySatisf-CGPA
1.93199E+12	2.19593E+12	3.66838E+12	27794	27794	27794

Risk Assessment KPIs

- At-Risk Students = *Students with **High Academic Pressure*** + *Students with **High Financial Stress*** + *Students with **Low Sleep Duration*** + *Students with **Depression***

Risk Assessment KPI		
At-Risk Students		
	Benchmark Value	
High Academic Pressure	4	
High Financial Stress	4	
Low Sleep Duration	1	Less Than 5 Hours
Depression	1	Yes
At-Risk Students: Count student if all benchmark are satisfied		
At-Risk Students Count:	1727	

Creating Visual Dashboard

- Combine all Visuals and KPIs to create Visual Dashboard

STUDENT'S MENTAL HEALTH ANALYSIS DASHBOARD
Avg Academic Pressure
3.14
Avg Financial Stress
3.14
Avg CGPA
7.66
Avg Study Satisfaction
2.94
Gender
Female
Male
Degree
B.Arch
B.Com
B.Ed
B.Pharm
B.Tech
BA
BBA
BCA
BE
BHM
BSc
Class 12
LLB
LLM
M.Com
M.Ed
Age Group
18-23
23-28
28-33
33-38
Suicidal Thoughts Percentage
63.28%
Depression Rate
58.55%
Family History Rate
48.39%
Correlation Values
Financial Stress and Depression Correlation:
0.460
Academic Pressure vs. Suicidal Thoughts Correlation:
0.386
Study Satisfaction vs. CGPA Correlation:
-0.025
At-Risk Students Count:
1727
At-Risk Students Threshold Value
High Academic Pressure
4
Low Sleep Duration
>5 Hours
High Financial Stress
4
Depression
Yes
The data shows moderate correlations between financial stress and depression, academic pressure and suicidal thoughts, and weak negative correlation between study satisfaction and CGPA. At-risk students total 1,727.
Student Count per Dietary Habits
Healthy
7623
Moderate
9684
Unhealthy
10287
Student Count per Sleep Duration
More than 8 hours
6027
5-6 hours
6159
7-8 hours
7324
Less than 5 hours
8284
Work/Study Hours vs. Sleep Duration Student Count
Work/Study Hours