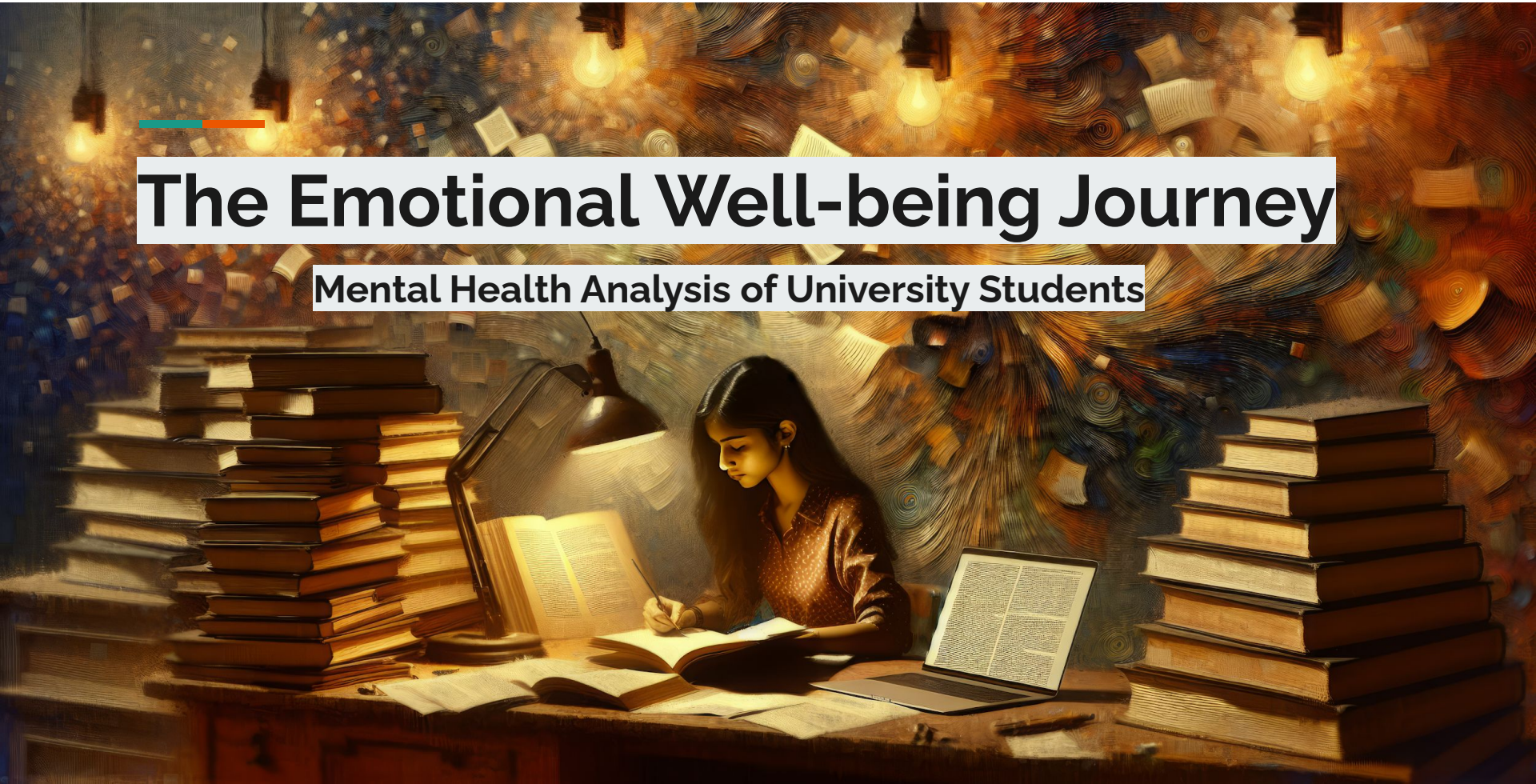


The Emotional Well-being Journey

Mental Health Analysis of University Students

Understanding the context

Background

- Mental Health is growing concern for university students often impacted by academic and social pressure.
- This study uses daily surveys from students over a semester to understand their emotional well being

Motivation

- Identify patterns of sadness and stress as indicators of well being
- Uncover insights to support mental health interventions

Data Source

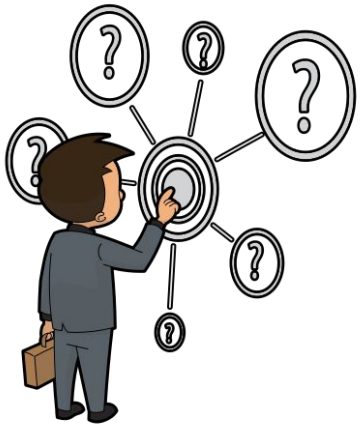
- Survey data collected in Spring 2019 from 423 students.
- Each student took the daily survey twice over the period spanning February to May.
- Combining everything together, there are 55,791 data points and five features: 'pid', 'survey.date', 'local.time', 'answer', and 'variable'.
- ‘Variable’ represents the emotions whereas ‘Answer’ represents the degree of their emotion

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 55791 entries, 0 to 55790
Data columns (total 5 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   pid          55791 non-null  object
 1   survey.date  55791 non-null  datetime64[ns]
 2   local.time   55791 non-null  datetime64[ns]
 3   answer       55791 non-null  int64
 4   variable     55791 non-null  object
dtypes: datetime64[ns](2), int64(1), object(2)
memory usage: 2.1+ MB
```

Data Understanding

- 8 different Variables
- Collected during the day - refreshed, restful, sleep
- Collected at the night - content , energy, lonely, sad, stress
- While all variables seem interrelated, to analyze mental health focus should be on content, lonely, sad and stress variables.



Data Preparation

Feature Creation:

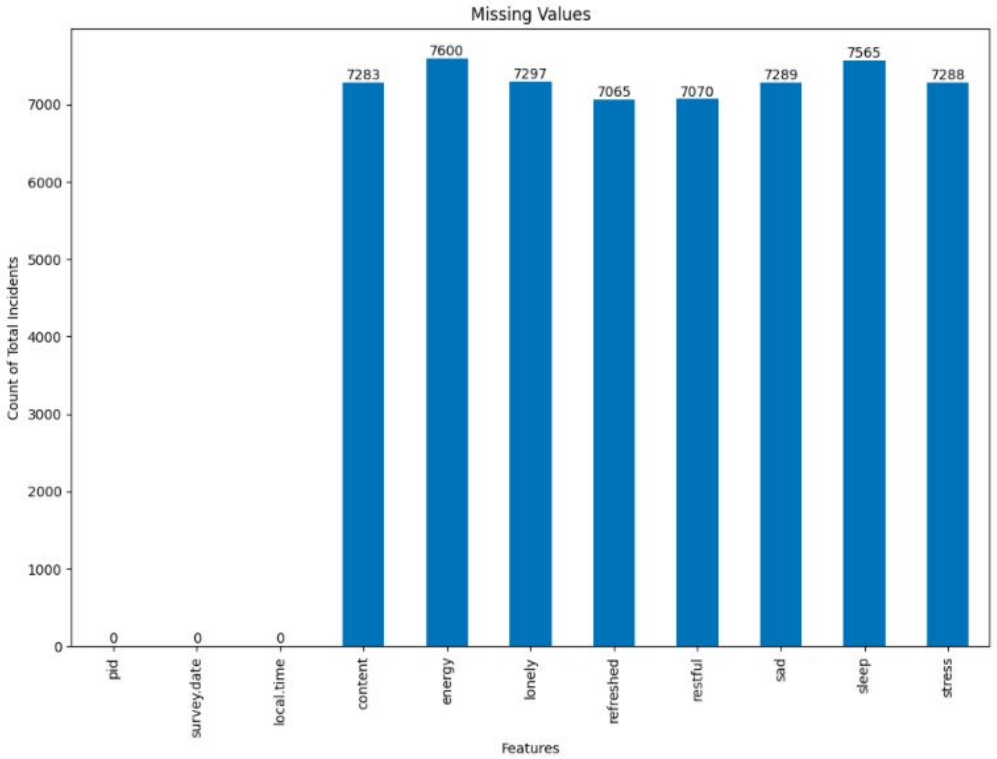
- Variable values converted into separate features for easier analysis.
- Example: Sadness, stress, and other emotions now exist as individual columns.

variable	pid	survey.date	local.time	content	energy	lonely	refreshed	restful	sad	sleep	stress
0	1193rv5x	2019-02-14	2019-02-14 08:17:47	NaN	NaN	NaN	2.0	3.0	NaN	5.0	NaN
1	1193rv5x	2019-02-14	2019-02-14 23:51:50	3.0	3.0	2.0	NaN	NaN	1.0	NaN	1.0
2	1193rv5x	2019-02-15	2019-02-15 08:01:56	NaN	NaN	NaN	1.0	2.0	NaN	6.0	NaN
3	1193rv5x	2019-02-15	2019-02-15 20:32:55	2.0	3.0	3.0	NaN	NaN	2.0	NaN	1.0
4	1193rv5x	2019-02-16	2019-02-16 10:02:31	NaN	NaN	NaN	1.0	2.0	NaN	9.0	NaN

Data Preparation

Missing Data:

- Missing values accounted for incomplete surveys.
- Example: 7,283 missing entries for 'content.'



Data Preparation

Handling Missing Data

- Missing data filled using the maximum value from two surveys for the respective student (pid) on the given survey date.
- If NA, the data is filled with 0

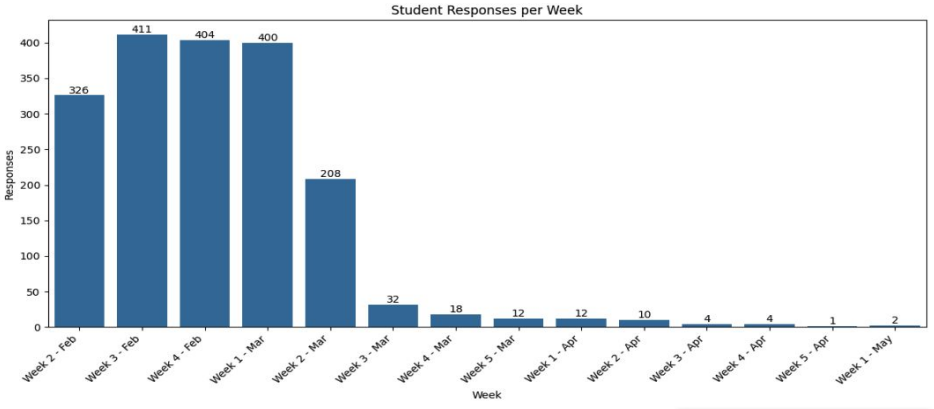
variable	pid	survey.date	content	energy	lonely	refreshed	restful	sad	sleep	stress
0	1193rv5x	2019-02-14	3.0	3.0	2.0	2.0	3.0	1.0	5.0	1.0
1	1193rv5x	2019-02-15	2.0	3.0	3.0	1.0	2.0	2.0	6.0	1.0
2	1193rv5x	2019-02-16	1.0	2.0	3.0	1.0	2.0	2.0	9.0	1.0
3	1193rv5x	2019-02-17	1.0	1.0	3.0	2.0	2.0	3.0	9.0	2.0
4	1193rv5x	2019-02-18	3.0	3.0	1.0	1.0	2.0	1.0	5.0	1.0

Survey Participation Over Time

Weekly student response trends analyzed

- Week 3 of February saw the highest participation, with 411 students responding.
- Average participation observed between February Week 2 and March Week 1.
- Noticeable drop starting Week 2 of March, with very few responses thereafter.

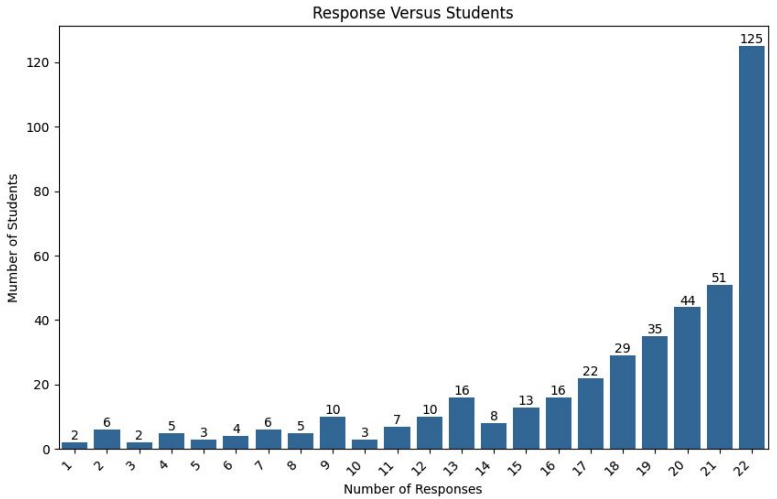
To ensure data quality, we consider data collected during the high response periods for subsequent analysis.



Survey Response Insights

Based on prior trends, data collected between 2019-02-07 and 2019-03-07 is selected for analysis.

- Overall Response Rate: 60%.
- Highest Individual Response Rate: 75%.
- Consistent Participation:
  - Around 125 students participated in 22 out of 29 days during this period.

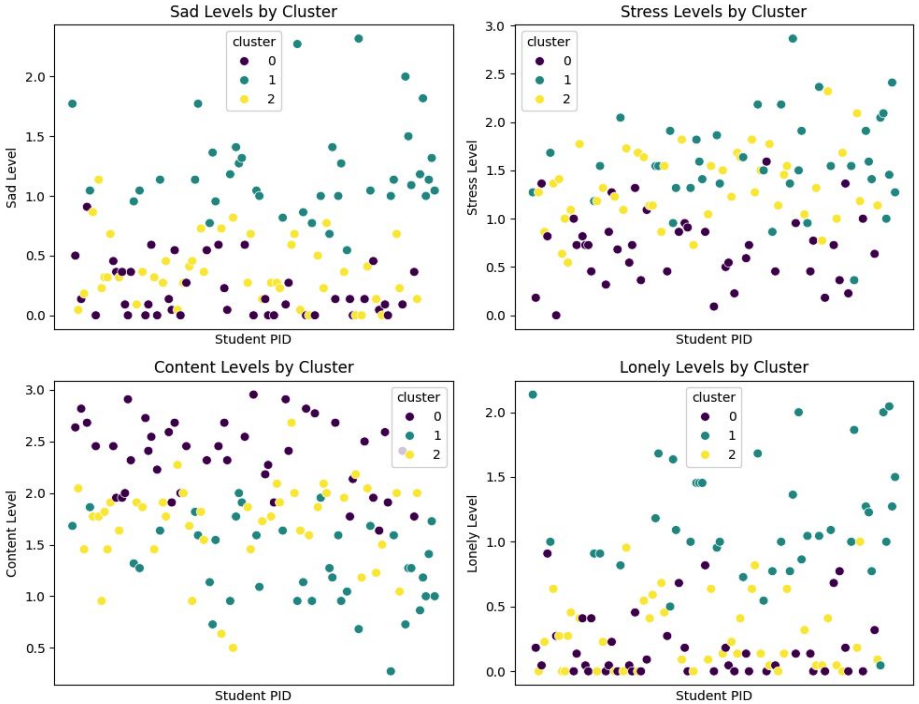


Group Students into Distinct Clusters

Identify emotional patterns among 125 students

Methodology:

- K-means clustering applied to stress, sadness, contentment, and loneliness data.
- Identified three clusters:
  - Cluster 0
  - Cluster 1
  - Cluster 2



Insights from Cluster Analysis

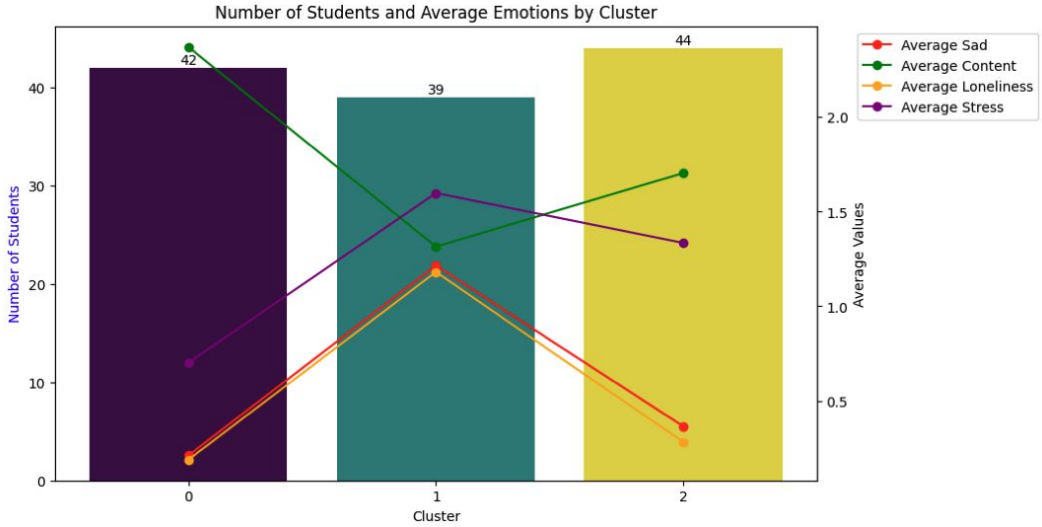
Patterns:

Students in Cluster 0:
- Low stress levels correlate with low sadness and loneliness and High Contentment.

Students in Cluster 1:
- High stress correlates with low contentment and Average sadness and loneliness.

Students in Cluster 2:
- Represent a mixed pattern, possibly transitioning between emotional states.

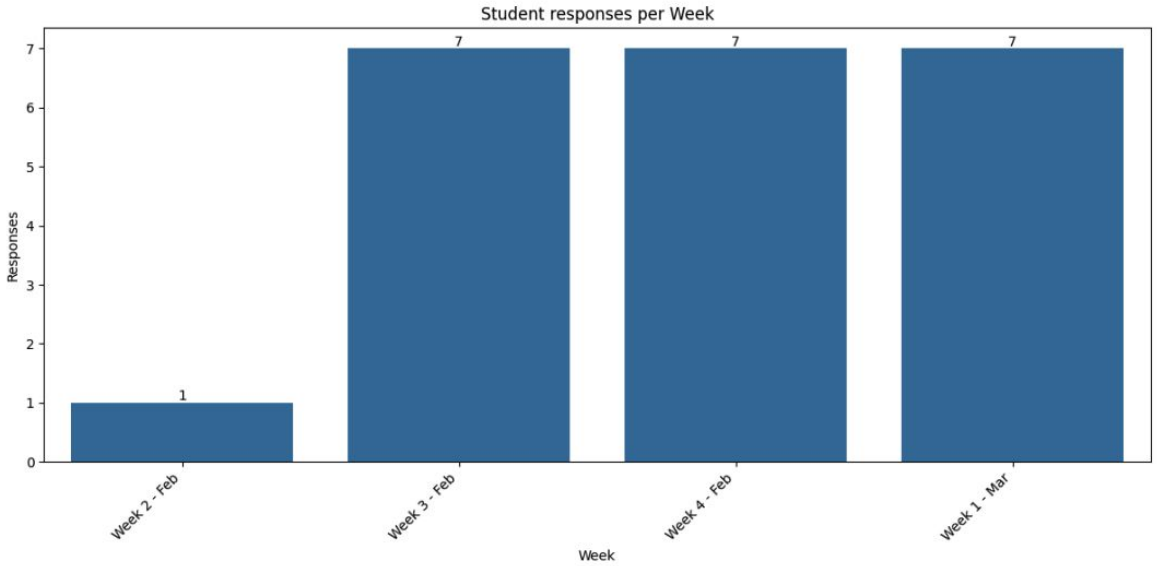
Relationships:
- Clear linkages between stress, sadness, and loneliness.
- Inverse relationships between contentment and other emotional variables.



Analyzing One Student to identify pattern

Understanding why a students emotions fluctuates over the month is point to consider

Out of 4 weeks, he responses almost everyday for 3 weeks



Emotional Trends

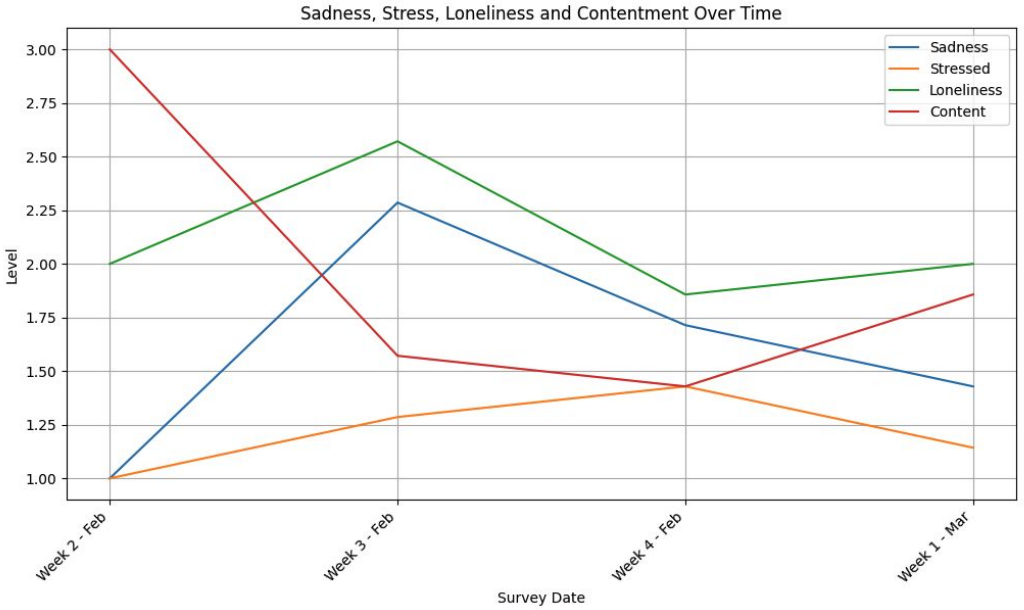
Detected peaks around the 3rd week of February, suggesting heightened emotional responses.

Possible Causes:

- Reduced Social Interaction:
  Limited opportunities to connect with peers.
- Time Constraints Due to Academic Demands:
  Increased workload or exams during this period.

Emotional Impact:

- High Levels of Loneliness, Sadness
- Lower Levels of Contentment



Analyzing Causes of Emotional Patterns

Identify factors influencing students emotions.
Approach:

Why are students experiencing these emotions?

Data:

Another Survey includes information on:

- Locations (e.g., Home, Campus, Café)
- Emotion Degrees (e.g., Loneliness, Contentment.

pid	local.time	sad	stress	content	lonely	energy	where.at	with.whom
1193rv5x	2019-02-14 08:17:47	1	1	2	1	2	[Home (dorm; apartment)]	[No one; alone]
1193rv5x	2019-02-14 11:01:48	1	1	2	3	4	[Home (dorm; apartment)]	[No one; alone]
1193rv5x	2019-02-14 15:45:23	1	0	3	1	3	[Cafe; Restaurant]	[Family]
1193rv5x	2019-02-14 17:17:27	1	0	3	3	3	[Home (dorm; apartment)]	[Family;No one; alone]
1193rv5x	2019-02-15 08:01:56	1	0	3	2	2	[Home (dorm; apartment);Vehicle]	[Family]

Location and Emotions

Sad and Stress:

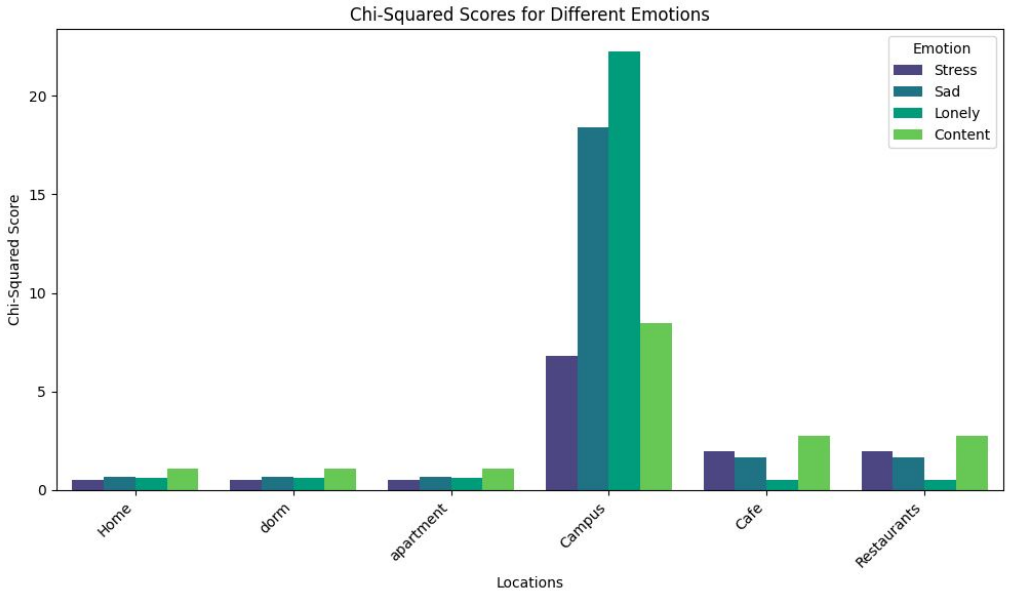
- High at Campus.
- Lower when home/dorm/apartment
- Some degree of stress observed at Cafes/Restaurants.

Lonely:

- High at Campus.
- Low at rest of the spaces

Contentment:

- High at Campus.
- Low at other places



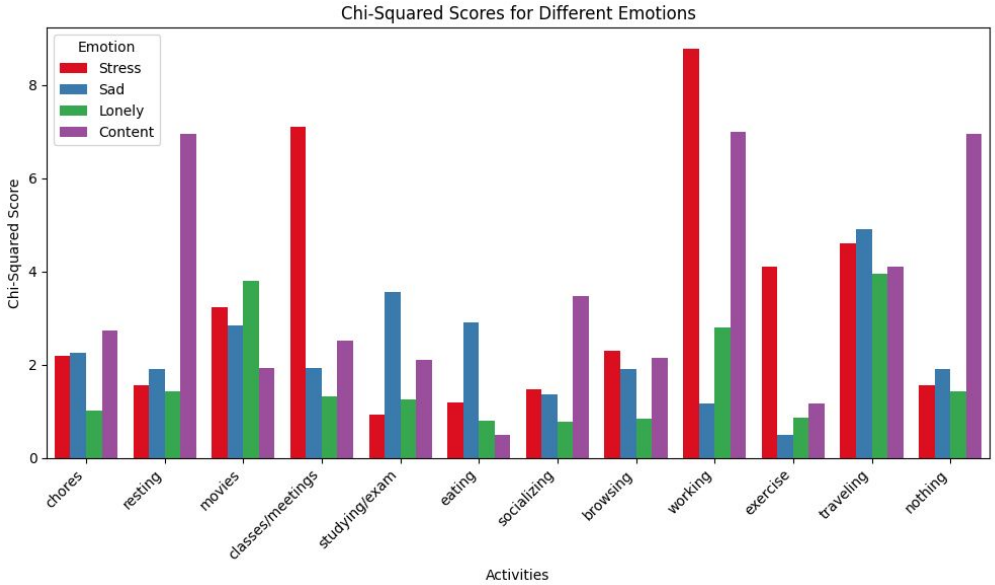
Activity and Emotions

Stress:
- While in classes/meetings or working at job.

Sad:
- When Traveling, during studying/exams

Lonely:
- During Movies and while traveling.

Contentment:
- When resting, working,traveling and doing nothing



Conclusion

Key Findings:

- Emotional well-being of the analyzed student is significantly influenced by location, activity, and time.
- Stress, sadness, and loneliness negatively correlate with contentment.
- Student on campus experience higher levels of stress and loneliness, while at home feel more content.

Actionable Insights:

- Encourage students to adopt a balanced routine that integrates academic, social, and personal time for better well-being.
- Motivate students to engage in diverse activities and explore different environments to reduce monotony and enhance emotional resilience.

Future work:

- Compare two students in the same clusters to identify patterns.
- Compare two students in different clusters to analyze relationships.