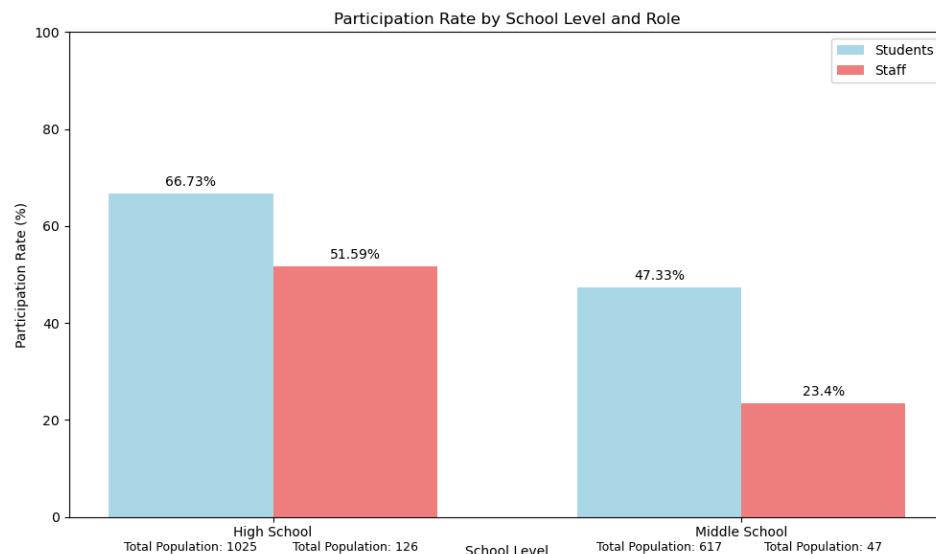


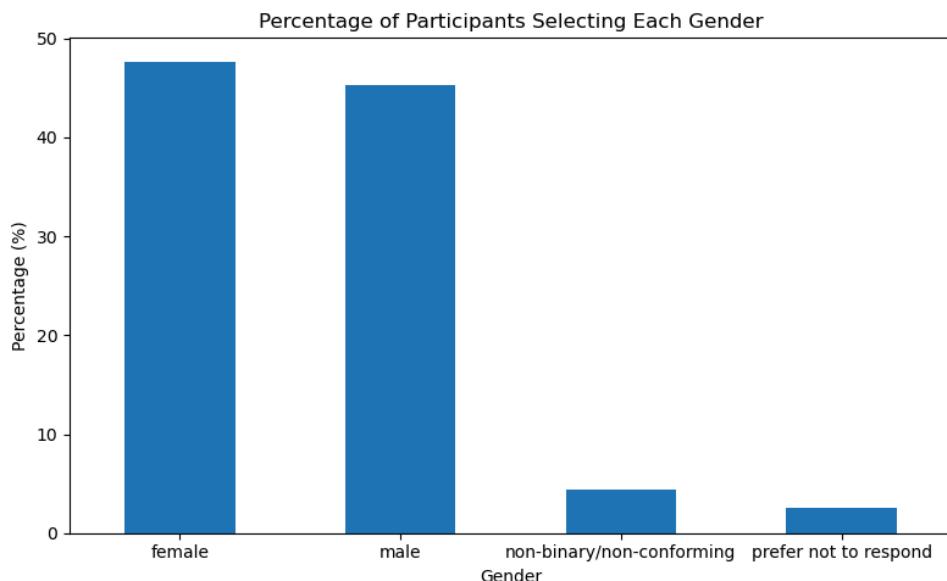
ConnectEd Deliverable With Visualizations

Participation Analysis

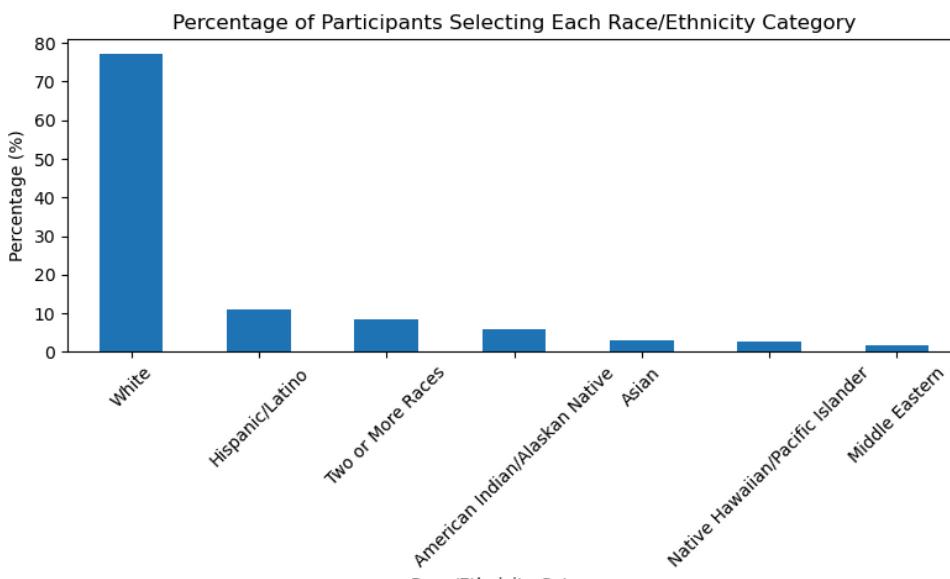
Takeaway: Strong participation, demographics in line with the school district as a whole



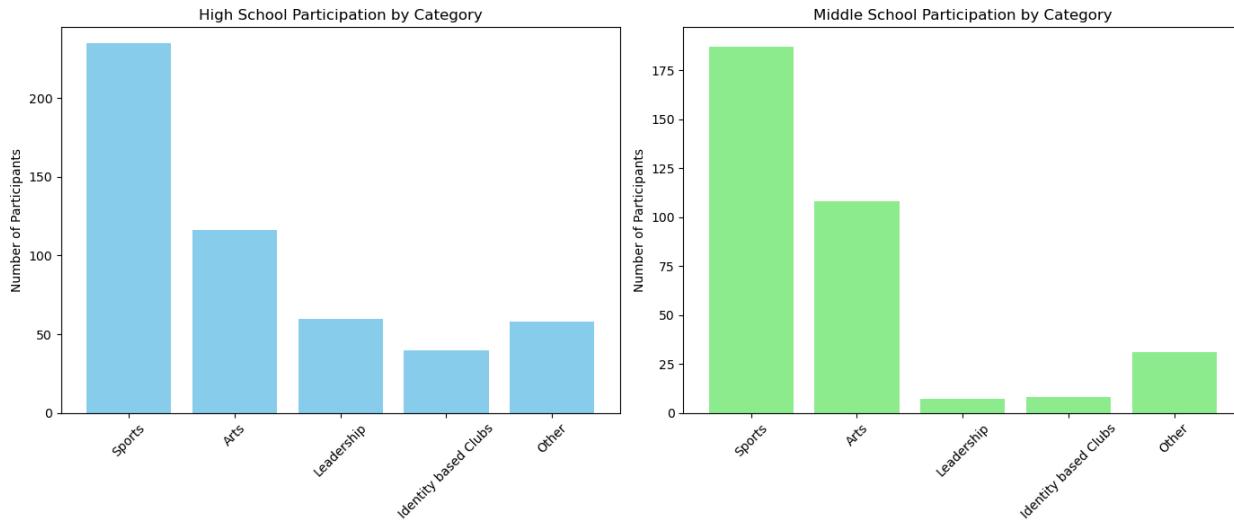
Higher percentage of high school students completing the survey, and higher percentage of students compared to staff at both levels.



Completion not limited to just one gender group. Reflects overall demographics of the population.



Completion not limited to a single racial group. Reflects overall demographics of the population.



A variety of activities are represented at both levels, with sports and arts being most popular. Much more leadership involvement at the high school level compared to middle school though.

High And Low Belonging Analysis

Types of centrality metrics explained:

- Betweenness Centrality: Measures how often a node acts as a bridge along the shortest paths between other nodes in a network. In a school network, a student or staff member with high betweenness centrality might be someone who connects different groups, like a teacher who works with multiple grades.
- Eigenvector Centrality: Indicates a node's importance based on how connected it is to other important nodes. In a school, a student or staff member with high eigenvector centrality might be someone influential because they are connected to key individuals, like a principal or popular student.
- Indegree Centrality: Counts the number of incoming connections a node has in a network. In a school network, a student with high indegree centrality might be someone whom many others turn to for advice or help, such as a peer mentor.
- Outdegree Centrality: Counts the number of outgoing connections a node has in a network. In a school, a staff member with high outdegree centrality might be someone who regularly communicates with others, like an administrator sending updates to teachers and students.

Correlation Analysis

- The different centrality metrics (including unweighted vs weighted and online vs in-person subsets) are all moderately correlated with each other.
- Interestingly, the correlation between Belonging Barometer and these metrics is very weak and sometimes not significant.
- There is a significant small negative correlation ($\rho = -0.12$) between belonging barometer and time spent online.

Who are the leaders?

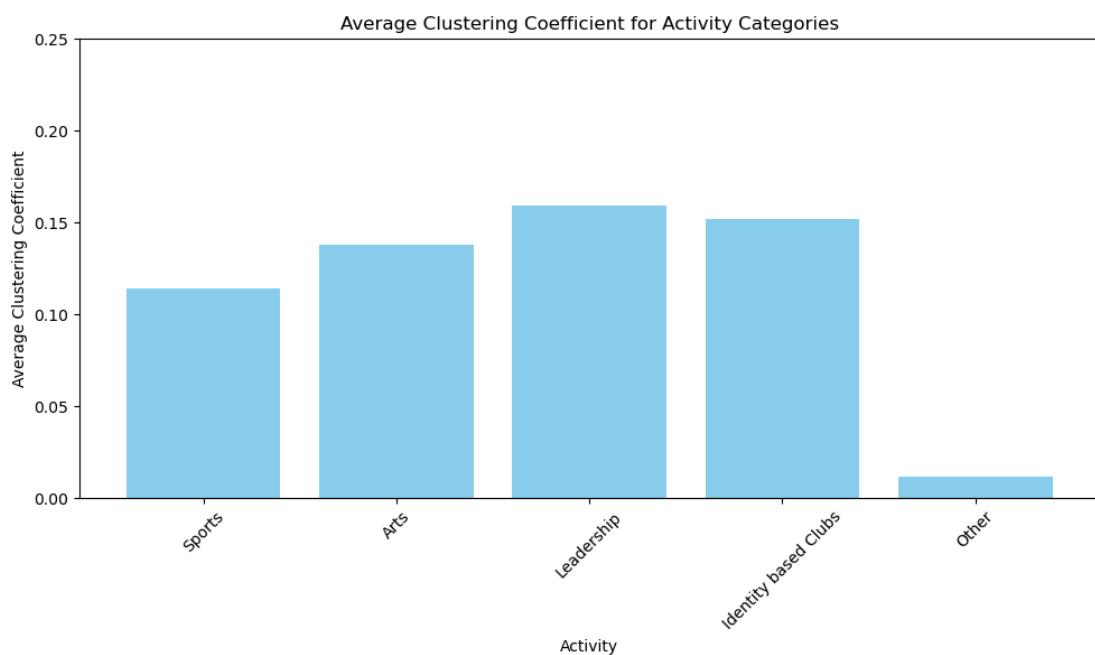
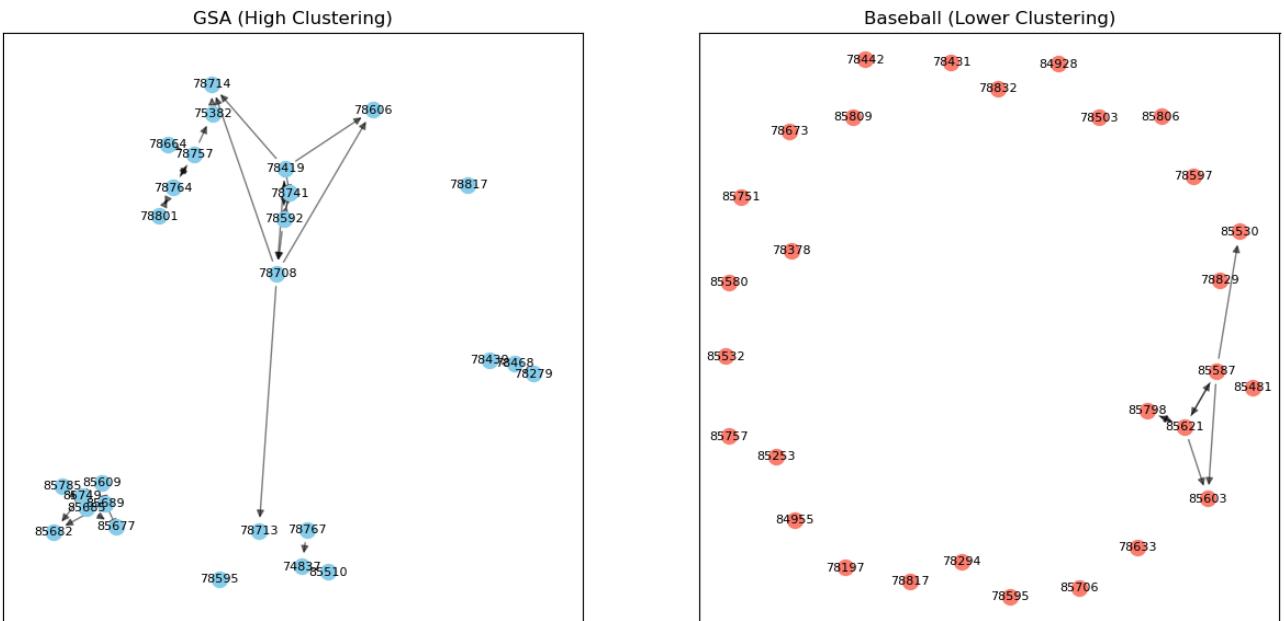
Teachers Lead in Eigenvector Centrality:

- Teachers are often connected to many well-connected students, placing them at the core of the school's social network. Their influence comes from their widespread connections to influential students, who themselves are connected to others, amplifying the teacher's reach across the network.

Mix of Students and Teachers in Betweenness Centrality:

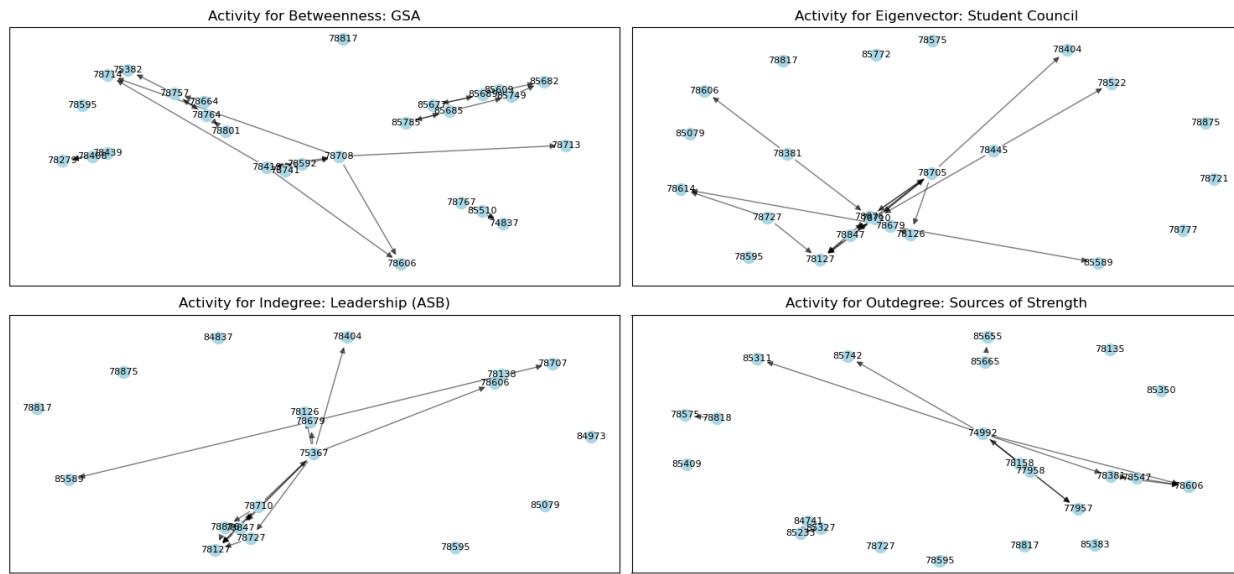
- Both students and teachers can have high betweenness centrality, but for different reasons. Students often bridge different social groups or cliques, while teachers may serve as intermediaries between entire classes or groups of students.

Activity	Average Clustering Coefficient	Top activities & activity categories by average clustering coefficient (level of connectedness between members)
Sources of Strength	0.295652	
Leadership (ASB)	0.295363	
GSA	0.248148	Some activities have high level of connection between members (GSA) while others have lower clustering (baseball)
Band	0.168947	
Leadership	0.159475	
Club Softball	0.157895	
Identity based Clubs	0.152273	
Volleyball	0.148652	
Soccer	0.144444	
Tennis	0.142857	
Arts	0.138219	
Student Council	0.121739	
Color and/or Winter Guard	0.119048	
Sports	0.114260	
Football	0.101917	
Choir	0.094017	



	betweenness	eigenvector	indegree	outdegree	Belonging Barometer Number
1	Panthera Leo/Journalism	Leadership (ASB)	Leadership (ASB)	Panthera Leo/Journalism	Geography Club
2	Debate Club	Student Council	Lion Crew	Homework Club	Leadership (ASB)
3	Homework Club	Lion Crew	Student Council	Sources of Strength	National Honor Society
4	Sources of Strength	Environmental Club	National Honor Society	Leadership (ASB)	Lion Crew
5	GSA	National Honor Society	GSA	Student Council	Track

Showing the network for different clubs based on their level of different connection metrics.

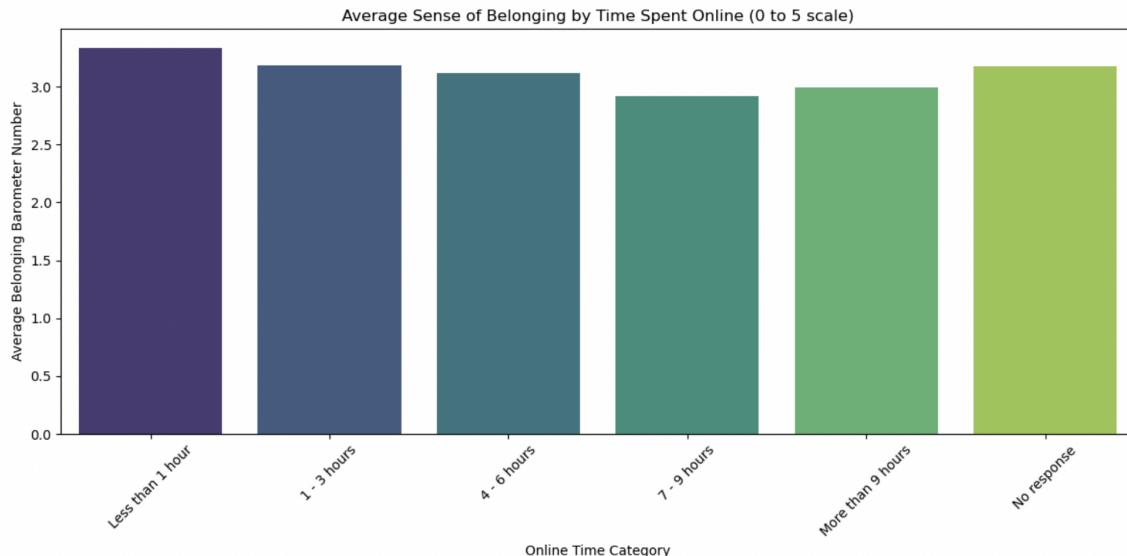


Belonging and Demographics

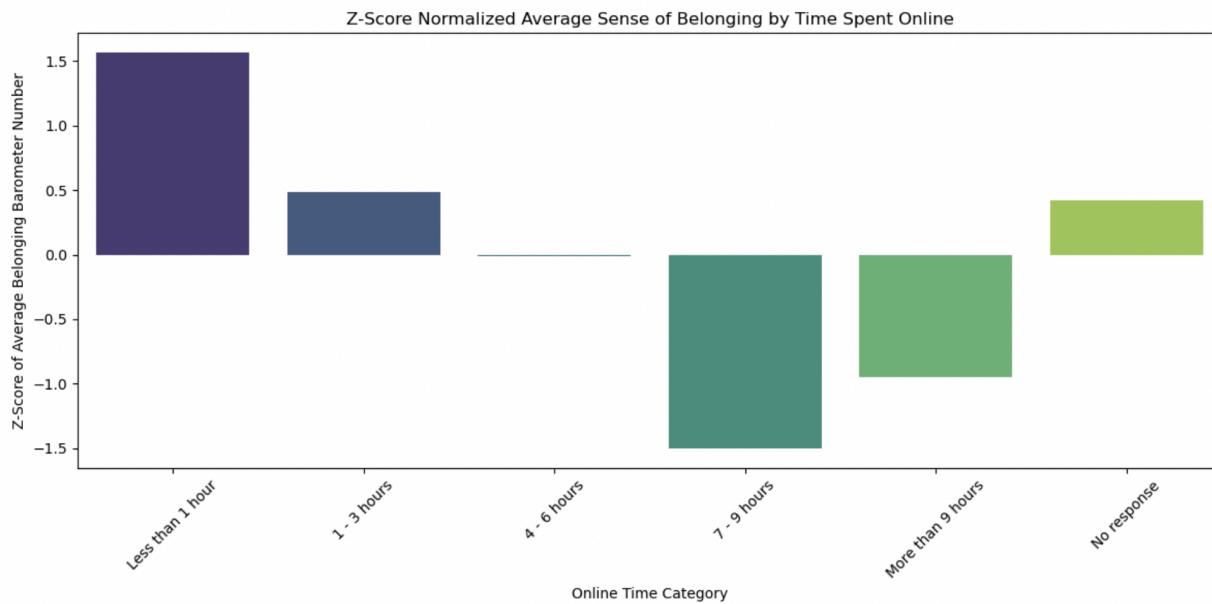
Belonging plays a critical role in students' emotional well-being, academic success, and engagement within their communities. This analysis explores how demographic factors such as gender, race, grade, and time spent online correlate with students' sense of belonging, emphasizing the significance of understanding both demographic trends and behavioral influences on belonging.

Focus Areas:

- **Race and Gender:** Their impact on belonging scores.
- **Time Spent Online:** Examining behavioral trends and their relationship to belonging.
- **Mental Health Impacts:** Days missed due to mental health, grouped by race and gender, to highlight vulnerabilities.



In analyzing the correlation between time spent online and students' sense of belonging, as depicted in the provided data visualization, it's evident that while the overall average belonging scores (referred to as "Average Belonging Barometer Number", which is scaled to 0 to 5) are relatively consistent, distinct variations emerge based on online engagement durations. Students who spend less than one hour online demonstrate slightly higher average belonging scores, suggesting a stronger community connection likely facilitated by more in-person interactions. Conversely, those who engage online for extended periods, specifically 7-9 hours and over 9 hours, exhibit slightly lower belonging scores, indicating a potential decrease in perceived community connection due to prolonged digital engagement.

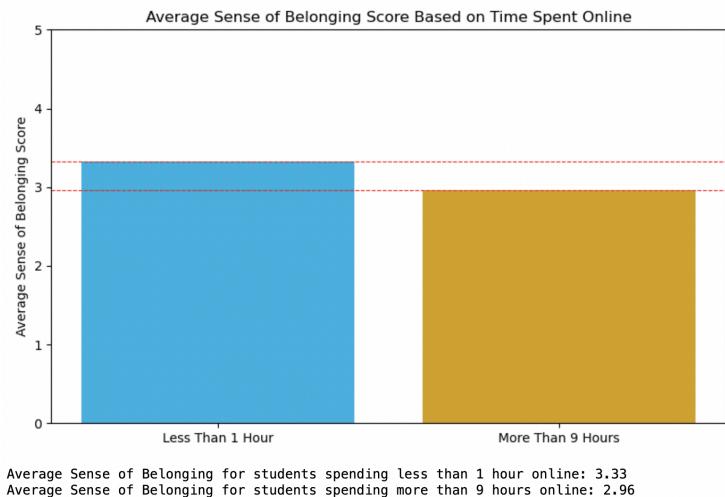


Due to the relatively close average belonging scores across different categories, I employed **Z-score normalization** to scale and interpret the differences more effectively.

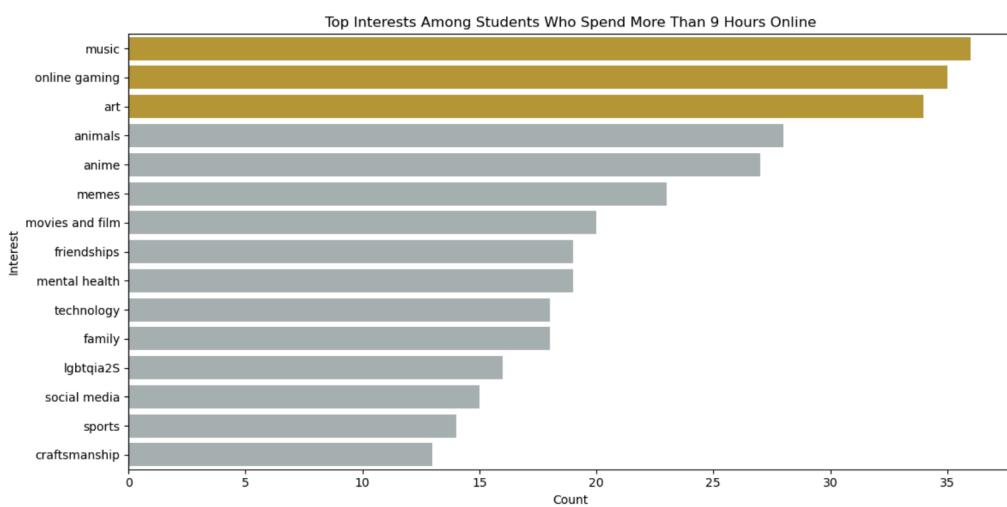
- Z-score normalization is a statistical technique that adjusts the scores for each group by calculating the number of standard deviations each group's average score deviates from the mean of the entire dataset.

- This process transforms the data into a standard normal distribution, where the mean is zero and the standard deviation is one, allowing for a direct comparison of scores across different categories on a common scale.

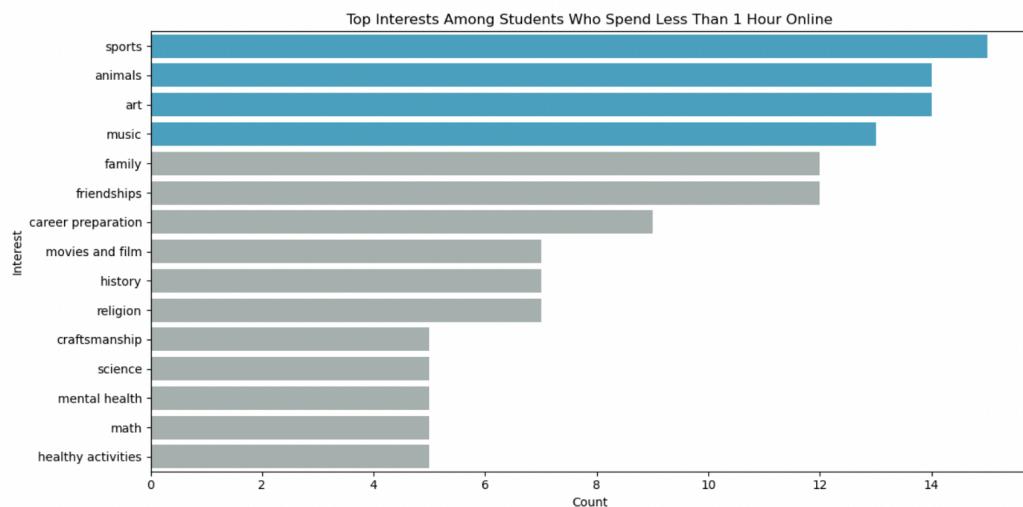
Through this method, the visualization revealed that students spending less than one hour online exhibit the highest Z-scores, indicating a stronger sense of belonging compared to the overall average. Conversely, those spending 7-9 hours or more than 9 hours online show lower Z-scores, suggesting a weaker sense of belonging relative to their peers. This highlights a notable trend where excessive online engagement could be inversely related to students' feelings of community and connection, providing a quantifiable measure to guide further interventions and support within educational settings.



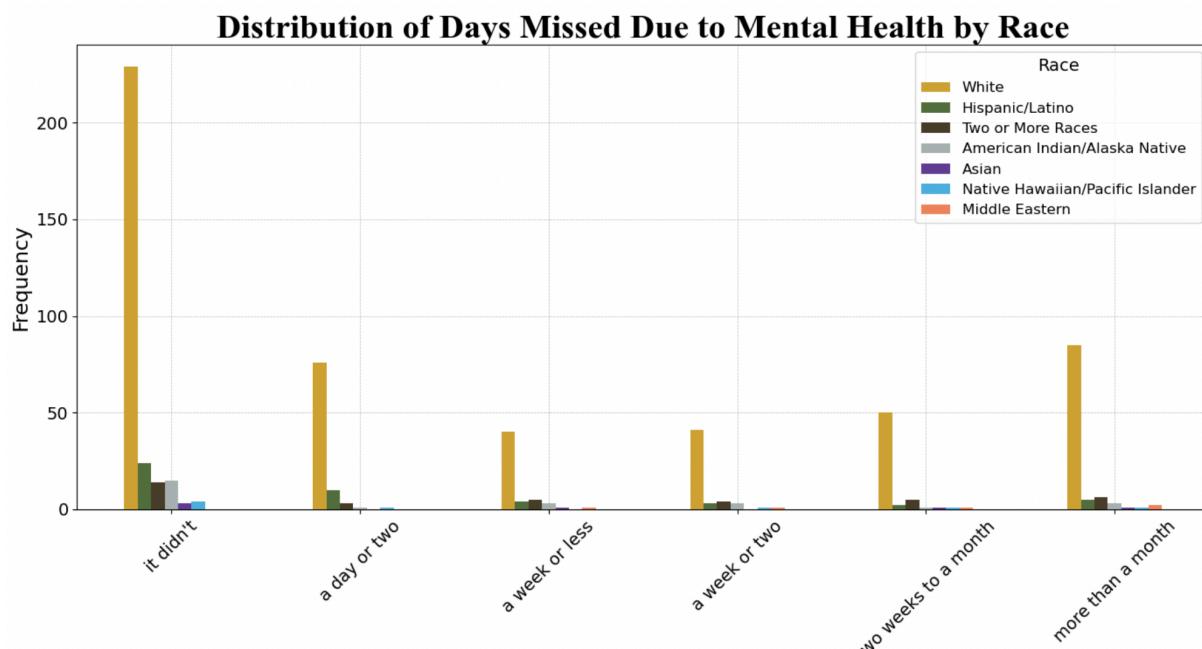
In the provided bar chart, I compared the average sense of belonging scores between students who spend less than one hour online and those who spend more than nine hours. Students with less than one hour of online activity have an average belonging score of 3.33, which is slightly higher than those spending more than nine hours online, whose average score is 2.96.



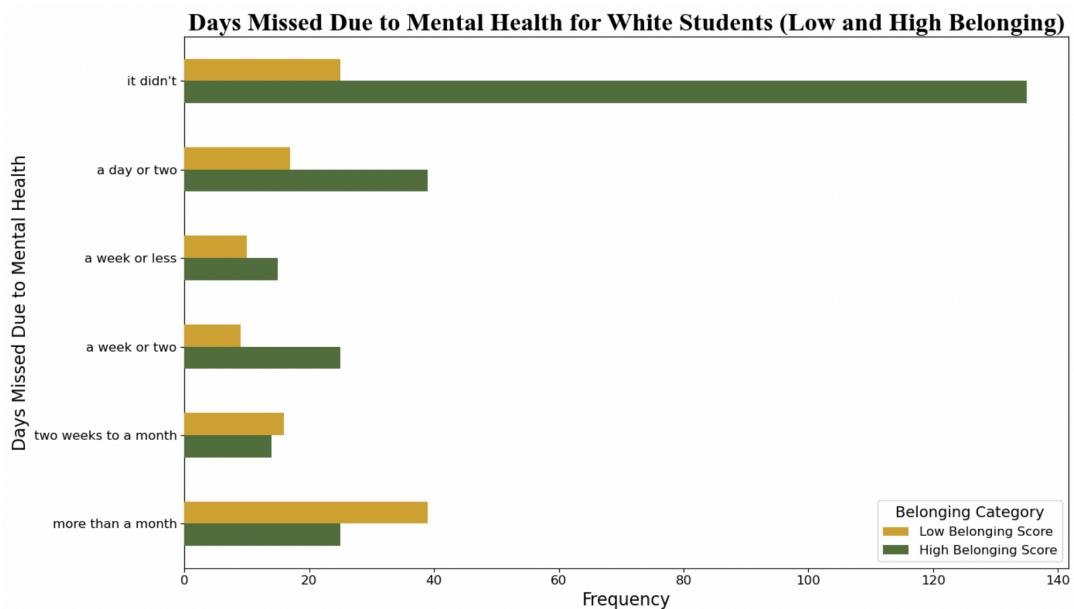
Building on the observed correlation between online time and sense of belonging, an exploration of the specific interests of students who spend more than 9 hours online reveals that music, online gaming, and art are the most prominent interests. This chart illustrates that while these students might experience a slightly lower sense of belonging, they engage significantly in activities that are potentially rich in social interactions, such as online gaming and music. These interests may serve as avenues for these students to connect with others despite their extensive time spent online, suggesting that fostering targeted programs in these areas could help strengthen their sense of community and belonging.



In contrast to students who spend more than 9 hours online, those who limit their online engagement to less than one hour show a distinct set of interests, with sports, animals, and art topping the list. This visualization highlights a notable trend where these students, who report a slightly higher sense of belonging, are more involved in physical and nature-related activities, which are often associated with more direct social interactions and outdoor experiences. Such interests may play a significant role in fostering a strong sense of community and well-being, reinforcing the idea that offline activities can be crucial in building meaningful social connections. Engaging in these activities might also contribute to the higher belonging scores observed in this group, suggesting potential areas for encouraging participation among all students to enhance their sense of belonging and mental health.

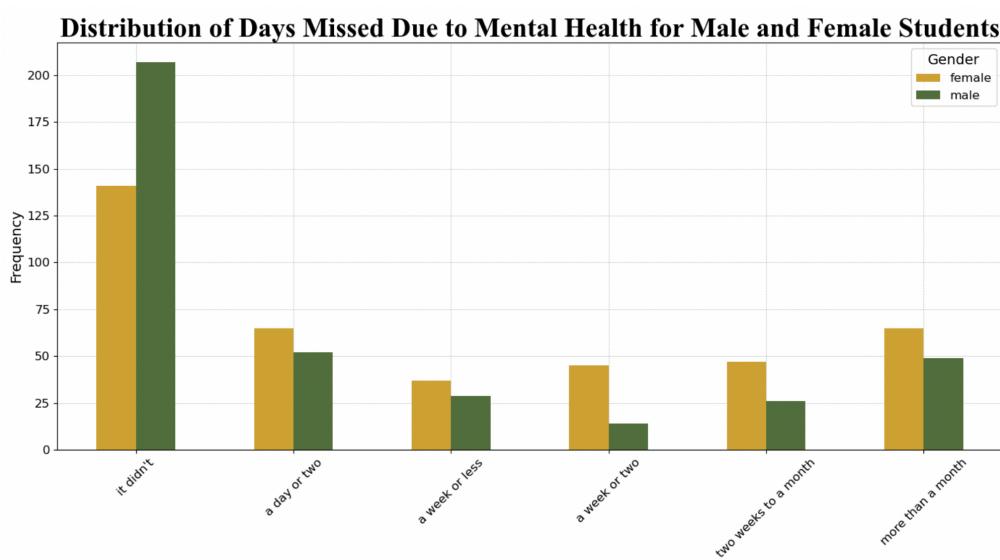


The visualization displays the distribution of days missed due to mental health issues among students, segmented by race. Notably, White students dominate this dataset, representing the largest number of responses across nearly all categories of days missed. However, it's important to highlight that half of the students did not specify their race/ethnicity in the survey, which could influence the interpretation of the data.

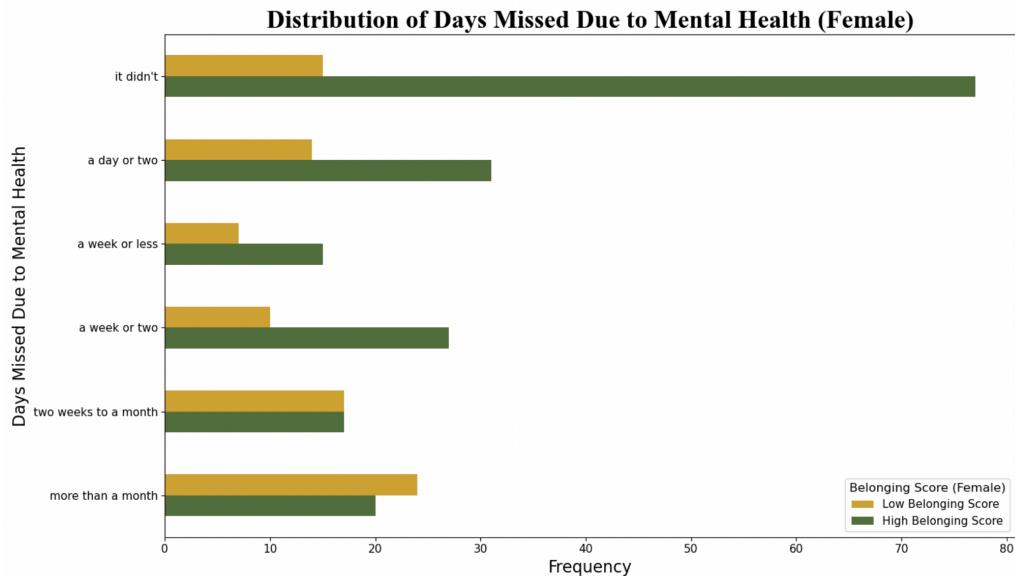


This visualization focuses specifically on White students, comparing the number of days missed due to mental health issues between those with **low belonging scores (0-2.8)** and **high belonging scores (2.9-5)**. These ranges were intentionally defined to make the interpretation more meaningful and straightforward.

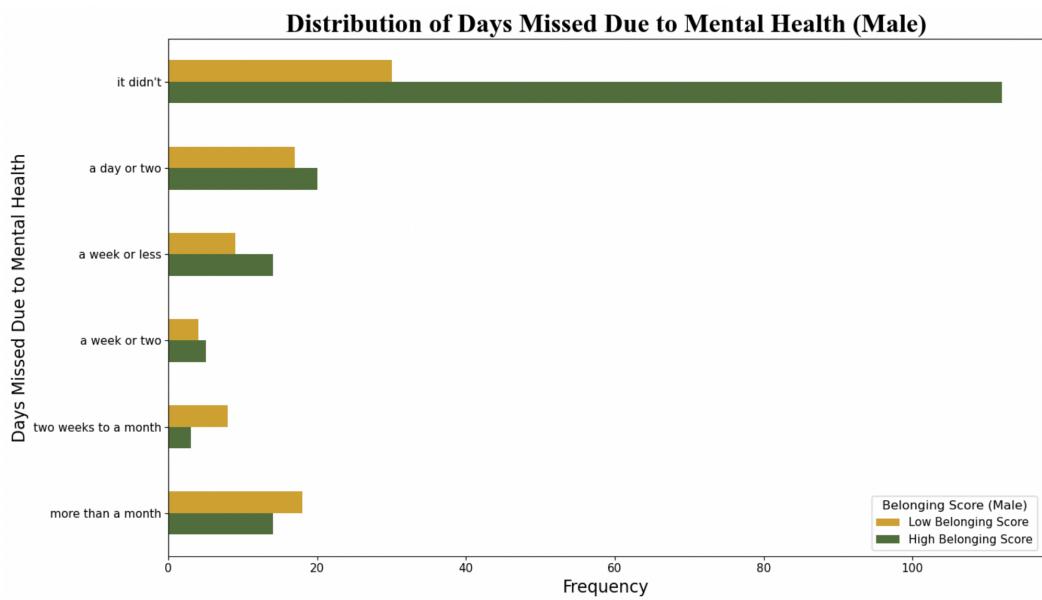
The results show that students with low belonging scores missed more days overall, especially for longer absences like "**more than a month**." On the other hand, students with high belonging scores mostly reported no days missed.



Above visualization compares the days missed due to mental health issues between male and female students. Most students, regardless of **gender**, reported no days missed, but a slightly higher number of male students fall into this category.



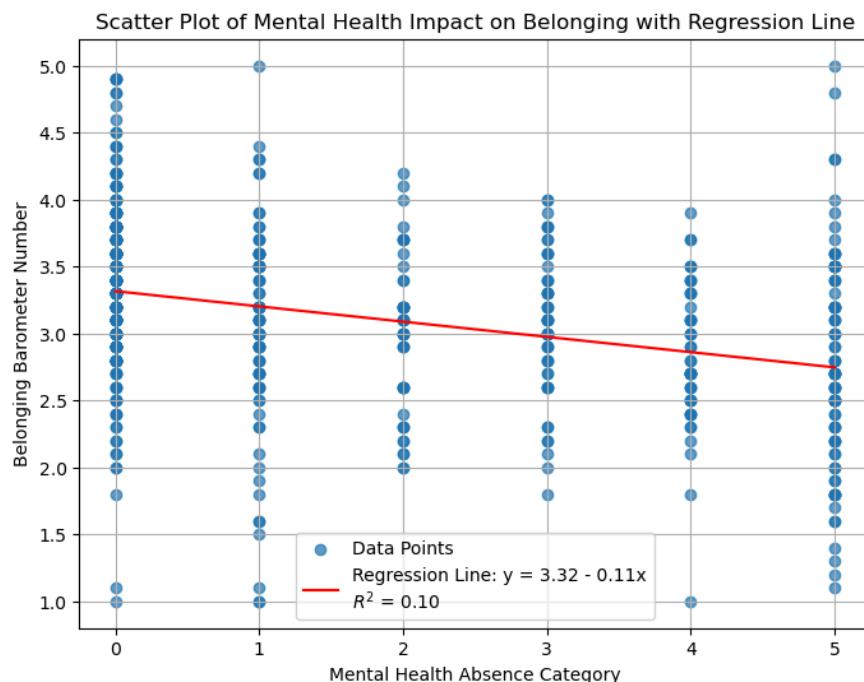
- Female students, comparing the days missed due to mental health issues between those with low belonging scores (0-2.8) and high belonging scores (2.9-5).
- Female students with high belonging scores mostly reported no days missed, showing a strong connection between a higher sense of belonging and fewer mental health-related absences. However, female students with **low belonging scores** are more likely to miss longer periods, especially "**more than a month**."



- Male students, comparing the days missed due to mental health issues between those with low belonging scores (0-2.8) and high belonging scores (2.9-5).
- Similar to the pattern seen with female students, male students with high belonging scores mostly reported no days missed, indicating a strong link between a higher sense of belonging and fewer mental health-related absences. Male students with low belonging scores, however, are more likely to miss longer periods, such as "more than a month." This emphasizes the consistent relationship between a lower sense of belonging and increased absenteeism across both genders.

In summary, the analysis shows a clear relationship between students' sense of belonging and various factors such as online engagement, interests, and mental health-related absenteeism based on demographic features (Gender & Race). Students with higher belonging scores tend to miss fewer days due to mental health issues, regardless of gender or race, while those with lower scores are more likely to experience longer absences. Additionally, excessive online time correlates with slightly lower belonging scores, but interests like music, gaming, and art offer opportunities for connection. These findings highlight the importance of fostering a strong sense of belonging to support students' well-being and engagement.

Mental Health



Correlation = -0.32

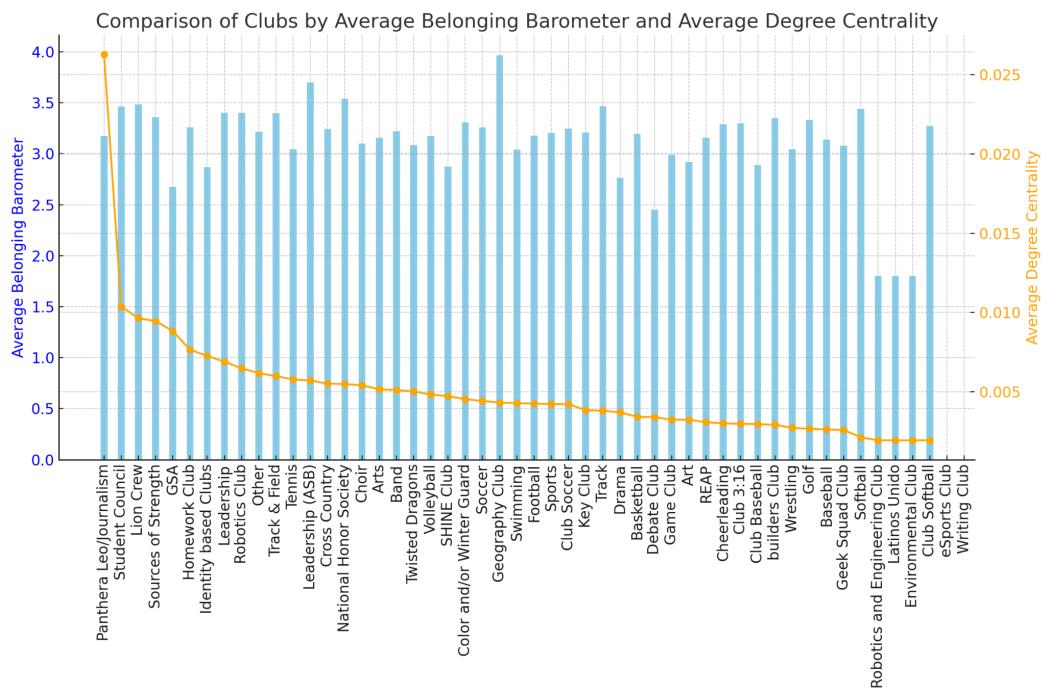
There is a moderate negative correlation between days missed due to mental health and belonging barometer number, but as shown by the scatter plot, there is high variance in belonging barometer score at each level of mental health absence response

Social Network Analysis

Metrics Explained

- Degree centrality : measures how many connections a club may have, regarding their popularity
- Closeness centrality: measures how closely connected a club is to another

Extracurricular activities such as clubs can greatly influence student engagement with the community and help foster their sense of belonging within the school community. By leveraging social network analysis and metrics such as Degree centrality, Closeness Centrality, and Belonging Barometer, we can better understand how clubs facilitate connections and contribute to students' overall satisfaction.

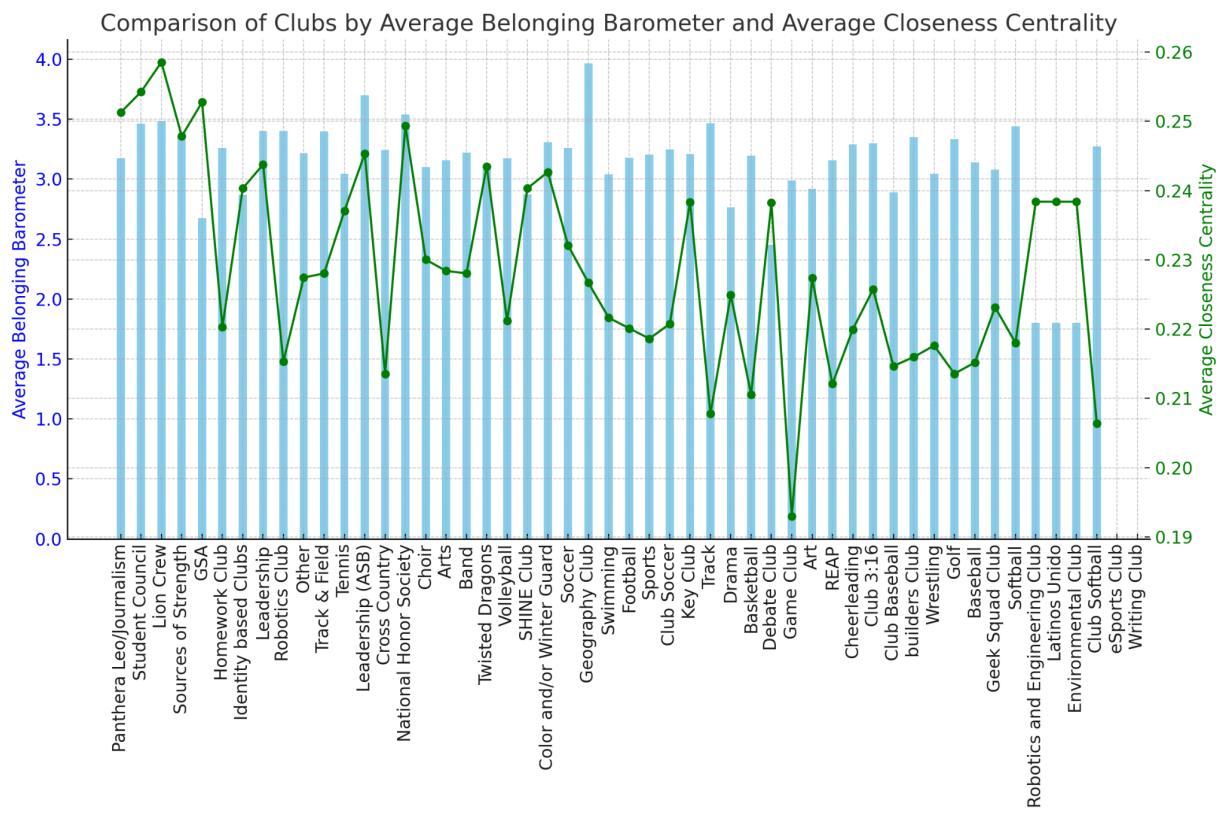


The graph above, “Comparison of Clubs by Average Belonging Barometer and Average Degree Centrality”, compares two key metrics. The bar chart represents the High Centrality in the blue bars, measuring how strongly students feel they belong within a club. Across the chart is a yellow line measuring the degree of centrality for each club, which reflects how much a club is interconnected with the larger student network.

Clubs like Panthera Leo/ Journalism, Student Council, and Sources of Strength score highly on the belonging barometer, indicating they excel at fostering a strong sense of community for their members. In contrast, clubs such as the Environmental Science Club and Writing Club demonstrate a high degree of centrality. This suggests they are highly interconnected with other clubs, acting as bridges that connect students across various groups. The downward slope of the degree centrality line implies that connectivity (degree centrality) and belonging do not always align. While centrality highlights the club's position in the network, the belonging barometer captures the quality of relationships and emotional attachment within

the club. These findings suggest that clubs vary in their roles. Some serve as highly connected hubs that link diverse groups, while others emphasize building close-knit internal communities.

The second visualization, “Comparison of Clubs by Average Belonging Barometer and Average Closeness Centrality”, shifts the focus to Closeness Centrality. The clubs with the highest closeness centrality, such as Leadership (ASB) and National Honor Society, are well positioned within the network. They can connect to other clubs efficiently, serving as central hubs for collaboration and outreach.



Interestingly, clubs like Sources of Strength and Writing Club maintain both high belonging barometer scores and moderate closeness centrality. This indicates their ability to provide a strong internal sense of belonging while remaining accessible to the broader student network.

In contrast, clubs with lower closeness centrality may function as isolated spaces. While these clubs may not serve as central connectors, they can still provide value through focused and specialized communities. The balance between closeness centrality and belonging highlights how clubs can act as “bridges” while maintaining strong internal bonds.

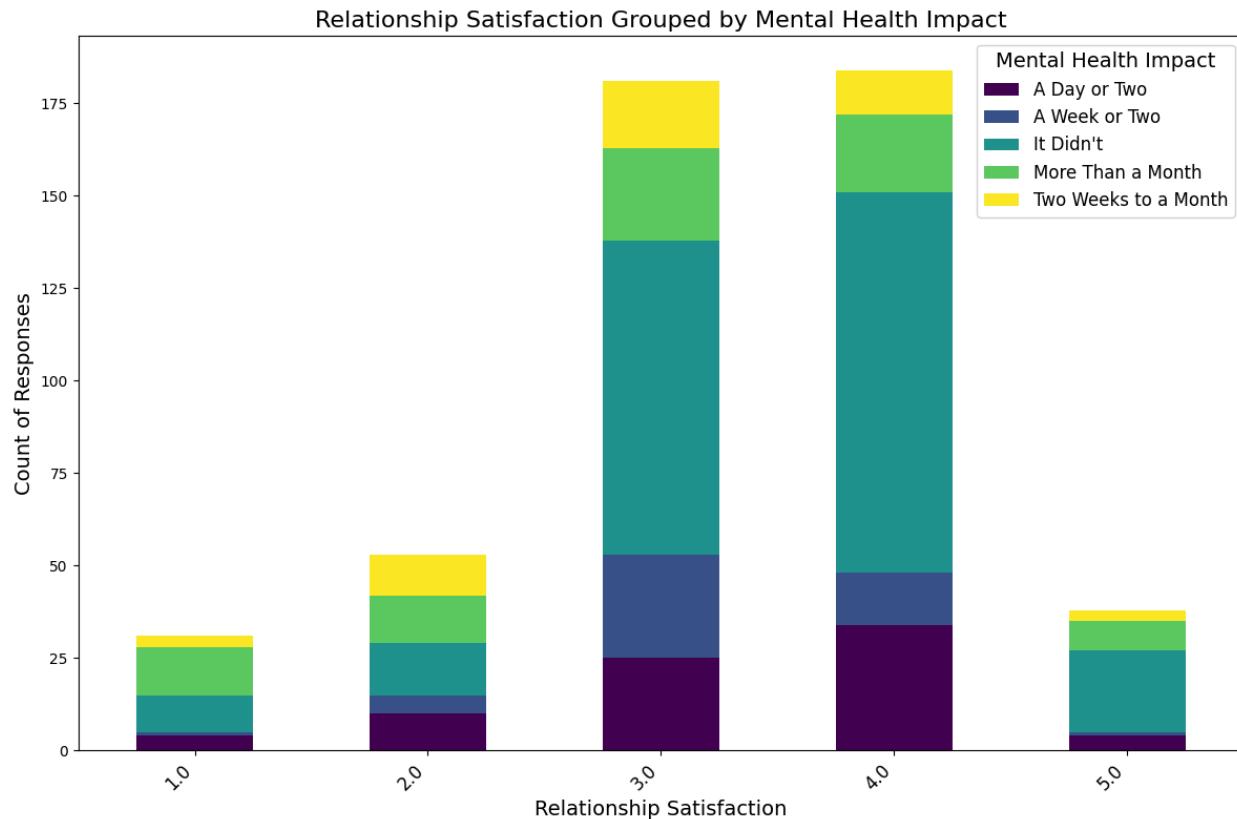
The third visualization, a summary table of club metrics, provides a more granular look at the strength and frequency of relationships within clubs.

Club	Average Weight of Connections	Average Number of Connections per Participant	Average Closeness Centrality
builders Club	5.67	6.00	0.143
Homework Club	6.29	14.00	0.151
Sources of Strength	4.57	11.30	0.152
Lion Crew	3.14	10.88	0.142
Writing Club	1.50	2.00	0.196
Spanish Club	NaN	NaN	0.160
Leadership (ASB)	3.24	14.17	0.152
Student Council	2.99	13.93	0.144
National Honor Society	3.04	9.42	0.147
Leadership	3.84	11.47	0.143

Clubs such as the Homework Club and Builders Club report higher average weights of connections, indicating stronger, more frequent interactions among their members. Average number of connections per participant is highest in clubs like Leadership (ASB) and Student Council, suggesting that these clubs foster larger social networks for their members. Average Closeness Centrality reinforces the role of certain clubs, such as the Writing Club and Spanish Club, as central nodes within the network.

These findings suggest that clubs not only differ in their overall connectivity but also in the depth and frequency of relationships they foster. Clubs with higher weights of connections often serve as spaces for more meaningful and frequent interactions.

The fourth visualization, “Relationship Satisfaction Grouped by Mental Health Impact,” examines the relationship between mental health challenges and students’ satisfaction with their relationships.



The tallest bars correspond to satisfaction scores of 3.0 and 4.0, indicating that most students report moderate to high satisfaction with their relationships. However, the distribution of mental health impact within these bars reveals a clear pattern. Students who reported “It Didn’t” (minimal mental health disruption) are overrepresented in the higher satisfaction categories, while those reporting prolonged disruptions (“More Than a Month”) appear more frequently in lower satisfaction scores. This highlights a potential correlation between mental health struggles and reduced satisfaction, suggesting that students facing mental health challenges may also struggle to form or maintain satisfying relationships within their school community.

Clubs, therefore, play a critical role in providing safe and supportive spaces where students can build meaningful connections that may mitigate the negative impacts of mental health challenges.

These visualizations demonstrate that clubs contribute to a sense of belonging through two distinct. Connectivity in terms of clubs with high degree centrality or act as bridges within the student network, connecting diverse groups and fostering collaboration. As well as, community dynamics where clubs with high belonging barometer scores provide strong internal support systems, creating environments where students feel valued and connected.

Furthermore, the relationship between mental health and satisfaction underscores the importance of clubs in supporting students' overall well-being. Clubs like Sources of Strength and Student Council, which balance connectivity and belonging, serve as models for fostering inclusive, supportive communities.

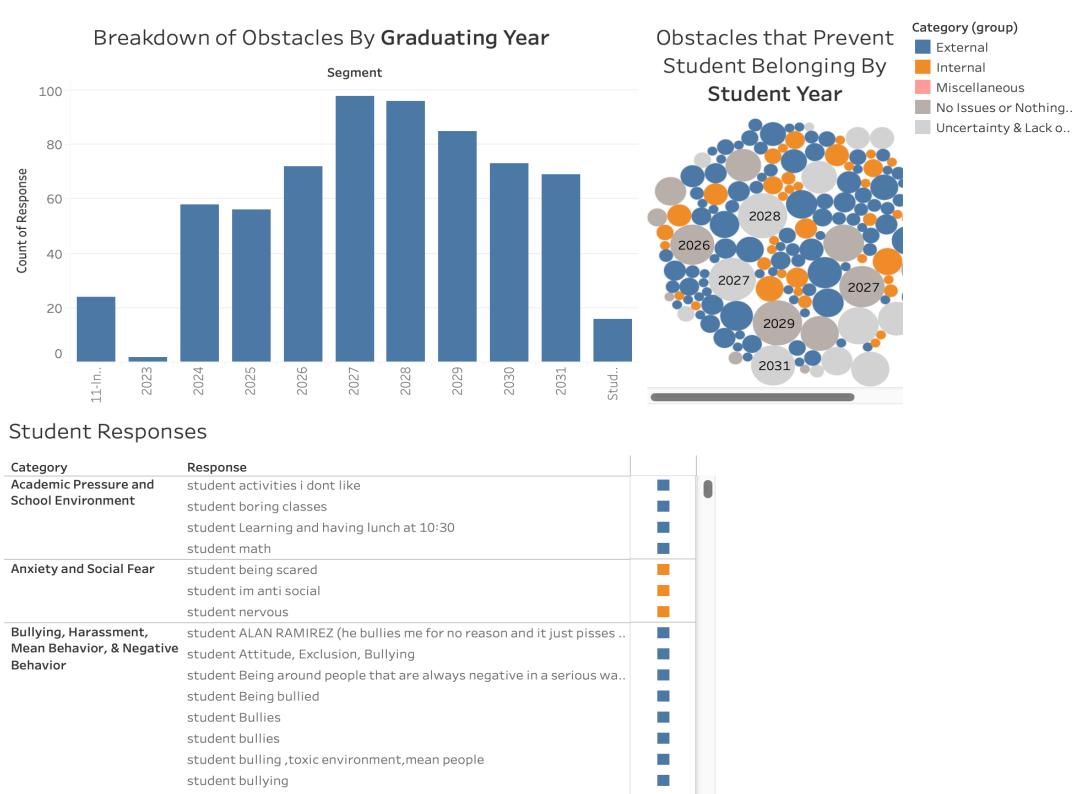
Obstacles that Prevent Student Belonging

Mapped Student Response Subset

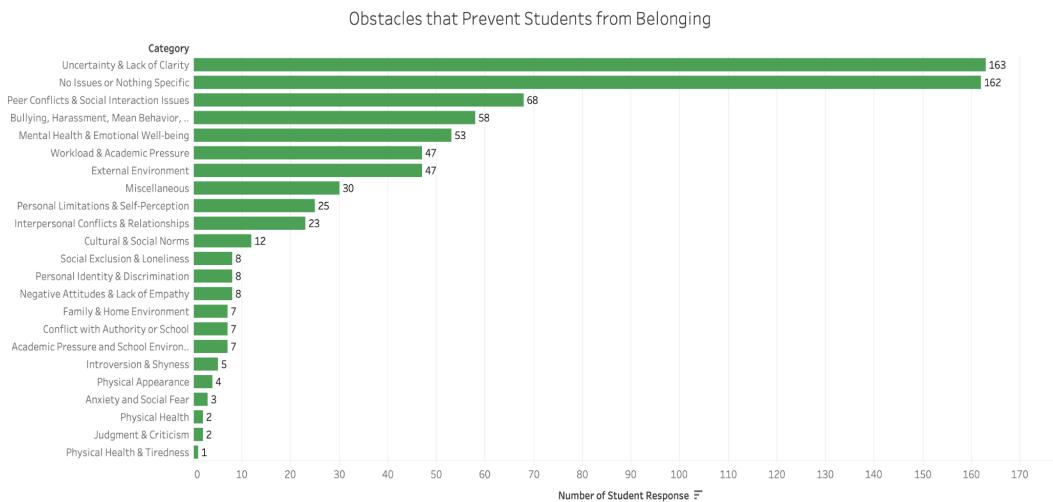
Category	Response
Bullying, Harassment, and Mean Behavior	"People bully and harass me a lot"
Conflict with Authority or School	"Teachers and rules sometimes make me feel restricted"
Family & Home Issues	"I have family issues that cause a lot of stress"
Interpersonal Conflicts & Relationships	"There are conflicts with my friends and trust issues"
Mental Health & Emotional Well-being	"I'm always anxious and struggling with mental health issues"
No Issues or Nothing Specific	"Nothing really bothers me, it's all fine"
Personal Identity & Discrimination	"I face discrimination because of my identity and race"
Social Exclusion & Loneliness	"I feel lonely and left out all the time"
Uncertainty & Lack of Clarity	"I don't know what to do or feel confused"
Workload & Academic Pressure	"There is too much workload and assignments to handle"
Miscellaneous	"jifhf", " " blank, etc

Here's a small subset of student responses, so you can get an idea how student responses were mapped to each category. Miscellaneous category, means that we couldn't parse through student response, either because it was blank, or just didn't make sense. I was able to filter it down to 30 students in the Miscellaneous section.

Interactive dashboard showcasing obstacles that prevent student belonging

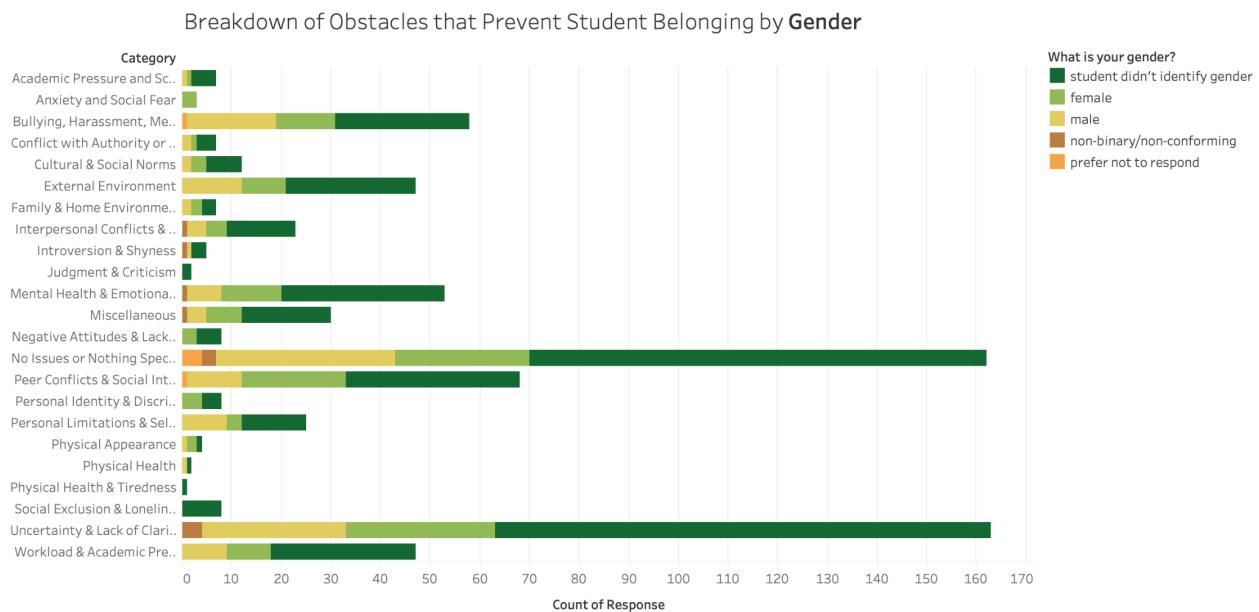


Bar Chart | Key Obstacles Preventing Students From Feeling a sense of Belonging



The chart displays the obstacles that prevent students from feeling a sense of belonging, ranked by the number of student responses. The most significant barriers include "Uncertainty & Lack of Clarity" (163 responses), "No Issues or Nothing Specific" (162 responses), and "Peer Conflicts & Social Interaction Issues"

Stacked Bar Chart | Breakdown of Obstacles Preventing Student Belonging via Gender



Count of Response for each Category. Color shows details about What is your gender? The view is filtered on Category, which excludes Null.

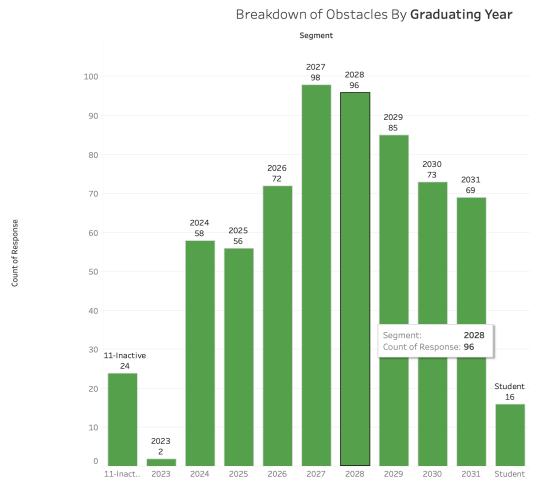
(Analysis on next page)

For this analysis, I wanted to gain a better understanding to see if one gender is more prone to reporting obstacles.

One key detail is that most students didn't identify a gender (dark green).

- **Female Students:** Face significant challenges with **Bullying, Mental Health, and Workload**.
- **Male Students:** Struggle most with **Peer Conflicts and Interpersonal Relationships**, though report fewer issues overall.
- **Non-Binary/Non-Conforming Students:** Experience notable challenges in **Personal Identity & Discrimination and Social Exclusion**.

Breakdown of Student Response by Graduation Year



This bar chart shows you the number of student responses by graduation year.