

The Relationship between Academics, Community, and Depression among College Students*

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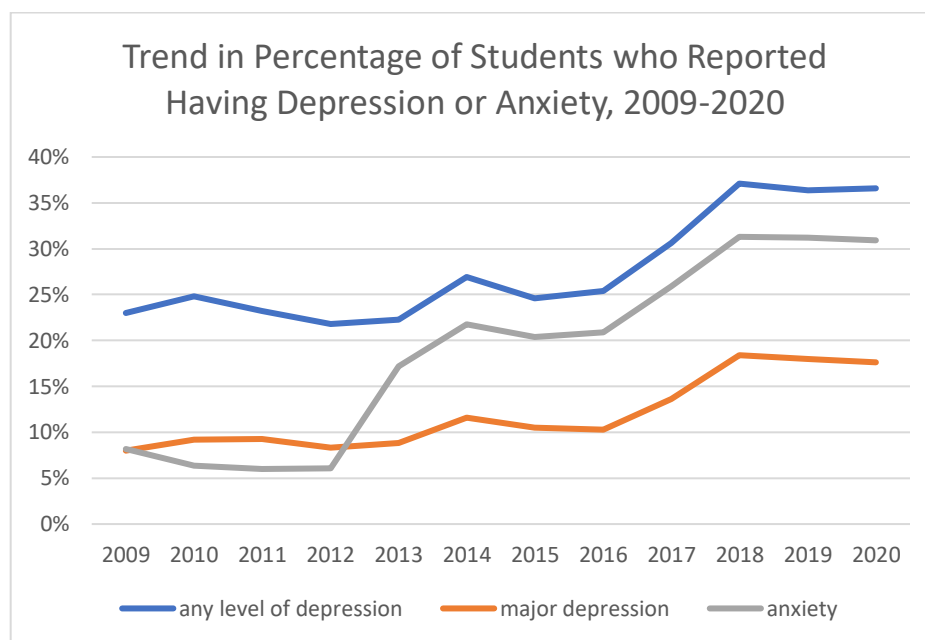
ABSTRACT. Using data from the Healthy Minds Network's 2020 – 2021 national data report, this study examines the effects of the sense of community and academic effort on college students' depression levels through multivariate ordinary least squares (OLS) regression analysis. The results reveal that both academic effort and the sense of community are significant predictors of depression level, with the sense of community showing a stronger and more significant association. Moreover, the findings discover new quantitative evidence for the non-linear relationship between time spent studying and depression level, and the interaction effect of student's years in school over the relationship between sex and depression level.

Keywords: Mental Health, Depression, University Students, Sense of Community, Academic Effort

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College student mental health is a growing concern in the United States, with recent studies indicating that about 48% of young adults showed symptoms for poor mental health (University of California, San Francisco 2022). Similarly, a survey conducted by the Healthy Minds Network (2021) found that more than 60% of college students are struggling with at least one mental health issue such as anxiety and depression in 2021. What is even more alarming is that this concern is ever-growing. The survey shows a consistent increase in the percentage of students reporting mental health concerns over the years.

Figure 1 – Trend in Percentage of Students who Reported Having Depression or Anxiety, 2009 – 2020



In different research on the current mental health crisis, Rakow and Eells (2019) state that, “clearly, students are experiencing increased levels of various mental health concerns,” and that

“the emotional health of incoming freshmen is at the lowest point in at least three decades.” Many other researchers (Abrams 2022; Xiao et al. 2017) have corroborated this claim. They agree that the need for mental health services and the intensity of symptoms have appeared to rise in recent years. Using the data collected by the Healthy Minds Network, the purpose of this study is to examine how and to what extent and sense of belonging/community and academic effort affect students’ depression level.

Academics have long been a hallmark of a quality education, but it has also become a significant contributor to declining mental health among college students. The increasing demands of college coursework, combined with the pressure to achieve high grades and maintain a competitive GPA, have created a stressful and high-pressure environment for many students (Fischman and Gardner 2022). Additionally, the emphasis on grades and test scores over holistic learning and personal growth can take a toll on students' sense of self-worth, leading to feelings of inadequacy and failure.

Yet, many students have been struggling outside of the classroom as well. To fully enjoy their college time, it is important for the students to build a sense of belonging with the larger community of the university. Many researchers have determined that such sense of belonging and community are in fact crucial for students’ mental health (Gopalan and Brady 2020; Hagerty et al. 1992). Sargent et al. (2002) also presented that sense of belonging is able to act as a “buffer” against depressive symptoms, and that it could have potential use as a treatment against depression.

Living in an era of digital technology, the concept of community also covers the visual world. The rise of social media and online teaching platforms are other leading factors that researchers have identified to explain raising mental health issues. Social media platforms often foster comparison, as students are constantly exposed to curated and often idealized versions of

others' lives that can lead to feelings of inadequacy and low self-esteem (Braghieri et al. 2022; Mishna et al. 2018). Moreover, the constant exposure to negative and often triggering content, cyberbullying, and the pressure to present a perfect image can be overwhelming and damaging to one's mental well-being (Haddad et al. 2021).

At the same time, the COVID-19 pandemic has been another frequently proposed cause for mental health issues in the last few years. It affected students' mental health as the sudden shift to remote learning and social isolation has increased stress and anxiety levels for many students (Grubic et al. 2020; Lister et al. 2021; Lischer et al. 2022). In addition, the uncertainty and disruption caused by the pandemic has also led to increased feelings of loneliness and depression among students and has made it more difficult for students to access mental health resources and support (Luchetti et al. 2020; Dahlberg 2021; Kim and Jung 2021). At their cores, the issues with students' social media use and the effects of COVID-19 largely stem from the lack of real, human connection and relationships among students (Mitchinson et al. 2021).

Additionally, many researchers noticed and proposed that female college students are more likely to show signs of mental health issues compared to male students. Due to a combination of biological, psychological, and societal factors, females tend to show higher signs of depression levels, anxiety, and various other mental health related symptoms (Parker and Brotchie 2010; Albert 2015; Piccinelli and Wilkinson 2018). However, Turner and Hurley (2002) suggested that males tend to seek help for mental health issues less frequently than females, not because they have less need for it, but because they are less likely to ask for assistance. This brings light to the claim that maybe the higher level of mental health issues in females stems from the stigma and reluctance to admit these issues that many males struggle with.

METHODS

This study utilized data from the Healthy Minds Survey (HMS)¹ collected by the Healthy Minds Network for their 2020 – 2021 national data report on the mental health and wellbeing of approximately 54,000 college students. The study focuses on undergraduate students that are under 30 years old. All unqualified cases, severe outliers, and missing data in the original data set were filtered out, leaving us with a subset of 14,205 students. Additionally, severe outliers, such as respondents who answered that they worked 200 hours a week, were inspected individually and were excluded on a case-by-case basis if they were considered inaccurate or unrealistic.

The main dependent variable in this study was Student Depression Level, which was calculated using the Patient Health Questionnaire (PHQ-9) - (Kroenke et al. 2001)². In order to predict and find the underlying relationships that lead to changes in Student Depression Level, the main method for analysis was regression models, specifically multi-stage multivariate ordinary least squares (OLS) regression techniques. The independent predictor variables cover three major categories: academic effort, sense of belonging/community, and demographic characteristics (Age, Sex at Birth, Citizenship, Relationship Status).

We measure academic effort through several categories, which include not only the students' efforts in the classroom, including Year in School, Field of Study, and Hours per Week Studying, but also the students' lives outside of the classroom, Hours per Week Working. The previous research shows that higher year in school and STEM fields requires more academic efforts from the students (Appianing and Eck 2018). Part-time jobs tend to compete with academic

¹ The Healthy Minds Network annually administers the Healthy Minds Survey, “a population-level survey of post-secondary student mental health, collecting over half a million responses from students at more than 450 colleges and universities.”

² The PHQ-9 is a nine-item depression scale survey. The PHQ-9's nine items are directly based on the nine major depressive disorder diagnostic criteria in the DSM-IV. See next page for scoring range.

works and adds extra pressure to students (Drăghici and Cazan 2022). Sense of belonging/community is measured using Number of People in Residence, Number of Extracurricular Activities, Sense of Belonging Score, and UCLA Loneliness Test Score. Number of People in Residence and the Number of Extracurricular Activities indicate how involved a student is with the community at their university. The previous research shows that a student that lives alone and participates in fewer activities is more likely to show higher levels of depression (Civitci 2015; Feldman and Matjasko 2005; Glick 1994;). Researchers also find a positive impact of romantic relationships on adolescents' and young adults' mental health (Olson and Crosnoe 2017). Based on these findings, we hypothesize that students who exhibit more academic effort and feel lower levels of belonging and community will show higher levels of depression.

DATA

Univariate Analysis

Table 1 shows the descriptive statistics of all the numerical variables examined in the study (n = 14,205).

Table 1 - Descriptive statistics of numerical variables

	Variable Name	Mean	Std	Min	Max
Dependent Variable					
	Depression Level	18.92	6.83	9	36
Independent Variables					
	Age	20.6	2.2	18	29
	Hours/Week Working	12.51	13.55	0	100
	Number of Extracurricular Activities	1.14	1.33	0	14

Sense of Belonging Score	3.24	1.42	0	6
UCLA Loneliness Test Score	5.78	2.13	0	9

The main dependent variable, Depression Level, has a mean of 18.92, which signifies that on average, the respondents have mild to moderate depression levels, according to the scale provided.

Table 2 – Patient Health Questionnaire (PHQ-9) Depression Test Scoring Scale

Total Score	Depression Severity
9 - 13	Minimal Depression
14 - 18	Mild Depression
19 - 23	Moderate Depression
24 - 28	Moderately Severe Depression
29 - 36	Severe Depression

Respondents work an average of 12.51 hours per week, with 0 hours being the most common (39%) response, signaling that many undergraduate students do not work during the academic year. The students that did work showed extremely varied ranges of work hours, including part-time and full-time employees³, shown through the high value of standard deviation. 15% of respondents were full-time working students who worked 30 or more hours per week. Number of Extracurricular Activities has a mean of 1.14 activities, which is less varied than expected as many students showed that they participated on the fewer side, 42% of students participating in 0 activities.

³ The IRS defines a full-time employee as an employee employed on average at least 30 hours of service per week

The Sense of Belonging Score was found through asking students the question, “How much do you agree with the following statement?: I see myself as a part of the campus community.” The students were given a scale of 1 through 6, 1 being Strongly Agree and 6 being Strongly Disagree, meaning that the mean score of 3.24 shows that on average, students neither strongly feel like they belong, nor strongly feel like they do not belong. For the Loneliness Score variable, the UCLA 3-Item Loneliness Scale⁴ was utilized. The mean score of 5.78 shows that on average, students were very close to the cutoff point of 6, and 58% of students show signs of loneliness.

Table 3 shows the descriptive statistics of all categorical variables examined in the study. There are significantly more females (more than double) than males that responded to the survey. We account for this skewed distribution by performing our analyses with sex at birth as a control variable. For the Citizenship variable, the percentage of international students is 3% which is relatively in line with the percentage of international students enrolled in US colleges which was 4.6% for the 2020-2021 academic year (Institute of International Education 2021). Although the small percentage of international students is not significant itself, additional analyses will be performed with citizenship kept as a control variable. For the Relationship Status variable, rather than looking at marital status, the “Not Single” option includes anyone who considers themselves “in a relationship,” which includes those who are dating, married, engaged, divorced, or widowed. This was done because the focus of the study is on undergraduate college students, for which marital status would not be a significant variable compared to including dating and other casual relationships. The Under vs Upper variable was calculated based on the students’ year in school, where anyone in their first and second years was put into the “Underclassman” category, and anyone who was in their third year or greater was put into the “Upperclassman” category.

⁴ The UCLA 3-Item Loneliness Scale computes a student’s loneliness level through a 3-Item questionnaire. A score of 0 – 5 signals that a student is not lonely, and a score of 6 – 9 signals that the student shows signs of loneliness.

Table 3 – Descriptive statistics of all the categorical variables

Variable	Frequency	Percentage (%)
Sex at Birth		
Female	10485	73.81
Male	3720	26.19

Citizenship			
Domestic	13774	96.97	
International	431	3.03	
Relationship Status			
Single	8105	57.06	
Not Single	6100	42.94	
Under vs Upper			
Underclassman	6674	46.98	
Upperclassman	7531	53.02	
Social Sciences & Humanities vs STEM			
Social Sciences & Humanities	4372	30.78	
STEM	7157	50.38	
Other	2676	18.84	
Time Studying (hours/week)			
0 – 5 hours	3700	26.04	
6 – 10 hours	4113	28.95	
11 – 15 hours	2740	19.29	
16 – 20 hours	1924	13.54	
more than 20 hours	1728	12.16	
Residence Location			
On-Campus	4238	29.83	
Off-Campus	4409	31.04	
Off-Campus with Family	5558	39.13	

To analyze the students' majors, we divided the various majors into two umbrella categories, Social Sciences & Humanities and STEM (Science, Technology, Engineering, and Mathematics)⁵. In the Social Sciences & Humanities category, we included the respondents that

⁵ The America COMPETES Act of 2010 (P.L. 111-358) defines the term STEM as “the academic and professional disciplines of science, technology, engineering, and mathematics.”

selected the majors, Humanities (history, languages, philosophy, etc.), Social Sciences (economics, psychology, etc.), and Art and Design. In the STEM category, we included the respondents that selected the majors, Natural Sciences or Mathematics, Business, Engineering, Nursing, and Public Health. The Other category includes the respondents that selected other majors such as Architecture, Education, and Music.

Residence Location was recoded into three categories “On-Campus”, “Off-Campus”, and “Off-campus” with Family. The category of “On-Campus” is the combination of the respondents that selected that they were currently living in a Residence Hall, On-Campus Apartment, and Fraternity or Sorority House. The category “Off-Campus” includes the respondents that selected Non-University Housing and Co-operative Housing.

Bivariate Analysis

As noticed in the literature, Sense of Belonging Score and Loneliness have the strongest correlation with Depression Level, with correlation coefficients of 0.31 and 0.47 respectfully. This shows that the extent to which students are integrated with and belong within the communities that shape their social lives are significant predictors of Depression Level. In addition, the correlation coefficient between Sense of Belonging and Loneliness of 0.25 shows moderate correlation to ensure the accuracy of the surveys independently. The correlation between Sex at Birth (0 = Female, 1 = Male) and Depression Level is negative, reinforcing previous research that states that females are more likely to be diagnosed with depression.

Our hypothesis that more academic effort leads to higher depression levels is not clearly supported or opposed. The correlation between Time Spent Studying and Depression Level was close to 0, and the other factors, Time Spent Working and Field of Study showed weak correlations. The Time Spent Working shows a negative correlation, which is in line with our initial hypothesis,

yet the correlation between Depression Level and Hum vs. Stem is interesting. The negative correlation signifies that students studying the Social Sciences & Humanities show higher levels of depression, which differs from our hypothesis that STEM majors would show higher depression levels.

With regards to the correlation between Depression Level and Sense of Belonging/Community, our hypothesis is supported, Sense of Belonging Score and Loneliness having moderate, positive correlations with Depression Level. The other factors that break down Sense of Belonging/Community did not individually show significant correlations with Depression Levels, except for Relationship Status and Number of Activities, which agrees with previous literature.

Table 4 – Bivariate Correlation Matrix of All Variables

	Age	Sex	Relationship	Work	Under vs Upper	Hum vs STEM
Age	1					
Sex at Birth	0.05*	1				
Relationship Status	0.15*	-0.09*	1			
Hours/Week Working	0.25*	-0.06*	0.14*	1		
Under vs Upper	0.51*	0.00	0.09*	0.16*	1	
Social Sciences & Humanities vs STEM	-0.01	0.14*	0.01	-0.01	-0.04*	1
Time Studying	-0.01	-0.01	0.01	-0.09*	0.03*	0.03*
Number of People in Residence	-0.02*	-0.03*	-0.03*	0.02*	0.05*	0.05*
Number of Extracurricular Activities	-0.09*	-0.02*	-0.05*	-0.09*	0.08*	-0.07*
Sense of Belonging Score	0.12*	0.03*	0.07*	0.11*	0.03*	-0.01
UCLA Loneliness Test Score	-0.03*	-0.06*	-0.13*	0.01	-0.03*	-0.08*
Depression Level	0.02*	-0.11*	0.02*	0.09*	0.00	-0.09*

	Studying	Resid. Num People	Num Activities	Belonging	Loneliness	Depression
...						
Time Studying	1					
Number of People in Residence	-0.02*	1				
Number of Extracurricular Activities	0.14*	-0.05*	1			
Sense of Belonging Score	-0.05*	0.02*	-0.37*	1		
UCLA Loneliness Test Score	0.02*	-0.04*	-0.03*	0.25*	1	
Depression Level	-0.00	-0.01	-0.10*	0.31*	0.47*	1

* Correlation is significant at the .05 level (2-tailed)

FINDINGS

Table 5 – OLS Regression of Academic Effort and Sense of Belonging/Community**Categories on Depression Level**

Independent Variable	Model 1	Model 2	Model 3	Model 4
UCLA Lonliness Scale	1.52*		1.39*	
Residence Type				
on-campus		reference	reference	
off-campus		-0.18	0.11	
off-campus with family		-0.21	-0.14	
Number of People in Residence		-0.1	0.01	
Relationship Status		0	0.87*	
# of Extracurricular Activities		0.10*	-0.03	
Sense of Belonging Score		1.55*	0.97*	
Age				
Sex at Birth				
Citizenship				
Number of Hours per Week Working				0.05*
Year in School (Underclassmen vs Upperclassmen)				-0.26*
Field of Study				-1.28
Time Spent Studying per Week				
0-5				reference
5-10				-0.60*
10-15				-0.31
15-20				0.12
20+				0.63
Cons	10.15	14.16	6.45	19.44
N	14205	14205	14205	11,529
R2	0.22	0.1	0.27	0.02

* $p < .05$

We built 8 models of Ordinary Least Squares (OLS) Regression to find which combination of the independent variables best predicted students' Depression Level. In Model 1, we wanted to look at the binary linear relationship between Loneliness and Depression Level, which agreed with the binary analysis. Both correlations were positive and significant.

Model 2 uses the variables in the Sense of Belonging/Community category of predictor variables. We want to use these qualitative variables in order to have a different measure of Sense of Belonging that encompasses several different factors that, according to the literature, contribute to a student's Sense of Belonging/Community. Of these, Number of Extracurricular Activities, and Sense of Belonging Score were significant. In Model 3 we combined Model 1 and Model 2 in order to compare the variables and their relationships within the Sense of Belonging/Community category. We saw a vastly improved R² value of 0.27. In addition, we saw that the variables Loneliness, Relationship Status, and Sense of Belonging Score were shown as significant, and Number of Extracurricular Activities was no longer significant. Due to this, we decided to select the three variables, Loneliness, Relationship Status, and Sense of Belonging Score to represent the Sense of Belonging/Community category for our future models. In Model 4, we examined the variables in the Academic Effort category. Only the variables Number of Hours per Week Working and Field of Study were found to be significant,. The R² value of Model 4 is extremely low, at 0.02, which signifies that the Academic Effort category alone is not a significant predictor of students' depression levels.

Table 6 – OLS Regression of Categories with Controls and in Combination

Independent Variable	Undergraduate Student Depression Level			
	Model 5	Model 6	Model 7	Model 8
UCLA Loneliness Scale	1.36*		1.35*	1.35*
Relationship Status	0.74*		0.72*	0.72*
Sense of Belonging Score	0.99*		0.96*	0.96*
Age	0.03	0.06	-0.02	-0.02
Sex at Birth	-1.34*	-1.60*	-1.27*	-1.55*
Citizenship	0.22	-0.64	0.23	0.24
Number of Hours per Week Working		0.04*	0.03*	0.03*
Year in School (Underclassmen vs Upperclassmen)		-0.35*	-0.08	-0.21
Field of Study		-1.08*	-0.61*	-0.61*
Time Spent Studying per Week				
0-5		reference	reference	reference
5-10		-0.64*	-0.48*	-0.48*
10-15		-0.36	-0.29	-0.29
15-20		0.07	-0.04	-0.03
20+		0.65*	0.47*	0.48*
Interaction between Year in School and Sex at Birth				0.50*
Cons	6.61	18.74	7.91	8.00
N	14205	11529	11529	11529
R2	0.276	0.03	0.284	0.284

* $p < .05$

For Models 5 and 6, we used the chosen variables from each category and added the background category (Age, Sex at Birth, and Citizenship) as control variables. In both models, Sex at Birth was the only control variable that was found to be significant. In addition, both models showed slightly increased R2 values, yet the increases were not large in value (0.27 to 0.276 and 0.02 to 0.03 respectively). Given the large difference in R2 values in Models 5 and 6, the Sense

of Belonging/Community category is a better predictor for students' Depression Level compared to Academic Effort.

Model 7 combined all the variables that we identified in the previous models for each category as well as all of the control variables. All variables that were previously significant remained significant, except for year in school, and the R^2 value increased to 0.283. Finally in Model 8 we considered the interaction effect between year in school and sex at birth. The interaction effect was shown to be significant, and explains an underlying relationship between sex and year in school – when consider students' sex and years of school together male upperclassmen students tend to have higher levels of depression.

DISCUSSION

Our findings indicate that both sense of community and academic effort are significantly related to depression level, providing support for our initial hypothesis. In our study though, we found that sense of community was a much stronger, and more reliable predictor of depression level compared to academic effort. Specifically, the regression model that shows the relationship between sense of community and depression level has a much higher R^2 value, 0.27, compared to the R^2 value, 0.02, of the regression model that shows the relationship between academic effort and depression level. In addition, we found that the three variables, UCLA Loneliness Scale, Relationship Status, and Sense of Belonging Score account for most of the explanatory power of the relationship between sense of community and depression level. This indicates that the UCLA Loneliness Scale is a valuable indicator for student's loneliness and sense of belonging. It can also be used as valuable tool for future research on students' level of depression. This finding underscores the importance of social support and connectedness for mental health and well-being

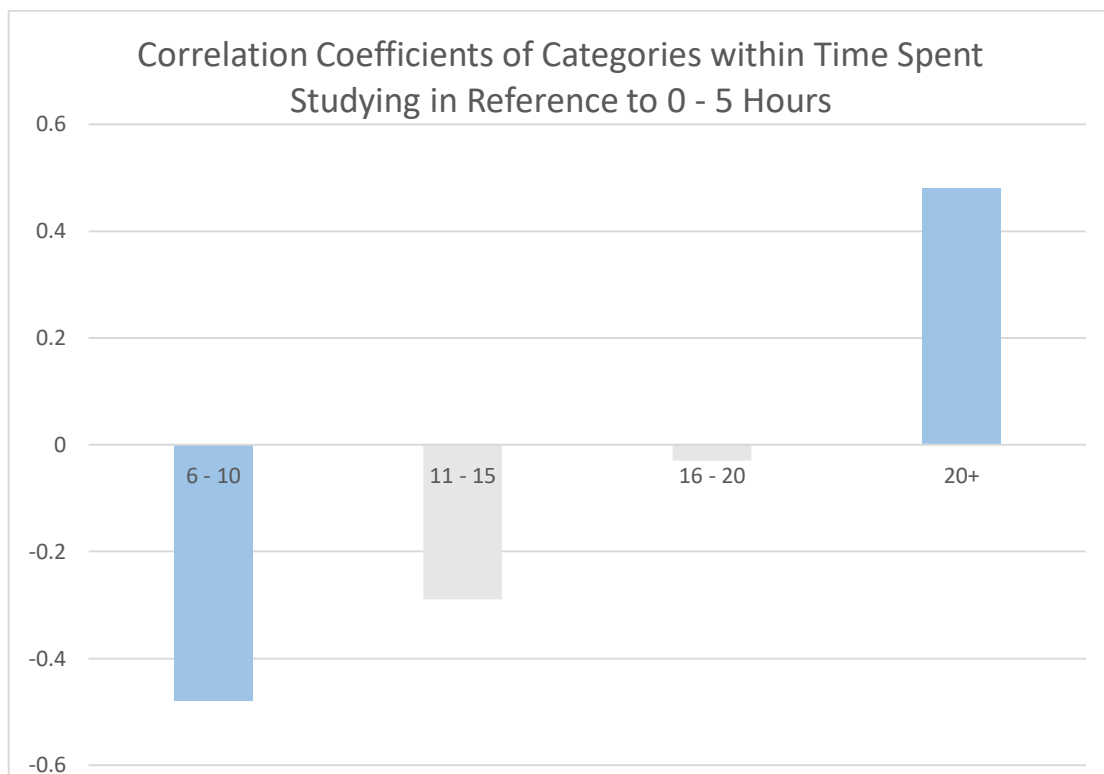
and suggests that creating a sense of community among students may be a particularly effective strategy for promoting positive mental health outcomes. While academic effort was still found to be significantly related to depression level, the fact that sense of community was a stronger predictor highlights the need for academic institutions to prioritize not only academic achievement, but also social connectedness and community-building efforts in their support services and interventions for students.

Another interesting finding is that students' time spent studying had varying effects rather than a linear correlation. Specifically, we found that students who studied less than 5 hours a week had higher levels of depression compared to students who studied a median amount of 6 – 10 hours. As the number of hours spent on study per week increases from 10 hours, the level of depression also increases. On the other end of the spectrum, students who studied more than 20 hours a week had higher levels of depression than those who studied less than 5 hours. This finding consistent with previous research that has highlighted the negative effects of academic overcommitment on mental health outcomes. It also indicates that some level of academic engagement may be protective against depression. One possible explanation for these findings is that a moderate amount of academic engagement may provide a sense of structure and purpose, which can be beneficial for mental health. In contrast, insufficient or excessive academic engagement may lead to feelings of inadequacy, overwhelm, and burnout, which can contribute to negative emotions, such as depression (Rieger et al. 2022).

Lastly, our findings suggest that the relationship between sex, school year, and depression levels shows an significant interaction effect. While our initial analysis indicated that female students were more likely to have higher depression levels than male students, our subsequent analysis revealed that this relationship was moderated by school year. Specifically, we found that

male students in higher school years were more likely to be depressed than female students in the same school years. This finding suggests that the effect of sex on depression levels may be influenced by other factors, such as academic demands or social pressures, that vary across different school years.

Figure 2 – Correlation Coefficients of Categories within Time Spent Studying in Reference to 0 - 5 Hours



*The blue color indicates that the correlation coefficient is significant at the 0.05 level.

CONCLUSION

In this study, we have provided important insights into the complex relationships between academic effort, sense of community, sex, years of school, and depression levels among college and university students. Our findings suggest that sense of community and academic effort are important factors to consider when examining depression levels among students.

While our study provides a valuable contribution to the literature on student mental health, there are several limitations and areas that require further investigation. For instance, the study is based on self-reported data, and is limited to a particular population of university students who were voluntarily surveyed. Additionally, the study does not consider other potentially relevant variables, such as family or personal history of mental health conditions or socioeconomic factors. Future research could examine the extent to which these other factors, including social support, family dynamics, and financial stress, may influence depression levels among students. In addition, more research is needed to better understand the underreporting of mental health concerns among male students, and to develop effective strategies for reaching out to this group. Furthermore, our study suggests that different approaches may be needed to support the mental health and well-being of students at different stages of their academic careers. Future research could explore the effectiveness of targeted interventions aimed at promoting mental health and well-being among students at different years of school, taking into account the unique challenges and stressors that students face at each stage.

In conclusion, our study highlights the need for a more nuanced and context-specific approach to studying the complex relationships between academic effort, sense of community, sex, years of school, and depression levels among college and university students. By continuing to investigate these relationships and developing targeted interventions, we may be better able to

support the mental health and well-being of students, ultimately improving their academic and personal outcomes.

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